COUNCIL OF THE EUROPEAN UNION

Brussels, 23 January 2014

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COVER NOTE

from:	Secretary-General of the European Commission, signed by Mr Jordi AYET PUIGARNAU, Director
date of receipt:	23 January 2014
to:	Mr Uwe CORSEPIUS, Secretary-General of the Council of the European Union
No Cion doc.:	SWD(2014) 20 final Part 2/4
Subject:	Commission Staff Working Document Energy prices and costs report *Accompanying the document* Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions - Energy prices and costs in Europe

Delegations will find attached Commission document SWD(2014) 20 final Part 2/4.

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Encl.: SWD(2014) 20 final Part 2/4

EUROPEAN
COMMISSION

Brussels, 22.1.2014
SWD(2014) 20 final

PART 2/4

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

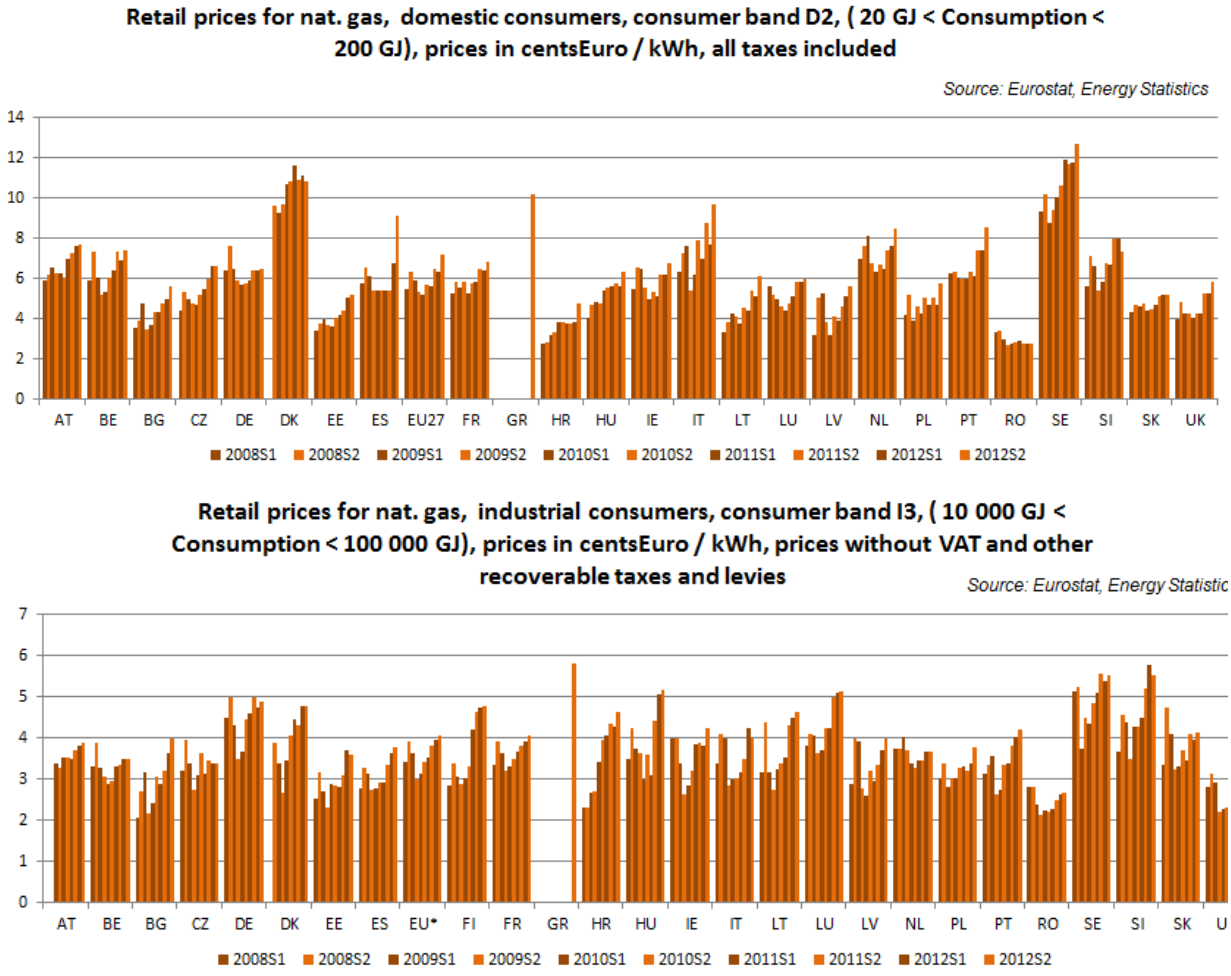
{COM(2014) 21 final}
{SWD(2014) 19 final}

1.2. Developments in the retail markets for natural gas

Retail natural gas prices expressed in Euros

From 2008 until 2012, natural gas prices for household consumers increased in every country of the EU except for Germany and Romania. **Europe's gas prices have risen by more than 3% a year between 2008 and 2012**[1]. Bulgaria, Estonia and Spain registered annual price increases close to 10% and growth rates in Lithuania and Croatia were even higher, reaching more than 12% and 14% respectively.

Figure 1. Evolution of retail prices, natural gas, domestic and industrial consumers, centsEuro / kWh



During the observed period, industrial prices for natural gas (excluding VAT and other recoverable taxes and levies) were much more stable, with an average annual increase for the EU being less than 1%. In most Member States a similar trend was observed: prices would decrease in 2008 – 2009 and then they would pick up. Yet, the growth rates varied wildly across Member States.

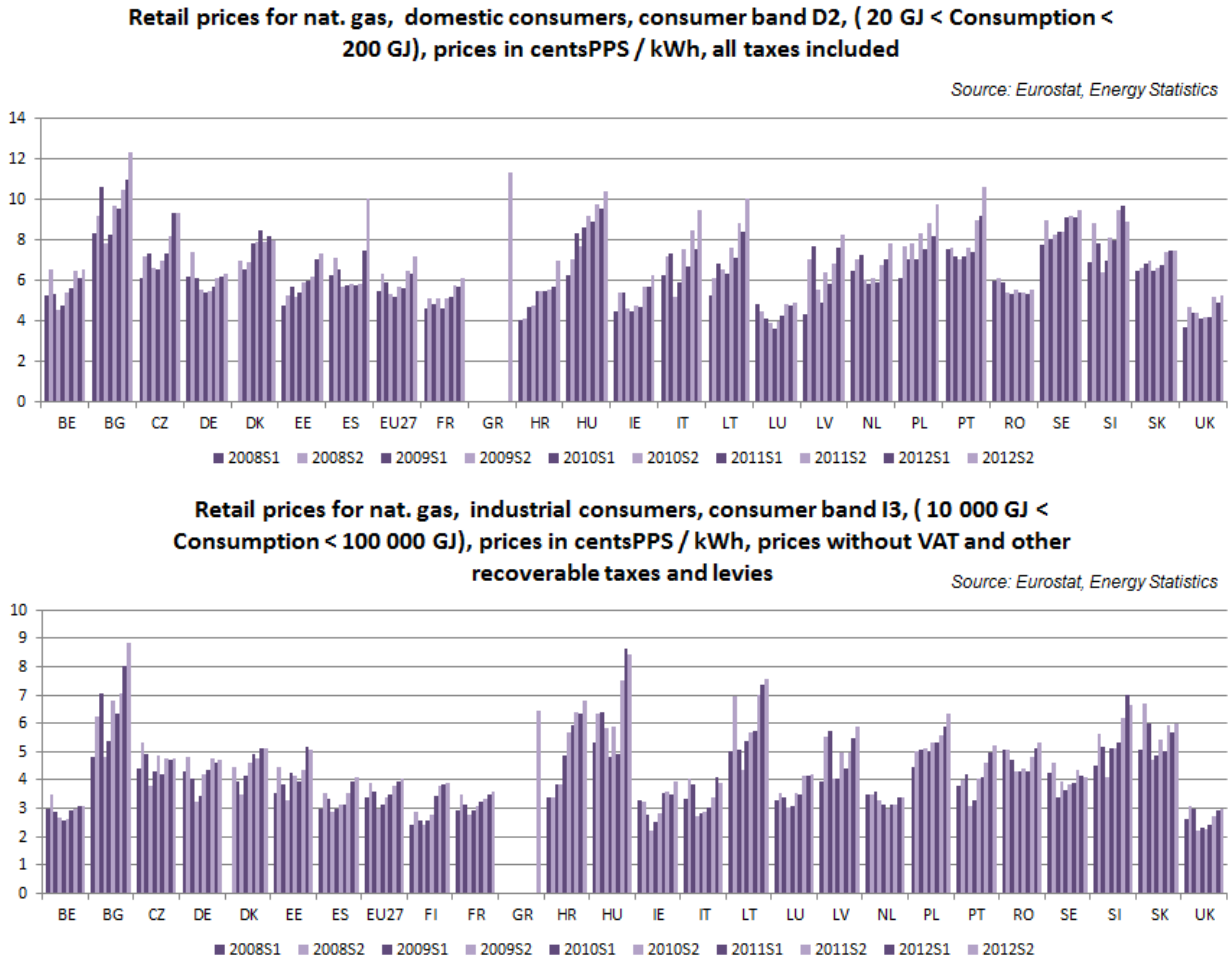
[1] Median household consumer band D2 with annual consumption between 5.56 and 55.56 MWh per year. Prices measured in cents EUR / kWh.

Over the whole period, natural gas prices (measured in Euro) fell for industrial consumers in Belgium, the Czech republic, Germany, Italy, the Netherlands, Romania and Slovakia whereas double digit annual growth rates were registered in Bulgaria and Croatia, even though from a relatively low basis.

Retail natural gas prices expressed in purchasing power standards

When the monetary measure is switched to purchasing power standards (PPS), the ranking of Member States is changed with countries from the Eastern part of the continent moving up in the ranking of countries with the highest prices. 7 out of the 10 Member States with the highest household prices are such countries with the average consumers from Bulgaria paying the highest price for natural gas.

Figure 2. Evolution of retail prices, natural gas, industrial consumers, cents PPS / kWh



The same observation applies for industrial consumers: the top 10 PPS rates are all paid by countries from the East. In the second half of 2012 industrial consumers from Hungary, Lithuania, Croatia, Slovenia, Greece, Poland, Slovakia, Latvia and Romania were paying on average higher gas prices than the countries from North West Europe; in Bulgaria industrial consumers were actually paying three times as much as in the UK.

These developments have clear negative implications for the competitiveness of the economies of the new Member States and point to the potential savings for final consumers if grids are integrated and the competitive play of supply and demand is allow to set the prices.

Comparing natural gas price changes to inflation levels

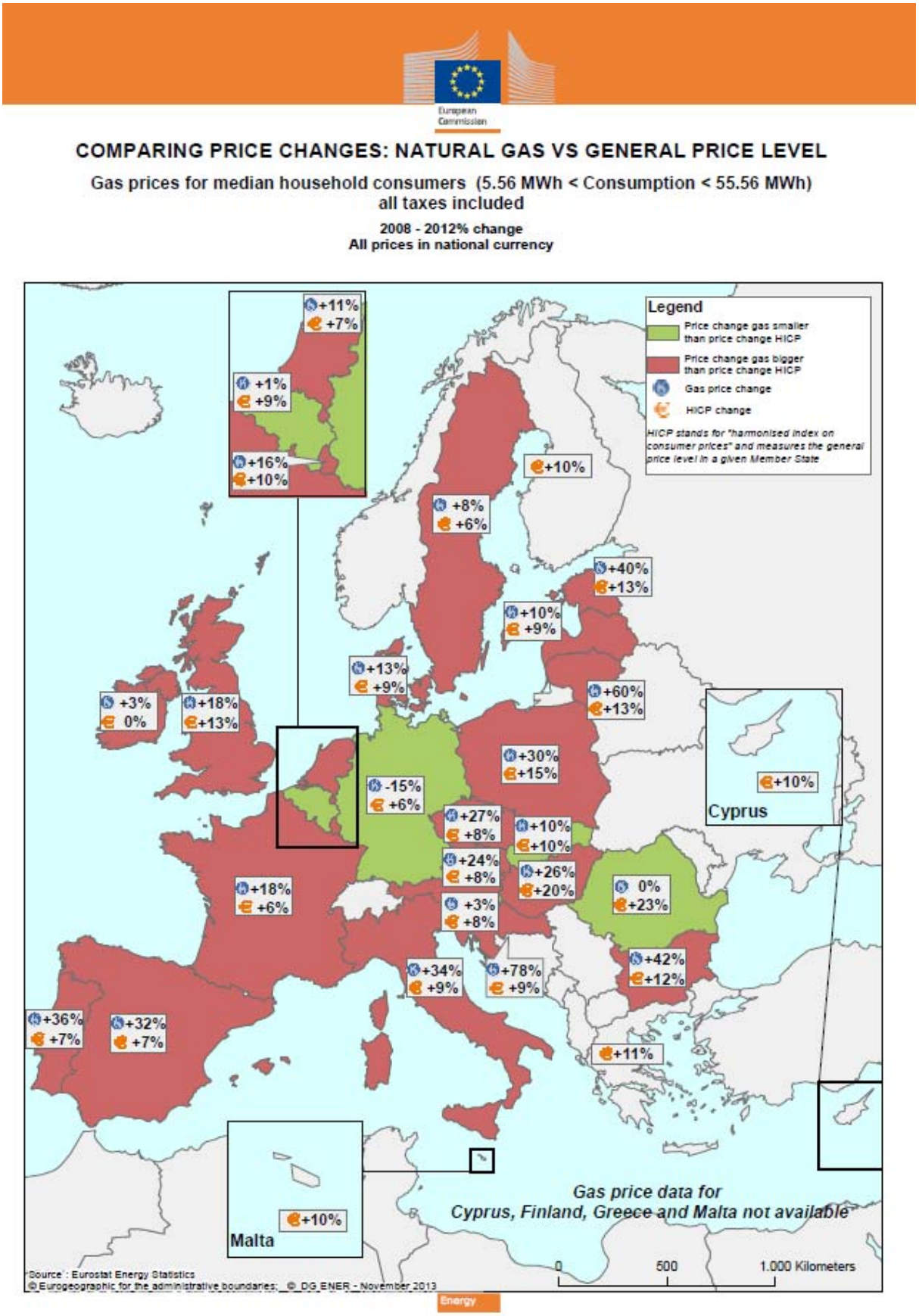
As shown on Map 1, during the observed period the increase of median household consumer prices for natural gas outpaced the increase of the general price level[2], as measured by the harmonized index of consumer prices (HICP). Belgium, Germany, Romania, Slovenia and Slovenia were the exception to that rule.

The actual changes of natural gas and general price levels in 2008 – 2012 were quite unique for each Member State and the map colours illustrate only the relative position of those changes. Natural gas prices, measured in national currencies, all taxes included, increased by more than 30% from 2008 to 2012 in Bulgaria, Estonia, Spain, Italy, Hungary and Portugal. In Lithuania and Croatia gas prices rose by 60% and 70% respectively. For the same period, inflation levels increased by more than 10% in Bulgaria, Estonia, Greece, Cyprus, Lithuania, Luxembourg, Hungary, Malta, Poland, Romania, Slovakia, Finland and the UK.

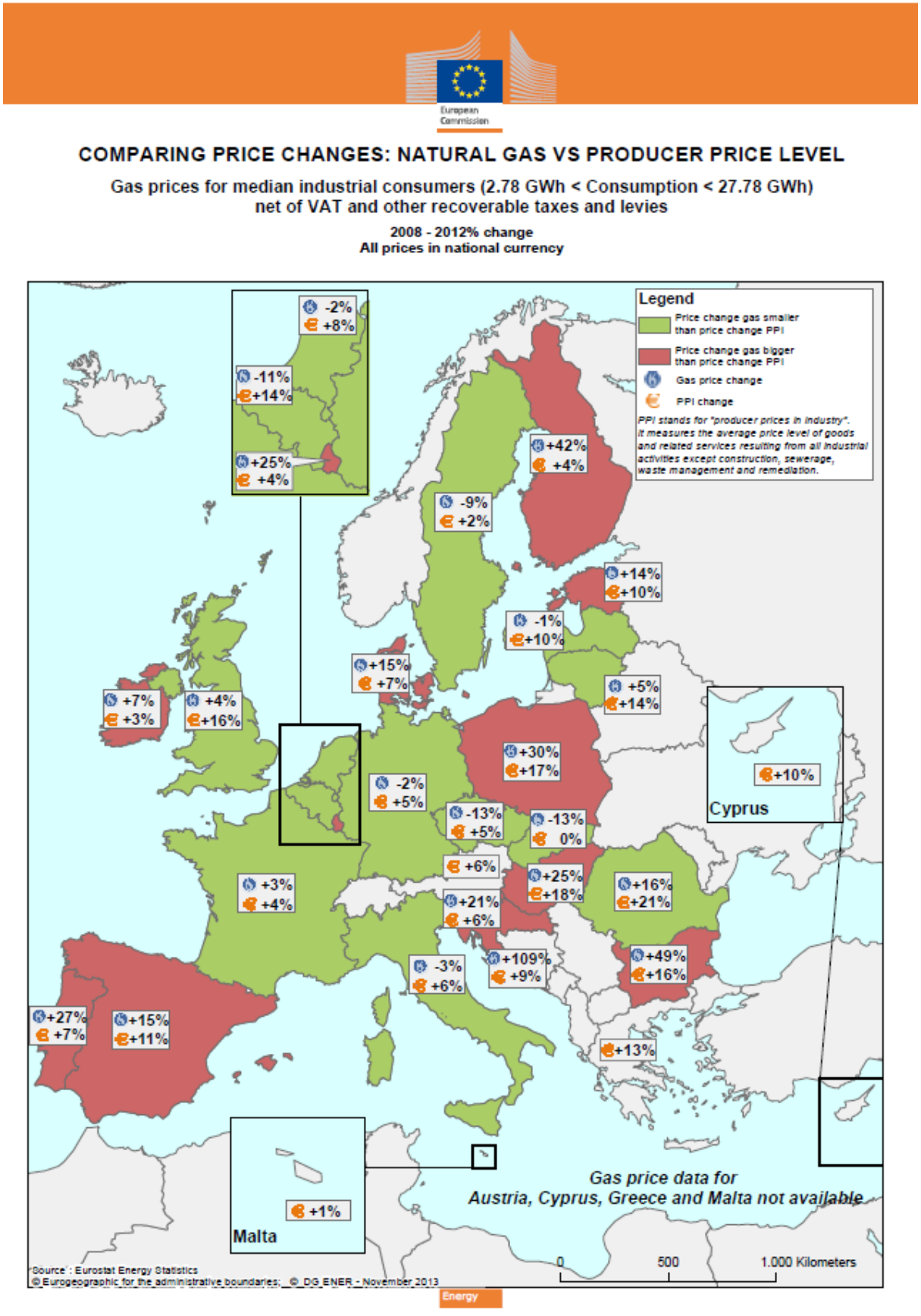
In the case of industrial consumers (**Map 2**), the situation was quite different. For the majority of Member States the price rise for gas was below the industrial price levels, as measured by the producer price index. The levels of producer price indices (PPI) and gas prices (excluding VAT and other recoverable taxes and levies) were specific for each Member State. Gas price changes varied in a broad range from a 10 – 15 % decrease (Belgium, Czech republic, Slovakia) to increases of up to 50% (Finland, Bulgaria) with an outlier of 100% (Croatia).

[2] 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.

Map 1 Household gas prices vs. inflation (HICP)



Map 2 Industrial gas prices vs. inflation (PPI)



Comparing natural gas price changes to exchange rate variations

The exchange rate variations played similar effects to the ones observed in retail prices for electricity. From 2008 to 2012 the Romanian Lei depreciated by a fifth of its value (21%) with respect to the Euro and the natural gas price for households was kept stable in national currency; as a result, it appeared that prices measured in Euro decreased by 18%.

Polish and Hungarian currencies depreciated by 19% and 15% respectively in 2008 – 2012. Natural gas price increases in natural currencies were then stronger than those observed in Euro (12% and 36%).

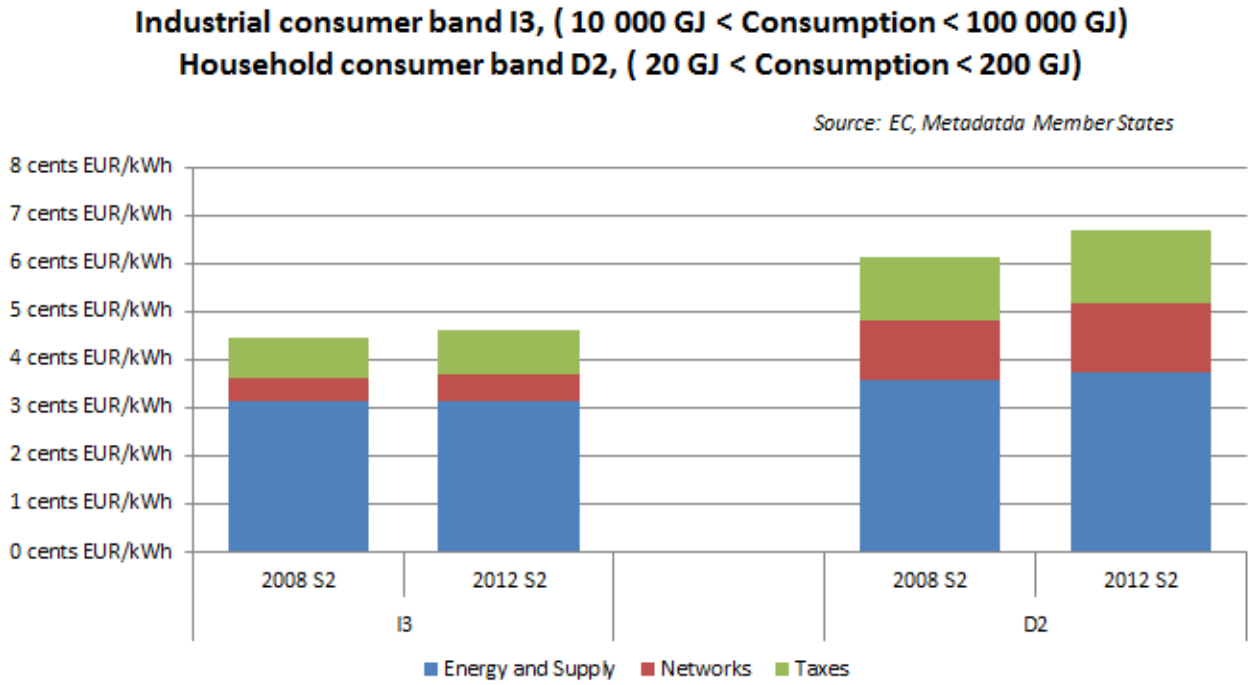
Swedish natural gas prices increased by 25 % in 5 years when measured in Euro; their rise was more gradual if measured in Swedish Kroners. The 9% appreciation of the national currency made the price rise appear bigger in Euros, with negative implications for the energy intensive export oriented companies.

1.2.1. Natural gas price developments by components

Components at the EU level

The next chart illustrates the evolution of the average EU retail prices for natural gas for industrial and household consumers weighted by the respective share of each Member State in both consumption categories.

Figure 3 Evolution of EU retail price for natural gas (wtd avg) by components: levels, selected household and industrial bands)



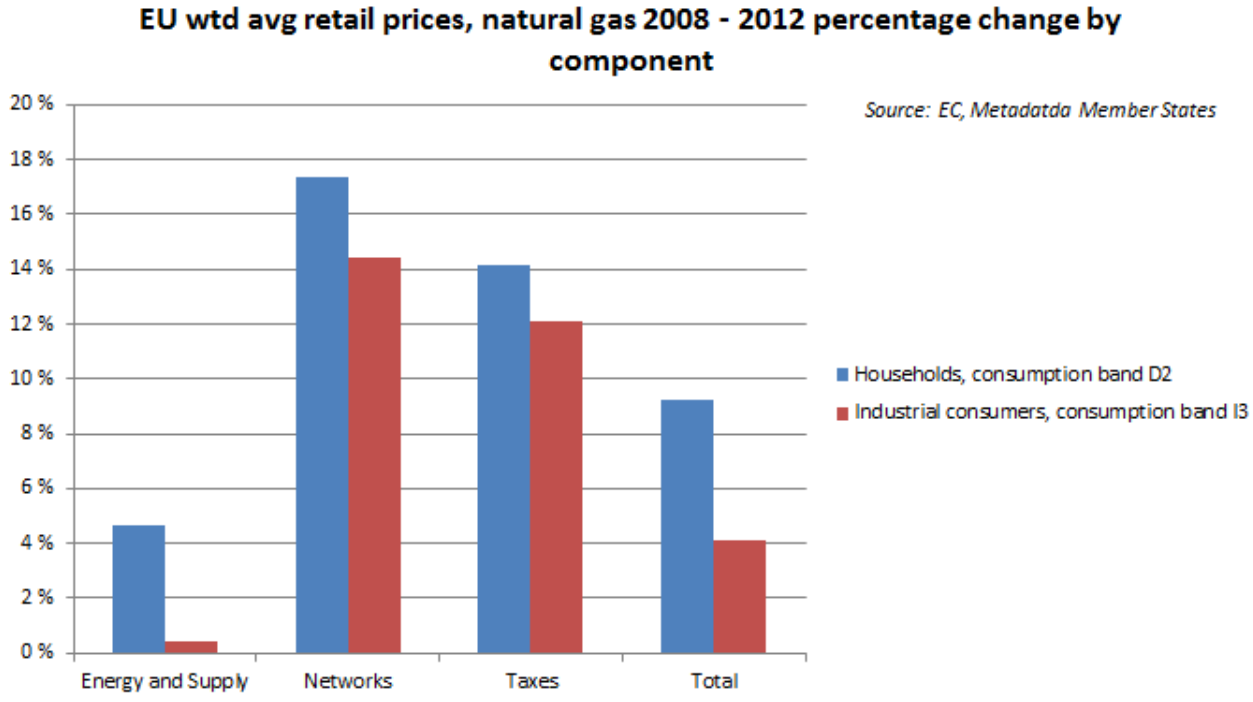
The data collected from Member States[3] indicates that, on EU level, **the average gas bill for the median industrial consumers remained stable around 4.5 cents EUR / kWh during the period** covering 2008 – 2012. The energy component accounted for 3 cents EUR per kWh in 2008 and in 2012 but its relative share registered a slight decrease (from 70% to 68%) as the network and taxation elements increased marginally to 11% and 18% respectively.

The **average EU retail gas price for household consumers followed similar developments, gaining half a cent EUR in 5 years and reaching close to 7 cents EUR per kWh**. All components increased by a small margin but the relative share of energy went from 59% to 56% as the network and taxation elements grew faster, levelling at 21% and 23% in 2012.

The next chart illustrates that these developments contrasted sharply with the ones observed for the electricity bill. The component growth of the different elements of the gas bill was much more homogenous and not a single element grew by more than 20%.

As shown in the figure below, only the energy component of the electricity bill registered moderate increases on a similar scale to the one observed for all elements of the natural gas bill.

Figure 4. EU28 weighted average retail prices for natural gas, 2008-2012 percentage change by component



Looking into the evolution of the average EU gas bills through 2008 - 2012, it appears that household consumers witnessed bigger increases for all components. As a result, the total bill increased by 9% for households as opposed to just 4 % for industrial consumers. 4 of these

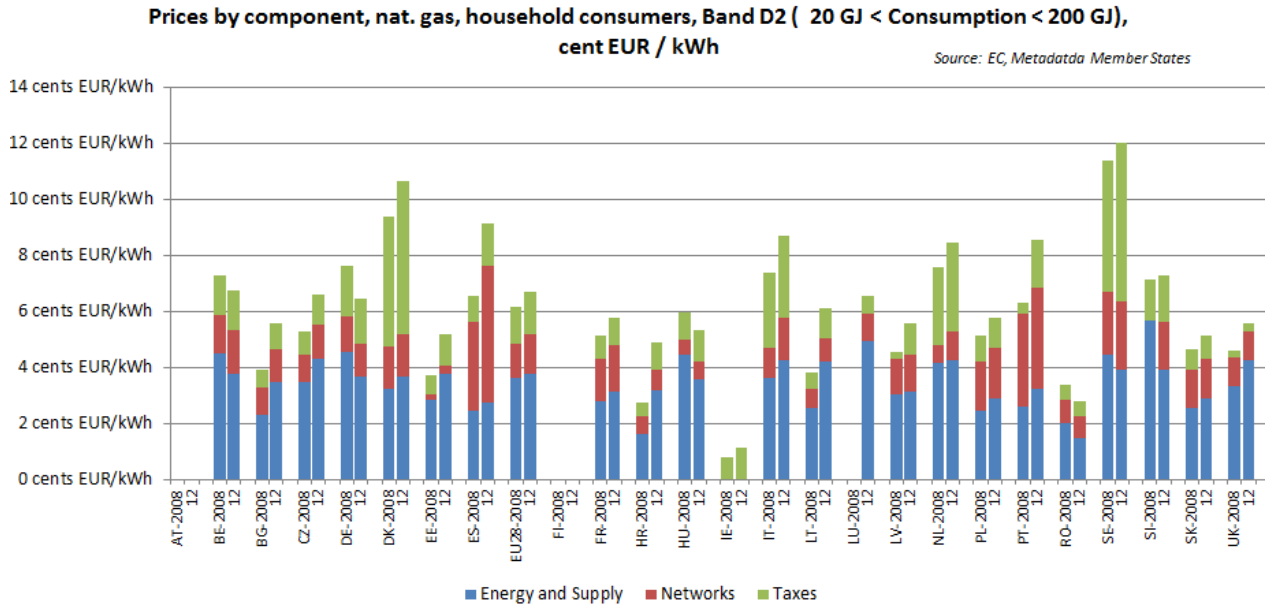
[3] The data was gathered under a reporting exercise, in the spirit of recital (16) and Annex II (n) of Directive 2008/92/EC. The data request concerned the exact composition of the cost elements reported under energy and supply, network and taxation components of retail prices of electricity and gas for industrial and household consumers (median bands) in 2008 and in 2012. Data for other years, consumer bands and components was not requested or reported.

percentage points were due to the lower rise of the energy component industry and 1 was linked to the stronger increase of taxes and network costs for domestic consumers.

Components at national level

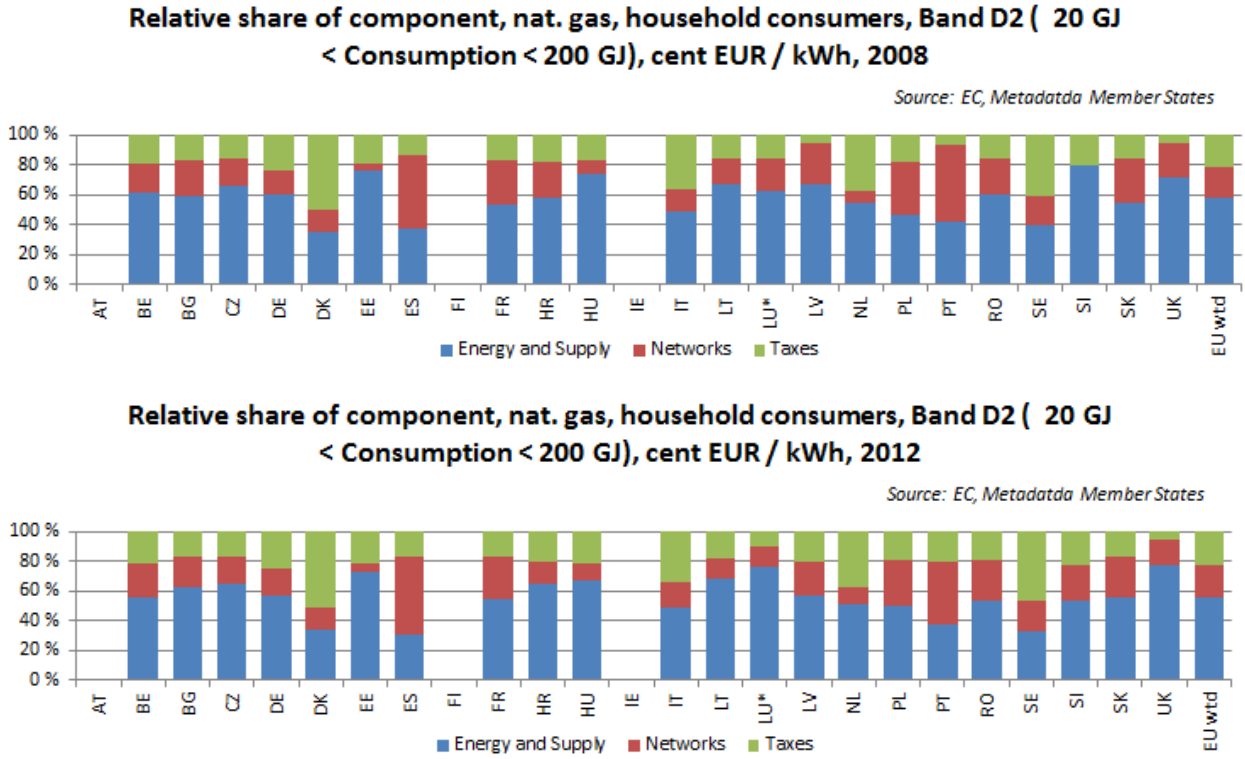
Similar to the case of electricity, the broad EU numbers conceal a wide range of variation for the retail gas prices across Member States. Figure 5 and Figure 6 trace the level and the relative share of the price components for each Member State and for the **median household consumers** in 2008 and in 2012.

Figure 5. Natural gas prices by component, households, Eurocent/kWh (2012)



Note: No data was reported for: Austria (2008 and 2012), Cyprus (2008 and 2012), Finland (2008 and 2012), Greece (2008 and 2012), Luxembourg (2008) and Malta (2008 and 2012). Ireland reported only tax-related elements.

Figure 6. Natural gas prices, households, relative share of components



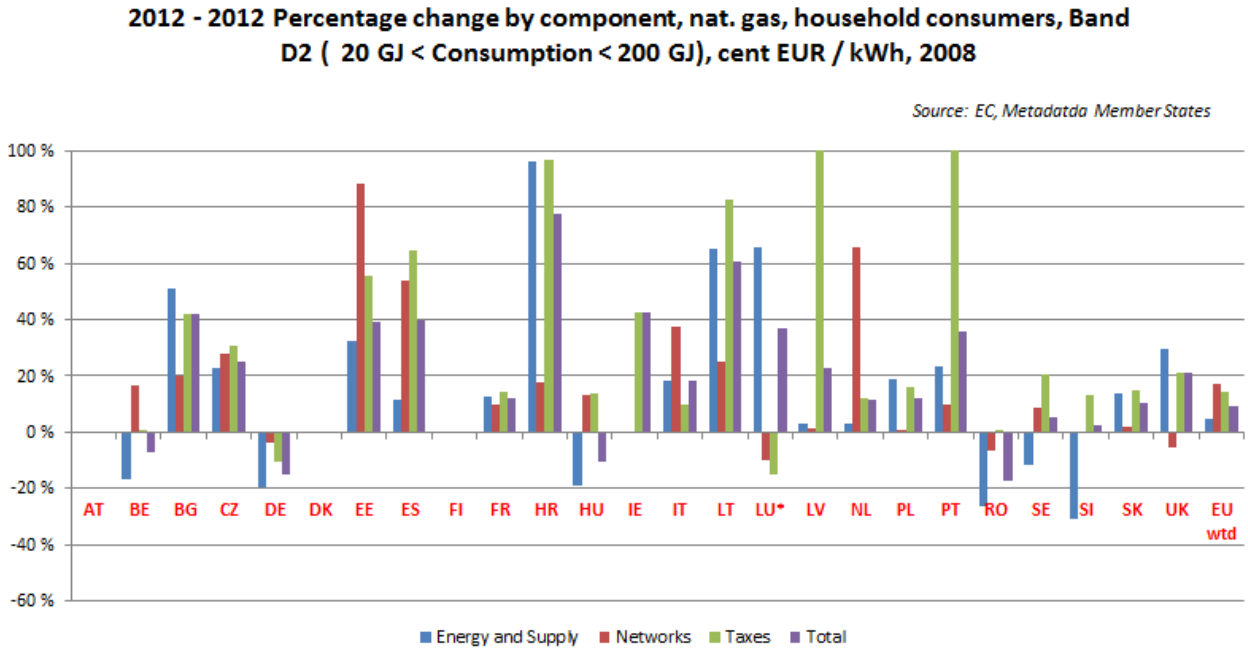
Note. No data was reported for: Austria (2008 and 2012), Cyprus (2008 and 2012), Finland (2008 and 2012), Greece (2008 and 2012) and Malta (2008 and 2012). Ireland reported only tax-related elements, so relative shares are not reported. * Luxembourg data is for 2009.

In 2012 the energy element varied between 1.5 Eurocent/kWh (Romania) and 5 Eurocent/kWh (Luxembourg) and accounted for 30-77% of the consumer price (with Spain and Denmark at the lower end and UK and Luxembourg at the higher end). Network costs ranged between 0.32 Eurocent/kWh (Estonia) and 4.9 Eurocents/kWh (Spain) and accounted for 6%-54% of the total price paid in these two countries. Taxation ranged between 5% (UK) and 52% (Denmark) and was at levels from 0.28 Eurocents/kWh (UK) to 5.66 Eurocents/kWh (Sweden).

At the European level, the energy-related costs appreciated by 4.5% between 2008 and 2012 (Figure 7). On the Member State level however, the same element fluctuated in broad bands ranging from decreases by 20%-25% in Romania, Germany and Hungary[4], to increases by more than 50% in Bulgaria, Lithuania and Luxembourg and reaching almost 100% in Croatia.

[4] The outlier for Slovenia is due to the fact that back in 2008 network and energy were bundled together; when both components are taken together, the 2008 and 2012 prices appear stable.

Figure 7 Natural gas prices, households, 2008 – 2012 percentage change by component



Note. * LU data is for 2009 as 2008 data is not available

Whereas the variation ranges observed for energy are comparable to the ones for networks, the retail price elements related to taxation were again the ones to register the highest movements.

With regards to the percentage change in the network component, the Member States were spread in a range from a 5%-10% decrease in the UK, Romania and Luxembourg to increases above 50% in Estonia, Spain and the Netherlands.

With regards to the percentage change in the taxation component, the majority of Member States witnessed an increase of 20% - 50%, the more notable exceptions being Germany and Luxembourg, where a modest decrease was observed and Estonia, Spain, Croatia and Lithuania where the tax-related costs for households rose by 50% - 80%. Latvia and Portugal were a special case where the taxation component grew by more than 300%, in both cases due to a significant increase in the VAT rate (and a new excise duty for the case of Latvia[5]).

Figure 8 and Figure 9 provide additional information on the evolution of retail prices for residential consumers in the capitals of 15 Member States, based on the household energy price index (HEPI) from VaasaETT and E-Control, the Austrian regulator[6].

The HEPI index breaks down the taxation component further into energy and non-energy related and it provides up-to date retail price data on a monthly frequency since January 2009.

Error! Reference source not found. describes the main drivers by component and by Member State and provides a description of the elements of the end consumer bill for electricity and natural gas and for household and industrial consumers.

[5] The national tax rate applied by Latvia is EUR 0.43 /GJ which is close to the EU minimum of EUR 0.3 /GJ.
[6] http://www.energypriceindex.com/

Figure 8. EU15 natural gas prices, residential consumers, 2009 – 2012

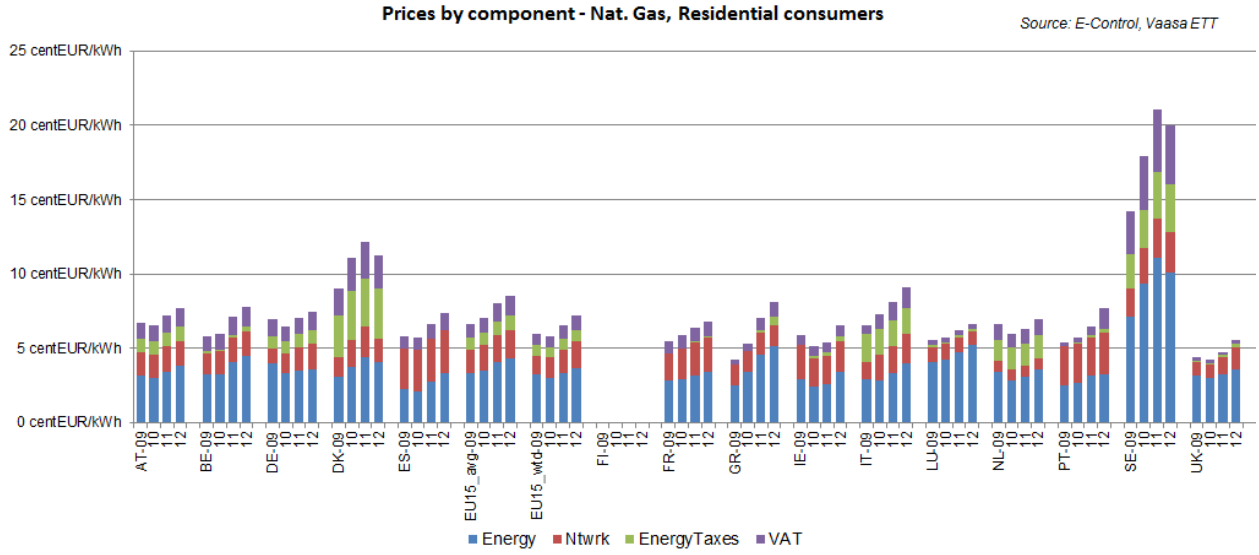
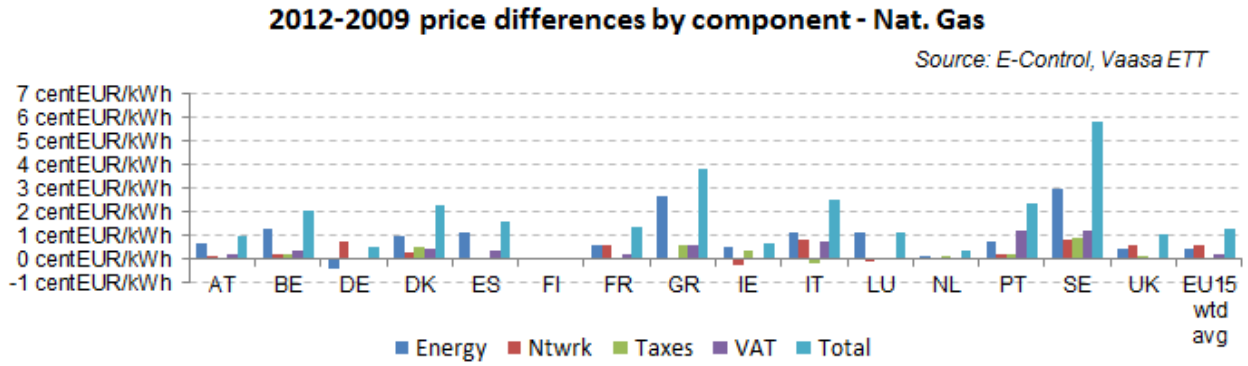
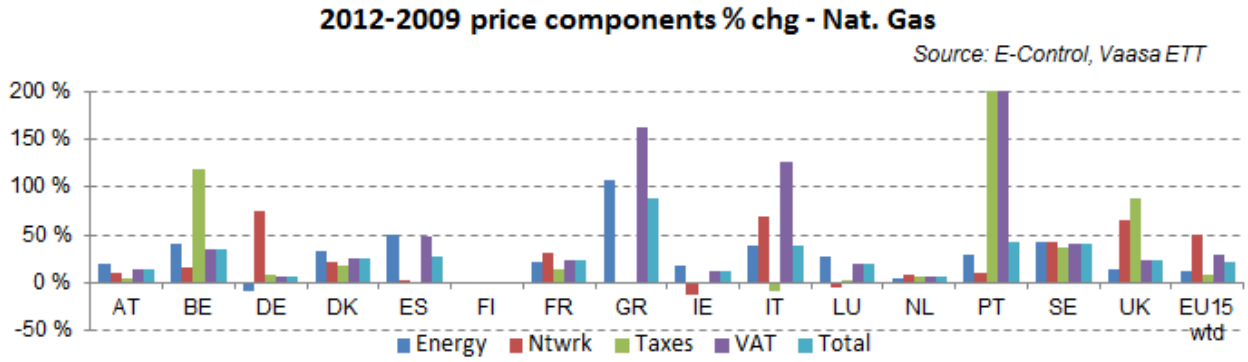


Figure 9. 2009 – 2012 differences and percentage changes by component, Eurocent/kWh





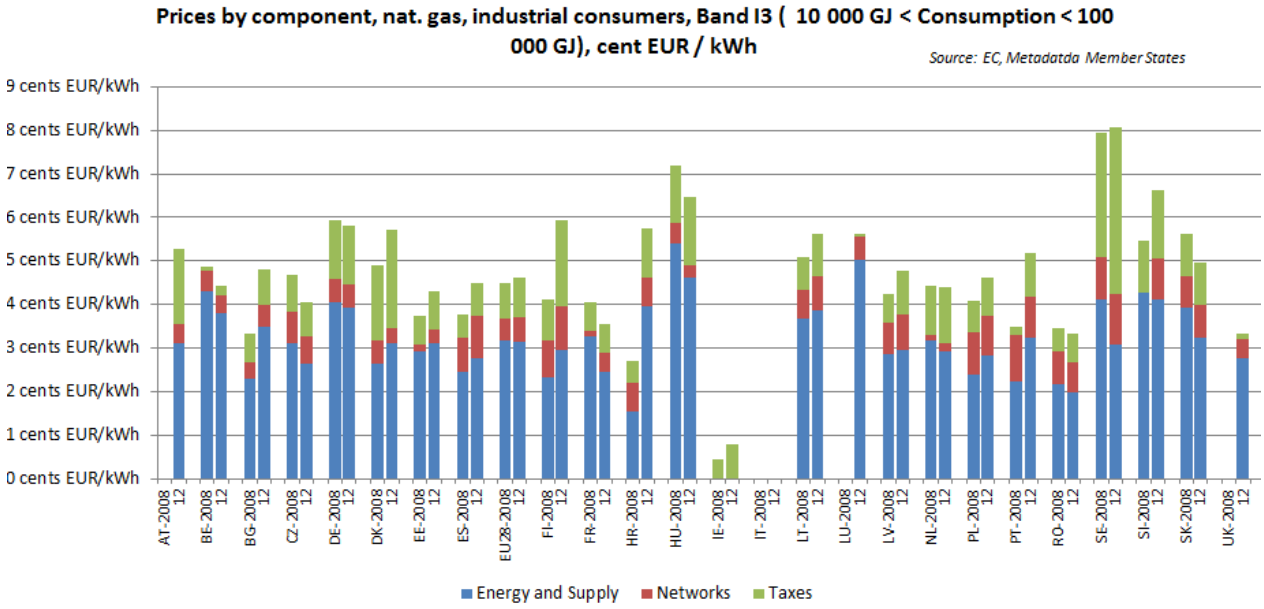
Turning now to **industrial consumers**, it appears that retail gas prices appreciated on average by 4%, from 4.44 Eurocent/kWh in 2008 to 4.62 Eurocent/kWh in 2012. This is the smallest increase across the energy products (gas and electricity) and consumer types (households and industrial consumers) that are analysed in this report.

And yet this seemingly reassuring picture results from a variety of different combinations of ups and downs in components that are specific for each Member State, as illustrated by Figure 10 and Figure 11.

In 2012 the energy element was spread in a range between 2 Eurocent/kWh and 5 Eurocent/kWh. As for household consumers, Romania and Luxembourg were again to be found respectively at the cheap and expensive ends. The energy accounted for 38% of the consumer price in Sweden (lowest value) to more than 80% in Belgium, UK and Luxembourg (highest value).

Network costs ranged between 0.19 Eurocent/kWh in the Netherlands and more than 1 Eurocent/kWh in Finland and Sweden. These costs accounted from 4% (Hungary) to 22% (Spain) of the total price.

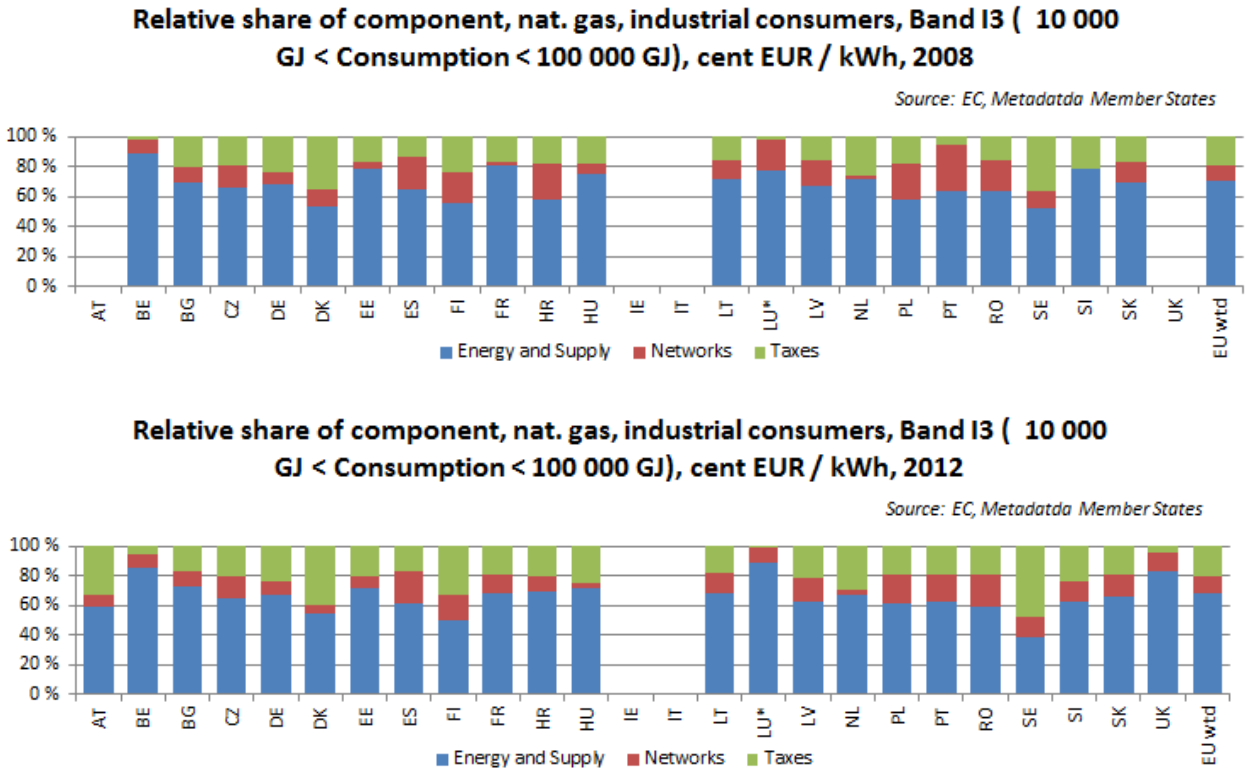
Figure 10 Natural gas prices by component, industrial consumers, Eurocent/kWh (2012)



Note: No data was reported for: Austria (2008), Cyprus (2008 and 2012), Greece (2008 and 2012), Italy (2008 and 2012), Luxembourg (2008), Malta (2008 and 2012) and UK (2008). Ireland reported only tax-related elements.

As it was not possible to separate and take out the recoverable taxes and levies from the taxation part, Figure 10 and Figure 11 report on all taxes and levies and exclude possible exemptions. As such they should be seen as an upper limit. The tax-related elements accounted for less than 5% in the UK, Belgium and Luxembourg whereas in Austria, Finland and Sweden they represented more than a third of the price. The combined level of elements ranged from 0.06 Eurocents/kWh in Luxembourg to 3.83 Eurocents/kWh in Sweden, the majority of Member States being situated within a range of 0.5 Eurocents/kWh – 1.5 Eurocents/kWh.

Figure 11 Natural gas prices, industrial consumers, relative share of components

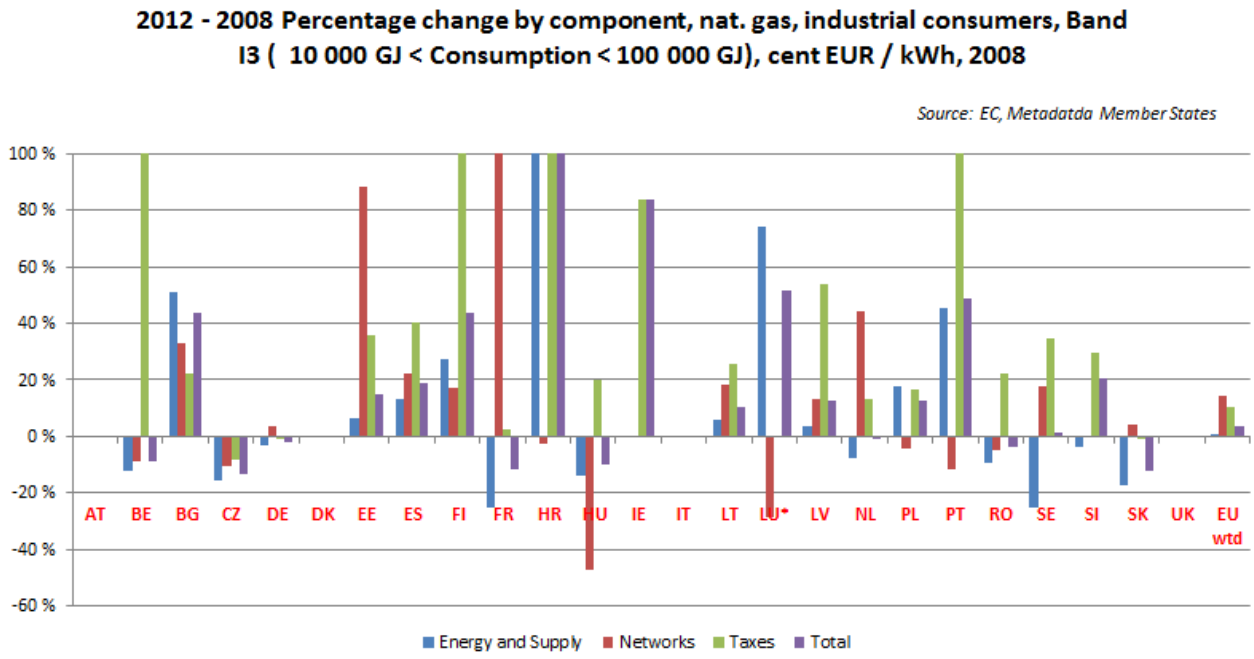


Note: No data was reported for: Austria (2008), Cyprus (2008 and 2012), Greece (2008 and 2012), Italy (2008 and 2012), Malta (2008 and 2012) and UK (2008). Ireland reported only tax-related elements. * Luxembourg data is for 2009.

From 2008 to 2012 the industrial consumers in Belgium, the Czech Republic, Hungary, and Slovakia experienced a price decrease of more than 10% in the energy component of their gas price. In France and Sweden the decline was higher than 25%. On the other extreme, industrial consumers in countries like Bulgaria and Luxembourg had to pay between 50% - 75% more in 2012 than what they paid back in 2008. In Croatia this increase was almost 150%, mostly linked to the shipping rate of gas delivered at the border.

The costs related to network elements in Hungary went down by 47% and Belgium, the Czech Republic, Croatia, Luxembourg, Poland, Portugal and Romania also registering decreases. On the other side, the French network tariffs increased 2.5 times as transmission and distribution charges rose from 0.09 Eurocent/kWh in 2008 to 0.27 Eurocent/kWh in 2012 and as the storage component went from 0.04 Eurocent/kWh to 0.18 Eurocent/kWh during the same period.

Figure 12 Natural gas prices, industrial consumers, 2008 – 2012 percentage change by component



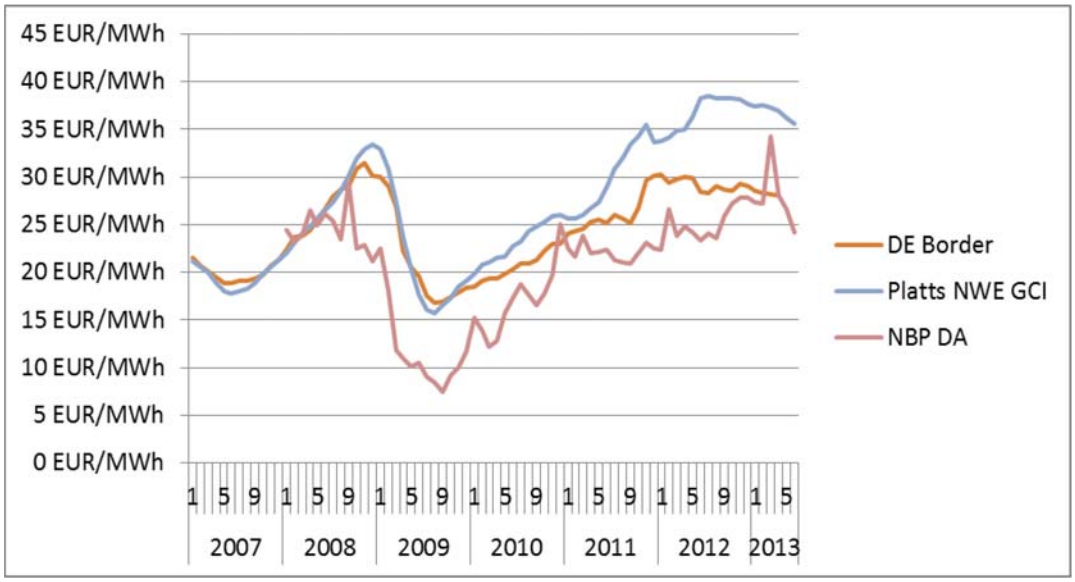
Finally, the taxation component decreased marginally in the Czech Republic, Germany and the UK whereas notable increases above 100% were observed in Belgium (increase in public levies and VAT and energy contribution), Finland (increase in the excise tax – energy content and CO2) and Croatia (increase in VAT rates). In Portugal the tax component increased by almost 500 % (increase in VAT rate).

1.2.1.1. Costs related to energy and supply

In the second half of 2012 the energy and supply component of household natural gas prices ranged from 1.5 cents/kWh (RO) and 4.9 cents/kWh (LU). In the case of industrial users the ranges were between 2 cents/kWh (RO) and 5 cents/kWh (LU). As natural gas prices still heavily depend on oil-indexed long term gas import contracts, and as indigenous gas production is constantly decreasing in Europe, higher oil prices result in higher import gas prices, especially in the Central and Eastern European countries where oil-indexation is dominant.

The 2012 annual survey on wholesale price mechanisms by the International Gas Union shows that 44% of gas consumption in Europe was priced on a gas-on-gas competition basis, as opposed to **51% of gas consumption which was still oil-indexed**. The share of gas-on-gas priced volumes has increased by a factor of 3 since 2005 and by more than 7% over the period 2010-2012. In contrast, oil-indexed consumption has gone down from representing almost 80% of consumption in 2005 to 51% in 2012. Strong regional differences persist in price formation mechanisms with about 70% of gas in North-West Europe (defined in the survey as UK, Ireland, France, Belgium, Netherlands, Germany, Denmark) priced on a gas-on-gas basis in 2012, compared to less than 40% in Central Europe (Austria, Czech Republic , Hungary, Poland, Slovakia and Switzerland).

Figure 13. Selected European benchmarks, wholesale natural gas



Source: Platts and BAFA

Figure 13 shows a selection of different wholesale price contracts for natural gas in the EU. The benchmarks presented represent a pure gas-on-gas competition benchmark set at EU's largest and most liquid hub (National Balancing Point, NBP in the UK), a theoretical pure oil-indexed price for gas (Platts Gas Contract Indicator, GCI) and the price of actual gas imports at the German border, as published by the German customs agency. This selection of benchmark is expected to capture the range of lowest wholesale price for gas in Europe (typically the NBP) to highest (the theoretical pure oil-indexed price). Estimates of the Commission show that a number of Member States in Eastern Europe pay border prices that are somewhere in-between the German border price and the pure oil-indexed price for gas.

These wholesale gas market benchmarks show similar trends over time. The peak of 2008 was followed by a collapse in 2009. Between 2010 and the first half of 2013 gas prices on NBP and the German border price have recovered to 2008 peak levels, while the pure oil-indexed price has well exceeded 2008 levels. While the German border price has traditionally been taken as an indicator showing the price of oil-linked gas into Europe, in the past few years the German border price has increasingly been dropping away from the Platts NWE GCI oil-indexed price indicator and converging towards the spot gas price, especially since the second half of 2012.

Even within the EU, the gap between the lowest and the highest wholesale gas price remains significant, as illustrated in Map 3. Member States with a diverse portfolio of gas suppliers and supply routes and with well-developed gas markets reap the benefit by paying less for imports and generally having lower prices. In 2012 the difference between the highest and lowest estimated wholesale prices in the EU stayed at around 18 Euro/MWh[7].

Based on the latest report from *Prospex Research*[8], the total traded volumes (including exchange spot and forward and OTC cleared and non-cleared) of the EU markets of natural gas stood at 32 200 TWh in 2011, a fifth consecutive year of strong growth. This number

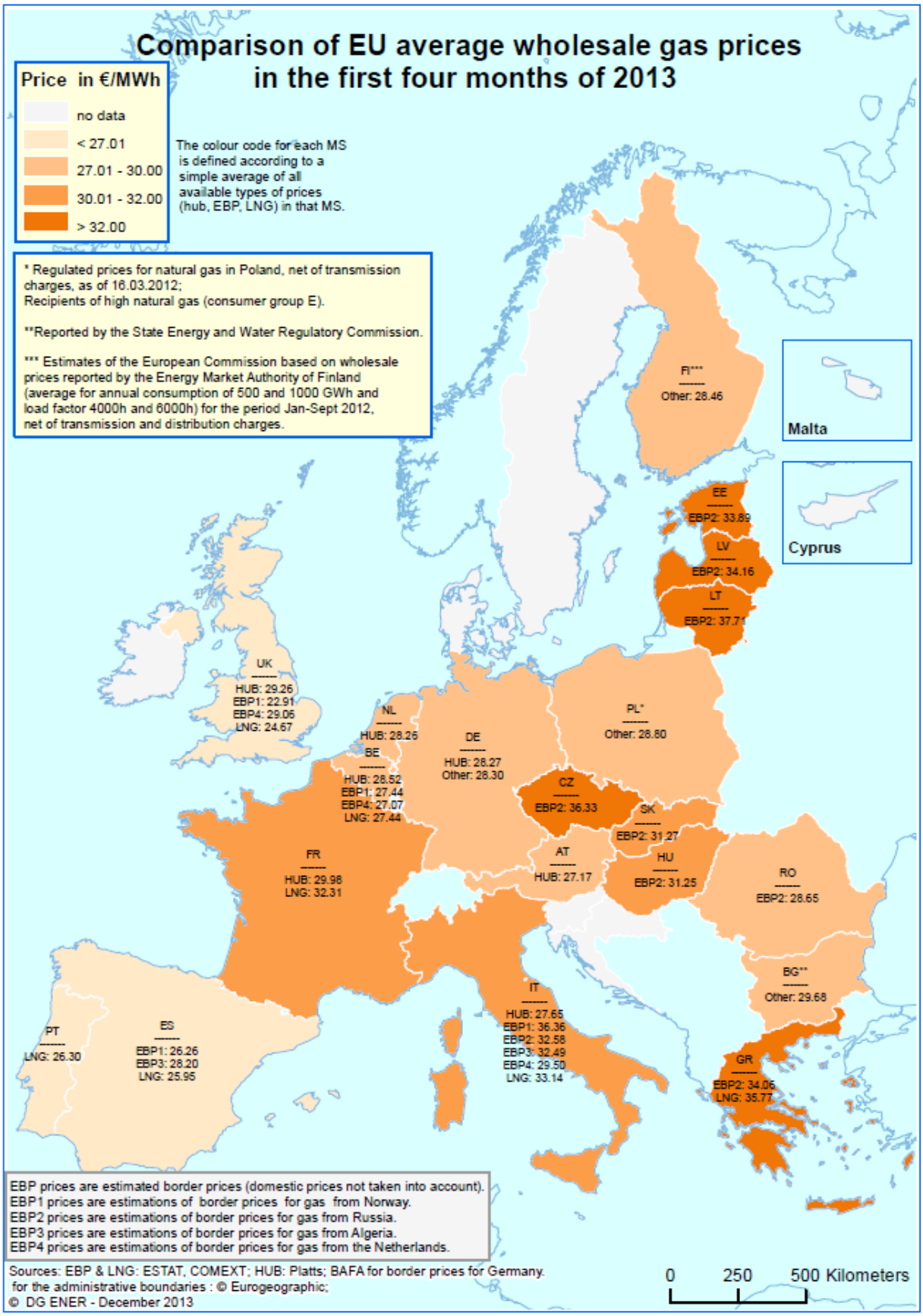
[7] Estimated border prices and estimated LNG prices based on data from Eurostat's database of international trade COMEXT. Day-ahead hub prices as reported by Platts.
[8] "European Gas Trading 2012", Prospex Research, www.prospex.co.uk

compares to a gross inland consumption in the EU of 4 600 TWh. The gas traded volumes are also approximately 4 times bigger than those recorded for electricity.

The UK market is by far the most liquid, recording trading volumes higher than 20 000 TWh. Market operators on the Dutch and German markets exchanged respectively 6 500 TWh and 2 100 TWh. The highest churn factors[9] were in the UK (23.6) and the Netherlands (16.3), followed by Austria (4.4), Belgium (4.2) and Germany (2.5). OTC accounts for more than 80% of the traded volumes. Similar to electricity markets, the cleared OTC has a much smaller share than the non-cleared OTC under which the gas volumes from the long term contracts are recorded.

[9] 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.

Map 3 Wholesale prices for gas in the EU



Textbox 1 Competitive Pricing Brings Norwegian Gas Exports to the EU close to Russian Exports

Against the background of weaker demand in the course of 2012 exports of natural gas from Norway to the EU have risen to levels comparable with Russian natural gas exports.

Data on imports of natural gas from the Russian Federation and Norway is sometimes difficult to reconcile. Eurostat's database on international trade Comext contains no or patchy data on the gas import volumes from the Russian Federation and Norway for some big EU importers, such as Germany and France.

IEA statistics show that in 2011 Norway exported a total of 99 bcm. The Norwegian Petroleum Directorate production figures show that in 2012 Norway produced 114.8 bcm oil equivalent gas for sale: a 15% increase in natural gas exports on an annual basis. Of that amount, 107.6 bcm was exported to the EU, according to Gassco, the Norwegian TSO. Another source of information is the Gas Trade Flow platform of the IEA, according to which 105.8 bcm of Norwegian gas entered into Germany, France, the UK and Belgium between January and November 2012.

At the same time, the volumes of Russian gas entering the EU fell by approximately 8%. According to the 2011 annual report of Gazprom, in 2011 the company exported 150 bcm to European customers, out of which 26 bcm to Turkey. A breakdown of exports by country shows that the 2011 sales to the EU amount to 122 bcm5; in addition, in 2011 Gazprom exported 5.25 bcm to the three Baltic states. Gazprom's CEO Alexey Miller was quoted by ICIS-Heren European Gas Markets as saying that in 2012 Gazprom's exports of natural gas to Europe were equal to 138 bcm.

SUMMARY OF DATA ON EXPORTS TO THE EU

	2011	2012	y-o-y change
Norway total exports (bcm)	99[a]	107.6[b]	+16%
Gazprom exports to the EU (bcm, excluding the Baltic states)	122[c]	112-113 (est)[d]	-8%

Notes: (a) source of data: IEA. 2012. Key world energy statistics
(b)source of data: Norwegian Petroleum Directorate 2013, Gassco
(c) source of data: Gazprom website. Data excluding the Baltic states
(d) source of data: ICIS Heren 2013 based on the announcement of Alexei Miller on Gazprom's 2012 exports to foreign countries. No data for the Baltic states
There are a number of likely explanations for this evolution.

Norwegian companies have been actively changing their pricing policy. Torgrim Reitan, CFO of the Norwegian producer Statoil that controls 75% of Norwegian exports, was quoted by ICIS-Heren in October 2012 as saying that the company has concluded the renegotiation of some half of its contracts. New Statoil contracts are also being negotiated purely on a spot indexation basis, such as the November 2012 ten year deal with German firm Wintershall - the natural gas unit of chemicals firm BASF – which is spot-indexed mainly to the NCG and GASPOOL hubs. The contract is for a total of 45bcm, equal to more than 6% of Germany's annual gas consumption. These developments are pointing to a fundamental change in the way traditional natural gas exporters to Europe are pricing their product.

In addition, in January 2013 Norway's Ministry of Petroleum and Energy submitted a proposal to reduce the tariffs for transport and treatment of new gas volumes from the Norwegian shelf. This will reduce the cost of extraction companies in Norway, possibly facilitating more exploration, development of more discoveries and further measures on existing fields. Bloomberg have reported that the cuts could be by as much as 90% on the original fees.

In Russia, changes appear to have been less radical. In its 2011 annual report, Gazprom maintains that the oil price link is indispensable for long-term business planning. At the same time, as reported by Reuters, Gazprom has offered a number of discounts in its long-term prices in 2011 and 2012 to a number of companies. In its 2011 annual report Gazprom announced agreements to adjust pricing conditions with Italy's Edison and Sinergie Italiane, France's GDF SUEZ, Germany's WIEH and Win¬gas, and Slovakia's SPP. In 2012, agreements on contract price revision were signed with Austria's EconGas, Centrex and GWH Gashandel, Italy's Eni, Germany's E.ON Ruhrgas, Netherlands' GasTerra, and Poland's PGNIG. In accordance with these agreements, contract price formulas with oil indexation were adjusted.

Furthermore, Gazprom's officials were quoted by Reuters as saying that the company had set aside 4.4 billion USD for 2012 refunds and eventually paid out 2.7 billion USD. Reuters further quotes Gazprom officials as expecting to refund 4.7 billion USD in 2013.

The recent developments show that for the moment Norwegian producers are adapting faster to the new gas market conditions than other exporters. By changing the price setting mechanism to gas-on-gas they have been able to retain consumers and indeed increase their market share to the detriment of other exporters such as the Russian Federation and Algeria. At the same time, recent announcements on refunds following agreements on contract price revision seem to suggest that Gazprom is offering price discounts on its existing contracts without fundamentally changing the pricing mechanism.

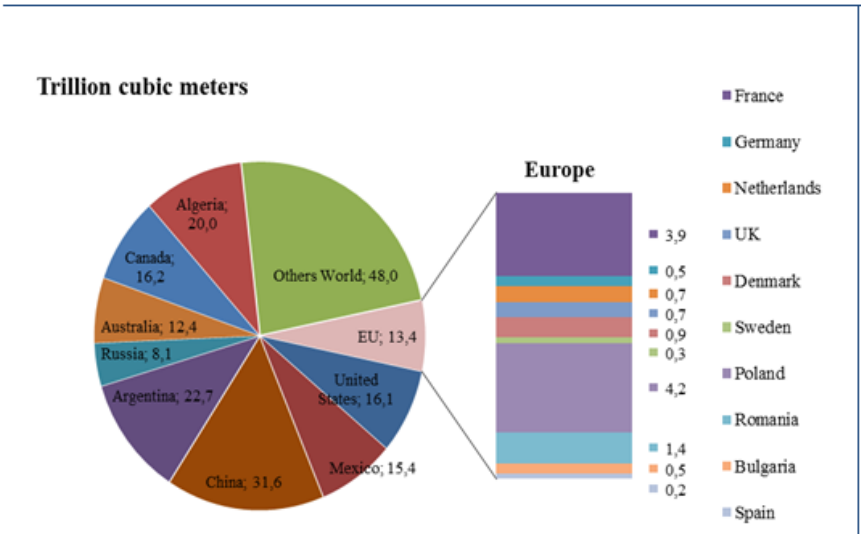
Yet, with gas exports hitting record levels, Norway is approaching full utilisation of its pipelines (transport capacity of the Norwegian pipeline system is 120 billion Sm3 per year). Further export growth of Norway may thus depend on transport capacity, including LNG terminals, and fields coming online.

According to some sources, recoverable shale gas in the EU could range between 2.3 tcm and 17 tcm[10], these estimates should however be seen in the context of the total proved natural gas reserves that for the EU were about 4 tcm in 2011[11].

Textbox 2 Potentials and uncertainties for shale gas exploration in the EU and the US[12]

Information on EU shale gas reservoirs is limited and uncertain, due to early stages of exploration. It appears nonetheless that potential shale gas producers in the EU may not be able to achieve similar production volumes and costs as their US counterparts. The main reason would be that Europe's shale gas reserves appear to be significantly smaller than the US ones. In addition, they would also be less concentrated: between one third and half of the potential US reserves are located in one basin while other US basins are also sizeable (Haynesville, 10% of total, around 2 tcm); on the other hand, the EU potential reserves are dispersed across several countries, this may entail lower economies of scale in their exploitation, compared to the US.

Unproved technically recoverable shale gas resources



Unproved shale gas Technically Recoverable Reserves[2]		
Tcm	2011	2013
Total EU	15,8	13.3
Of which		
France	5,1	3,9
Germany	0,2	0,5
Netherlands	0,5	0,7
Norway	2,4	0
UK	0,6	0,7
Denmark	0,7	0,9
Sweden	1,2	0,3
Poland	5,3	4,2
Bulgaria	/	0,5
Spain	/	0,2
Romania	/	1,4
Total US	24,4	16,1
Of which		
Marcellus	11,0	5.3
Total World	187,5	203,9

Source: EIA

[10] European Commission (2012), Unconventional gas: potential energy market impacts in the European Union, JRC Scientific and Policy Reports, p 29

[11] Further information on shale gas reserve estimates are available in the Forthcoming publication, Energy Economic Development in Europe, DG ECFIN

[12] ECFIN, Energy economic developments in Europe, forthcoming publication

Linking wholesale and retail markets: natural gas

The supply and demand of natural gas possess distinctive features that set it apart from other network industries such as electricity generation. Whereas the practise of administered, non-market prices still comes out as a suboptimal policy choice, those features ensure that the inefficiencies incurred are perhaps on a smaller scale than those for electricity.

Apart from chemical processing in the upstream, the characteristics of natural gas remain virtually unchanged from the extraction well to the delivery point as an end product. This contrasts strongly with the significant transformation of the input fuel that is turned into electricity. The production process for natural gas is much more homogenous, as extraction and delivery systems appear quite similar when compared to the variety of electricity generation technologies. As a result, the price of the end product is more closely linked to the input commodity than for electricity.

On the demand side, it is in general easier to find substitutes for the uses of natural gas than for those of electricity[13].

On the supply side, unlike electricity, only few Member States can rely on indigenous production of natural gas. As the European conventional resources are gradually being depleted, the relative share of natural gas delivered from external sources in gross inland consumption is projected to grow.

Historically, most Member States signed long term contracts with suppliers outside of the EU and those suppliers shipped and delivered the commodity at the border via a pipeline or with a fleet of LNG vessels. The contract price of gas was determined by its replacement value in the end-use sectors. Gas prices were indexed to the prices of energies competing with gas in final energy consumption – most often heating oil or diesel.

As a result from all of the above, the scope of price regulation seems to be more limited than for electricity. For example, few Member States can set end consumer prices below production costs because very few can produce natural gas in the first place. Setting prices at levels that would accumulate tariff deficits in the balance sheet of national companies does not seem to be an appealing option either: it can affect the bargaining power of those companies when they negotiate new terms with external suppliers.

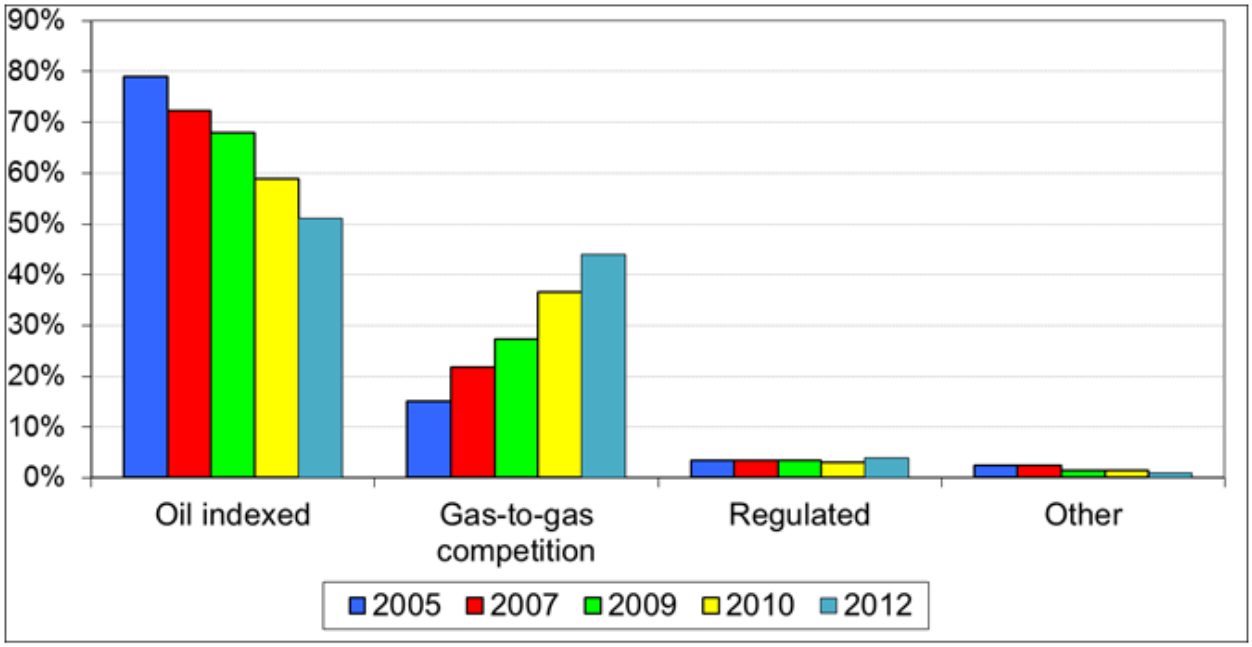
Thus, the shortcomings of price regulation of natural gas are more subtle. Yet, such practises are slowing down the functioning of the internal energy market. Next to the clustering effect[14] which is similar to the one observed in electricity, fixing end-consumer prices extends the application of gas indexation.

The next charts illustrate that as the EU wholesale markets are maturing, more and more gas is being delivered under gas-on-gas pricing mechanisms. Administered prices that reflect oil indexation only would then delink the retail level from the true fundamentals of supply and demand on the EU gas market, as defined by the market conditions on the hubs.

[13] Yet, the demand elasticity should not be overestimated: the switching of heating sources for example entails significant upfront capital costs for end consumers.

[14] The regulated price offer acts as an anchor; it discourages pro-active consumer behaviour, it protects incumbents and sets implicit barriers to entry.

Figure 14 Wholesale gas price formation mechanisms in Europe



Source: International Gas Union

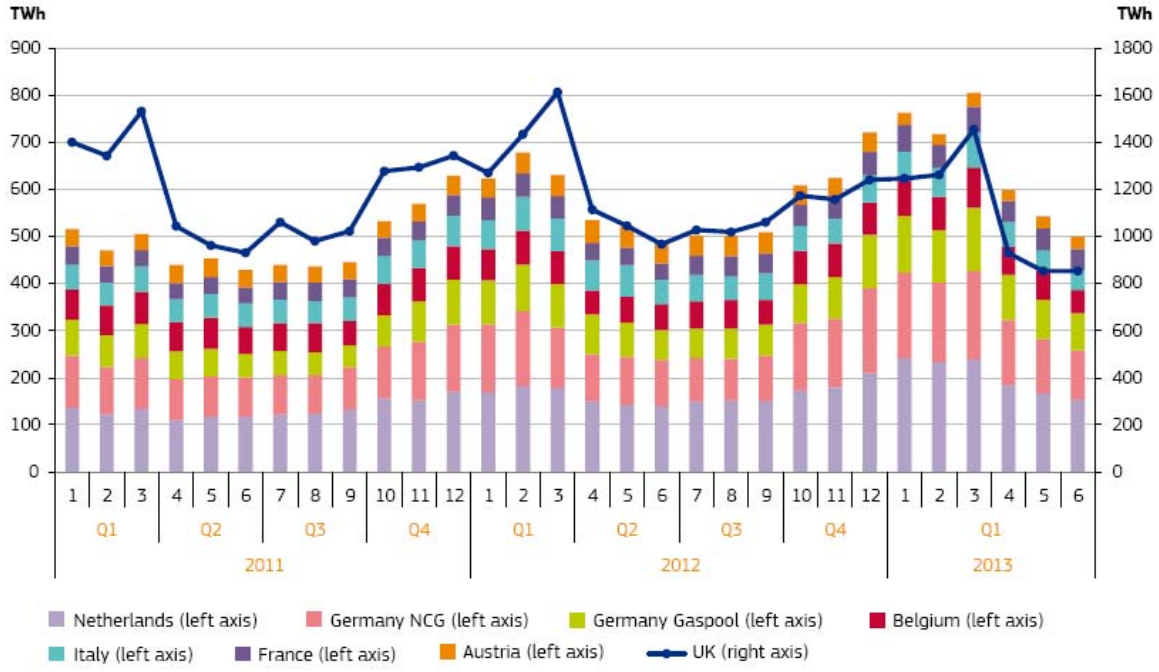
The rise of traded volumes in the European hubs, as shown in

Figure 14 and Figure 15 is also due to the fact that hub prices have been significantly lower than oil indexed prices throughout 2008 – 2012. This point is further developed in Section 1.2.1.1. It is interesting to observe that the lack of wholesale and network integration at the EU level is proving to be very costly for consumers situated in isolated areas with inexistent or very illiquid wholesale markets – which are the consumers that cannot benefit from cheaper sources of gas.

The latest market monitoring report from ACER-CEER [15] estimates for example that household consumers from Hungary, Italy, Romania, Latvia, Estonia, Greece, Poland, Finland, the Czech republic, Sweden, Slovenia and Lithuania could save between 100 and 200 Euros of their annual bill if the price for gas supplied at the border was comparable to the prices on the liquid hubs in Western Europe, as shown in Figure 16. In Bulgaria, one of the poorest Member States, consumers could save up to 250 Euros per year.

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

Figure 15. Traded volumes on European gas hubs

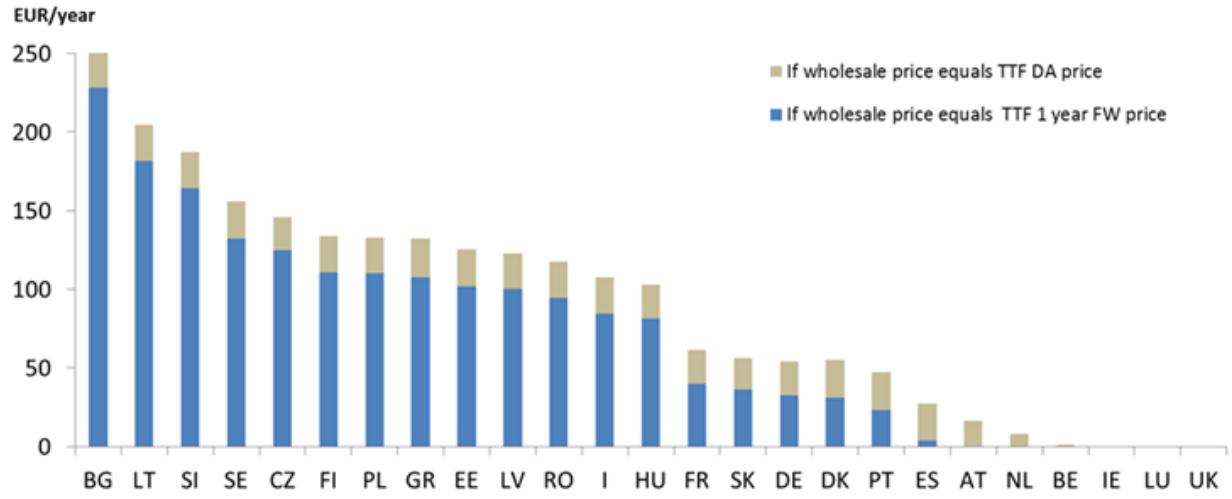


Sources: National Grid (UK), GTS (Netherlands), Huberator (Belgium), Gaspool (Germany), NCG (Germany), GTTGaz (France), Snamrete (Italy), CEGH (Austria). As of 15 July 2013: no data on volumes traded on Gaspool and PSV in June 2013.

The chart covers the following trading hubs:
UK: NBP (National Balancing Point); Belgium: Zeebrugge beach, ZTP and ZTPL; Netherlands: TTF (Title Transfer Facility); France: PEG (Point d'Echange Gaz); Itay: PSV (Punto di Scambio Virtuale); Germany: GASPOOL and NCG; Austria: CEGH (Central European Gas Hub)
Note: CEGH volumes after January 2013 are not directly comparable with the values before that date due to the entry into force of entry/exit system

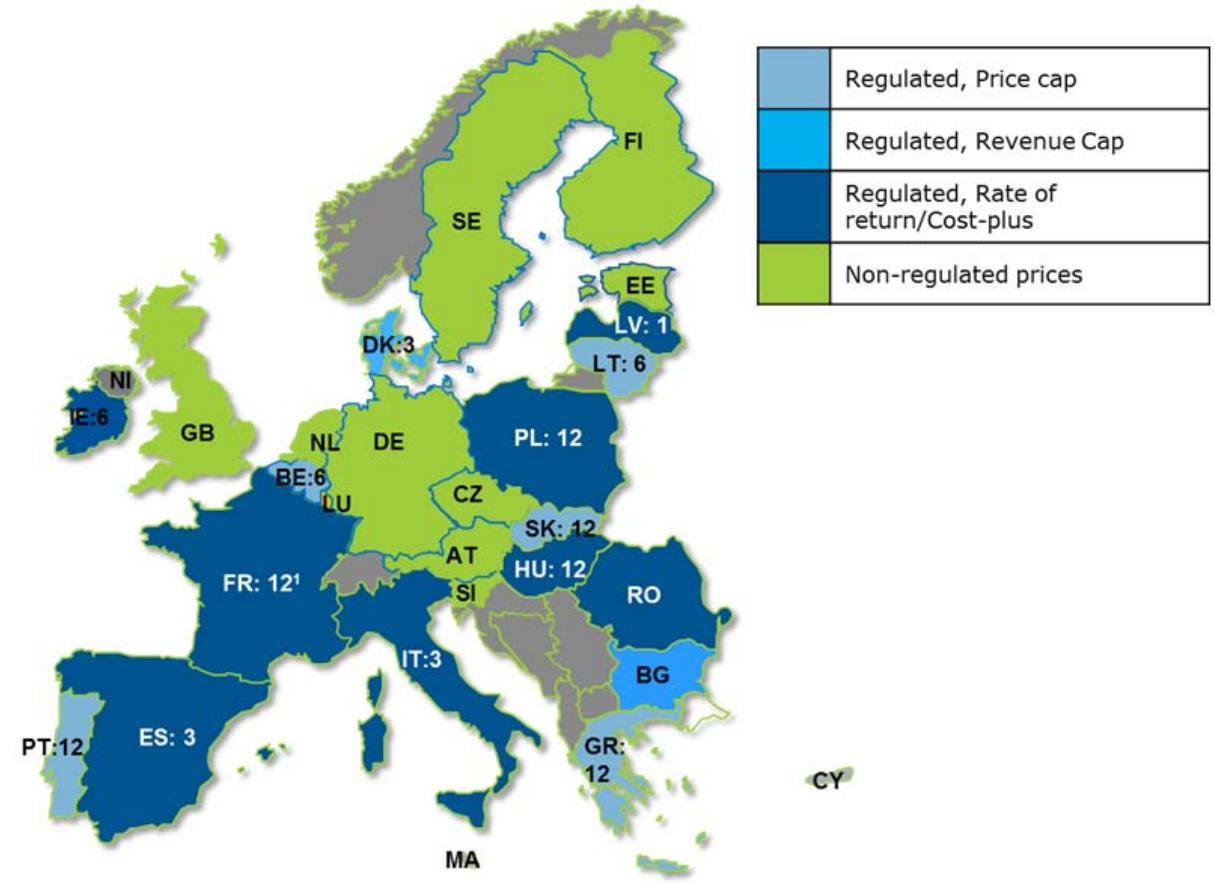
Barriers to the completion of the internal market are further analysed in the ACER-CEER report. It indicates that, "*in 2012, 46.2 million European household customers (about 46% of the total number of households with natural gas) were supplied under regulated prices (a 1.5% decrease compared with 2011)*".

Figure 16. Gross welfare loss per year, per typical household consumer, due to lack of wholesale and network integration in EU27 – 2012 (Euro/year)



Source: ACER analysis based on COMEXT (Eurostat) and Platts

Map 4 Method of price regulation (natural gas) and update frequency in months in Europe - 2012



Sources: CEER National Indicators database (2013) and ACER questionnaire on regulated prices (2013)

Map 4, again from the market monitoring report of ACER and CEER, illustrates that 15 Member States continued to regulate prices in 2012. "*At the end of 2012, Bulgaria, Greece, Hungary, Latvia, Lithuania, Poland, Portugal, Romania, and Slovakia, more than 90% of households under regulated prices. In Denmark, France, and Italy between 70% and 90% of household consumers chose regulated prices. In Ireland, the number of households with regulated prices dropped to a record low (66%) in 2012, down from 98% three years before. In Spain and Belgium, fewer than 35% of household customers were still on regulated prices in 2012.*"

The Consumer Markets Scoreboards[16] show that consumers rank the gas market among the poorly functioning markets. In 2013, the market ranks 22nd out of 31 services markets. As is the case with electricity, the gas market has particularly poor scores on the choice of suppliers available in the market (lowest out of all services markets) and comparability of offers (fifth lowest). In addition, only 3% of consumers have switched products or services with their existing provider and 8% switched supplier during the past 12 months (3rd lowest among the 14 'switching services' markets)[17].

[16] http://ec.europa.eu/consumers/consumer_research/cms_en.htm
[17] Consumer Market Monitoring Survey 2013 commissioned by DG SANCO, to be used in the forthcoming 10th Consumer Markets Scoreboard

According to Commission services' empirical estimate on natural gas price drivers[18], the natural gas prices are largely driven by long term oil indexation contracts. Among other price determinants that influence the formation of retail natural gas prices, import dependency and diversification of imports are important factors. In parallel, market opening and especially the option of having access to hubs have a downward impact on retail prices by stimulating the diversification of gas supplies, enhancing market's liquidity and by promoting the most efficient allocation of gas supplies. Especially, market opening eliminates the possibility of having artificially low regulated prices and cross-subsidies between different consumer groups by promoting the cost reflectiveness of tariffs which provide incentives to new entrants to enter the supply market.

This is important, as in the natural gas market similarly to the case of electricity market the distribution of costs through regulated prices might be driven by political preferences, in favour of energy intensive industries. Finally, unbundling of networks and the population density put downward pressure on prices. The first driver benefits the consumers by contributing to lowering the infrastructure cost, especially under cases where a tight supervision of investment plans is exerted by regulatory authorities and the latter factor by lowering the transmission and distribution unit cost of investments. However, the downward effect of these factors is limited, as they affect a small part of the retail tariff.

1.2.1.2. Costs related to networks

In the second half of 2012 the network component of household gas prices ranged between 4.9 cents/kWh (Spain) and 0.32 cents/kWh (Estonia). In the case of industrial gas prices the network component ranged between 0.2 cents/kWh (the Netherlands) and 1.14 cents/kWh (Sweden).

As with electricity network costs, the proceeds collected from the network component of the end consumer bill are intended to reflect pipeline costs related to operational expenditures, depreciation and the cost of capital.

Pipeline operating costs vary mainly according to the number of compressor stations, which require significant amounts of fuel, and local economic conditions. The expected load factor determines the optimal mix of diameter and compression capacity. The pipeline diameter can be linked to the pressure level and to the type of transportation: transmission (mostly pipelines with high and median diameter and high pressure levels) or distribution (mostly pipelines with small diameters and low pressure levels).

As in the case of electricity network costs, 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.

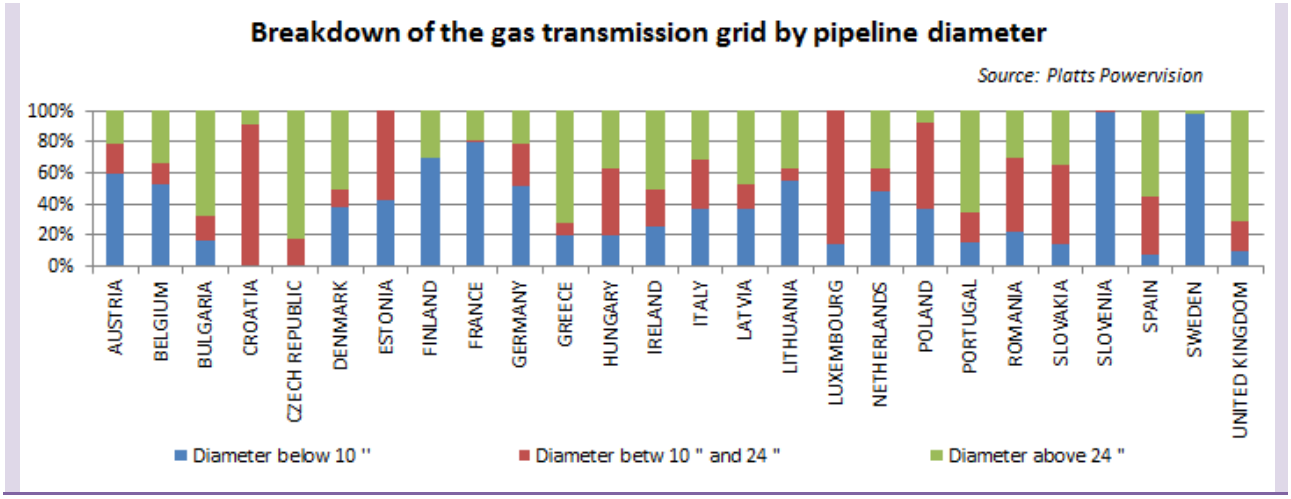
Detailed and harmonized information on gas networks in the EU is in general scarce with no scarce data on total length and age of operation by component. The Framework Guidelines on rules regarding harmonised transmission tariff structures for gas apply to the transmission

[18] DG ECFIN. Energy Economic Development in Europe

services offered at all entry and exit points of gas TSOs, irrespective of whether they are physical or virtual[19].

Figure 17 Length and relative share of Member States gas grids by pipeline diameter

	< 10" (km)	10"–24" (km)	> 24" (km)	Total (km)
AUSTRIA	4243	1398	1522	7163
BELGIUM	1912	479	1227	3618
BULGARIA	431	415	1758	2603
CROATIA	0	695	70	765
CZECH REPUBLIC	35	569	2753	3357
DENMARK	1078	324	1440	2841
ESTONIA	326	436	0	761
FINLAND	606	0	257	863
FRANCE	26799	476	6313	33588
GERMANY	34603	18187	14337	67127
GREECE	207	82	741	1029
HUNGARY	1021	2253	1925	5199
IRELAND	526	524	1057	2106
ITALY	10529	9039	9055	28623
LATVIA	403	184	520	1108
LITHUANIA	998	148	660	1806
LUXEMBOURG	41	239	0	280
NETHERLANDS	4063	1208	3144	8415
POLAND	5801	8668	1149	15618
PORTUGAL	168	225	738	1130
ROMANIA	1154	2405	1570	5129
SLOVAKIA	762	2888	1970	5621
SLOVENIA	752	6	0	758
SPAIN	908	4573	6627	12108
SWEDEN	965	0	20	985
UNITED KINGDOM	1637	3421	12771	17828



Note. The pipeline diameter can be linked to the pressure level and to the type of transportation: transmission (mostly pipelines with high and median diameter and high pressure levels) or distribution (mostly pipelines with small diameters and low pressure levels)

[19] See Draft Framework Guidelines on rules regarding harmonised transmission tariff structures for gas http://www.acer.europa.eu/Gas/Framework%20guidelines_and_network%20codes/Documents/outcome%20of%20BoR27-5%201_FG-GasTariffs_for_publication_clean.pdf

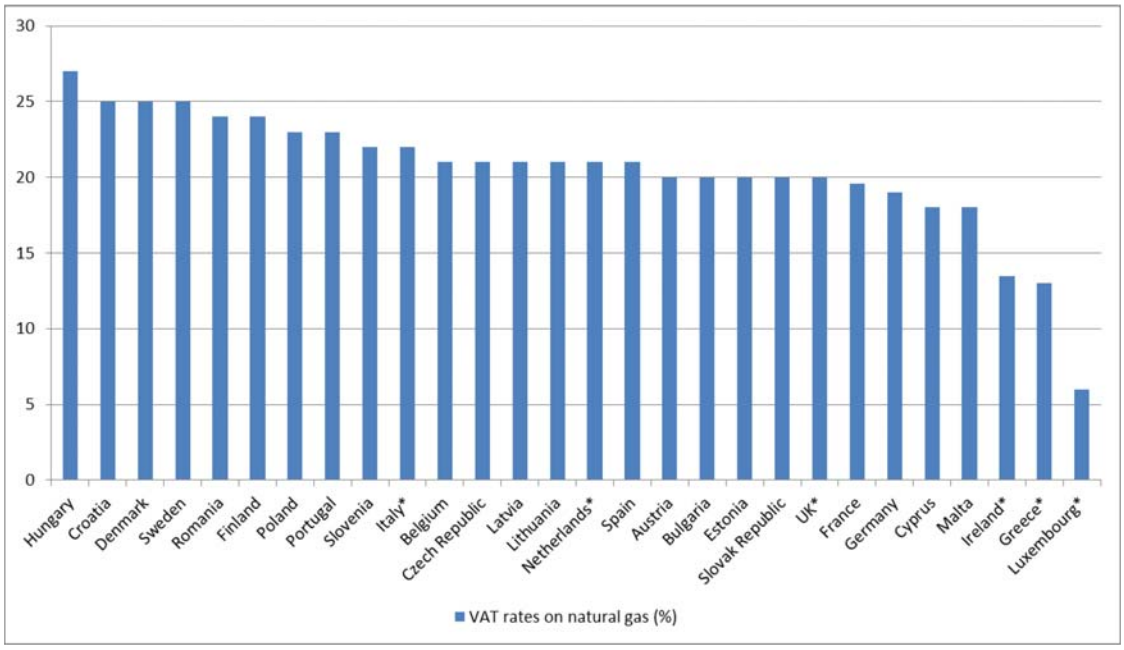
1.2.1.3. Costs related to taxation

In 2012 median EU households paid between 0.28 Eurocent/kWh (UK) and 5.66 Eurocent/kWh (SE) for the taxation component. In the case of industrial consumers, taxation accounted for between 0.06 Eurocents/kWh (LU) and 3.83 Eurocent/kWh (SE). The Energy Tax Directive sets minimum levels of excise duty for natural gas used for heating at €0.15 per gigajoule for business use and €0.3 per gigajoule for non-business use.

Tax Rates - VAT and excise duties

As with electricity (see section 1.1.1.3), VAT rates on natural gas are broadly constant across Member States. Luxembourg and Greece charge reduced VAT rates of 6% and 13%, respectively, on natural gas consumption for heating (business and non-business use), as well as propellant use. Ireland charges a reduced VAT rate of 13.5% on natural gas for industrial/commercial use, as well as heating use (business and non-business use), while the UK, Italy and the Netherlands charge reduced rates of 5%, 10% and 19%, respectively, on natural gas for non-business heating use. VAT rate on gas in Croatia, Sweden and Denmark is at 25% and in Hungary at 27%.

Figure 18. VAT rates on natural gas



Source: European Commission

Note: *Reduced VAT rates, see details in text.

The Energy Tax Directive sets minimum levels of **excise duty** for natural gas used for heating at 0.15 Euro/GJ in the case of business use (0.5 Euro/MWh) [20] and at 0.3 Euro/GJ (1 Euro/MWh) for non-business use and for industrial/commercial use.

Table 1. Excise duties levied on natural gas, Euro/MWh, 2013

Natural gas, EUR/MWh (1)	Industry commercial use	Heating business use	Heating – non-business use
Belgium (2)	0,47	0,47	0,97
Bulgaria	1,55	0,18	0,18
Croatia	1,98	1,98	3,92
Czech Republic	1,22	1,22	1,22
Denmark	39,50	33,71	33,71
Germany	13,88	4,10	5,50
Estonia	0,00	2,52	2,52
Greece	5,40	5,40	5,40
Spain	4,14	0,00	0,00
France	1,19	1,19	0,00
Ireland	4,10	4,10	4,10
Italy	1,15	1,22	4,28
Cyprus	9,35	9,35	9,35
Latvia	1,65	1,65	1,65
Lithuania	0,00	0,00	0,00
Luxembourg	0,00	0,54	1,08
Hungary	1,12	1,12	1,12
Malta	9,35	3,02	3,02
Netherlands	19,03	19,03	19,03
Austria	5,97	5,97	5,97
Poland	0,00	0,00	0,00
Portugal	1,08	1,08	1,08
Romania	9,35	0,61	1,15
Slovenia	4,42	4,42	4,42
Slovakia	9,35	1,33	1,33
Finland	10,47	10,47	10,47
Sweden	10,25	10,25	34,17
UK	0,00	0,00	0,00

Source: European Commission Excise Duty Tables[21].
Notes: (1) Some Member States impose other charges and levies that form part of the price of natural gas paid by the final consumer, including environmental taxes, natural gas taxes, concession fees, CO2 and energy taxes, strategic stockpile fees, grid charges (in addition to transmission and distribution).; (2) In Belgium, a federal contribution of EUR 0.468/GJ is applied;

The levels of excise duty which Member States charge in addition to the minimum rates set by the Directive vary significantly by country and are frequently applied unevenly across sectors. For example, in Bulgaria, Denmark, Germany, Malta, Romania and Slovakia, natural gas for industrial and commercial use is subject to higher excise duties than natural gas used for heating.

[20] Business use is defined in Article 11 of the Directive as "use by a business entity … which independently carries out , in any place, the supply of goods and services, whatever the purpose or results of such economic activities".
[21] See details on exemptions from excise duties at http://ec.europa.eu/taxation_customs/resources/documents/taxation/excise_duties/energy_products/rates/excise_duties-part_ii_energy_products_en.pdf

Tax exemptions

As indicated in the discussion on the role of taxation on electricity prices (section 1.1.1.3), tax exemptions may be available in some countries to specific sectors.

In eleven EU countries natural gas for heating use by businesses pays zero or lower excise duty than heating use by non-businesses. Seven EU countries levy zero excise duty on gas used for industrial and commercial purposes; out of these seven four levy zero excise duty on gas used for heating by businesses.

Most of the Member States applying a total tax exemption for natural gas used for heating base it on Article 15(1) (g) of the Energy Taxation Directive, which allowed this exemption/reduction for the maximum period of 10 years; this possibility expired in the end of 2013. Member States using this option need to comply with EU minimum as from 1 January 2014. The other possibility for tax exemptions is for energy intensive business; however every measure has to comply with the state aid rules.

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, but energy intensive industries qualify for a reduction of 80% on this levy, on condition of meeting certain energy-saving targets set out in a Climate Change Agreement (see details in section 1.1.1.3).

In **Denmark**, under the Green Tax Package scheme, EIIs are completely exempt from energy taxes, and almost completely exempt from carbon taxes.[22] 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 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.

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.[23]

In **Finland**, a special rate of EUR 0.244/MWh applies to consumers with consumption greater than 70,000 MWh per year in the steel industry (out of the scope of the Energy Taxation Directive).

[22] ICF report, p142
[23] OECD p67

1.2.2. Natural gas price developments in selected industries

Based on the methodology described in **Error! Reference source not found.**, the results of several case studies for selected energy-intensive industries are presented below with regard to natural gas prices. All caveats on the interpretation of the results for electricity prices reported by the sampled plants apply in the case of gas prices too. As in the case of electricity, this section starts with presenting and comparing the variation of natural gas price data for each of the seven sectors assessed.

In particular, for each sector and the related EU-wide sample (not split into regions) the average natural gas prices paid by operators are presented together with standard deviation. The consumption ranges are also presented using the median and box plots, the former indicating the value which splits the sample in half; the latter indicating the range of values between which 50% of the data sample lay.

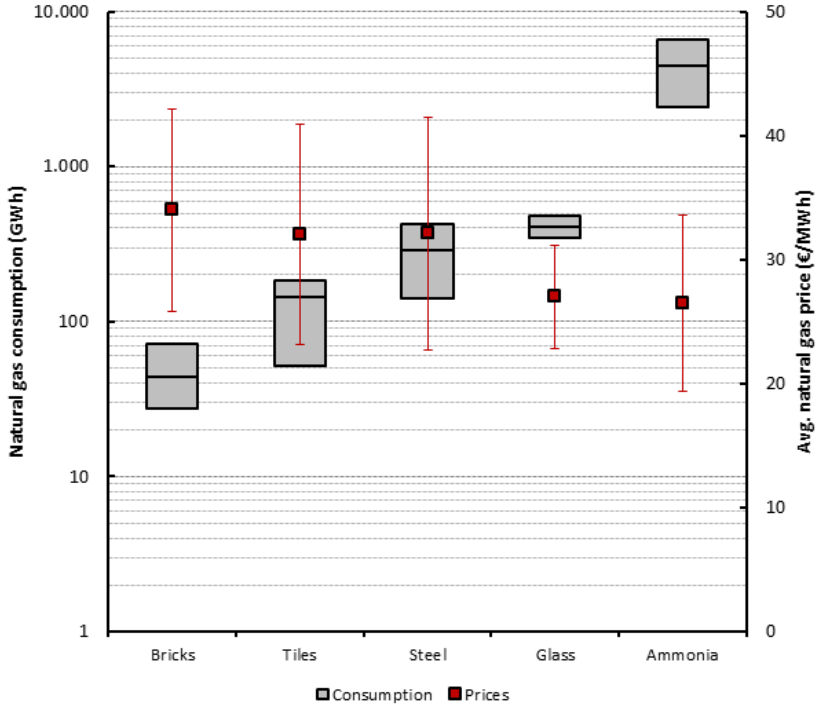
Natural gas data is not available or used for all sectors as, for example, both chlorine and aluminium producers mainly rely on electricity as energy input. The number of questionnaires used for each sector is reported below.

Table 2 Number of questionnaires used in cross-sectoral analysis

(sub)sector	**N. of questionnaires Natural gas**
Bricks and roof tiles	16
Wall and floor tiles	20
Float glass	10
Ammonia	10
Chlorine	-
Steel	13
Aluminium	-
Total	**69**

As in the case of electricity although with lower observed gaps, larger consumers pay lower prices. The difference in the price of natural gas paid by an average producer of bricks and an average producer of ammonia is of 7.0 €/MWh. Gas prices in the sample of large users discussed are mainly determined by the energy component and do therefore offer less flexibility than electricity contracts for possible discounts or exemptions.

Figure 19 Natural gas consumption range and price variations grouped by sector (69 plants)



Source: CEPS, calculations based on questionnaires

Table 3 Average natural gas prices and median consumption in various sectors (69 plants)

	Bricks	Tiles	Steel	Glass	Ammonia
Average price (€/MWh)	34.0	32.0	32.1	27.0	26.5
Median consumption (GWh)	44.3	142.5	288	406.2	4,446.3

Source: CEPS, calculations based on questionnaires

1.2.2.1. 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. The share of the sampled plants in EU production is unknown. Production volumes are reported using different units due to homogeneity of products.

Table 4 Number of questionnaires used in the brick and roof tiles case study

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

Data collected show that the average price of natural gas paid by the 13 sampled producers of bricks and roof tiles has increased by 30% between 2010 and 2012, from 30.4 to 39.5 €/MWh. The spread between the lowest and the highest price has also increased, going from 29.4 to 38.8 €/MWh. Different geographical regions have all seen an increasing trend although of different intensity, as can be seen from the table below.

Table 5 Descriptive statistics for natural gas prices paid by the 13 sampled EU producers of bricks and roof tiles (€/MWh)

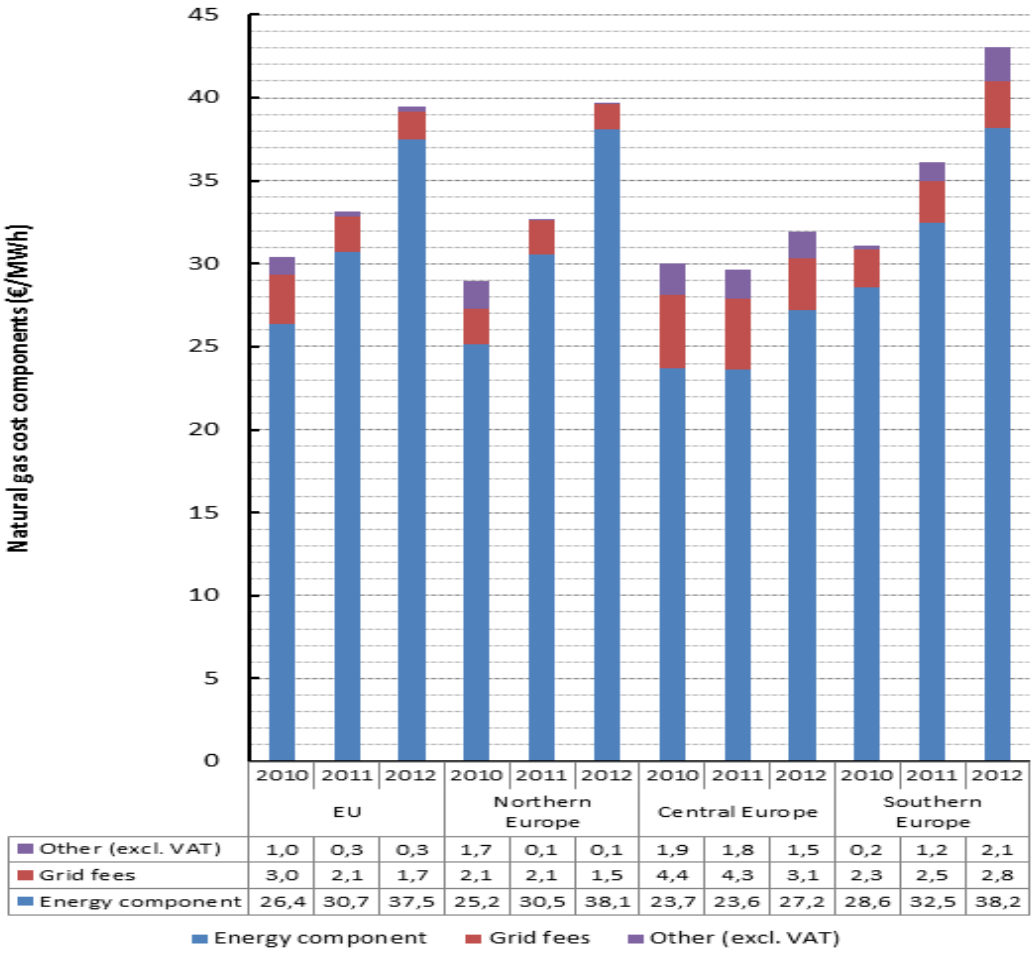
Natural Gas price (€/MWh)	2010	2011	2012	% change 2010-2012
EU average	30,4	33,2	39,5	29,9
EU minimum	18,7	25,6	24,7	32,1
EU maximum	48,1	57,2	63,5	32,0
Northern Europe (average)	28,9	32,7	39,7	37,4
Central Europe (average)	30,0	29,7	31,9	6,3
Southern Europe (average)	31,2	36,2	43,2	38,5

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 MS in one region. The specific countries cannot be indicated due to confidentiality reasons.
Source: CEPS, calculations based on questionnaires

On average, the 5 operators in Southern Europe pay the highest price for natural gas. They already did in 2010, but also faced a considerable increase in the period 2010-2012 (+38.5%), compared to the moderate one observed in the 3 plants in Central Europe (+6.3%).

In terms of components, the energy component is the major driver of natural gas prices in the 13 sampled plants. Over the period examined and for the whole of the sample examined, it has increased by 42%, from 26.4 to 37.5 €/MWh. Such evolution, accompanied by a decreasing impact of the other components in absolute terms, has implied a significant increase of the relative impact of the energy component on the overall price, which has gone from 87% to 95%.

Figure 20 Components of the natural gas bills paid by the 13 sampled bricks and roof tiles producers in Europe (€/MWh)

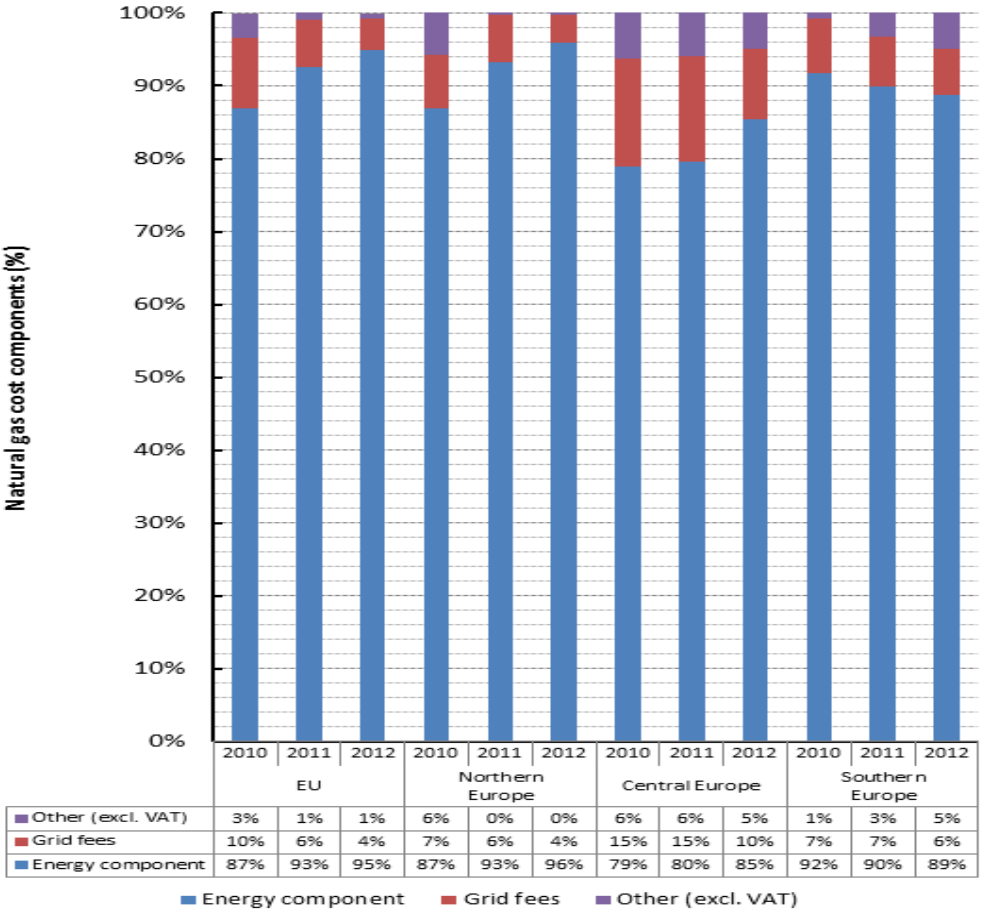


Source: CEPS, calculations based on questionnaires.

While an increase in the energy component can be observed in all regions and in particular in Northern and Southern Europe (5 plants in each of the two regions), Southern Europe was characterized by an increase also in the other two components, that is grid fees and non-recoverable taxes, which went up by 22% and by a factor of 9.5%, respectively.

As a share of total price of natural gas, grid fees in 2012 have the largest share in the 3 plants in Central Europe (10%) followed by the 5 plants in Southern and the 5 plants in Northern Europe (6% and 4%, respectively).

Figure 21 Components of the natural gas bills paid by the 13 sampled bricks and roof tiles producers in Europe (%)



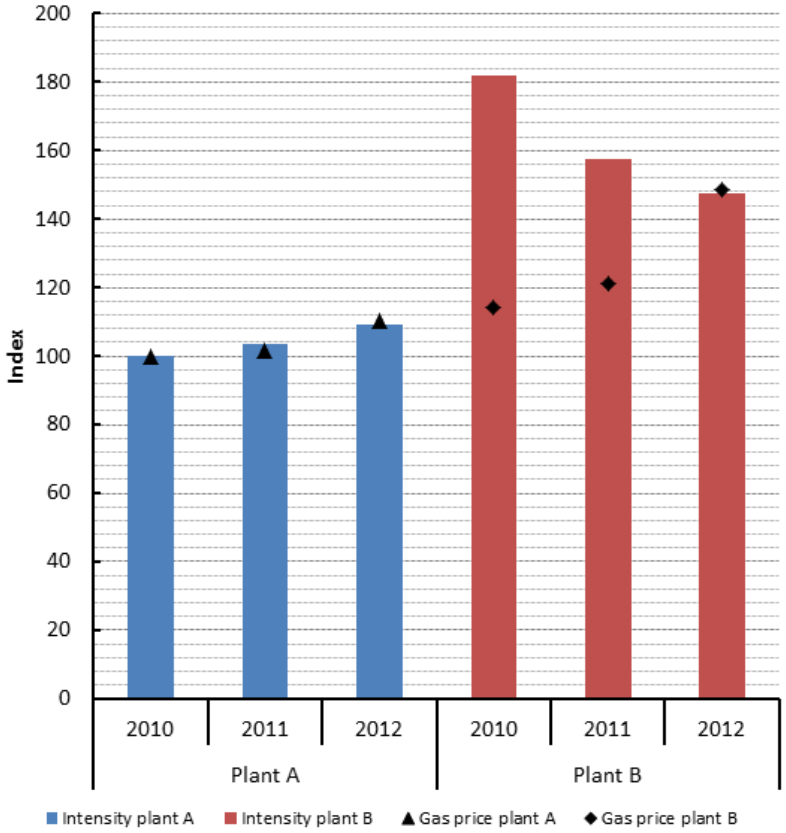
	2010	2011	2012	2010	2011	2012	2010	2011	2012	2010	2011	2012
	EU			Northern Europe			Central Europe			Southern Europe		
Other (excl. VAT)	3%	1%	1%	6%	0%	0%	6%	6%	5%	1%	3%	5%
Grid fees	10%	6%	4%	7%	6%	4%	15%	15%	10%	7%	7%	6%
Energy component	87%	93%	95%	87%	93%	96%	79%	80%	85%	92%	90%	89%

Source: CEPS, calculations based on questionnaires

As indicated in the description of the methodology (Annex 2), case studies also looked at the issue of gas and/or electricity intensity for the sampled plants. In particular, the most and the least efficient plant of the sample - in terms of one or the other energy input - are compared in terms of gas or electricity price.

In the case of bricks and roof tiles, the efficiency gap between the most and least efficient plant (plant A and B, respectively) has been reducing between 2010 and 2012, while the differential in the gas price paid increased considerably. General conclusions cannot be drawn but it seems clear that, under current conditions, potential efforts from plant B to further reduce its gas intensity and get closer to best performers in the sector would not allow addressing the clear competitive disadvantage represented by far higher gas prices.

Figure 22 Natural gas intensity and natural gas prices of two plants (indexed values)



Source: CEPS, calculations based on questionnaires. Lowest value = 100.

1.2.2.2. 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.

It is not possible to establish the share of the sampled plants in EU production due to the homogeneity of products, respondents reported production volumes using different units or did not disclose production volumes.

Table 6 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

Data collected from the 12 sampled plants shows that the average price of natural gas paid by the sampled producers of wall and floor tiles has increased by 27% between 2010 and 2012, from 25.0 to 31.7 €/MWh.

The spread between the lowest and the highest price paid by the 12 respondents in the sample has diminished, going from 11.3 to 10.2 €/MWh although the price range that plants in the sample faced moved upwards - in particular the lower prices paid by some operators increased faster – associated to an increasing gap of prices paid by different operators.

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

Table 7 Descriptive statistics for natural gas prices paid by 12 sampled EU producers of wall and floor tiles (€/MWh)

Natural Gas price (€/MWh)	2010	2011	2012	% change 2010-2012
EU average	25,0	26,2	31,7	26,8
EU minimum	21,0	23,1	27,6	31,4
EU maximum	32,3	35,3	37,8	17,0
Central and Northern Europe (average)	25,7	23,8	28,7	11,7
South-Western Europe (average)	25,6	29,7	34,7	35,5
South-Eastern Europe (average)	23,0	25,0	31,4	36,5

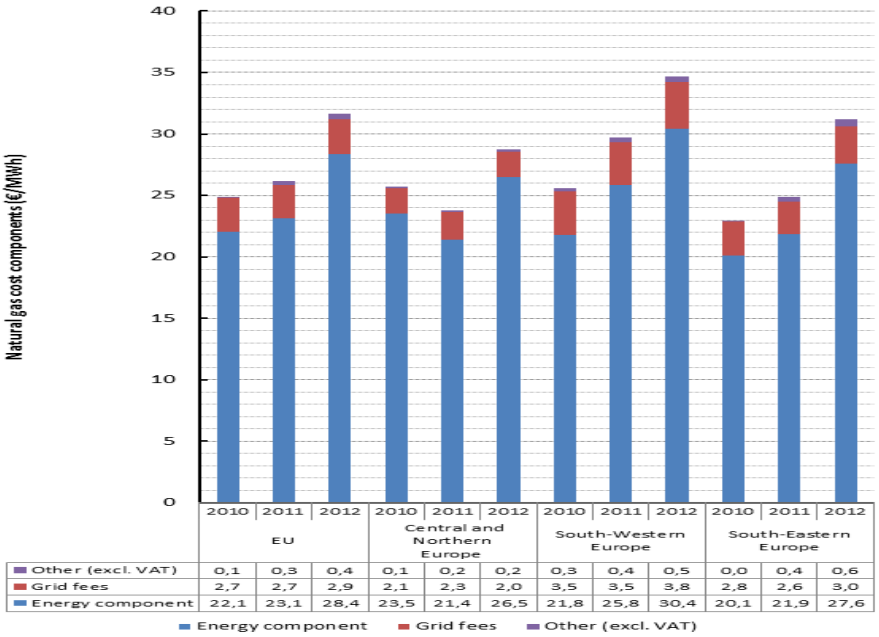
Central and Northern Europe includes 3 plants: IE, UK, BE, LU, NL, DK, DE, PL CZ, LV, LT, EE, SE, FI
South-Western Europe includes 5 plants: ES, PT, FR
South-Eastern Europe includes 4 plants: IT, SI, AT, HU, SK, HR, BU, RO, EL, MT, CY
Note that sampled plants do not come from all the MS in one region.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

On average, in 2012 the 5 operators in South-Western Europe paid the highest price for natural gas, following an increase of more than 35% since 2010. An even higher increase was

registered for the 4 operators in South-Eastern Europe (36.5%) which however were paying the lowest price in 2010.

The energy component is the major driver of the natural gas price, representing on average about 90% of the total in 2012 (28.4 €/MWh compared to 22.1 €/MWh in 2010). An increase is observed also for the other two components whose cumulated weight on total price remained nevertheless stable.

Figure 23 Components of the natural gas bills paid by the 12 sampled wall and floor tiles producers in Europe (€/MWh)



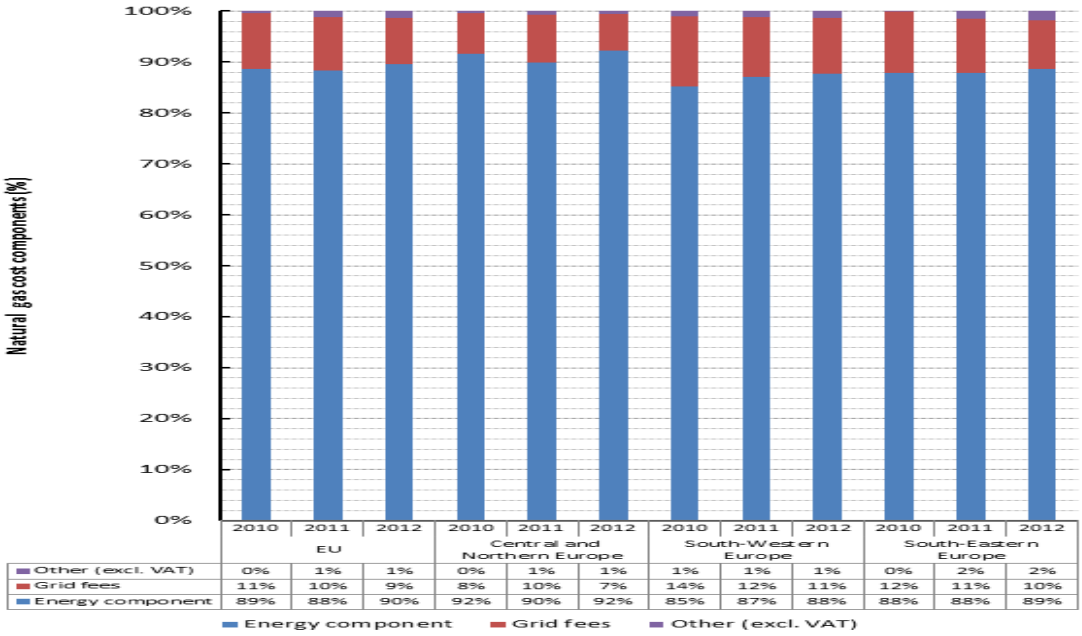
	2010	2011	2012	2010	2011	2012	2010	2011	2012	2010	2011	2012
	EU			Central and Northern Europe			South-Western Europe			South-Eastern Europe		
Other (excl. VAT)	0,1	0,3	0,4	0,1	0,2	0,2	0,3	0,4	0,5	0,0	0,4	0,6
Grid fees	2,7	2,7	2,9	2,1	2,3	2,0	3,5	3,5	3,8	2,8	2,6	3,0
Energy component	22,1	23,1	28,4	23,5	21,4	26,5	21,8	25,8	30,4	20,1	21,9	27,6

Source: CEPS, calculations based on questionnaires.

An increase in the energy component can be observed in all regions assessed and in particular in South-Western and South-Eastern Europe (39% and 37%, respectively as accounted for by 5 and 4 plants, respectively) which is clearly the main driver of the sustained increase in the overall price for the two regions discussed above.

As indicated in the description of the methodology adopted, case studies also looked at the issue of gas and/or electricity intensity for the sampled plants. In particular, the most and the least efficient plant of the sample - in terms of one or the other energy input - are compared together with the gas or electricity price they pay.

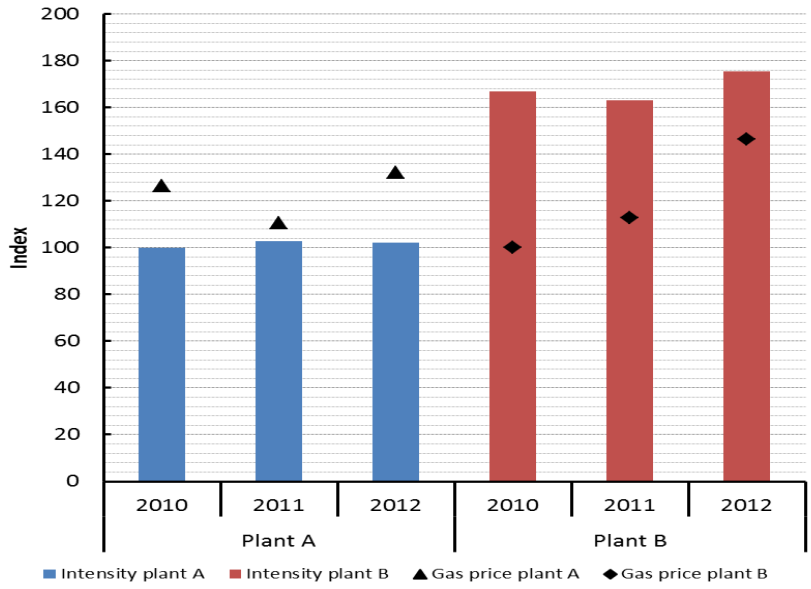
Figure 24 Components of the natural gas bills paid by the 12 sampled wall and floor tiles producers in Europe (%)



Source: CEPS, calculations based on questionnaires.

In the case of wall and floor tiles, the efficiency gap between the most and least efficient plant in the sample of 12 plants (plant A and B, respectively) has slightly increased between 2010 and 2012, while the differential in the gas price paid decreased. As for the other case studies, general conclusions cannot be drawn but the data suggests that, under current conditions, increasing gas prices equally affect best and lest performers in the sector and reduce the advantages associated to increased energy efficiency.

Figure 25 Natural gas intensity and natural gas prices of two plants producing wall and floor tiles (indexed values)



Source: CEPS, calculations based on questionnaires. Lowest value = 100.

1.2.2.3. 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 represent about 19% of European production.

Table 8 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

Data collected shows that the average price of natural gas paid by the 10 sampled producers of float glass has increased by 28% between 2010 and 2012, from 23.7 to 30.3 €/MWh. The spread between the lowest and the highest price has also increased, going from 9 to 12 €/MWh, reflecting increasing disparities between operators in the sample.

Starting from very close levels in 2010, different geographical regions have all registered an increasing trend, which determined new relative positions in 2012. In particular, the increase was particularly sustained in the 4 plants in Southern and Eastern Europe (40% and 37.4%, respectively).

Table 9 Descriptive statistics for natural gas prices paid by the 10 sampled EU producers of float glass (€/MWh)

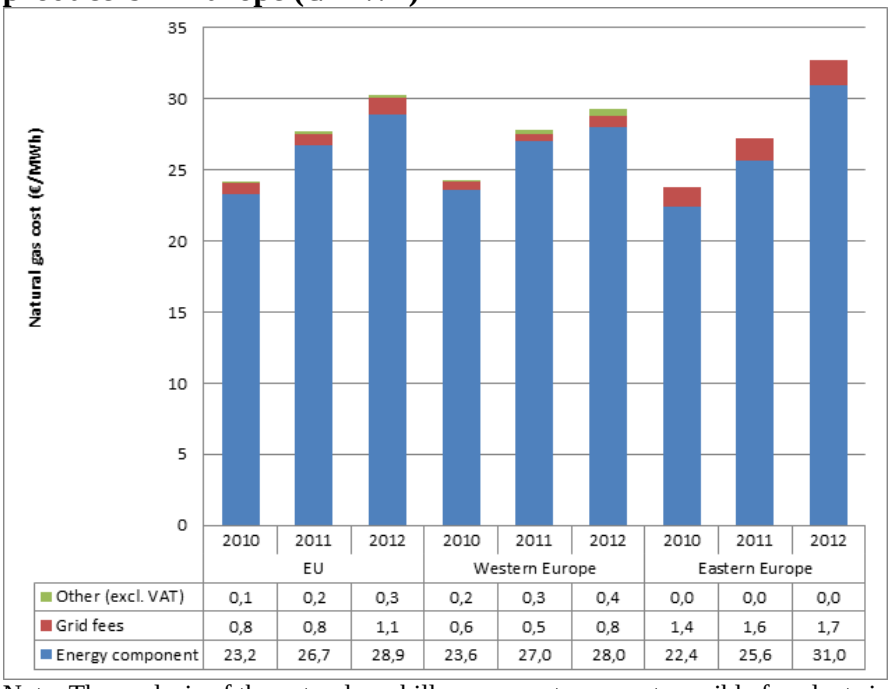
Natural gas price (€/MWh)	2010	2011	2012	% change 2010-2012
EU average	23.7	27.3	30.3	27.8
EU minimum	19.0	23.8	24.4	28.4
EU maximum	27.6	31.6	36.5	32.2
Western Europe (average)	23.6	27.3	28.7	21.6
Southern Europe (average)	23.7	27.7	33.2	40.1
Eastern Europe (average)	23.8	27.2	32.7	37.4

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

As with other sub-sectors assessed, the energy component represents the major driver of natural gas prices of the 10 float glass producers, accounting for about 95%. Between 2010 and 2012 this component has increased by 24%, from 23.3 to 28.9 €/MWh. Several plants in the sample declared that the major price driver in their gas contract was the rise in oil price as their natural gas prices are linked to the price of oil. The major increase of the energy component is observed for the 2 plants in Eastern Europe (38%). The impact of other components, although still marginal in absolute terms, has also increased. In particular grid

fees have increased from 0.80 to 1.09 €/MWh, while other non-recoverable taxes and levies have increased from 0.11 to 0.28 €/MWh.

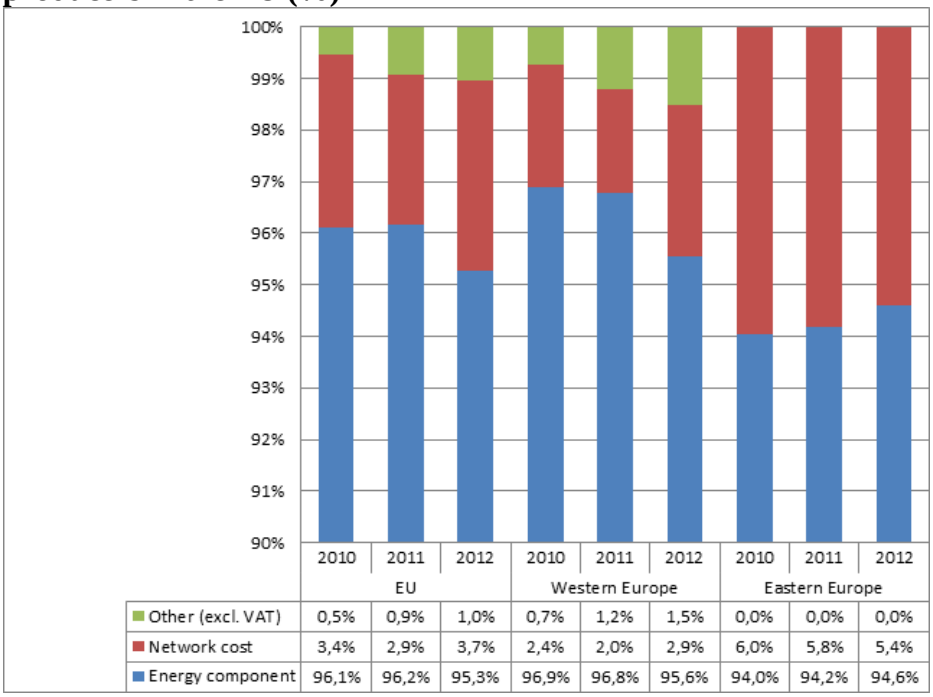
Figure 26 Components of the natural gas bills paid by the 10 sampled float glass producers in Europe (€/MWh)



	2010	2011	2012	2010	2011	2012	2010	2011	2012
	EU			Western Europe			Eastern Europe		
Other (excl. VAT)	0,1	0,2	0,3	0,2	0,3	0,4	0,0	0,0	0,0
Grid fees	0,8	0,8	1,1	0,6	0,5	0,8	1,4	1,6	1,7
Energy component	23,2	26,7	28,9	23,6	27,0	28,0	22,4	25,6	31,0

Note: The analysis of the natural gas bill components was not possible for plants in Southern Europe.
Source: CEPS, calculations based on questionnaires.

Figure 27 Components of the natural gas bills paid by the 10 sampled float glass producers in the EU (%)



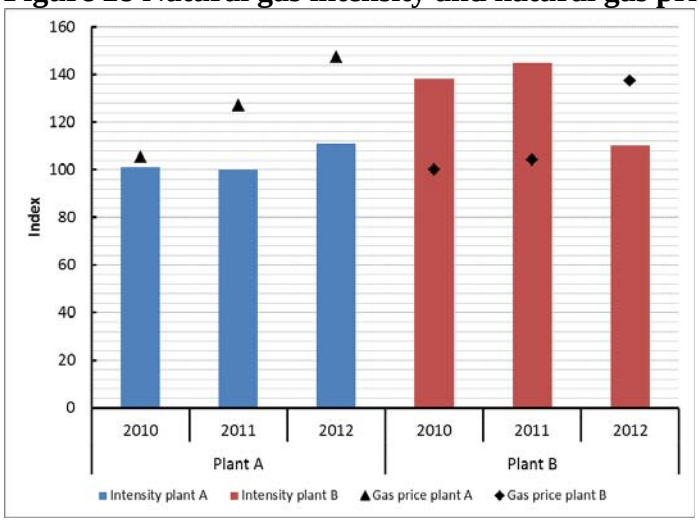
	2010	2011	2012	2010	2011	2012	2010	2011	2012
	EU			Western Europe			Eastern Europe		
Other (excl. VAT)	0,5%	0,9%	1,0%	0,7%	1,2%	1,5%	0,0%	0,0%	0,0%
Network cost	3,4%	2,9%	3,7%	2,4%	2,0%	2,9%	6,0%	5,8%	5,4%
Energy component	96,1%	96,2%	95,3%	96,9%	96,8%	95,6%	94,0%	94,2%	94,6%

Note: The analysis of the natural gas bill components was not possible for plants in Southern Europe.
Source: CEPS, calculations based on questionnaires.

Case studies also looked at the issue of gas and/or electricity intensity for the sampled plants. In particular, the most and the least efficient plant of the sample - in terms of either electricity or gas - are compared in terms of the gas or electricity price they pay.

In the case of float glass, the efficiency gap between the most and least efficient plant in the sample of 10 plants (plant A and B, respectively) decreased between 2010 and 2012 and the same level of efficiency could be observed at the end of the period. As for the other case studies, general conclusions cannot be drawn but data suggests that, under current conditions, increasing gas prices equally affect best and worst performers in the sector and reduce the monetary advantages associated to increased energy efficiency.

Figure 28 Natural gas intensity and natural gas prices of two plants (indexed values)



Source: CEPS, calculations based on questionnaires. Lowest value = 100.

1.2.2.4. 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, which represent a total of about 27% of EU production capacity. The 10 plants are located in 10 different member states.

Table 10 Number of questionnaires used in the case study

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

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.

Natural gas is the predominant fuel used by the 10 sampled plants, for which it accounts for about 90-94% of total energy costs. Data collected show that the average price of natural gas paid by the sampled producers of ammonia has increased by 41% between 2010 and 2012, from 22.2 to 31.2 €/MWh.

The gap of prices paid by sampled producers has also increased. Sustained price increase can be observed in all the geographical regions defined, in particular in Eastern and Southern Europe (49% and 48%, respectively), with the latter one resulting to be the region with the highest price in all three years assessed.

As regard the different price components, the energy part constitutes the major part of the price, accounting for more than 95% of the total price of the 10 sampled plants. Between 2010 and 2012, the energy component increased on average for the whole sample by 42%, from 21.2 to 30.1 €/MWh, and even more for the operators in Eastern Europe (+54%). The share of other components in the total price for the 10 sampled plants is relatively limited and as in the case of grid fees even decreasing (from 4% to 2.4%).

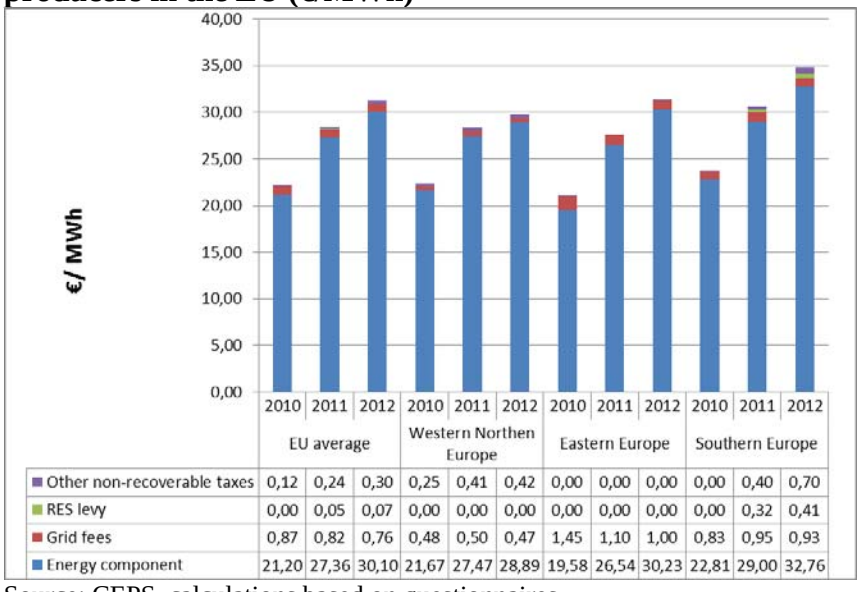
Table 11 Descriptive statistics for natural gas prices paid by the 10 sampled EU producers of ammonia (€/MWh)

Natural gas price (€/MWh)	2010	2011	2012	% change 2010-2012
EU average	22.2	28.5	31.2	40.5
Western-Northern Europe (average)	22.4	28.4	29.8	33.0
Southern Europe (average)	23.6	30.7	34.8	47.5
Eastern Europe (average)	21.0	27.6	31.2	48.6

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.

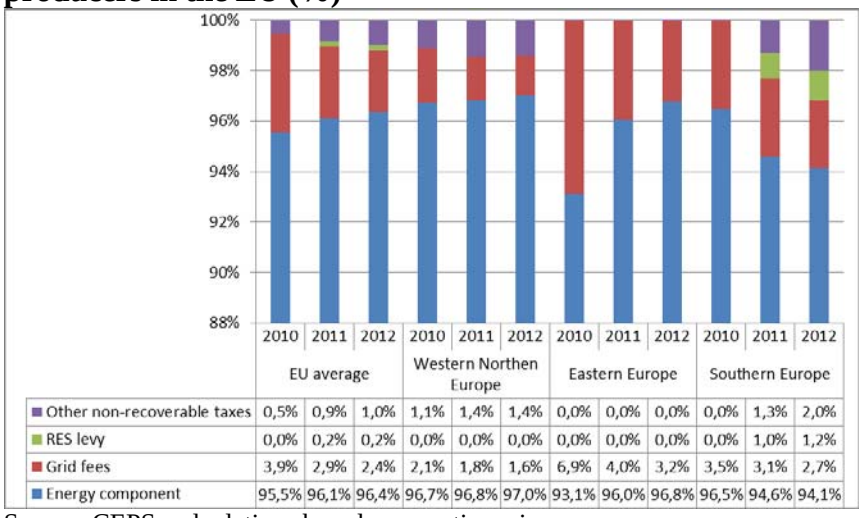
The comparison between regions does not reveal particular differences but for the fact that, as from 2011, the plants in Southern Europe are the only ones that pay a RES levy, although this still represents a very limited share of total price (around 1%).

Figure 29 Components of the natural gas bills paid by the 10 sampled ammonia producers in the EU (€/MWh)



Source: CEPS, calculations based on questionnaires.

Figure 30 Components of the natural gas bills paid by the 10 sampled ammonia producers in the EU (%)



	2010	2011	2012	2010	2011	2012	2010	2011	2012	2010	2011	2012
	EU average			Western Northen Europe			Eastern Europe			Southern Europe		
Other non-recoverable taxes	0,5%	0,9%	1,0%	1,1%	1,4%	1,4%	0,0%	0,0%	0,0%	0,0%	1,3%	2,0%
RES levy	0,0%	0,2%	0,2%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	1,0%	1,2%
Grid fees	3,9%	2,9%	2,4%	2,1%	1,8%	1,6%	6,9%	4,0%	3,2%	3,5%	3,1%	2,7%
Energy component	95,5%	96,1%	96,4%	96,7%	96,8%	97,0%	93,1%	96,0%	96,8%	96,5%	94,6%	94,1%

Source: CEPS, calculations based on questionnaires.

Case studies also looked at the issue of gas and/or electricity intensity for the sampled plants. In particular, the most and the least efficient plant of the sample of 10 plants - in terms of one or the other energy input - are compared together with the gas or electricity price they pay. In the case of ammonia, the comparison suggests no relation between efficiency gains and price levels.

Figure 31 Natural gas intensity and natural gas prices of two plants (indexed values)

Source: CEPS, calculations based on questionnaires. Lowest value = 100.

1.2.2.5. 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.

Table 12 Number of questionnaires used in the 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 steel cumulative cost assessment study[24]

For each technology[25], sampled plants had different capacity in order to reflect a distribution similar to that of the steel making universe.

Most steel makers are large gas consumers. Large BOF integrated plants producing flat products included in the sample, i.e. the vast majority of European BOF plants, consume between 1 and 1.5 mln MWh of natural gas per year, most of it in the rolling facilities. EAF and rolling facilities included in the sample consume between 450 and 700 thousands MWh of natural gas per year.

The prices of natural gas paid by the 14 sampled steel producers were on the rise throughout the entire observation period. Data collected show that the average price of natural gas paid by these sampled producers went up by 32% from 24.4 to 32.2 €/MWh between 2010 and 2012. Different geographical regions have all registered an increasing trend although of different intensity, as can be seen from the table below:

[24] http://ec.europa.eu/enterprise/sectors/metals-minerals/files/steel-cum-cost-imp_en.pdf
[25] See technology explanations, abbreviations and representation in the sample in section **Error! Reference source not found.**.

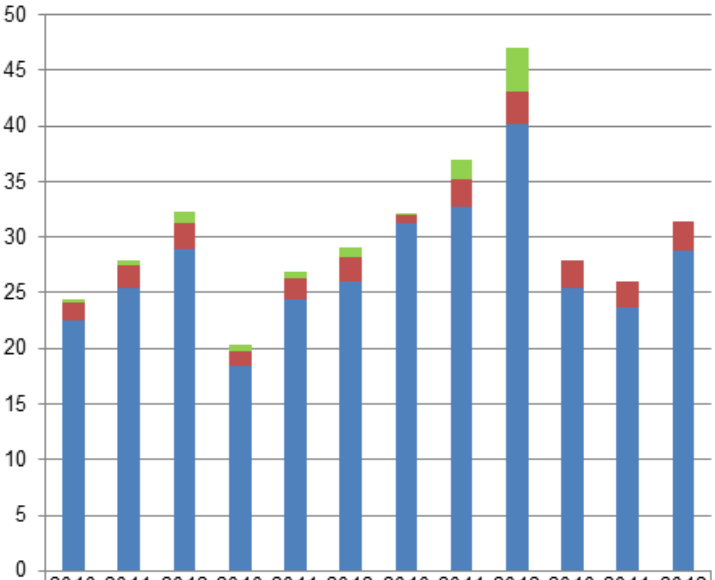
Table 13 Descriptive statistics for natural gas prices paid by 15 sampled EU producers of steel (€/MWh)

Natural Gas price (€/MWh)	2010	2011	2012	% change 2010-2012
EU (average)	24,4	27,8	32,2	32,0
EU (minimum)	17,8	23,0	26,6	49,4
EU (maximum)	35,4	47,9	59,1	66,9
Central and Eastern EU (average)	27,6	26,1	31,3	13,4
Southern EU (average)	32,0	36,7	47,2	47,5
North-Western EU (average)	20,2	26,7	28,9	43,1
BOF Average	24,4	26,2	30,8	26,2
EAF Average	24,0	28,6	32,6	35,8

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.

In terms of components, the energy part is the major driver of natural gas prices for the 14 sampled plants in Europe (one respondent provided data on price trends, but not on components). Over the period examined, for the sampled plants it has increased by about 28%, from 22.5 €/MWh, to 28.9 €/MWh. The share of energy in the total price paid by the sampled plants in 2012 was down to 89%, compared to 92% in 2010, while other components increased. The strongest increase was observed in other non-recoverable taxes, which increased by a factor of 2.3 (from 0.3 to 1.0 €/MWh), although their weight in total price remained relatively limited (around 3%), also in comparison to network costs which represent about 8%.

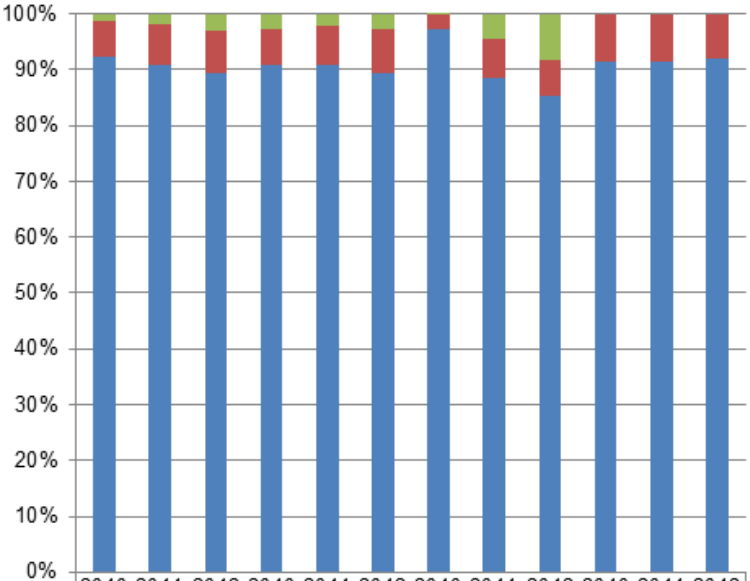
Figure 32 Components of the natural gas bills paid by 14 steel producers in the EU (€/MWh)



	2010	2011	2012	2010	2011	2012	2010	2011	2012	2010	2011	2012
	EU			North-West			South			Center-East		
Other Taxes	0,3	0,5	1,0	0,5	0,6	0,8	0,0	1,7	3,9	0,0	0,0	0,0
Network Costs	1,6	2,1	2,5	1,3	1,8	2,3	0,8	2,5	3,0	2,4	2,3	2,5
Energy Component	22,5	25,4	28,9	18,4	24,4	26,0	31,2	32,8	40,1	25,5	23,7	28,9

Source: CEPS, calculations based on questionnaires.

Figure 33 Components of the natural gas bills paid by 14 steel producers in the EU (%)



	2010	2011	2012	2010	2011	2012	2010	2011	2012	2010	2011	2012
	EU			North-West			South			Center-East		
Other Taxes	1%	2%	3%	3%	2%	3%	0%	5%	8%	0%	0%	0%
Network Costs	7%	7%	8%	6%	7%	8%	3%	7%	6%	9%	9%	8%
Energy Component	92%	91%	89%	91%	91%	89%	97%	89%	85%	91%	91%	92%

Source: CEPS, calculations based on questionnaires.

1.3. Chapter conclusions

- The retail segment is an essential element of the internal energy market (IEM) and ensuring conditions for fair competition and transparent price mechanisms on that segment is a necessary step in completing the IEM.

- The **progress on achieving a functioning retail market for electricity and natural gas** in the EU **has so far been difficult**. **Persistent divergences across Member States remain** with few indications that prices may align in the near future.

- **Strong factors are slowing down the completion of the retail IEM**: the relative share of non-market elements in the end consumer bill is growing; the majority of final consumers are still under the non-competitive offer of the incumbents; the perceived complexity of bills and pricing schemes dampens demand response; too many Member States still practice regulated prices over large group of consumers which in turn brings such undesirable effects as cross subsidization, the accumulation of tariff deficits and creating barriers to entry as the regulated benchmarks acts as an anchor to competitive commercial offers. **Coordinated EU action may prove to be the most efficient tool to mitigate those factors**.

- The end consumer bill can be schematically broken down by 3 sub aggregates: energy, network and taxation. **In the case of electricity**, the **energy element** followed broadly developments on the wholesale markets, although the recent wholesale price decreases have only partly translated into retail prices. It remained stable on average, registering a 3% decrease for the median industrial consumer and a 7% increase for the households. It turns out that the element that can be directly linked to the operation of the IEM **was the one that was least affected by price increases**. However, its relative share in the final energy bill decreased from 46% to 42% for the domestic consumers in the last 5 years[26].

- Costs related to the **network component** increased by 18% - 30% for consumers. Grid maintenance and development were among the driving factors for the transmission-related costs. The work of ENTSO-E, especially the TYNDP, has done much to improve the understanding on the different elements and the comparability of different costs across Member States. Yet, the transmission-related costs are only a minor part of the network component as the greater share of that element goes to cover expenses on the distribution grid. **There is room for improving the cooperation of DSOs in Europe** much in line to what has been done on the TSO level; as a minimum the visibility of that price component should be improved, perhaps by applying harmonised accounting standards.

- The **taxation and levy element** was a strong driver both for industrial and household consumers: in 5 years (2008 – 2012) it grew by more than 120% and 30% respectively. The energy taxation policy is a national competence, but a certain degree of harmonisation is provided through the EU energy tax directive. Yet, **with regards to the energy- policy related instruments** in forms of various charges and levies, especially those introduced to respect commitments to the 20-20-20 targets**, there may be a case of sharing best practices and learning from the experience of other Member States**. The design of these instruments and their optimal use should make sure that consumers are not overburdened beyond the targets.

[26] The figures for industrial consumers were 67% and 55% respectively.

- As a rule, prices of **natural gas** were more stable than those of electricity, registering modest increases in the range of 5-10% at the EU level from 2008 to 2012. Yet, the same dispersed picture of specific Member State cases emerges as for electricity, so in some cases it is difficult to generalise. Natural gas tends to be more expensive in the new Member States, especially when prices are measured in purchasing power standards. These countries can reduce the negative impacts of high gas prices on competitiveness and household expenditure by more grid integration, by the introduction of internal market rules and by establishing a more diversified portfolio of suppliers and routes.

- The **energy and supply component** of the retail price for natural gas remained stable. Between 2008 and 2012 on average for industrial consumers the energy component increased by less than 0.5% and for households increased by 4.6%. During the observed period its relative share declined from 70% to 68% (industrial consumers) and from 59% to 56% (household consumers). As in the case of electricity, the broad EU numbers conceal a wide range of variation for the retail gas prices across Member States and across types of consumers.

- Cost items related to the **network component** of the end consumer bill for natural gas increased by 10-15% from 2008 to 2012; as a result, its relative share increased by a percentage point from 11% to 12% (industrial consumers) and from 20% to 21% (household consumers). Based on the available data, it was not possible to break down the costs on transmission and distribution and to estimate how much is attributable to maintenance and grid development. Transparency on these elements should be improved, as well as on the methodologies used by NRAs to estimate investment and operating costs and to define rates of return on this regulated activity. There is a room of improving the cooperation of DSOs in Europe, similar to what was done on the transmission level.

- Over the period 2008 – 2012 increases in the **taxation component** were in the range of 12-14%, significantly lower than the rates observed in electricity. The relative share of tax-related elements in the tax registered a marginal increase (from 18% to 20% for industrial consumers and from 22% to 23% for household consumers).

- In addition to the analysis of statistical data on electricity and gas retail prices, in-depth analysis of **price data at plant level** in a selection of energy intensive industrial sectors through case studies indicated that electricity and gas prices were on the rise in the period 2010-2012. The general trend results from the combination of increasing prices, although at highly variable speed, registered in all regional samples, and in some cases widening price differentials could be observed between the regions.

- Network fees, taxes and levies, including support schemes for renewables were identified as drivers for the electricity prices in the surveyed plants whereas the energy component remained stable and on comparable level across regions. Gas prices were influenced by energy and supply costs which, based on the sector and regions assessed, varies between 80% and 97%. The registered increase in gas prices was mostly linked to increased commodity price and indexation of gas to oil price. With taxes, levies and network charges having a negligeable impact on the price dynamics.

- The case studies indicate that the dynamics of price increases varied across industrial sectors and across Member States of the EU (presented in this report as regions for

confidentiality reasons) and that important differences remain in the price levels of electricity and gas paid by plants in the same industrial sector but located in different Member States.

- These intra-EU electricity and gas price differentials indicate real locational advantages, but also suggest there may be a scope for improving procurement practices by industry, as well as for Member States to increase efforts in completing the internal market and in ensuring the cost effectiveness of policies financed through electricity and gas prices.