A European comparison of electricity and gas prices for large industrial consumers

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Final report

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1. Executive Summary

1.1. Executive Summary – English

In this report, we compare energy prices for four industrial consumers (three electricity, one gas) between Belgium and four other countries: Germany, the Netherlands, France and the United Kingdom. When relevant, results are not presented on a countrywide basis but rather on a regional basis. The comparison looks at three components of the bill: commodity cost, transport cost and all other costs: taxes, levies, certificate schemes.

General hypotheses are adopted and their application across different countries is carefully described in order to maximize the objectivity of the comparison. Energy costs are analysed from the bottom-up, and the different price components are described in a detailed way in order to offer a clear view the origins of the observed results.

In terms of electricity, this report highlights a great deal of complexity as a consequence of government intervention aiming at reducing electricity costs for some categories of large industrial consumers. These interventions are specifically targeted at the second (transport costs) and third component (taxes, levies, certificate schemes).

While the United Kingdom is an (expensive) outlier for all electricity profiles, Germany offers the lowest and the highest possible electricity cost for every profile under review. The application of several tax and transport cost reductions in Germany depends on a host of very specific economic and geographic criteria, which obliges us to present the result in terms of a fairly large range of possibilities.

Commodity cost makes up for a more important part of the gas bill than the electricity bill, but its impact on the differences between countries is larger for electricity than for gas. France and Germany have a sizeable competitive advantage on the other countries in terms of electricity commodity cost, while gas market prices are largely identical across the observed countries (except for the southern part of France).

For gas prices, the differences observed between countries are smaller than for electricity, as are the ranges of possibilities within countries. We observe considerably less complexity and government intervention with regards to taxes and transport costs.

In terms of Belgian competitiveness, general conclusions are mixed. For large industrial baseload consumers, Belgium has a low competitiveness score: it is only certain to offer more competitive prices than the United Kingdom. For (smaller) industrial peakload electricity consumers, the picture is more nuanced with important differences between the three Belgian regions. When connected at lower voltage levels, industrial peakload consumers in the Brussels and Flemish regions are relatively well-positioned compared to the other countries, while the Walloon region offers a substantially higher cost. When connected at higher voltage levels, the same conclusions can be drawn for industrial peakload consumers, but with less outspoken differences between the regions. For industrial gas consumers, Belgium offers the lowest cost of all countries studied in this report.

1.2. Executive Summary – Nederlands

In deze studie worden de energieprijzen voor vier industriële verbruikers (drie in elektriciteit en één in aardgas) vergeleken in België en vier andere landen: Duitsland, Nederland, Frankrijk en het Verenigd Koninkrijk. Wanneer dat relevant is, worden de resultaten niet op nationale basis gepresenteerd, maar wel in zones. De vergelijking behandelt de drie componenten van de eindfactuur: de commodity, het transport en alle andere kosten: belastingen, toeslagen en certificaatsystemen.

Met als doel om een zo objectief mogelijke vergelijking te realiseren worden een aantal algemene hypotheses aangenomen en de toepassing ervan wordt zorgvuldig beschreven. De totale energiekost wordt volledig opgebouwd van aan de basis, waarbij de verschillende componenten in detail beschreven worden om een duidelijk zicht te houden op de oorsprong van de eindresultaten.

Voor elektriciteit stelt dit rapport een grote complexiteit vast als gevolg van overheidsinterventies die erop gericht zijn de elektriciteitskost voor sommige categorieën grote industriële verbruikers te verminderen. Deze ingrepen zijn specifiek gericht op de tweede (transportkost) en derde prijscomponent (belastingen, toeslagen en certificaatsystemen).

We stellen vast dat het Verenigd Koninkrijk voor de drie verbruiksprofielen voor elektriciteit duur is, terwijl Duitsland zowel de laagst mogelijke als de hoogst mogelijke elektriciteitskost biedt voor dezelfde drie profielen. Het van toepassing zijn van de verschillende verminderingen op de transportkost en de belastingen hangt immers af van een hele reeks specifieke economische en geografische criteria, waardoor wij als resultaat een relatief breed bereik aan mogelijkheden voorstellen.

De kost van de commodity heeft een groter aandeel in de eindprijs voor aardgas dan voor elektriciteit, maar speelt een meer bepalende rol voor elektriciteit. Frankrijk en Duitsland hebben een substantieel competitief voordeel op de andere landen qua commoditykost voor elektriciteit, terwijl de marktprijzen voor aardgas grotendeels gelijklopen in de verschillende landen (met uitzondering van het zuidelijk deel van Frankrijk).

Voor wat betreft aardgas zijn de verschillen tussen de verschillende landen kleiner dan voor elektriciteit, en ook het bereik aan mogelijkheden binnen de landen is kleiner. In het algemeen is de prijssamenstelling minder complex en stellen we minder overheidsinterventie vast op gebied van transportkosten en belastingen.

Voor wat betreft de competitiviteit van België zijn de conclusies gemengd. Voor grote baseload industriële elektriciteitsverbruikers heeft België een lage competitiviteitsscore: het kan enkel met zekerheid een lagere kost aanbieden dan het Verenigd Koninkrijk. Voor de kleinere industriële peakload elektriciteitsverbruikers is het besluit meer genuanceerd, met belangrijke verschillen tussen de drie gewesten. Voor industriële peakloadverbruikers aangesloten op lagere spanning zijn Brussel en Vlaanderen relatief goed gepositioneerd in vergelijking met de andere landen, terwijl Wallonië een duidelijke hogere kost heeft. Bij aansluiting op een hoger spanningsniveau zien we een gelijkaardige resultaat, maar met minder uitgesproken verschillen tussen de drie gewesten. Voor industriële aardgasverbruikers is de conclusie wel erg duidelijk: de kost in België is de laagste van alle onderzochte landen.

1.3. Executive Summary – Français

Dans ce rapport, nous menons une comparaison des prix de l'énergie pour quatre profils de consommateurs industriels (trois en électricité, un en gaz) entre la Belgique et quatre autres pays: l'Allemagne, les Pays-Bas, la France et le Royaume-Uni. Lorsque pertinent, les résultats ne sont pas présentés sur une base nationale mais sur une base régionale. La comparaison traite les trois composantes de la facture finale: le coût de la commodité, le coût du transport et tous les autres coûts: taxes, surcharges et systèmes de certificats verts et autres.

Des hypothèses générales sont adoptées et leur application est décrite de façon détaillée afin de maximiser l'objectivité de la comparaison. Le coût total de l'énergie est analysé et reconstruit à partir de zéro, tout en décrivant les différentes composantes de façon détaillée afin d'offrir une vue aussi claire que possible sur l'origine des résultats observés.

En ce qui concerne l'électricité, ce rapport met en exergue la grande complexité causée par des interventions gouvernementales qui visent à réduire le coût de l'électricité pour certaines catégories de grands consommateurs industriels. Ces interventions concernent surtout la deuxième (transport) et troisième composante (taxes, surcharges et systèmes de certificats).

Pendant que le Royaume-Uni se situe en permanence très haut (cher) dans les résultats, l'Allemagne offre à la fois la possibilité du coût le plus bas et du coût le plus haut de l'échantillon étudié. L'application des nombreuses réductions de taxes et surcharges en Allemagne dépend d'une série de critères économiques et géographiques très détaillés qui nous oblige à présenter le résultat comme une gamme de possibilités relativement large.

Le coût de la commodité représente une part plus importante du coût total pour le gaz que pour l'électricité, mais son rôle est plus déterminant en électricité. L'Allemagne et la France ont un avantage compétitif considérable par rapport aux autres pays en termes de coût de la commodité, alors que les prix sur les marchés du gaz sont généralement très similaires dans les pays de l'échantillon (hormis la partie méridionale de la France).

En ce qui concerne le gaz, les différences de prix final observées tout comme les gammes de résultats possibles sont moins grandes que pour l'électricité. Nous observons moins de complexité et d'intervention gouvernementale dans les taxes et les coûts de transport.

En ce qui concerne la compétitivité de la Belgique, les conclusions générales sont mixtes. La Belgique a un score de compétitivité bas pour les grands consommateurs d'électricité *baseload* : elle peut garantir un coût plus bas qu'un seul autre pays (le Royaume-Uni). Pour les (moins grands) consommateurs d'électricité *peakload*, la conclusion est plus nuancée, avec de grandes différences entre les trois Régions belges. En cas de connexion au réseau de transport local, les consommateurs industriels *peakload* à Bruxelles et en Flandre sont relativement bien positionnés par rapport aux autres pays, tandis que la Wallonie offre un coût substantiellement plus élevé. En cas de connexion à un niveau de tension supérieur à celui du transport local, la situation pour les consommateurs industriels *peakload* est généralement la même, mais avec des différences moins importantes entre les trois Régions. Pour les consommateurs industriels de gaz naturel, la Belgique offre le coût le plus bas de tous les pays étudiés dans ce rapport.

Introduction

2. Introduction

This report was commissioned by CREG, the Belgian federal regulator for Energy and Gas, in November 2014. In the framework of CREG's larger mission of supervising transparency and competition on the market, ensuring market conditions serve the public interest, and safeguarding consumers' essential interests, PricewaterhouseCoopers was asked to conduct a study comparing industrial energy prices in Belgium and the neighbouring countries.

The purpose of this study is to compare the gas and electricity prices, in total as well as per component, billed to large industrial consumers in the three Belgian regions (Wallonia, Flanders, Brussels capital region) with those in Germany, France, the Netherlands and Great-Britain. The focus is mainly put on the comparison of all costs that do not directly relate to the commodity cost: transport, taxes, levies, public service obligations, certificate schemes, etc…

In terms of methodology, we built up the energy cost from the bottom up, identifying three main components: the commodity price, the transport cost, and all other costs (taxes, levies and certificate schemes). These three components are analysed and compared looking at four industrial consumer profiles: two peakload industrial electricity consumers (with different connection levels to the grid), one large baseload industrial electricity consumer, and one baseload gas industrial consumer.

In terms of structure, this report first describes the dataset: the general assumptions in terms of consumer profiles and consumer behaviour, completed by an overview of the different zones identified in all five countries under review. We then move on to a detailed description of the deconstructed energy cost for gas and for electricity, carefully describing the observed regulatory framework.

In the last part of this report, we present the results per consumer profile, using a double analysis approach: how energy prices in Belgium compare to the other four countries, and how the three components of the energy price explain the observed final results. We also attach particular attention to the comparison of the second (transport costs) and third (taxes, levies, certificate schemes) components. In a general conclusion, we highlight the impact of the observed results in terms of competitiveness for Belgian industrial energy consumers.

A preliminary version of this report was submitted for review by the energy regulators of France (CRE), Germany (Bundesnetzagentur), the Netherlands (ACM) and the United Kingdom (OFGEM). This final report integrates their remarks as well as those formulated by the CREG.

Description of the dataset

3. Description of the dataset

3.1. Consumer profiles

Four consumption profiles have been defined to compare the situation between the five countries under review.

These profiles are described in the following table, and were provided by the CREG. The power sector comprises three profiles (E1, E2, E3) while the gas sector has only one profile (G1).

Profiles	E1 (Electricity 1)	E2 (Electricity 2)	E3 (Electricity 3)	G1 (Gas 1)
Annual demand	25.000 MWh	25.000 MWh	250.000 MWh	100.000 MWh
Consumption profile	Stable, 8am-6pm, work days only	Stable, 8am-6pm, work days only	Flat throughout the year (baseload)	Stable
Consumption hours/year	2.527	2.527	8.760	8.000
Connection	30-70 kV	≥ 150 kV	≥ 150 kV	
Maximum capacity	9.893 kW	9.893 kW	28.539 kW	15.000 kW

All considered profiles are built on the basis of simplifying hypotheses. The emphasis is put on the energy consumption, the consumption hours and (for electricity) the voltage level of the grid connection. Other variables, such as maximum capacity, are a function of those hypotheses.

Profiles E1 and E2 are peakload electricity consumers with an annual consumption of 25 GWh. The difference between them is the voltage level of their grid connection; while profile E1 is connected at a medium/high voltage level (the local transmission grid in Belgium), profile E2 is connected to the (very) high voltage level (the transmission grid in Belgium).

Profile E3 is a large baseload consumer with an annual consumption of 250 GWh and connected to the grid at a tension level of 150 kV or higher. While profile E3's consumption is tenfold that of profiles E1 and E2, its maximum power subscription is only three times as high as that of E1 and E2. This is caused by the peakload consumption profile of E1 and E2: they only consume electricity on week days between 8am and 6pm, which lowers their consumption hours to +/- 2500. As we will see later on in this study, this has an impact on transport tariffs that often charge part of the grid cost based on the maximum power capacity.

It is important to note that the electricity consumption profiles are assumed to have a totally predictable and flat load profile during the load period. Possible reactive energy is not taken into account, and neither are possible occasional power capacity overshootings.

Profile G1 is a large baseload gas consumer, with an annual consumption of 100 GWh and 8000 consumption hours. The maximum capacity is 15 MW and the consumer is directly connected to the gas transmission grid.

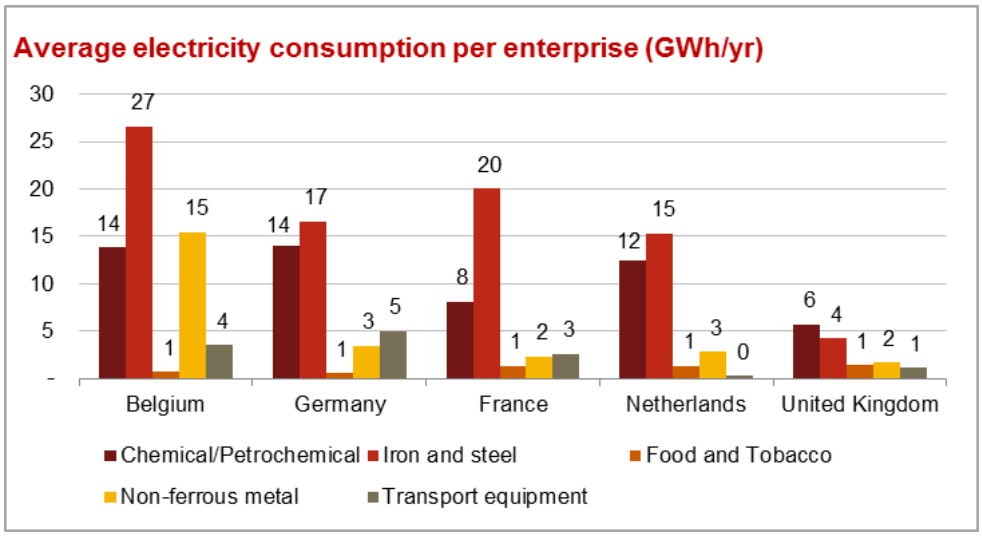
This study is based on theoretical consumption profiles in order to enable a maximal level of objectivity while comparing the different countries/zones. As a consequence they do not refer either to a specific sectoral profile.

3.2. Economic analysis of consumer profiles

Even though the consumption profiles under review are purely theoretical, it might nonetheless be clarifying to have a brief look at the economic background and possible industrial occupation of these consumers.

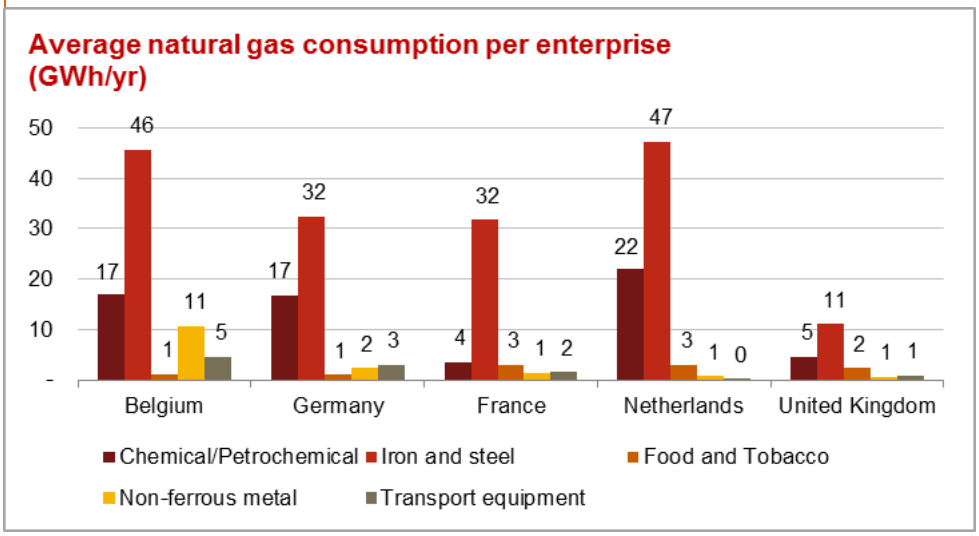
Looking at Belgian data, we can identify several agro alimentary industrial sites that broadly fit the consumption criteria (25 GWh/year) set for profiles E1 and E2. For profile E3 (250 Gwh/year), we can identify several large (but not the largest) industrial plants from the iron and steel sector, and some chemical industry. These are mere indications of what type of industrial consumer we *could* be looking at, but by no means an attempt to contain the consumer profiles we use within a certain sector.

Looking at Eurostat-data based on the NACE-categorization of industrial sectors, we observe a similar conclusion in relative terms: the largest electricity consumers can generally be found in the iron and steel and the chemical/petrochemical sectors. In absolute terms, these numbers are heavily negatively impacted by the fact the denominator is not filtered on relevance: every single enterprise with an enterprise number is absorbed in the denominator, whether it is active or not. In relative terms, however, these data give a reliable idea of which sectors of the economy harbour large energy consumers.



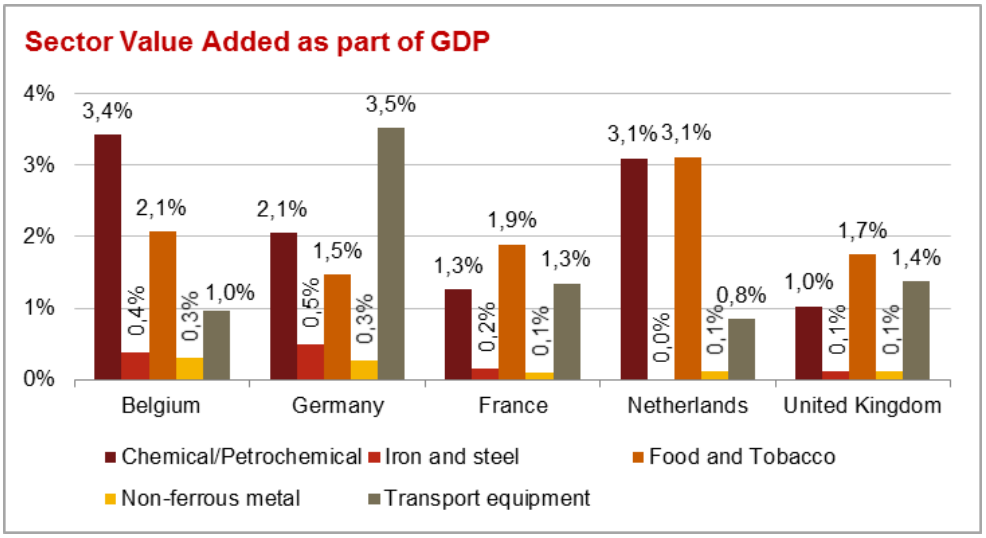
Source: Eurostat data, 2012

The iron and steel industry and the chemical/petrochemical sector show by far the highest average electricity consumption per enterprise, while the food sector (agro-alimentary included) is on average a more modest consumer. The two main electro-intensive sectors are also clearly the two sectors with the largest gas consumers.



Source: Eurostat data, 2012

In the framework of this study, the importance of these energy-intensive sectors for an economy is very useful information in assessing the impact of possible price differences on the competitiveness of an entire economy. When looking at the added value created by the sectors that we deem close to the consumer profiles under review in this study, and offsetting it against the Gross Domestic Product, we can draw some interesting conclusions.



Source: Eurostat data, 2012

First and foremost, we observe that Belgium is the country where the (electro-intensive) chemical/petrochemical sector is of the largest importance in economic terms, closely followed by the Netherlands. Germany and Belgium are the two countries where the iron and steel industry is most important compared to the economy as a whole.

Regarding less energy-intensive economic sectors, linking the consumer profiles in this study to broader economic data is a more complex issue. Nevertheless, the importance of the food and tobacco-industry in the Netherlands might indicate a relatively higher presence of consumers comparable to consumer profiles E1/E2.

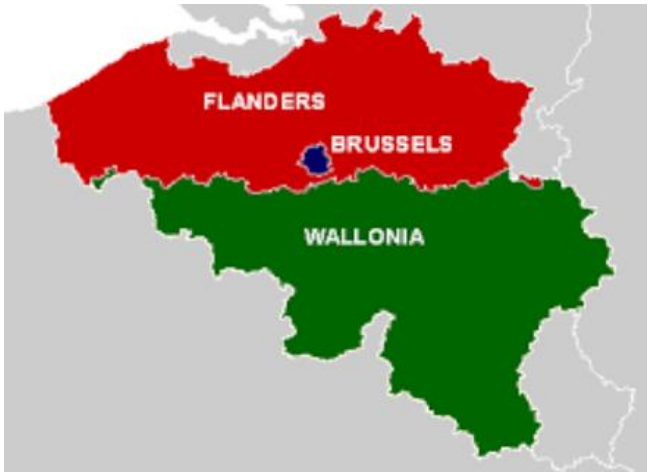
3.3. Table of acronyms

Acronym	Description
APX	Anglo-Dutch Energy exchange operating electricity spot markets in the Netherlands, the UK and Belgium
Cal	Calendar product, which is a power future on a 12-month basis
DAM	Day Ahead Market
DSO	Distribution System Operator
EEX	German energy exchange, active in Central-Europe and France
EPEX SPOT	European power exchange (partly held by EEX) operating spot and intraday markets, active in France, Germany, Austria and Switzerland
ICE ENDEX	Power derivatives exchange providing power futures for Belgium and the Netherlands
LTSO	Local Transport System Operator
Mi	Monthly, which is a power future on a monthly basis
NBP	National Balancing Point, British gas exchange
NCG	NetConnect Germany, one of the two gas market areas in Germany
PEG	'Point d'échange de gaz', gas exchange in France (PEG Nord, PEG Sud, PEG TIGF)
Qi	Quarterly, which is a power future on a three-monthly basis
TSO	Transmission System Operator
TTF	Dutch gas exchange

3.4. Electricity: Countries/zone(s) identified

Belgium

Belgium is divided in three regions, respectively Flanders, Wallonia and the Brussels Region as mapped below.



Even though commodity cost for industrial electricity consumers is assumed to be identical for the entire territory of Belgium, it is logical to analyse the three regions separately because of the existence of a double regional impact on the third price component: taxes, levies and certificate schemes.

The first impact is caused by the regional public service obligations that are a consequence of the transmission grid situation that is summarized in the table below. Elia operates as LTSO for profile E1 and as TSO for profile E2 and E3. While the same transmission tariffs apply for the three profiles, the regions can impose public service obligations on Elia on their territory for users of the 30-70 kV grid.

Voltage	Operator in charge	Operator in Belgium
< 30kV	Distribution System Operator (DSO)	Several
30 kV< x < 70 kV	Local Transmission System Operator (LTSO)	Elia in the 3 regions
> 70kV	Transmission System operator (TSO)	Elia (federal)

The second regional impact within Belgium is caused by the certificate schemes that stem from the regional competence in terms of renewable energy obligations on their territory. Flanders, Wallonia and the Brussels Capital region each impose their own green certificate scheme on all electricity consumers within their region.

Apart from looking at the Belgian case through the three regional cases, we also make several other assumptions: the three electricity consumers under review are part of an energy efficiency agreement and belong to the sectoral NACE-BEL classification codes 5-33 (all industry).

Germany

Within the German territory, consumers can take part in one single electricity market and we therefore assume that the commodity cost is equal for the whole of Germany. As to taxes, levies and certificate schemes, we observe no regional differences for electricity consumers, not even for the local taxes.[1]

On the German territory, four different TSO's are active; their corresponding geographical coverage is depicted below.

1. The *West region* which is made of Nordrhein-Westfalen, Rheinland-Pfalz and Saarland, where Amprion is the TSO.
2. The *South-West region* which is made of Baden-Württemberg where Transnet BW is the TSO.
3. The *Central region* which is made of Niedersachsen, Hessen, Bayern, Schleswig-Holstein and where Tennet operates the transmission grid.
4. The *East region* which is made of former East-Germany and Hamburg; 50 Hertz operates the transmission grid in this region.

Given the geographical and economic importance of these four zones (even the smallest one has as many inhabitants as the whole of Belgium), it is logical to treat these four zones the same way as we treat the three Belgian regions. They will hence be analysed separately.

Given the particular setup of the German electricity grid, profiles E1 and E2 will also pay a distribution cost (explained in further detail in section 4.2). As Germany counts about 870 distribution system operators[2], and as distribution and transmission tariffs are integrated (two layers presented in one single tariff), the four

[1] The Konzessionsabgabe is a local tax that applies to all electricity consumers connected to the distribution grid, but it is fixed on a national level and capped at one single rate for industrial consumers (*Konzessionsabgabenverordnung, § 1-2)*.
[2] From Distribution networks to smart Distribution systems : rethinking the regulation of European electricity DSO's, European University Institute, THINK paper topic 12, Final report, 2013, pgs. 12-13.

transmission zones remain the most relevant way of presenting the results for Germany.

France

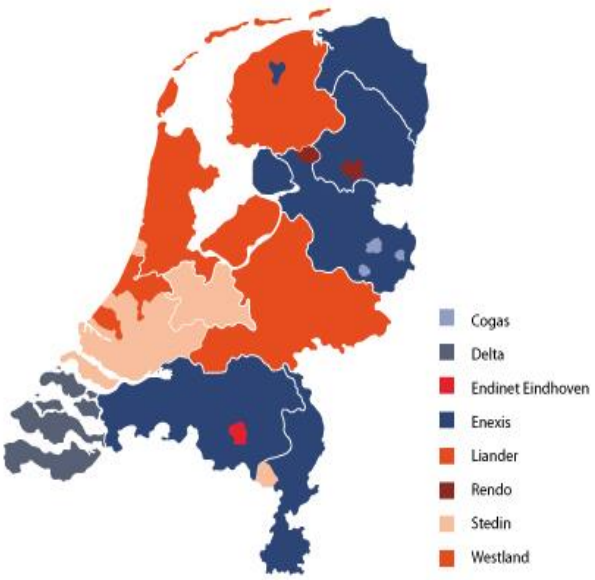
In terms of electricity market, France will be treated as one single zone. The same commodity cost, transmission tariffs and taxes and levies apply everywhere on the national territory.

The Netherlands

The Netherlands will also be treated as one single zone in this study. In terms of commodity costs and taxes, levies and certificates schemes, no regional differences are observed: there is one single electricity market and the only taxes on electricity are imposed on a national basis.

On the grid cost level, the situation is somewhat more complicated. The Netherlands counts only one TSO: Tennet. For this reason, the tariff methodology implemented is the same throughout the national transmission grid. The Dutch distribution grid, however, covers the entire grid below the 110 kV voltage level and hence profile E1 also pays distribution tariffs.

The Dutch distribution network counts eight different DSO's of different size and importance (see map below), who each apply different tariffs. As is the case in Germany, these distribution costs are integrated with transmission costs (two layers integrated in one cumulative tariff).



These DSO's are characterized by differences in size and number/type of clients. For profile E1, we will therefore present a weighted average of distribution tariffs in accordance with the amount of electricity transported by the DSO's.

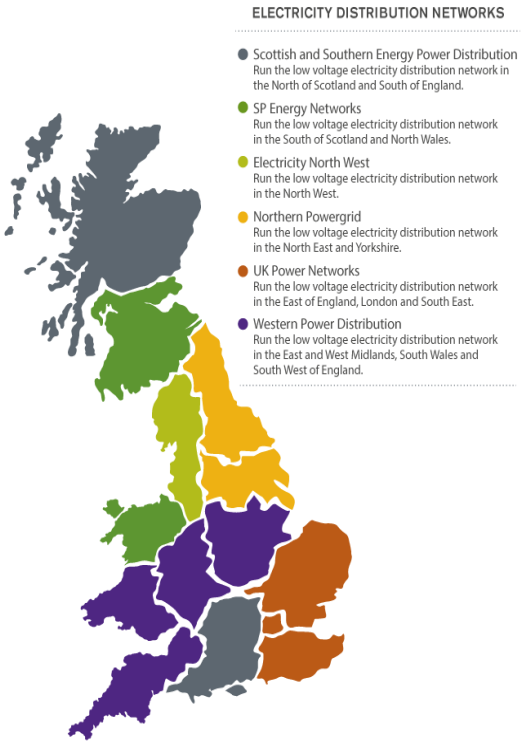
United Kingdom

As is the case for France and the Netherlands, the United Kingdom will also be treated as one single zone in this study. In terms of commodity costs and taxes, levies and certificates schemes, no regional differences are observed: there is one single electricity market and the only taxes on electricity are imposed on a national basis.

In terms of grid costs, the United Kingdom has three transmission system operators:

1. National Grid (for England and Wales);
2. Scottish Hydro Electric Transmission (SHET);
3. Scottish Power Transmission (SPT).

On top of these three transmission system operators, six distribution system operator groups are active.[3] The TSO's and DSO's all charge different tariffs in the same fourteen tariff zones in the UK (without Northern Ireland).



TSO	DSO	Zones
3	6	14
Scottish Hydro Electricity Transmission (SHE)	Scottish and Southern Energy Power Distribution	Northern Scotland
		Southern
Scottish Power Transmission (SPT)	SP Energy Networks	Southern Scotland
		North Wales & Mersey
National Grid Electricity Transmission (NGET)	Electricity North West	North West
	Northern Power Grid	Northern
		Yorkshire
	UK Power Network	Eastern
		London
		South East
	Western Power Distribution	East Midlands
		Midlands
		South Wales
		South Western

For grid costs - transmission tariffs for profile E3, transmission and distribution tariffs for profiles E1 and E2 - we will hence present average values for all fourteen zones.

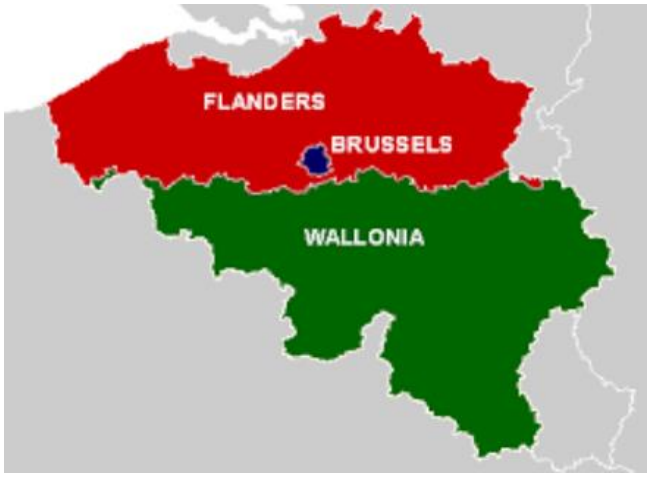
As to taxes and levies, we assume that industrial consumers considered in this study are all part of a Climate Change Agreement.

[3] In addition to these large DSO's, the UK also has some smaller Independent Network Operators (IDNO's). These are not taken into account in this study.

3.5. Gas: Countries/zone(s) identified

Belgium

In terms of commodity cost and transport cost, no regional differences are observed in Belgium. The same commodity prices on the gas market are available to all consumers, and Belgium counts only one Transmission system operator: Fluxys Belgium. About 230 clients are directly connected to the transmission system, and profile G1 is assumed to be part of this group of directly connected clients.[4]



In terms of taxes and levies, however, some (very) small differences exist between regions. This is why we present the results for Belgium in the same way as we did for electricity: a separate analysis for Wallonia, Flanders and the Brussels capital region.

Germany

The only component of the gas price for our profile under review that does not show any regional differences is the taxes and levies component.

In terms of commodity price, Germany has two market areas: (*Gaspool* and *Netconnect Germany)* and twelve different transmission system operators. Each of them is mainly active in one market area, but some of them are active in both.

[4] None of these clients directly connected to the transport grid is located in the Brussels Captial Region.

1. In the *Gaspool* area, the following operators are active: Gascade, GTG Nord, OntrasGastransport GmbH, Jordgas Transport, Nowega, Gasunie.
2. *NetConnect Germany (NCG)* counts the following TSO's in its area: Bayernets, Fluxys Temp, GRT Gaz, Terranetsbw, Thyssengas, Open Grid Europe.

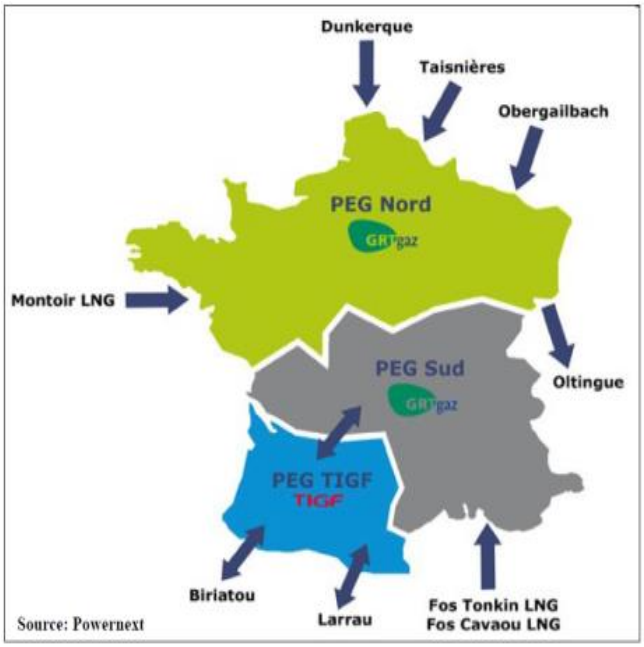
Given the fact that we observe an advanced form of convergence between the Gaspool and NCG-market prices, and given the amount of different TSO's, we will present one single result for Germany. In terms of commodity, we will present the average of Gaspool and NCG-prices. With regards to network costs, we will base the evaluation on the average of the exit tariffs of 12 TSO's serving directly connected industrial clients.

France

France has three different market areas for gas and two different transmission system operators.

As shown on the map below, the two transmission system operators (TSO) are:

1. *GRTGaz,* operating respectively in the North of the country and in the central and South-Eastern regions.
2. *TIGF,* concentrated on the central and South-Eastern regions.



Within the GRTGaz network, we find two different gas markets: PEG Nord and PEG Sud. The third (and in traded quantity much smaller) gas market area coincides with the TIGF transmission grid.

As we observe substantial differences between the two different transport tariffs and between the commodity prices in the three market areas, we will analyse the French result by presenting three different price zones: GRTGaz/Nord (representing about 75% of gas consumption in France), GRTGaz/Sud (about 20%) and TIGF (about 5%).[5]

The Netherlands

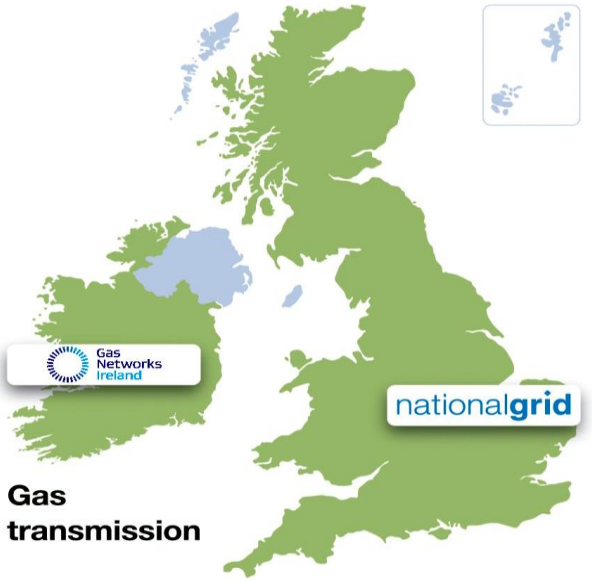
The Netherlands counts one single gas market (TTF), does not impose any regional taxes on gas, and has one Transmission System Operator: Gasunie Transport Services. About 330 industrial clients are directly connected to the gas transmission grid, and we assume profile G1 is part of this group.

We will hence, logically, present the Netherlands as one single zone.

United Kingdom

The United Kingdom will be presented as one single zone for gas in this study (leaving out Northern Ireland). There is one single gas market (NBP: National Balancing Point), there are no regional taxes, and there is one single gas transmission system operator, *National Grid Gas plc*.

[5] CRE, Marchés de gros: Observatoire des marchés de l'électricité, du gaz et du CO2, 3ième trimestre 2014.


Gas Networks Ireland
nationalgrid
Gas transmission

3.6. Summary table on number of zones per country

Country	Number of zones	
	Electricity	Gas
Belgium	3	3
Germany	4	1
France	1	3
The Netherlands	1	1
United Kingdom	1	1
Total	**10**	**9**

3.7. General Assumptions

The general assumptions, applicable to all compared consumer profiles and countries, are outlined below.

1. *October 2014*. This study gives an overview of the price levels in October 2014.
2. *Economically rational actors*. We assume that our four profiles are economically rational actors who optimise their energy cost where possible. We assume for instance that British industrial consumers are part of a Climate Change Agreement: they focus on energy efficiency and emission reduction, and obtain tax reductions at the same time.
3. *Exemptions and reductions*. In many cases, we observe the existence of (often progressive) reductions or exemptions on taxes, levies, certificate schemes or transport costs. Whenever economic criteria - such as exercising a well-defined industrial activity, or paying a certain part of your company revenue as energy cost - are used to determine the eligibility for those exemptions and reductions, we do not present one single value but a range of possibilities as result with a minimum and a maximum case.
4. *Commodity prices*. All market data in terms of commodity was provided by CREG and – where necessary – completed by PwC based on Bloomberg market indices.
5. *Transportation cost and contractual formulas*. Whenever different tariff options are available for a client, we assume that the client always opts for the most advantageous formula. Given the predictable consumption profiles of the cases under investigation, this assumption is, according to PwC, the most realistic one.
6. *Gas pressure level and caloric value*. Industrial gas consumers directly connected to the transport grid are not connected to the same gas pressure level in every country. We will consider the most plausible pressure level in every country, given the nature of the gas network and the size of the considered client profile. We also take into account the caloric value of the gas in every country.
7. *Sales margin (electricity and gas)*. Based on the input by the CREG, we count a sales margin of 0,5 €/MWh for electricity, and of 0,4 €/MWh for natural gas.
8. *Exchange rate*. For the UK comparison, we have always used the October 2014 average exchange rate to convert from Pound Sterling to Euro (0,7886 GBP/EUR).[6] The commodity cost formula was calculated entirely in Pound Sterling, and the final result converted to Euro at the October 2014 exchange rate.
9. *VAT*. Following the terms of reference provided by the CREG, we do not take into account Value Added Tax (which is tax deductible for industrial clients) in this study.
10. *UK*. Wherever this study speaks about the UK, Northern Ireland is not taken into account.

[6] Source: *National Bank of Belgium*.

Electricity: Detailed description of the prices, price components and assumptions

4. Electricity: Detailed description of the prices, price components and assumptions

4.1. Belgium

Component 1 - the commodity price

Both base and peak rates in Belgium are calculated on the basis of market prices. The national indexes used in the calculation of the baseload commodity price and the peak-load price are the ICE Endex CAL and the Belpex DAM.

The baseload commodity formula applies to profile E3, the peakload commodity formula applies to profiles E1 and E2.

The formulas used for pricing commodities in this study were provided by the CREG and are based on an analysis by the Belgian regulator of the electricity supply contracts of all Belgian consumers with an annual consumption above 10 GWh.

$$\textit{Commodity price baseload} =$$

$$47{,}1\%\ \textit{CAL}\ Y-1 + 20{,}1\%\ \textit{CAL}\ Y-2 + 7{,}1\%\ \textit{CAL}\ Y-3 + 7{,}8\%\ Qi{-}1 + 2{,}2\%\ Mi{-}1 + 15{,}7\%\ \textit{Belpex DAM}$$

$$\textit{Commodity price peakload} =$$

$$\textit{Commodity price baseload} \times \frac{\textit{weigthed average peakload price Belpex DAM}\ (38\%\ Y-1;\ 35\%\ Y-2;\ 27\%\ Y-3)}{\textit{weighted average baseload price Belpex DAM}\ (38\%\ Y-1;\ 35\%\ Y-2;\ 27\%\ Y-3)}$$

A supplier margin of 0,5€/MWh is added.

Component 2 - the transport costs

Whether connected to the transmission grid at 30-70 kV (Local Transmission System) or to the transmission network itself, the same transmission tariff structure applies to all profiles under review in this study. However, in function of the voltage connection and used capacity, different rates apply.

Transmission costs in Belgium have four components:

1. *Connection tariffs*: in this case, the study only takes into account the charges to operate and maintain the user connection;
2. *Grid use* : this cost includes (i) the power subscription for the off-take, (ii) the additional power for the off-take and (iii) the power put at disposal;
3. *Ancillary services* : this cost includes (i) reservation of primary frequency control, secondary control of the equilibrium in the Belgian control area, tertiary reserve and the black-start-service, (ii) voltage control and reactive power, (iii) supplementary deliveries of reactive energy (not taken into

account), (iv) congestion management and (v) compensation of losses of active energy in the grid ;

4. *Imbalance tariffs*, which are not taken into account in this study given the overall assumption that the load profiles are totally predictable and stable for all three consumer profiles under review.

In Belgium, *network losses* on the federal transport grid (380/220/150 kV)make for an additional and separate component of transport tariffs. They are billed by the supplier as a percentage (fixed every year by the TSO) of the commodity cost. Even though they are not part of the transmission tariff structure as such, we consider these network losses and their cost as part of component 2 (network costs). In the UK, a similar system applies (see section 4.5). In Germany, France and the Netherlands, to the contrary, network losses are covered by the transport tariff structure itself.

Component 3 - all extra costs

In Belgium, three different kinds of extra costs apply to electricity, detailed below:

1. ***Tariffs for Public Service Obligations* (PSO)**: six different public service obligations apply to the profiles under review. The two first are imposed on Elia as TSO (and hence apply to all profiles under review), the four other ones are imposed on Elia as LTSO (and hence only apply to profile E1).
   a. Financing of connection of offshore wind power generation units (0,0629 €/MWh);
   b. Financing of federal green certificates (offshore wind) (3,9132 €/MWh) but discount and cap based on quantity apply;
   c. Financing of support measures for renewable energy and cogeneration in Flanders (0,5171 €/MWh) but discount based on quantity applies (only E1);
   d. Financing measures for the promotion of rational energy use in Flanders (0,06 €/MWh) (only E1);
   e. Financing support measures for renewable energy in Wallonia (13,82 €/MWh) (only E1).
   f. Financing regional energy policies in Brussels (0,86€/kVA/month) but only due up to 5000 kVA/month (only E1).
2. ***Taxes and levies*** on the federal and on the regional level. We can identify four different taxes and levies:
   a. Federal *contribution* (2,4714 €/MWh), increased by 1,1% to pay for supplier administrative costs, no exemptions but discount and cap based on quantity apply;
   b. *Connection fee* in Wallonia (0,3 €/MWh);
   c. *Levy for occupying road network* in Brussels (3,25 €/MWh).[7]

[7] For this fee, the regional legislator introduced a cap starting January 1st 2007 (no fee due on electricity above 25 GWh/year), but the decree to make it applicable has not been issued so far. As a consequence, this ceiling is not applied in Brussels (source: *Ordonnance du 14 décembre 2006 modifiant les ordonnances du 19 juillet 2001 et du 1er avril 2004 relatives à l'organisation du marché de l'électricité et du gaz en Région de Bruxelles-Capitale et abrogeant l'ordonnance du 11 juillet 1991 relative au droit à la fourniture minimale d'électricité et l'ordonnance du 11 mars 1999 établissant des mesures de prévention des coupures de gaz à usage domestique, article 102*).

d. *Levy for occupying public domain* in Wallonia (0,34 €/MWh), which is only applicable to the local transport network (only E1);

3. **Certificate schemes and other indirect costs**. These are the indirect costs that are comprised within the electricity price, as a consequence of the regional quota for green certificates (three regions) and combined heat/power-certificates (only Flanders). Based upon the information received from CREG, we estimate the cost of certificates at 85% of the penalty a supplier has to pay for not meeting the quota. The three regions have a green certificate system for renewable energies, Flanders also has a certificate system for combined heat/power.

   a. Flanders (green certificates): the fine for non-compliance is 100 EUR/certificate. The quota increases every year. Important progressive quota reductions apply to all industrial consumers.

   b. Flanders (combined heat/power certificates): the fine for non-compliance is 41 EUR/certificate. The quota increases every year. Important progressive reductions apply to all industrial consumers.

   c. Wallonia: the fine for non-compliance is 100 EUR/certificate. The quota increases every year, and is at 23,1% of supplied electricity in 2014. Progressive quota reductions apply to large consumers, reinforced by the new regional decree that entered into force on July 1st 2014.

   d. Brussels: the fine for non-compliance is 100 EUR/certificate. The quota increases every year. No quota reductions for large consumers.

4.2. Germany

Component 1 - the commodity price

Both base and peak rates in Germany are calculated on the basis of market prices. The national indexes used in the calculation of the baseload commodity price and the peak-load price are the EEX Futures and EPEX DAM prices.

The baseload commodity formula applies to profile E3, the peakload commodity formula applies to profiles E1 and E2.

The formulas used for pricing commodities in this study were provided by the CREG and are based on an analysis by the Belgian regulator of the electricity supply contracts of all Belgian consumers with an annual consumption above 10 GWh.

$$\textit{Commodity price baseload} =$$

$$47{,}1\%\ CAL\ Y-1 + 20{,}1\%\ CAL\ Y-2 + 7{,}1\%\ CAL\ Y-3 + 7{,}8\%\ Qi{-}1 + 2{,}2\%\ Mi{-}1 + 15{,}7\%\ EPEX\ Spot\ DE$$

$$\textit{Commodity price peakload} =$$

$$Prix\ commodity\ baseload \times \frac{weigthed\ average\ peakload\ price\ EPEX\ Spot\ DE\ (38\%\ Y-1; 35\%\ Y-2; 27\%\ Y-3)}{weighted\ average\ baseload\ price\ EPEX\ Spot\ DE\ (38\%\ Y-1; 35\%\ Y-2; 27\%\ Y-3)}$$

A supplier margin of 0,5€/MWh is added.

Component 2 - the transport costs

The German electricity grid organization is fairly different from the Belgian one. The four Transmission grid operators only operate the extra-high voltage grid, while everything else (often, but not always, up to 110 kV) is operated by the distribution system operators.

Connection voltage (U_n)	Voltage profile	Grid operator
1 kV ≤ U_n ≤ 50 kV	Medium voltage	DSO
U_n = 110 kV	High Voltage	
220 kV < U_n ≤ 350 kV	Extra high voltage	TSO

For the first profile (E1), we assume the consumer benefits from the medium voltage tariff on the distribution grid. For the second profile (E2), we assume the consumer benefits from the high voltage tariff on the distribution grid, while it is extremely unlikely for such a consumer (which is not a very large industrial consumer) to be connected to the transmission grid in Germany. Profile E3 is assumed to be directly connected to the extra high voltage grid, operated by the TSO.

Transmission and distribution tariffs in Germany are integrated and presented as one single tariff to the consumers on the distribution grid. As stated in the description of the dataset, we present results for the four transmission zones in Germany. As Germany counts about 870 distribution system operators[8], the grid

[8] From Distribution networks to smart Distribution systems : rethinking the regulation of European electricity DSO's, European University Institute, THINK paper topic 12, Final report, 2013, pgs. 12-13.

cost we present for profiles E1 and E2 is an average of the tariffs of two large DSO's in each transmission zone (one rural DSO, one urban DSO).

German integrated grid fees, whether imposed on the distribution or the transmission grid, follow the same methodology and involve three main components:

1. Capacity rate;
2. Energy rate;
3. Metering and invoicing cost;

Other fees, such as capacity excess fees are not taken into account in this study given the assumption that load profiles are completely flat.

When annual consumption exceeds 10 GWh, important network tariff reductions can apply on large industrial consumers.[9] Users with a very abnormal load profile (case by case) get a reduction of max. 80%. Users who exceed 7000 consumption hours a year, benefit from reductions as shown in the table below:

Annual consumption	Annual consumption	Grid fee reduction
> 10 GWh	≥ 7000 hrs	- 80%
> 10 GWh	≥ 7500 hrs	- 85%
> 10 GWh	≥ 8000 hrs	- 90%

These reductions apply to profile E3, who as a consequence only pays 10% of the grid fee. As opposed to France, where a similar and recent reduction is paid by the regulatory account, this reduction is financed by a separate levy (see next part).

Component 3 - all extra costs

Regarding taxes and levies, the German situation is particularly complex, with a host of progressive reductions, diversified rates and exemptions. As laid out in the general assumptions, we assume our consumer is an economically rational actor and aims at obtaining the lowest tax rate. Whenever the application of reductions or exemptions depends on economic criteria that are not under the full control of the user (energy cost/turnover, energy cost/gross added value, pension payments, etc.), we will present a range with all possible options.

In Germany, seven taxes/surcharges can apply on electricity:

1. The *Combined heat & power generation surcharge* (CHP) is a surcharge that pays for CHP-plant subsidies. There are three different rates for the three following consumer groups:

Category A	All other consumers	1,78 €/MWh
Category B	> 0,1 GWh/year and not Category C	0,55 €/Mwh
Category C	> 0,1 GWh/year and manufacturing industry with electricity cost > 4% of turnover in 2013	0,25 €/MWh

[9] Stromnetzentgeltverordnung, §19, abs. 2.

For the three consumer profiles under review, we present a range from the category B to the category C rate.

2. *"StromNEV" §19-Umlage,* which is a digressive levy to compensate for the §19 transmission tariff reductions. Different rates apply to different bands of total electricity consumption.

Band A	Consumption ≤ 1 GWh/year	1,87 €/MWh
Band B	Consumption > 1 GWh/year	0,50 €/Mwh
Band C	Consumption > 1 GWh/year and manufacturing industry with electricity cost > 4% of turnover in 2013	0,25 €/MWh

For the three profiles under review, we present a range of two possibilities: either the consumer can benefit from the Band C-rate for its consumption above 1 GWh (bottom of range) or he cannot in case of which the Band B-rate applies (top of range) on the consumption above 1 GWh.

3. *Offshore liability overload,* which is a digressive levy to pay for offshore wind power generation units. Different rates apply to different bands of total electricity consumption.

Band A	Consumption ≤ 1 GWh/year	2,50 €/MWh
Band B	Consumption > 1 GWh/year	0,50 €/Mwh
Band C	Consumption > 1 GWh/year and manufacturing industry with electricity cost > 4% of turnover in 2013	0,25 €/MWh

For the three profiles under review, we present a range of two possibilities: either the consumer can benefit from the Band C-rate for its consumption above 1 GWh (bottom of range) or he cannot in case of which the Band B-rate applies (top of range) on the consumption above 1 GWh.

4. *"AblaV" Surcharge* which is a levy to finance interruptible load agreements. In 2014, this levy is fixed at 0,09 €/MWh. The three profiles under review pay this surcharge.
5. *"eEG-Umlage"* contributes to the financing of all renewable energies other than offshore wind power generation units. Consumers are divided in 3 different categories: those belonging to categories A and C pay one single rate on their entire consumption, while consumers belonging to category B pay a digressive rate.[10]

[10] A new law, changing the reduction system, entered into force on August 1st 2014, but companies will only start feeling the effect of it by the end of 2015.

Category A	All consumers that do not belong to categories B & C	62,40 €/MWh
Category B	If consumption > 1 GWh/year and electricity cost > 14% of gross value creation in 2013, the following rates apply on each band of consumption	
	Consumption ≤ 1 GWh/year	62,40 €/MWh
	1 GWh/year < Consumption ≤ 10 GWh/year	90% reduction
	10 GWh/year < Consumption ≤ 100 GWh/year	99% reduction
	Consumption > 100 GWh/year	0,50 €/MWh
Category C	If consumption > 100 GWh/year and electricity cost > 20% of gross value creation in 2013, 1 single rate applies	0,50 €/MWh

No eEG-Umlage is due on the consumption self-generated electricity. As we do throughout the entire report, we assume here as well that the three profiles under review do not produce any electricity themselves.

In this study, we present a range of possibilities for the three profiles under review, given the fact that it is not possible to determine whether they meet the economic criteria. Category A will be presented as an outlier, but is a plausible possibility. In 2014, only 2.026 of the over 45.000 industrial companies in Germany qualified for the criteria in category B or C. These 2026 companies, however, represent about 39% of total German industrial energy consumption.

Based on data from the German government, we can present the impact of the eEG-umlage and its reductions for German industry as follows. [11]

eEG-Umlage	Part of total industrial consumption
62,40 €/MWh	47%
6,24 €/MWh	6%
0,63 €/MWh	9%
0,50€/MWh	24%
Exempted autoproduction	14%
Total	**250 TWh**

6. "*Stromsteuer*" is an electricity tax. Since 2003, the normal tax rate equals 20,5 €/MWh. All industrial consumers that apply for it, benefit from a reduced rate of 15,37 €/MWh.

Further reductions are attributed on the basis of the amount of pension contributions a company pays: the fewer pension contributions a company pays, the higher the amount of the reduction on the Stromsteuer. The maximum reduction is 90%.[12] In 2014, 22.300 companies benefited from some kind of reduction through this system.[13]

Aside from these reductions, electricity used as a raw material for electro-intensive industrial processes is totally exempt from the electricity tax.

[11] Bundesamtes für Wirtschaft un Ausfuhrkontrolle (BAFA), *Statistischen Auswertungen zur "Besonderes Ausgleichsregelung"*; and *BDEW Strompreisanalyse Juni 2014* – Haushalte und Industrie, Bundesverband der Energie- und Wasserwirtschaft e.V., Berlin.
[12] *Stromsteuergesetz, §10.*
[13] *24. Subventionsbericht der Bundesregierung*, Bericht der Bundesregierung über die Entwicklung der Finanzhilfen des Bundes und der Steuervergünstigungen für die Jahre 2011 bis 2014, pg. 65.

Hence, for all profiles, we will present a range from 0 (exempted) to 15,37 €/MWh. The lowest tariff for non-exempted users - 1,537 €/MWh - is included in this range.

7. The *"Konzessionsabgabe"* or concession fee is an energy tax that is imposed on all users to fund local governments. The basic rate for industrial users is 1,1 €/MWh. One exemption exists: consumers whose final electricity price (all taxes and grid fees included) remains under an annually fixed threshold (*in 2014: 118,9 €/MWh*)[14] are exempted from the concession fee.

In practice, for the profiles under review, this means that the concession fee is only due when no substantial reductions are applicable for the eEG-Umlage. We will hence only apply the concession fee in the (outlier) case where the full rate (62,40 €/MWh) of the eEG-Umlage is due.

[14] The *Grenzpreis* is fixed by the German statistics office and represents the average final electricity price of all industrial consumers.

4.3. France

Component 1 - the commodity price

Baseload and peakload rates in France are calculated by combining the market price and the regulated rate ("Accès Régulé à l'Electricité Nucléaire Historique" (ARENH)).[15]

The commodity formulas applied to the baseload and peakload profiles are detailed below. The market price component of these formulas was provided by the CREG and based on an analysis by the Belgian regulator of the electricity supply contracts of all Belgian consumers with an annual consumption above 10 GWh.

$$\textbf{Commodity price baseload} = \textbf{95\% ARENH} + \textbf{5\% market price baseload} =$$

$$95\%\ ARENH + 5\%(47{,}1\%\ CAL\ Y-1 + 20{,}1\%\ CAL\ Y-2 + 7{,}1\%\ CAL\ Y-3 + 7{,}8\%\ Qi{-}1 + 2{,}2\%\ Mi{-}1 + 15{,}7\%\ EPEX\ Spot\ FR)$$

$$\textbf{Commodity price peakload} = \textbf{15\% ARENH} + \textbf{85\% market price peakload} =$$

$$15\%\ ARENH + 85\%\left(Market\ price\ baseload \times \frac{weighted\ average\ peakload\ price\ EPEX\ Spot\ FR\ (38\%\ Y-1; 35\%\ Y-2; 27\%\ Y-3)}{weighted\ average\ baseload\ price\ EPEX\ Spot\ FR\ (38\%\ Y-1; 35\%\ Y-2; 27\%\ Y-3)}\right)$$

The quantity of nuclear power at regulated prices (ARENH) a supplier gets, depends on its consumer portfolio and the consumption of that portfolio during a 'reference period'. In 2014, this reference period consisted entirely of off-peak hours, except for July and August, when peak-hours were counted as well.[16] This means that only 16,7% (two out of twelve months) of the consumption of profiles E1 and E2 is taken into account to allocate nuclear power at regulated prices to its supplier. We therefore assume that the commodity price of profiles E1 and E2 is 85% market-based and 15% ARENH.

Following the same reasoning, as profile E3 is a constantly consuming baseload profile, its entire consumption is taken into account when allocating nuclear power at regulated prices to its supplier. We therefore assume he benefits from regulated prices for 95% of the electricity it consumes.

A supplier margin of 0,5€/MWh is added.

Component 2 - the transport costs

In France, the transmission System Operator (TSO) in charge of the transport network is "RTE" ("Réseau de Transport d'Electricité"). The French high voltage network starts at 1 kV as shown in the table below.

Connection voltage (U_n)	Tariff scheme		Grid
$U_n \leq 1$ kV	BT		Low voltage (DSO)
1 kV < $U_n \leq$ 40 kV	HTA1	HTA Profile	High voltage (TSO)
40 kV < $U_n \leq$ 50 kV	HTA2		

[15] The Exeltium-contract, which is a separate contract with EDF signed by a consortium that consists of several very large electro-intensive companies in France, is not taken into account in this study. Apart from the fact that the content of the contract is not public, the contract had to be renegotiated over the course of 2014 because prices appeared to have been higher than the ARENH-price.

[16] *Arrêté du 17 mai 2011 relatif au calcul des droits à l'accès régulé à l'électricité nucléaire historique*, article 3.

50 kV < U_n ≤ 130 kV	HTB1	HTB Profile	
130 kV < U_n ≤ 350 kV	HTB2		
350 kV < U_n ≤ 500 kV	HTB3		Extra high voltage (TSO)

As the HTA2-tariff is identical to the HTB1-tariff, we assume profile E1 pays the HTB1-tariff (40-130 kV). We assume profiles E2 and E3 pay the HTB2-tariff.

Transmission tariffs in France involve four components detailed below:

1. management cost,
2. metering cost,
3. *withdrawal tariff*: this tariff includes the fee for reserved load capacity (which is a single fee), a fee for load capacity weighted according to 5 times slots and the fee for consumption which is a variable fee based on the consumption in 5 times slots. This tariff offers three contract options with different rates: medium, long and very long utilization. We assume our profiles pick the most advantageous contract option: medium for E1 and E2, and very long for E3.
4. *other fees* such as a fee for planned and unplanned exceeding of power capacity, fee for regrouping of connection, or transformation fee. Those fees are not taken into account for the profiles under review.

On August 1st 2014, a new competitiveness measure was introduced in France. All consumers whose consumption exceeds 10 GWh/year and 7000 hours/year (both criteria need to be met) see their transport tariffs reduced by 50%. Profile E3 will hence benefit from this reduction.

Component 3 - all extra costs

In France, three different surcharges apply to electricity. They are detailed as follows.

1. The *"Contribution tarifaire d'acheminement"* (CTA) is a surcharge for energy sector pensions.

For consumers directly connected to the transmission grid (profiles E1, E2 and E3 in France), the CTA is fixed at 10,14% of the fixed part of the transmission tariff. No exemptions are applicable for this surcharge.

2. The *"Contribution au service public d'électricité"* (CSPE) is a surcharge that pays (amongst other things) for the cost of renewables, the *péréquation tarifaire* and social tariffs.

In 2014, the CSPE was 16,5 €/MWh. Two reductions are applicable:

   i. Either, the profile meets the 2014 annual cap which equals 597.889 €/year.

   ii. Or, for a minimum of 7 GWh/year or more, the CSPE has to be lower or equal to 0,5% of the added value of the company.

Given the fact that, lacking more detailed economic and financial data on the consumer profiles, we are unable to apply the capping described under (ii), we only apply the cap described under (i) on our three consumer profiles. Profile E3 is the only one meeting the cap of 597.889 €/year.

3. The *"Taxe intérieure sur la consommation finale d'électricité"* (TICFE) is a tax on the final electricity consumption. In 2014, the TICFE amounts to 0,5 €/MWh. Exemptions apply:
    i. When a company is part of the metallurgy, electrolysis, non-metal minerals or chemical sectors, it is exempted of TICFE ;
    ii. When the electricity cost for a company equals 50% of the added value produced by the company. In this case, the exemption applies as well.

Based on these potential exemptions, a range will be presented for the TICFE from 0 to 0,5 €/MWh.

4.4. The Netherlands

Component 1 - the commodity price

Both base and peak rates in the Netherlands are calculated on the basis of market prices. The national indexes used in the calculation of the baseload commodity price and the peak-load price are the ICE Endex CAL and the APX NL DAM.

The baseload commodity formula applies to profile E3, the peakload commodity formula applies to profiles E1 and E2.

The formulas used for pricing commodities in this study were provided by the CREG and are based on an analysis by the Belgian regulator of the electricity supply contracts of all consumers with an annual consumption above 10 GWh.

$$\textit{Commodity price baseload} =$$

$$47{,}1\%\ CAL\ Y-1 + 20{,}1\%\ CAL\ Y-2 + 7{,}1\%\ CAL\ Y-3 + 7{,}8\%\ Qi{-}1 + 2{,}2\%\ Mi{-}1 + 15{,}7\%\ APX\ NL\ DAM$$

$$\textit{Commodity price peakload} =$$

$$\textit{Commodity price baseload} \times \frac{\textit{weigthed average peakload price APX NL DAM}\ (38\%\ Y-1;\ 35\%\ Y-2;\ 27\%\ Y-3)}{\textit{weighted average baseload price APX NL DAM}\ (38\%\ Y-1;\ 35\%\ Y-2;\ 27\%\ Y-3)}$$

A supplier margin of 0,5€/MWh is added.

Component 2 - the transport costs

In the Netherlands, the transportation costs involve three components:

1. *Standing charge*, metering charge, periodical connection tariff;
2. Transport service tariff (capacity tariff);
3. System service tariff (demand tariff).

The Dutch transmission grid, operated by the TSO Tennet, encompasses all electricity transport infrastructures above 110 kV. Profiles E2 and E3 are hence assumed to be directly connected to the transmission grid.

Profile E1, on the other hand, is assumed to be on the distribution grid. As is the case in Germany, the distribution and transmission tariffs are integrated. As we explained before, we will present a weighted average of the eight distribution zones.

Since January 1st 2014: a substantial reduction ("volumecorrectie") on transport tariffs is granted to large base-load consumers on the basis of two simultaneous conditions:

1. The customer exceeds 50 GWh/year in terms of consumption;
2. The consumer consumes at least during 65% of all the 2920 off-peak hours per year.

These two conditions must be matched together. If so, the maximum reduction is limited to 90%, which is the case for profile E3 in this study.[17]

[17] For the exact formula: Wet van 18 december 2013 tot wijziging van de Elektriciteitswet 1998, Artikel 1E, 2de lid.

Component 3 – all extra costs

Two surcharges apply to the electricity bill for industrials:

1. The *Energy Tax* is a digressive tax on all energy carriers. The energy tax for electricity has the following rates

Band A	Consumption up to 10 MWh (with tax reduction)	118,5 €/MWh
Band B	Consumption from 10-50 MWh (with tax r.)	43,1 €/MWh
Band C	Consumption from 50-10.000 MWh	11,5 €/MWh
Band D	Consumption above 10.000 MWh (professional)	0,5 €/MWh

2. The *ODE levy* is a digressive levy on gas and electricity that pays for renewable capacity.

Band A	Consumption up to 10 MWh (with tax reduction)	2,3 €/MWh
Band B	Consumption from 10-50 MWh (with tax r.)	2,7 €/MWh
Band C	Consumption from 50-10.000 MWh	0,7 €/MWh
Band D	Consumption above 10.000 MWh (professional)	0,03 €/MWh

4.5. United Kingdom

Component 1 - the commodity price

Both base and peak rates in The United Kingdom are based on market prices. The national index used in the calculation of the base-load commodity price and the peak-load price is the APX UK DAM. The commodity price formulas used for pricing commodities in this study were provided by the CREG and are based on an analysis by the Belgian regulator of the electricity supply contracts of all consumers with an annual consumption above 10 GWh. As no "Calendar +1/2/3" product exists for the UK power market, it was replaced by the aggregation of two seasonal products.

$$\textit{Commodity price baseload} =$$

$$47{,}1\%\ CAL\ Y-1 + 20{,}1\%\ CAL\ Y-2 + 7{,}1\%\ CAL\ Y-3 + 7{,}8\%\ Qi{-}1 + 2{,}2\%\ Mi{-}1 + 15{,}7\%\ APX\ UK\ DAM$$

$$\textit{Commodity price peakload} =$$

$$\textit{Commodity price baseload} \times \frac{\textit{weigthed average peakload price APX UK DAM } (38\%\ Y-1;\ 35\%\ Y-2;\ 27\%\ Y-3)}{\textit{weighted average baseload price APX UK DAM } (38\%\ Y-1;\ 35\%\ Y-2;\ 27\%\ Y-3)}$$

We calculated the commodity cost (based on the formula above) entirely in Pound Sterling, and converted the final result to Euro at the October 2014 exchange rate (see also section 3.7).

A supplier margin of 0,5 €/MWh is added.

Component 2 - the transport costs

The network structure in the United Kingdom has been described above on geographical level with three TSO's, six DSO's and 14 tariff zones identified.

On a technical level, the grid is organized as follows:

Connection voltage (U_n)	Operator	Tariff scheme
U_n < 22 kV	DSO	Common distribution charging methodology (CDCM) + Transmission charges (TNUoS)
22kV ≤ U_n ≤ 132 kV		Extra high voltage distribution charging methodology (EDCM) + TNUoS
275 kV ≤ U_n ≤ 400 kV	TSO	Transmission charges (TNUoS)

As in the German case, given the particularly high voltage level of the transmission grid, we assume profiles E1 and E2 are both connected to the distribution grid and pay both distribution and transmission charges. Profile E3 is assumed to be directly connected to the transmission grid and only pays transmission charges.

Transmission Network Use of System (TNUoS) charges in the UK have two different rates: half-hourly (HH) metered customers pay a capacity tariff in function of their power subscription, while customers who are not half-hourly metered pay a demand rate in function of their electricity consumption. We assume profiles E1, E2 and E3 are half hourly metered and hence pay the capacity rate. This HH tariff is zonal: there

is a different rate for all 14 zones of the UK. We present an average value of these fourteen zonal tariffs as transmission cost for profiles E1, E2 and E3.

Distribution charges, which are due for profiles E1 and E2, have a more complex methodology. The Common Distribution Charging Methodology (CDCM) is based on a combination of capacity and demand rates, with important differences between peak and off-peak consumption. Consumers connected to the distribution grid at a voltage level of 22kV and above are charged differently, through the EHV Distribution Charging Methodology (EDCM). They pay individualized rates, negotiated with the distribution system operator, but not a standard tariff. As the individual EDCM-rates are made public on an anonymous basis, we have calculated the average discount of individualized EDCM-rates compared to CDCM-tariffs in each of the 14 zones. We present the average discount of EDCM-rates on CDCM-tariffs in the 14 zones as the distribution cost value for profiles E1 and E2.

With regards to *network losses* on the transmission grid, a similar (but more dynamic) system to the one applicable in Belgium exists. Each half hour, the Balancing and Settlement Code Administrator defines the Transmission losses multiplier (TLM) applicable for offtake and delivery. This cost of the network losses on the transmission grid is added to the bill as a percentage of the commodity cost for offtake, but we consider it to be part of component 2, as it is a true network cost – even though it is not part of the tariff structure as such.

Component 3 - all extra costs

Four different extra costs are identified for the UK: two levies and the indirect cost of two renewable subsidies schemes.

1. The ***Climate Change Levy*** **(CCL)** is a levy payable on electricity, gas, fuel, etc. Its basic rate for electricity consumption is 6,68€/MWh, but users part of a Climate Change Agreement (CCA) benefit from 90% reduction. Given the assumption of this study that the customer profiles under review are economically rational and given the large scope and rate of application of CCA's, we assume profiles E1, E2, E3 are all part of Climate Change Agreement.
2. The ***Assistance for Areas with High electricity distribution Costs*** (AAHEDC) levy is a simple rate general levy to compensate for high distribution costs in the zone of Northern Scotland (1 of the 14 zones).
3. The ***Renewables Obligation*** **(RO)** is the cost taken into account for the large scale renewable subsidy scheme. From April 2014 to March 2015, the renewable quota is 0,244 Renewable Obligation Certificates (ROC's) per MWh. Given the fee per missing ROC of 54,9€, the penalty for non-ROC-covered electricity is 13,4€/MWh. As we did in the Belgian case, based on CREG input, we take 85% of this cost into account (11,4€/MWh).
4. **Feed-in tariffs (FIT)** are a subsidy system for small scale renewables, in which the suppliers pay a subsidy to the producers, and pass on the cost to the consumers. We took the total cost of the system for 2014 into account, offset against the total UK electricity consumption for the same period, which makes for a cost of 3,37 €/MWh.[18] As there is no transparency as to how this cost is passed on by the suppliers to their different customers (household or business), we cannot make a more precise assumption. For commercial reasons, however, it is conceivable that some suppliers do not pass on the total cost to the consumers (especially industrial consumers).

[18] In February 2013, OFGEM estimated the FIT cost for a household at £1,82/MWh (2,31€/MWh at October 2014 exchange rates). Since then, however, FIT payments have increased while general electricity consumption has decreased. (OFGEM, *Updated. Household energy bills*, Factsheet 98, February 2013).

Gas: Detailed description of the prices, price components and assumptions

5. Gas: Detailed description of the prices, price components and assumptions

5.1. Belgium

Component 1 - the commodity price

Commodity prices for natural gas in this study are based on the market prices. The national market index used in the calculation of the gas commodity price for Belgium is the Zeebrugge HUB 101 for gas, with a supplier margin of 0,4 €/MWh.

Component 2 - the transport costs

As discussed in the consumer profiles, we assume that profile G1 is directly connected to the transport grid. About 230 industrial clients in Belgium are directly connected to the grid of TSO Fluxys Belgium. [19] We assume the consumer is connected at medium pressure level (which is the case for the vast majority of industrial consumers).

In Belgium, the transport costs for a direct client have two main components:

i. a capacity fee (HP and MP),

ii. commodity fee

Optional tariffs for odorisation exist, but are not taken into account in the scope of this study, given the fact that the vast majority of industrial consumers in Belgium dispose of their own odorisation system.

Part of the network in Belgium is supplied with "L-gas". This gas has a lower calorific value than the H-gas that is used in much of Western-Europe. About 25% of industrial consumers directly connected to the gas transport grid in Belgium use L-gas.

Label	Superior calorific value (kWh/m³)	Direct exit points (without power plants)
H	11,3	75%
L	9,8	25%

Belgian gas transmission tariffs are volume-based and expressed in €/m³/h/year. This means that profile G1 has a higher transport cost in parts of the country with a lower calorific value of the gas. In the scope of this study, we therefore propose a weighted average of H and L-tariffs as value for the transport cost for profile G1.

[19] It has to be noted that no such client exists in the Brussels Capital Region.

Component 3 - all extra costs

In Belgium, two extra costs are charged to all gas consumers directly connected to the transport grid :

1. *Federal contribution* (0,6706 €/MWh), increased by 1,1% by the supplier, with decreasing tariff reductions:

0-20 GWh	0%	250 – 1.000 GWh	-25%
20-50 GWh	-15%	> 1.000 GWh	-45%
50 -250 GWh	-20%		
→ Ceiling of 750.000€/year by consumption site			

2. *Energy contribution*, with three different tariffs. As stated in the general assumptions, we assume profile G1 is part of an energy efficiency agreement. As the exemption is based on detailed economic criteria, we present a range from 0 to 0,0942 €/MWh.

Normal rate	0,9889 €/MWh
Companies with sectoral energy efficiency agreeements	0,0942 €/MWh
Companies OR - with energy cost > 3% of the value of the produce OR- with total energy tax amount > 0,5% of added value	Totally exempt

Aside from those two extra costs, one regional tax exists in both Brussels and Wallonia:

3. The Brussels levy for occupying road network (1,153 €/MWh)[20]
4. The Walloon fee for grid connection: 0,03 €/MWh

The Brussels public service obligation is not taken into account, as we assume it only applies to the distribution grid, and consumer G1 is assumed to be directly connected to the transport grid.

[20] For this fee, the regional legislator introduced a cap starting January 1st 2007 (no fee due on gas above 5.000.000 m³/year (=+/-57,5 GWh)), but the decree to make it applicable has not been issued so far. As a consequence, this ceiling is not applied in Brussels (source: *Ordonnance du 14 décembre 2006 modifiant les ordonnances du 19 juillet 2001 et du 1er avril 2004 relatives à l'organisation du marché de l'électricité et du gaz en Région de Bruxelles-Capitale et abrogeant l'ordonnance du 11 juillet 1991 relative au droit à la fourniture minimale d'électricité et l'ordonnance du 11 mars 1999 établissant des mesures de prévention des coupures de gaz à usage domestique, article 102*).

5.2. Germany

Component 1 - the commodity price

Commodity prices for natural gas in this study are based on market prices. As explained above, in Germany two market indices exist: Gaspool and NetConnectGermany (NCG). As commodity price for profile G1, we present the average of the NCG 101 and Gaspool 101 indices.

A supplier margin of 0,4€/MWh is added.

Component 2 - the transport costs

As explained in the section 3.3 Germany counts twelve TSO's with directly connected clients. They all apply a similar tariff methodology, with different rates.

These tariffs comprise in general the same two components:

1. *A capacity charge*, which makes up for the most important part of the tariff cost
2. Metering & invoicing & connection-costs

We have taken into account the exit tariffs for all TSO's with end-users directly connected to the transport grid.

Component 3 - all extra costs

Two additional costs on natural gas exist for industrial consumers in Germany: the Biogas levy (i.e. "Biogaskostenwälzung") and the Gas tax (i.e. "Energiesteuer – Erdgassteuer"):

1. The Biogas Levy is a nationwide standard biogas levy since January 1, 2014. This biogas levy amounts to approximately 0,51 EUR/(kWh/h)/a.
2. The "*Energiesteuer*" is an energy tax, with different rates for different sources of energy. For natural gas for industrial use, the normal tax rate amounts to 5,50 €/MWh with a standard reduction that lowers the rate to 4,12€/MWh. As is the case for the electricity tax in Germany, further reductions are attributed on the basis of the amount of pension contributions a company pays: the fewer pension contributions a company pays, the higher the amount of the reduction on the *Energiesteuer*. The maximum reduction is 90%, but this reduction does not apply to the reduced tax rate of 4,12 €/MWh, but to a lower figure of 2,28 €/MWh. A basic rate of 1,84 €/MWh (4,12-2,28) remains 'incompressible'. The minimum rate is hence 2,07 €/MWh (1,84 + 10%*2,28).[21]

   As the pension payment reduction system is based on economic criteria, we will present a range for the Energiesteuer from 2,07 to 4,12 €/MWh.

The *Konzessionsabgabe* (concession fee) that exists for electricity also apply to natural gas consumption. However, as consumers with an annual consumption of more than 5 GWh are exempted, it is not relevant in the framework of this study.

[21] *Energiesteuergesetz, §54, 55.*

5.3. France

Component 1 - the commodity price

The commodity price for gas in France is based on the market prices in the three different market areas: PEG Nord, PEG Sud and PEG TIGF.[22]

A supplier margin of 0,4 €/MWh is added.

Component 2 - the transport costs

As stated before, there are two Transmission System Operators (TSOs) in charge of the gas transport network : GRTGaz et TGIF (Transport GazInfrastructures France).

Their tariffs are built along the same methodology, and made of two main components for end users on the transmission grid:

1. *A fixed charge* per year per delivery station;
2. *A delivery charge* applicable to daily delivery capacity subscriptions.

Component 3 - all extra costs

In France, four surcharges apply on gas:

1. The *Contribution tarifaire d'acheminement* is a surcharge for energy sector pensions. On natural gas, for clients directly connected to the transmission grid, it amounts to 4,71% of the transmission cost.
2. The *Contribution au Tarif Spécial de Solidarité Gaz* (CTSSG) is a surcharge for supporting disadvantaged customers (social tariff). In 2014, the CTSSG amounted to 0,2 €/MWh.
3. The *Contribution biométhane* is a surcharge for financing bio-methane use. In 2014, it amounted to 0,0072 €/MWh.
4. The *Taxe intérieure sur la consommation de gaz naturel – TICGN* is a tax on gas consumption, that amounted to 1,27 €/MWh in 2014. The reduction or exemption of the TICGN depends on two criteria
    a. Certain sectors that are very energy intensive and use gas as primary source in their industrial process are exempted from the TICGN
    b. All companies that participate in the carbon market can pay last year's rate: 1,19 €/MWh.

Given the fact that these reductions depend on economic criteria that we do not detail for our consumer profile, we will present a range from 0 to 1,27 €/MWh for the TICGN.

[22] On April 1st 2015, the PEG TIGF and PEG SUD market areas will start trading on the same platform. Price convergence between both markets was already almost complete, but the fusion will solve the relative lack of liquidity on the PEG TIGF market. The objective is to have on single PEG France market area by 2018.

5.4. The Netherlands

Component 1 - the commodity price

The commodity price for gas in the Netherlands is based on the TTF 101 index, with a supplier margin added of 0,4 €/MWh.

Component 2 - the transport costs

The gas transmission network in the Netherlands serves distribution networks and direct exit points. Transmission tariffs are composed of :

1. *Exit capacity fee* (based on their individual consumption and usage profile);
2. *Balancing tariff* (equal for all users directly connected to the transport grid but in function of capacity);
3. *Connection fee* (equal for all users directly connected to the transport grid users but in function of capacity);
4. *Quality conversion fee* (equal for all directly connected users but in function of capacity.

In the Netherlands, a large part of the network is supplied with so called "Groningen-gas". This gas has a lower calorific value (L-gas) than the gas used in much of the rest of Western-Europe (H-gas). As opposed to the Belgian transmission tariffs (which are expressed in volume), the Dutch transmission tariffs are fixed in terms of capacity and expressed in €/kWh/h/year, which evens out this calorific value effect.

Gasunie does not disclose the calculation pattern of the individualized rate of the capacity tariff (which makes up for over 90% of total network costs) applied on each direct exit point. We will present therefore an average of the capacity tariff based on the capacity tariff of the+/- 350 directly connected industrial consumers.

Component 3 - all extra costs

Two surcharges apply to the gas bill for industrials in the Netherlands:

1. *Energy Tax,* or "Regulerende Energiebelasting" (REB) is a decreasing tax on all energy carriers. These are the 2014 rates for each band of gas consumption:

Band A	Consumption up to 170.000 m³	0,1894 €/m³
Band B	Consumption from 170.000-1.000.000 m³	0,446 €/m³
Band C	Consumption from 1.000.000-10.000.000 m³	0,0163 €/m³
Band D	Consumption above 10.000.000 m³	0,0117 €/m³

A lowered tariff exists, but only for (especially agricultural) heating installations. We assume our profile G1 does not benefit from the lowered tariffs.

2. *The ODE levy* ("Opslag duurzame energie") is a decreasing levy on gas and electricity that pays for renewable capacity. Rates for 2014:

Band A	Consumption up to 170.000 m³	0,0046 €/m³
Band B	Consumption from 170.000-1.000.000 m³	0,0017 €/m³
Band C	Consumption from 1.000.000-10.000.000 m³	0,0005 €/m³
Band D	Consumption above 10.000.000 m³	0,0004 €/m³

A lowered tariff exists, but only for (especially agricultural) heating installations. We assume our profile G1 does not benefit from the lowered tariffs.

As the REB tax and ODE Levy are fixed in euros per volume units (€/m³) and not in euros per energy units, the calorific value of the used gas has an impact on the total amount paid. We propose to use a weighted average in function of the calorific value distribution of all industrial gas users directly connected to the transport grid in the Netherlands.

5.5. United Kingdom

Component 1 - the commodity price

For commodity in the UK, we use the NBP (National Balancing Point) market index, based on input data provided by CREG. A supplier margin of 0,4 €/MWh is added.

Component 2 - the transport costs

The Gas Transmission Transportation Charges are comprised of the following components. The national transmission system in the UK (except for Northern Ireland) is operated by one single entity.

1. Ca*pacity charge:* capacity charges are payable when a right to flow gas is purchased irrespective of whether or not the right is exercised - based on peak demand capacity.
2. Comm*odity charge:* a charge per unit of gas transported by NTS (see above, cumulative).
3. *Compression charge:* an additional charge is payable where gas is delivered into the National Grid NTS system at a lower pressure than that required, reflecting the need for additional compression.
4. *Metering charge:* metering charges for the services which are obligated to be offered under the Gas Transporter License (i.e. rental charges for meters, rotary and turbine meters, volume converters, etc.)

Transmission Transportation Charge	Charge
Capacity charge	(individual calculation)
Commodity charge	0.0385 pence per kWh
Compression charge	Not applicable
Metering charge	Applicable

National Grid Gas does not disclose the calculation pattern of the individualized rate of the capacity tariff (which makes for over 90% of total network costs) applied on each direct exit point. To reflect transport costs for profile G1, we will therefore present an average of the capacity tariff based on the capacity tariff of the +/- 350 directly connected industrial consumers in the UK.

Component 3 – all extra costs

In the United Kingdom, one single levy is applied on gas consumption: the Climate Change Levy (CCL). The CCL is payable on electricity, gas, fuel, etc. The standard rate for natural gas is 0,188 p/kWh (about 2,4 €/MWh), but consumers who are part of Climate Change Agreement get a 35% reduction. We assume that profile G1 is an economically rational actor, and that he pays the reduced rate of +/- 1,5€/MWh.

Presentation and interpretation of results

6. Presentation and interpretation of results

6.1. Interpretation of figures

Figure A: Total yearly invoice

Graph 1 *Total invoice comparison (€/year)*

Symbol	Legend	Interpretation
	Maximum eEG	Only applies to Germany, if the full eEG tax is applicable
	Maximum (max) Minimum (min)	Demonstrates a range of points between the minimum option and maximum option (with regards to taxes / levies / certificate scheme), if applicable.
	Single result	No range is presented (as only one level of taxes / levies / certificate scheme)
	Maximum eEG average	Average (non-weighted) of all options (incl. max eEG)
	Average	Average (non-weighted) of all min and max options

Figure B: Total yearly invoice comparison

Graph 2 *Total yearly invoice comparison (Belgium = 100)*

Symbol	Legend	Interpretation
	Maximum eEG	Only applies to Germany, if the full eEG tax is applicable
	Maximum (max) Minimum (min)	Demonstrates the range of points between the minimum option and maximum option (with regards to taxes / levies / certificate scheme), if applicable.
	Single result	No range is presented (as only one level of taxes / levies / certificate scheme)

Figure C: Average power price by component / MWh

Graph 3 *Energy price per component (€/MWh)*

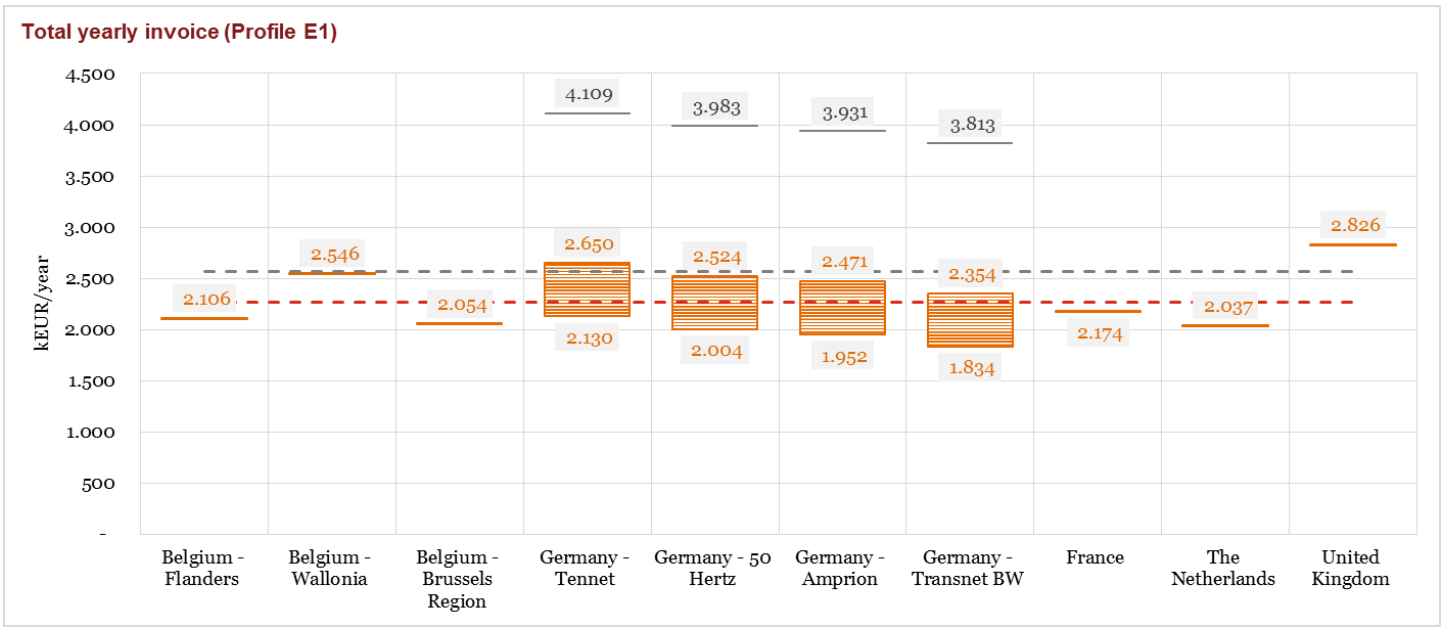
Symbol	Legend	Interpretation
	Commodity	Represents the total commodity cost
	Transport	Represents the total transport cost
	Taxes/Levies/Certificate scheme	Represents the cost of taxes/levies/certificate scheme (only one level of taxes / levies / certificate scheme)
	Taxes/Levies/Certificate scheme – minimum	Represents the **minimum** cost of taxes/levies/certificate scheme (if a minimum and maximum cost for level of taxes / levies / certificate scheme)
	Taxes/Levies/Certificate scheme – maximum	Represents the **possible range between minimum and maximum** cost of taxes/levies/certificate scheme
	Taxes/Levies/Certificate scheme – Maximum eEG	Only applies to Germany, if the full eEG tax is applicable

6.2. Profile E1 (Electricity)

Total invoice analysis

The following graph provides a comparison of the total yearly invoices paid by the reference consumer belonging to profile E1 in the various countries under review. Results are expressed in kEUR/year.

Figure 1: Total yearly invoice in kEUR/year (profile E1)

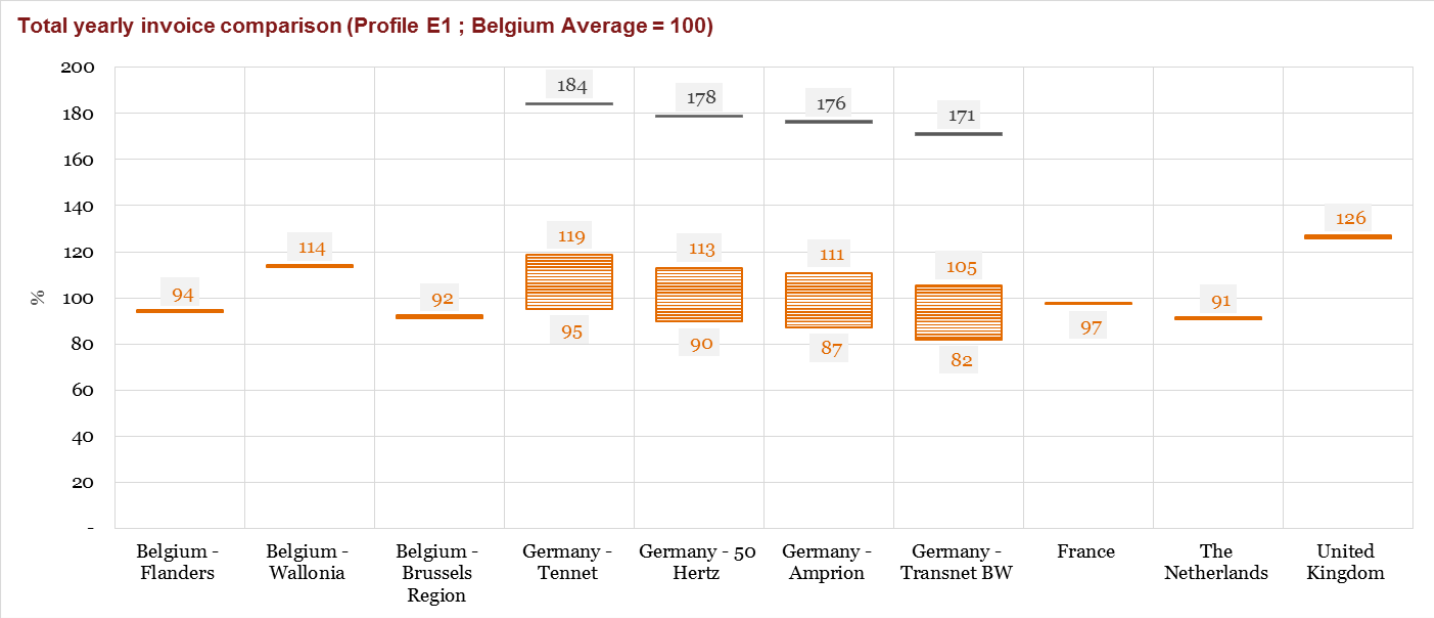


For an extensive legend for all figures, see page 50.

Belgium is split in three regions and Germany in four regions, while only one single result is presented for the UK, France and the Netherlands. For the UK and the Netherlands, reported data correspond to averaged values driven from the sub-regions.

For the purpose of facilitating the comparison, in Figure 2 the same results are compared to the reference situation which relates to the average of the three Belgian regions (Belgian average = 100%).

Figure 2: Total yearly invoice comparison in % (profile E1)



For an extensive legend for all figures, see page 50.

The three Belgian regions show very different results. The Brussels and Flemish regions are relatively well positioned, showing results similar to those in the Netherlands, France and the more competitive German regions (when minimal options are considered). The Walloon region shows a much higher cost, similar to the maximum options in Germany, and only slightly lower than the UK.

The detailed analysis of the German apparent lower competitiveness (when maximal options are considered) should be assessed carefully because of the large variance that occurs between the minimum and maximum options (including the eEG maximum option, that is only applicable when a company spends less than 14% of its annual gross value creation on electricity, see above) that mainly depends on the relative size of power costs in their turnover.

Competitiveness score:

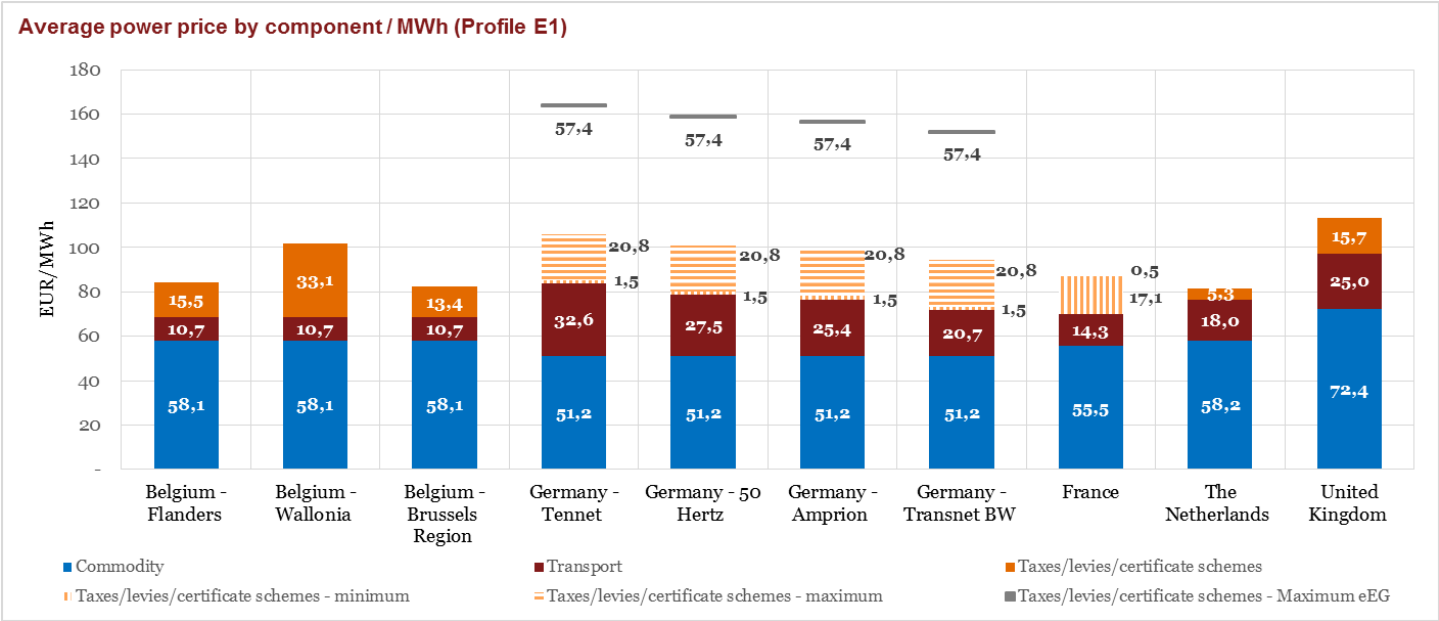
1. In terms of countries : Belgium is certain to be more competitive than 1 out of the 4 countries under review (1/4)
2. The Flemish region is certain to be more competitive than 3 out of the 7 zones under review (3/7)*
3. The Walloon region is certain to be more competitive than 1 out of the 7 zones under review (1/7)*
4. The Brussels region is certain to be more competitive than 3 out of the 7 zones under review (3/7)*

**these seven price zones are: the four German zones, France, Netherlands and UK*

Breakdown by component

The previous results are further detailed for profile E1 in Figure 3 which provides a closer look at the components breakdown.

Figure 3: Average power price by component in EUR/MWh (profile E1)



For an extensive legend for all figures, see page 50.

In most cases, the **commodity** makes up for the largest part of the bill. Belgian commodity cost lies in the average of the sampled countries. It is similar to the cost of commodity charged in the Netherlands but more expensive than in four German regions and in France. Commodity costs in the UK are markedly higher than in the other countries.

In all regions and/or countries, **transport costs** contribute to a variable extent of the invoice. In this respect, Belgium is more competitive than the other countries/regions of comparison. Transport costs are especially high in Germany where they can be three times higher than in the most competitive country/region (Belgium). Logically, transport costs are also higher in the countries where profile E1 not only pays transmission but also distribution charges: Germany, the UK and the Netherlands.

The third component, "**taxes, levies and certificates schemes**", has a large impact in all countries. As discussed before, the German situation offers the potential for the lowest and highest values. The Dutch level is low compared to the other countries. Important differences are observed between the three Belgian regions, with the Walloon region being double as expensive as the other regions.

KEY FINDINGS

The first electricity (E1) profile suggests the following findings:

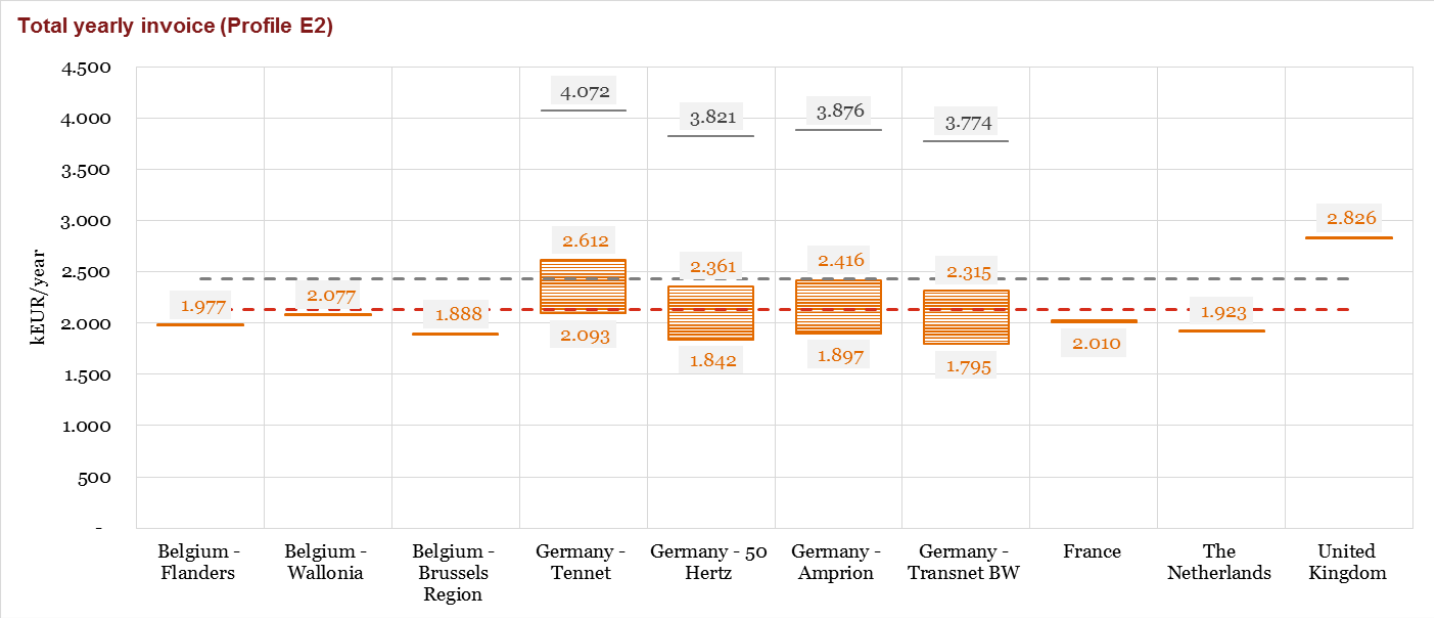
- We observe very important differences between the countries under review and even within the countries: a possible total invoice for profile E1 can vary between 1,87 mEUR and 4,11 mEUR.
- *Commodity costs* largely contribute to the total bill. In this respect, the situation encountered in Belgium is close to the average of the sampled countries, in line with those charged in the Netherlands. Germany and France offer a competitive advantage for this component, while the United Kingdom deals with a considerably higher commodity price.
- *Transport costs* usually absorb a variable but possibly substantial part of the total bill. They also diverge between the different countries/regions. They are the highest in the United Kingdom and in Germany, partly due to presence of distribution charges in those countries. Belgium is the most competitive country for transport costs.
- *"Taxes, levies and certificates schemes"* are characterised by a large variance. They are highest in the Walloon region (more than twice as high as in Flanders and Brussels), rather important in the UK and the other Belgian regions, but low in the Netherlands. In Germany the situation is mixed, depending on the taxation scheme implemented at company level. In this respect, the range between the best and the worst situation is high as it can reach twice the size of commodity cost.
- Only one out of seven zones (UK) is certainly less competitive than the Belgian average, but the differences between the Belgian regions are important: the Walloon region has the highest cost, while the Brussels and Flemish show costs within the same range as French, Dutch and the lower range of German costs.

6.3. Profile E2 (Electricity)

Total invoice analysis

Figure 4 provides a comparison of the total yearly invoices paid by profile E2 in the various countries under review. Results are expressed in kEUR/year.

Figure 4: Total yearly invoice in kEUR/year (profile E2)

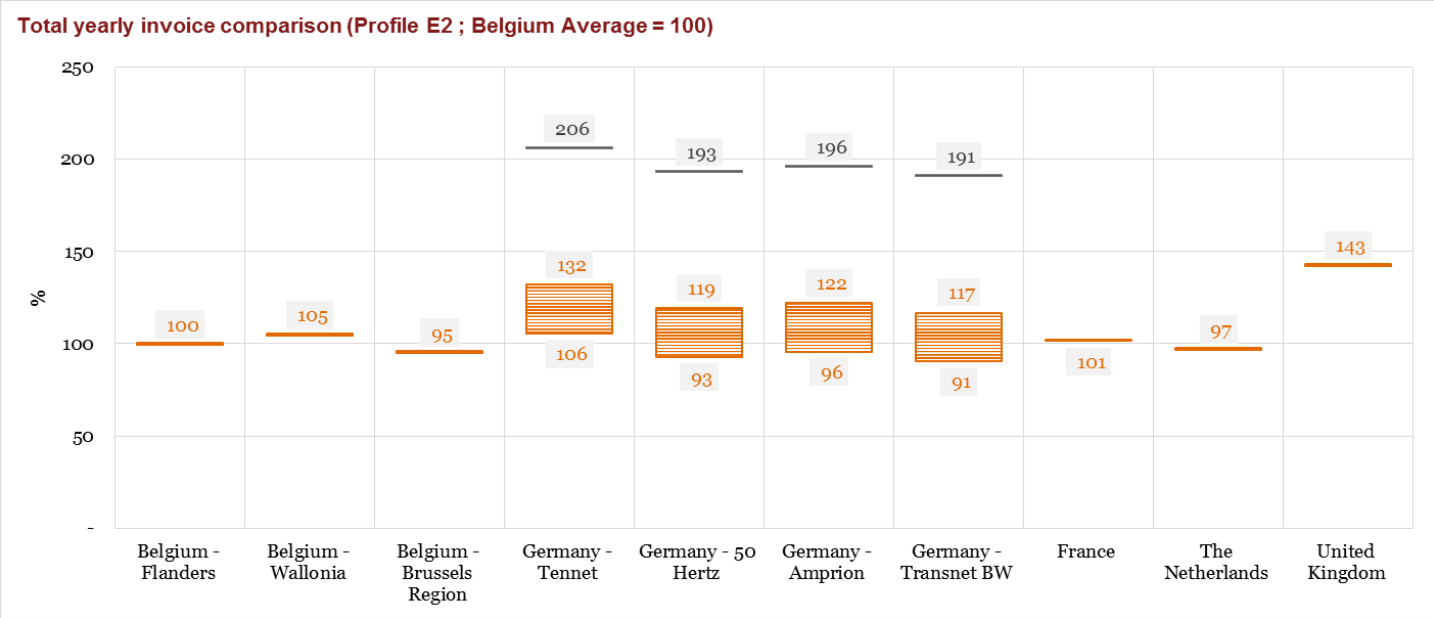


For an extensive legend for all figures, see page 50.

Again, Belgium is split in three regions and Germany in four regions, while only one single result is presented for the UK, France and the Netherlands. For the UK and the Netherlands, reported data correspond to averaged values driven from the sub-regions.

For the purpose of facilitating the comparisons, in Figure 5 the same results are compared to the reference situation which relates to the average of the three Belgian regions (Belgian average = 100%).

Figure 5: Total yearly invoice comparison in % (profile E2)



For an extensive legend for all figures, see page 50.

The Belgian average is relatively well positioned compared to the other countries, the Walloon region being the least competitive case under review. Prices in France, the Netherlands, Flanders and the three out of four German regions (low range) are within a very close range. The United Kingdom is an outlier, even more so than for profile E1.

The detailed analysis of the German apparent lower competitiveness as far as the maximum and 'maximum eEG'-range are concerned, should be assessed carefully because of the large variance that occurs between the minimum and maximum options (including the eEG maximum option, that is only applicable when a company spends less than 14% of its annual gross value creation on electricity, see above) that mainly depends on the relative size of power costs in their turnover.

Competitiveness score:

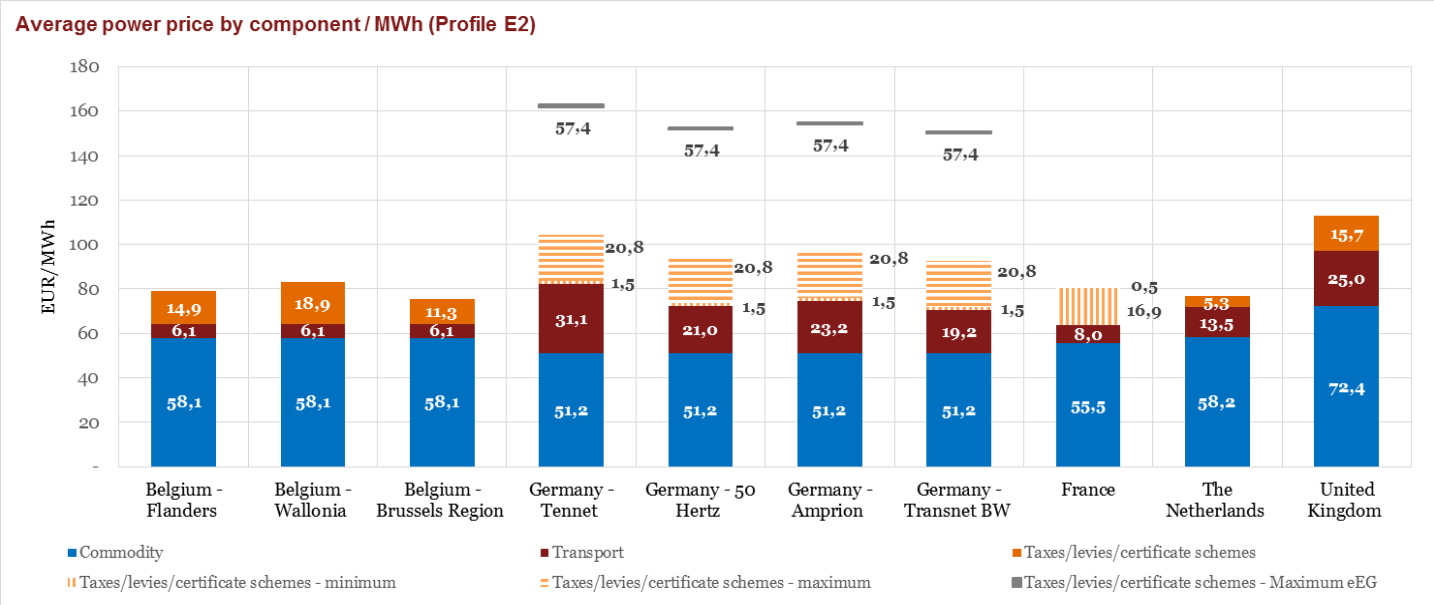
1. In terms of countries : Belgium is certain to be more competitive than 2 out of the 4 countries under review (2/4)
2. The Flemish region is certain to be more competitive than 3 out of the 7 zones under review (3/7)*
3. The Walloon region is certain to be more competitive than 2 out of the 7 zones under review (2/7)*
4. The Brussels region is certain to be more competitive than 5 out of the 7 zones under review (5/7)*

**these seven price zones are: the four German zones, France, Netherlands and UK*

Breakdown by component

The previous results are further detailed for the profile E2 in Figure 6 which provides a closer look at the components breakdown.

Figure 6: Average power price by component in EUR/MWh (profile E2)



For an extensive legend for all figures, see page 50.

In terms of commodity cost, we have to remember that profile E2 has the same consumption and load profile as profile E1; their commodity cost is the same. The **commodity** makes up for the largest part of the bill. Belgian commodity cost is in the average of sampled countries. It is similar to the cost of commodity charged in the Netherlands but more expensive than in four German regions and in France. Commodity costs in the United Kingdom are substantially higher.

In all countries, **transport costs** contribute to a variable extent to the invoice. Belgium clearly has the lowest transport costs, followed by France and the Netherlands. The UK and the four German zones have the highest transport costs. This is partly – but not entirely - due to the fact that in these countries, profile E2 not only pays transmission but also distribution charges.

The third component "**taxes, levies and certificates schemes**", has a (potentially) large impact in all countries, except for the Netherlands where its level is comparatively low. The highest values can be found in Wallonia, France and Germany (high range). Yet again, we observe relatively important differences between the Belgian regions. The difference between the most (Wallonia) and least (Brussel) expensive region is less substantial than was the case for profile E1, however, because no regional tariffs for public service obligations are due for profile E2.

As already mentioned, the German position should be assessed in line with the large variance characterizing minimum and maximum "taxes, levies and certificate schemes" which – in the least favourable situation - can be as large as the commodity and transport costs combined.

KEY FINDINGS

The second electricity profile (E2) suggests the following findings:

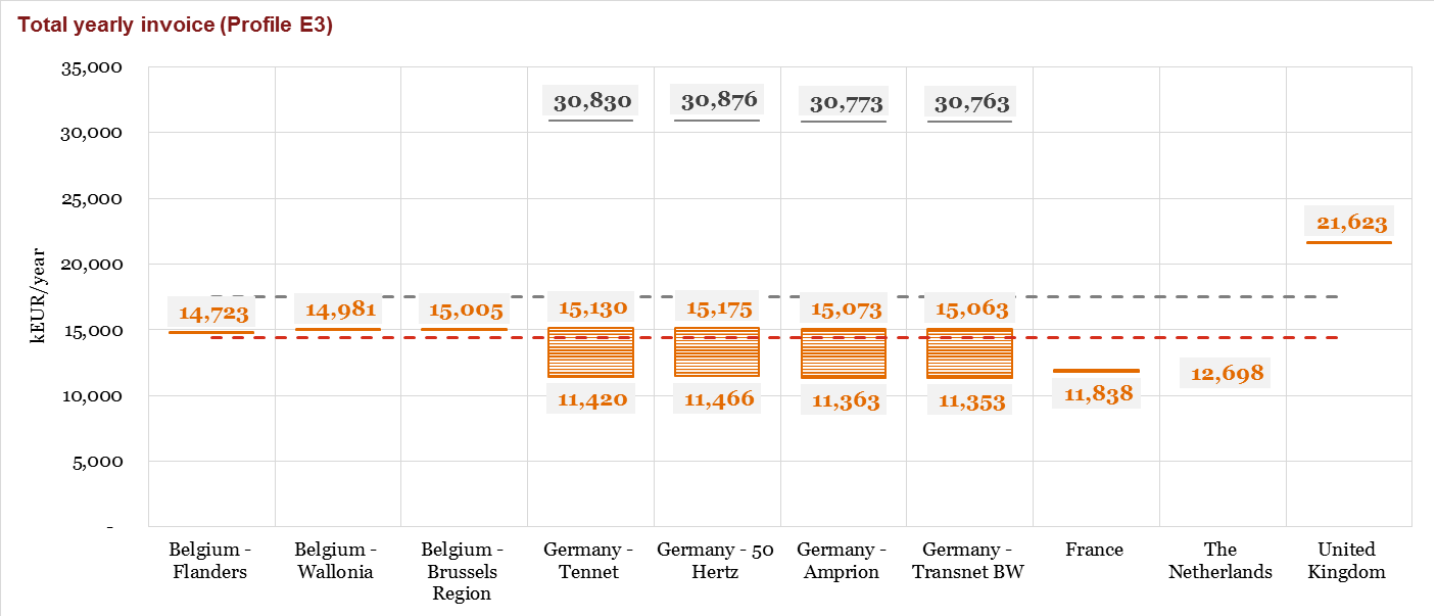
- We observe very important differences between the countries under review and even within the countries: a possible total invoice for profile E1 can vary between 1,83 mEUR and 4,07 mEUR.
- Belgium offers a relatively competitive electricity cost, especially the Brussels and (to a lesser extent) Flemish region. Electricity costs in France, the Netherlands, several German regions (low range) and Flanders are within a very close range.
- Commodity cost plays a key role. In this respect, the situation encountered in Belgium is close to the average of the sampled countries, in line with those charged in the Netherlands. Germany and France offer a competitive advantage for this component, while the United Kingdom deals with a considerably higher commodity price. In countries with more competitive commodity prices, higher transport costs (Germany) and/or taxes (France and Germany) are less harmful to competitiveness.
- *Transport costs* absorb a variable but possibly substantial part of the total bill. They also diverge between the different countries/regions. They are the highest in the United Kingdom and in Germany, partly due to presence of distribution charges in those countries. Belgium is the most competitive country for transport costs, even more than is the case for profile E1.
- *"Taxes, levies and certificates schemes"* are characterised by a large variance. They are high in France and the UK and rather important in Belgium, especially in the Walloon region, while they remain very low in the Netherlands. In Germany the situation is mixed, depending on the taxation scheme implemented at company level. In this respect, the range between the best and the worst situation is high as it can reach about the same size of commodity cost and transport cost combined.

6.4. Profile E3 (Electricity)

Total invoice analysis

Figure 7 provides a comparison of the total yearly invoices paid by profile E3 in the various countries under review. Results are expressed in kEUR/year.

Figure 7: Total yearly invoice in kEUR/year (profile E3)

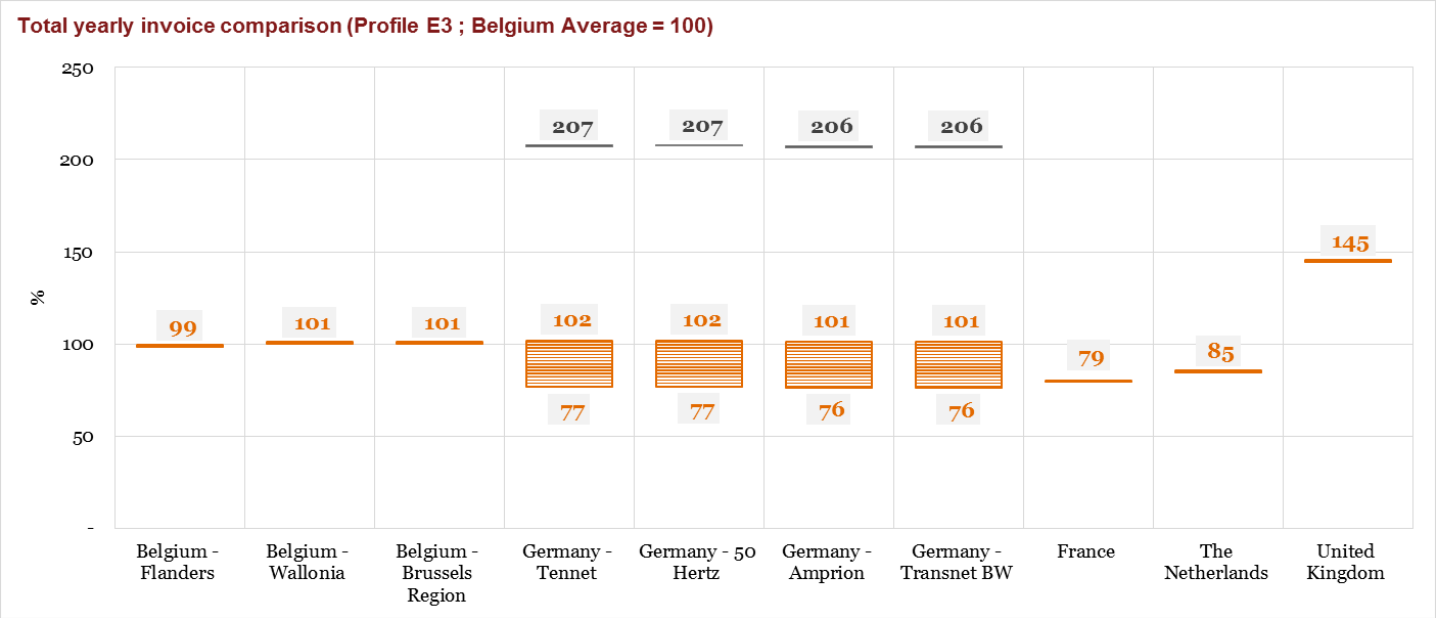


For an extensive legend for all figures, see page 50.

Again, Belgium is split in three regions and Germany in four regions, while only one single result is presented for the UK, France and the Netherlands. For the UK and the Netherlands, reported data correspond to averaged values driven from the sub-regions.

For the purpose of facilitating the comparisons, in Figure 8 the same results are compared to the reference situation which relates to the average of the three Belgian regions (Belgian average = 100%).

Figure 8: Total yearly invoice comparison in % (profile E3)



For an extensive legend for all figures, see page 50.

Belgium is less competitive than France, the Netherlands and important parts of the German range. This is true for all three Belgian regions, even though the Flemish region offers a slightly lower electricity cost than the Walloon and Brussels regions. The UK and the German eEG-maximum case are high outliers. In the latter case, payment of this renewable surcharge (only when total electricity cost does not constitute 14% of gross value creation) means doubling the electricity cost. The apparent lower competitiveness of top range German results should therefore be assessed very carefully.

Competitiveness score:

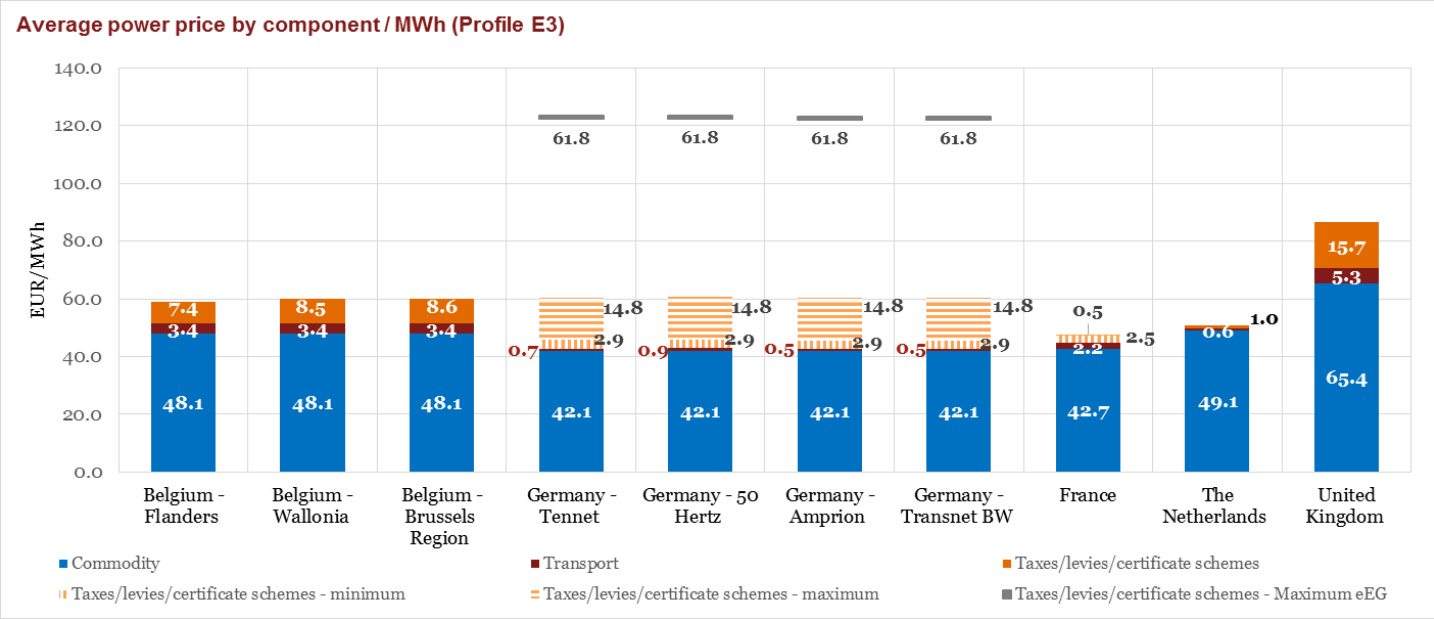
1. In terms of countries : Belgium is certain to be more competitive than 1 out of 4 countries (1/4)
2. The Flemish region is certain to be more competitive than 1 out of the 7 zones (1/7)*
3. The Walloon region is certain to be more competitive than 1 out of the 7 zones (1/7)*
4. The Brussels region is certain to be more competitive than 1 out of the 7 zones (1/7)*

**these seven price zones are: the four German zones, France, Netherlands and UK*

Breakdown by component

The previous results are further detailed for the profile E3 in Figure 9 which provides a closer look on the components breakdown.

Figure 9: Average power price by component in EUR/MWh (profile E3)



For an extensive legend for all figures, see page 50.

Even more so than for profiles E1 and E2, **commodity cost** plays a major role. Belgian commodity cost is in the average of sampled countries and similar to the commodity cost in the Netherlands. Germany and France have a substantially lower commodity cost. Commodity costs in the United Kingdom are high, and are an important factor in the outlier result for the UK.

For profile E3, **transport costs** only constitute a limited part of the total invoice. Large baseload consumers in the UK and Belgium pay higher transmission tariffs than those in France, the Netherlands and Germany. This is due to the reductions discussed on the next page.

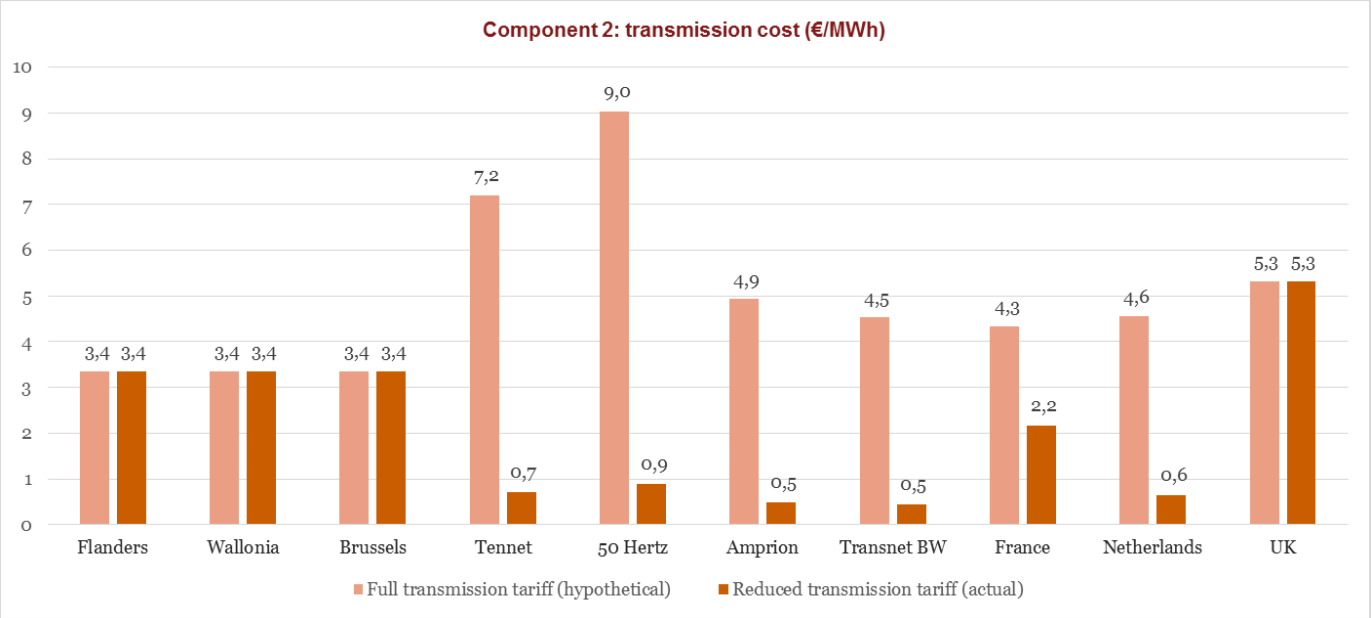
Taxes, levies and certificates schemes play a variable role. They have a relatively large impact in the United Kingdom, but also in Belgium (where differences between regions are small). Dutch and French large baseload consumers benefit from a very low cost of taxes, levies and certificates schemes. Generally speaking, German taxes and levies compensate part (or all) of the competitive advantage that is built up through the low commodity cost - depending on the exact amount of taxes that has to be paid.

Impact of reductions on transport tariffs

As briefly stated above, the impact of the reductions on transmission tariffs for large baseload consumers such as profile E3 is important. Germany introduced these reductions in 2012, the Netherlands in January 2014 and France in August 2014. Belgium and the UK do not grant reductions.

In Germany and the Netherlands, large baseload consumers such as E3 in this study can benefit from a transport tariff reduction up to 90%. In France, the reduction for large baseload consumers is maximum 50%. As shown in figure 10 below, these reductions profoundly alter the situation in terms of transmission tariffs, and by doing so the general picture in terms of competitiveness.

Figure 10: Transmission tariff reductions (profile E3)



In all three cases, the cost is transferred to the other consumers. In the Netherlands and in France, these reductions are compensated by the transport tariff itself (through regulatory accounts, for instance). In Germany, a separate levy (the "StromNEV §19-Umlage") was created to pay for the reduction. It is due by all consumers, but yet again reductions for large consumer profiles are granted on this levy. We can therefore say that high transmission tariffs in Germany are not the consequence of the reductions, but rather the cause.

KEY FINDINGS

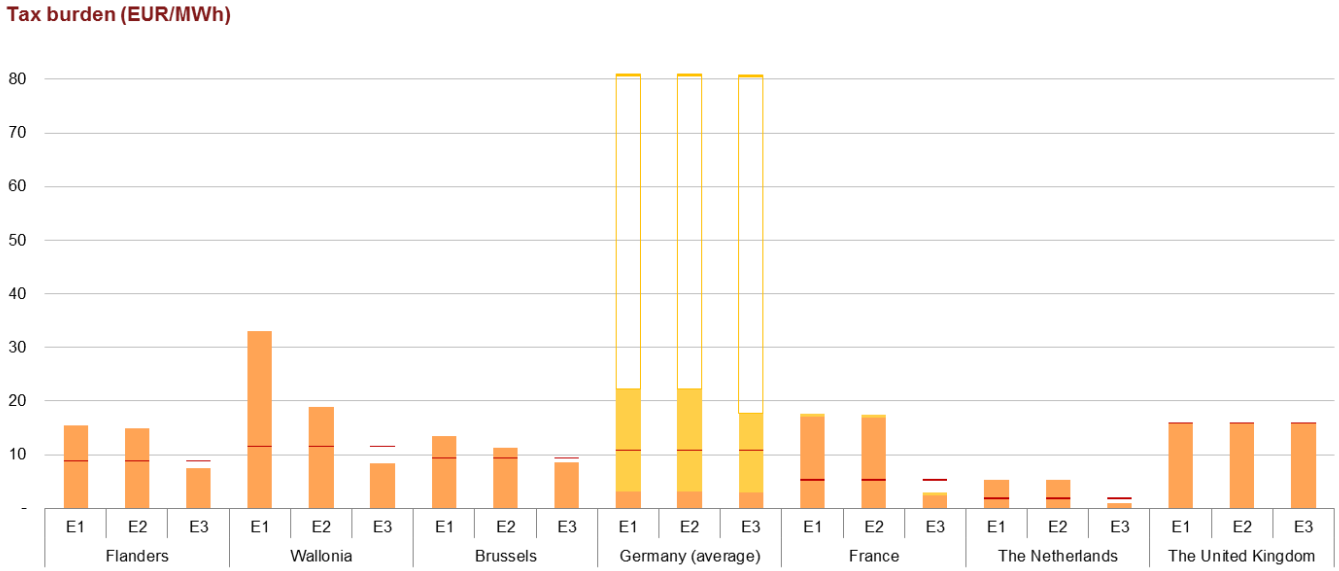
The third electricity profile (E3) suggests the following findings:

- The majority of cases under review are clearly more competitive than Belgium: France, the Netherlands and Germany (low and medium range).
- Commodity costs play a very important role. In this respect, the situation encountered in Belgium is close to the average of the sampled countries, in line with the Netherlands. Germany and France have a competitive advantage, while the UK is more expensive.
- Transport costs are responsible for a relatively small part of the bill. Important reductions in Germany, the Netherlands and France make that otherwise low (UK) to very low (Belgium) transport tariffs still constitute a competitive disadvantage.
- Transport tariff reductions for large baseload consumers constitute a sizeable competitive advantage for Germany, France and the Netherlands. These costs are borne by other consumers.
- "Taxes, levies and certificates schemes" are characterised by a large variance. They are high in the United Kingdom and rather important in Belgium while they remain very low in the Netherlands and in France. In Germany the situation is mixed, depending on the taxation scheme implemented at company level. In this respect, paying the high end of the German tax range can mean doubling the total electricity cost of a low end scenario.

6.5. Profiles E1 – E2 – E3: Burden of extra costs

When analysing and summarising the results in terms of electricity, it is interesting to see how the third component (taxes, levies and certificate schemes) compares between the different consumer profiles. In figure 11 below, the orange bars represent the total cost per MWh of component 3: taxes, levies and certificate schemes. The full yellow bars represent the minimum-maximum ranges where different options are possible, while the transparent yellow bars represent the maximum range of the eEG-Umlage. The red lines represent the weighted average tax burden for a country (in function of consumption volume).

Figure 11: Taxes, levies and certificate schemes throughout 3 profiles



Each country (and region in Belgium) allocates the total burden of extra costs (simplified: tax burden) differently, but one common trend is clearly visible: the more one consumes, the lower the tax burden. The UK is the only exception: it grants no reductions based on volume and allocates the tax burden completely evenly over the three profiles.

The outspoken differences in terms of taxes, levies and certificates schemes between profile E1 and E2 are a specific Belgian phenomenon: because profile E1 is connected to the local transport network, regional public service obligations apply. The fact that these regional PSO's are particularly high in the Walloon region (13,82 €/MWh), explains the important difference between E1 and E2.

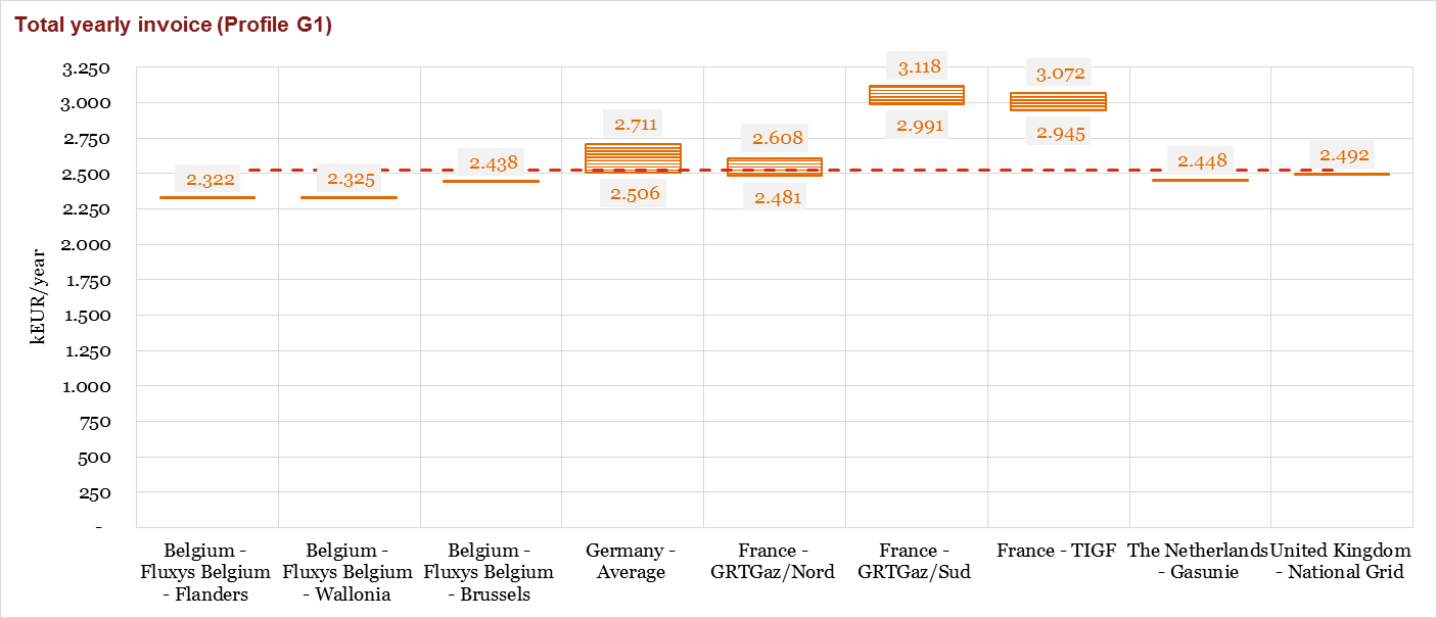
6.6. Profile G1 (Gas)

Total invoice analysis

The analysis of the unique gas consumption profile is carried out along the same pattern as the one used for the electricity profiles. However, while the three Belgian regions are still considered in the gas comparison, results are now averaged in the case of Germany. In France, three regions are treated separately. The Netherlands and the UK are each considered as one single zone.

The next chart, Figure 12, depicts the total yearly invoice charges to the consumer characterised by the reference profile (G1).

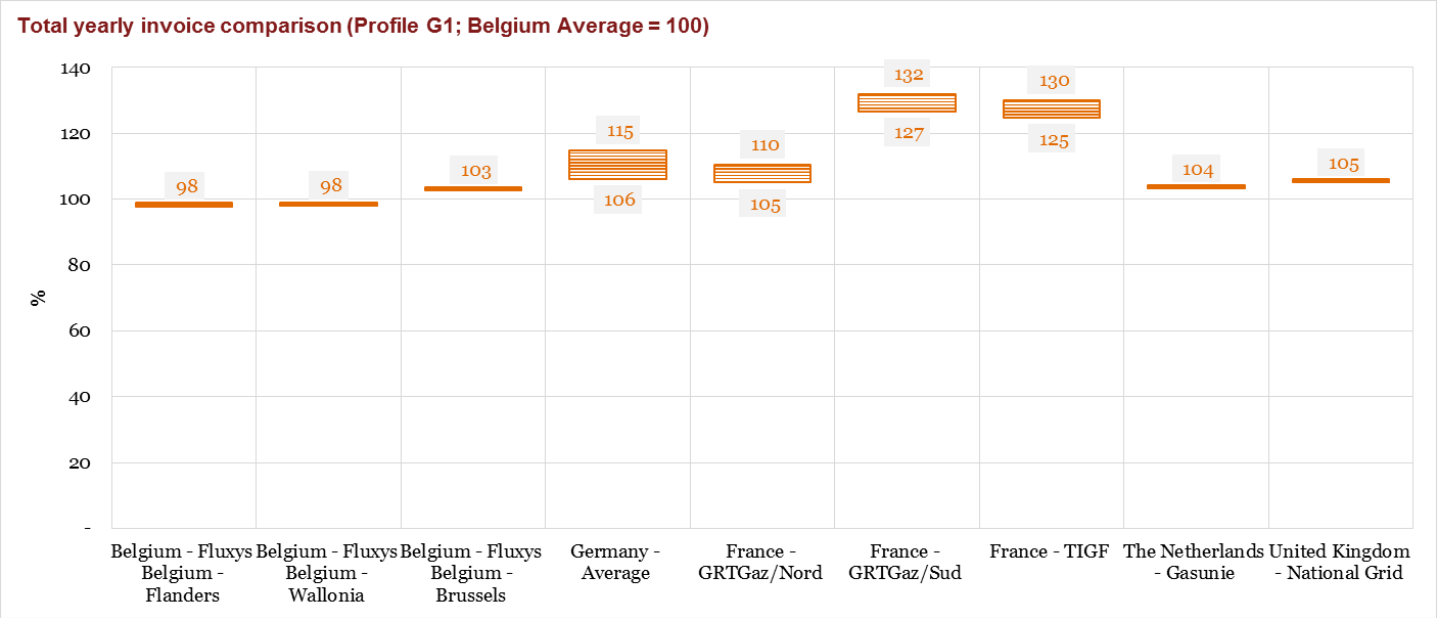
Figure 12: Total yearly invoice in kEUR/year (profile G1)



For an extensive legend for all figures, see page 50.

For the purpose of facilitating the comparisons, in Figure 13 the same results are compared to the reference situation which relates to the average of the three Belgian regions (Belgian average = 100%).

Figure 13: Total yearly invoice comparison in % (profile G1)



For an extensive legend for all figures, see page 50.

In terms of natural gas for a large industrial consumer like profile G1, Belgium is the most competitive country of the five countries under review. Total cost for natural gas in the Netherlands, the UK, northern half of France and Germany is almost the same, even though a small upward range exists in the last two cases. The South and South-West of France are clearly more expensive in terms of gas cost.

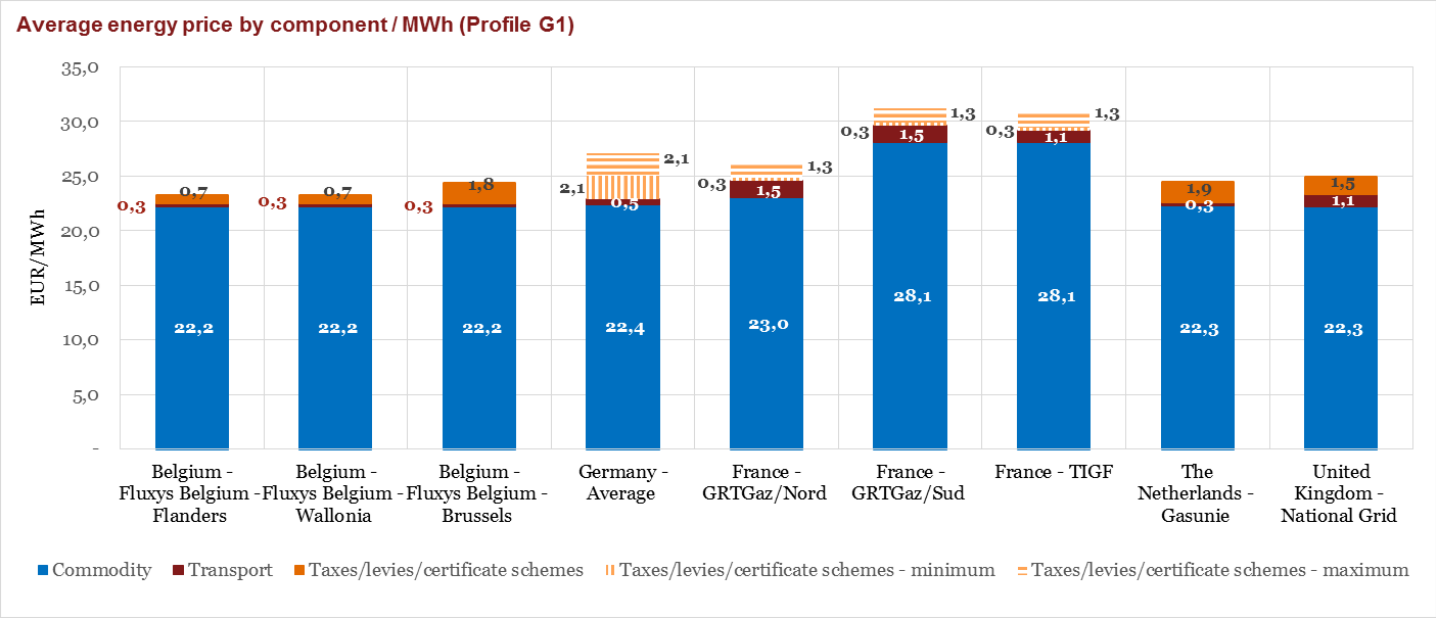
Competitiveness score:

1. In terms of countries : Belgium is certain to be more competitive than 4 out of 4 countries (4/4)
2. In terms of zones : the three Belgian regions are certain to be more competitive than 6 out of the 6 zones (6/6)

Breakdown by component

The previous results are further detailed for the profile G1 in the following chart, Figure 14, which provides a closer look on the components' breakdown.

Figure 14: Average gas price by component in EUR/MWh (profile G1)



For an extensive legend for all figures, see page 50.

More than for electricity and in all countries, the commodity cost plays the major role in the composition of the total gas price. Commodity cost is almost identical in Belgium, Germany, the Netherlands and the UK. It is only slightly higher in the northern half of France. The South and South West of France have to deal with a considerably higher gas market price, which constitutes a substantial competitive disadvantage.

The impact of the other two components is considerably lower. In terms of transport tariffs, Belgium, Germany and the Netherlands observe the lowest values, while the GRTGaz-tariffs are highest. As a consequence, the GRTGaz-PEG Sud zone shows the highest prices in France and of all the countries in this study: it combines the most expensive market area (PEG Sud) with the highest transport tariffs (GRTGaz).

As to taxes and levies, Dutch and German taxes (even the low range) are the highest and offset these countries' fundamentally competitive starting position in terms of commodity cost and transport tariffs.

KEY FINDINGS

The gas profile (G1) suggests the following findings:

- Belgium is the most competitive country in terms of natural gas prices for large baseload consumers.
- Together with the important share of commodity cost in the total cost, price convergence on the commodity market in the UK, Northern France, Germany Belgium and the Netherlands makes for relatively small differences between the zones under review (except for southern France).
- The impact of transport costs and taxes and levies on the total cost is very limited in absolute numbers, but determines the competitiveness rating.

Conclusion

7. Conclusion

Electricity

Some **general conclusions** can be drawn in terms of electricity:

1. In every country, governments intervene in order to reduce the electricity cost for some categories of large industrial consumers. These interventions occur on all three components: commodity (France), transport (Germany, Netherlands, France) and most importantly taxes, levies and certificate schemes (Belgium, UK, Germany, France and the Netherlands).
2. The United Kingdom is an outlier on the high side for peakload and baseload consumers, regardless of their connection level to the grid.
3. For all three profiles, the lowest electricity cost is available in Germany. However, the application of this cost in Germany depends on location (which zone) and a host of economic criteria used for granting reduced rates on taxes and levies. As a consequence, for all profiles under review, the highest electricity cost is also available in Germany.
4. Commodity cost plays a very important role: French and German consumers are clearly in a more competitive starting position. This competitive advantage finds its origin in a lower power market price and, in the French case, in commodity price regulation by the government.

Gas

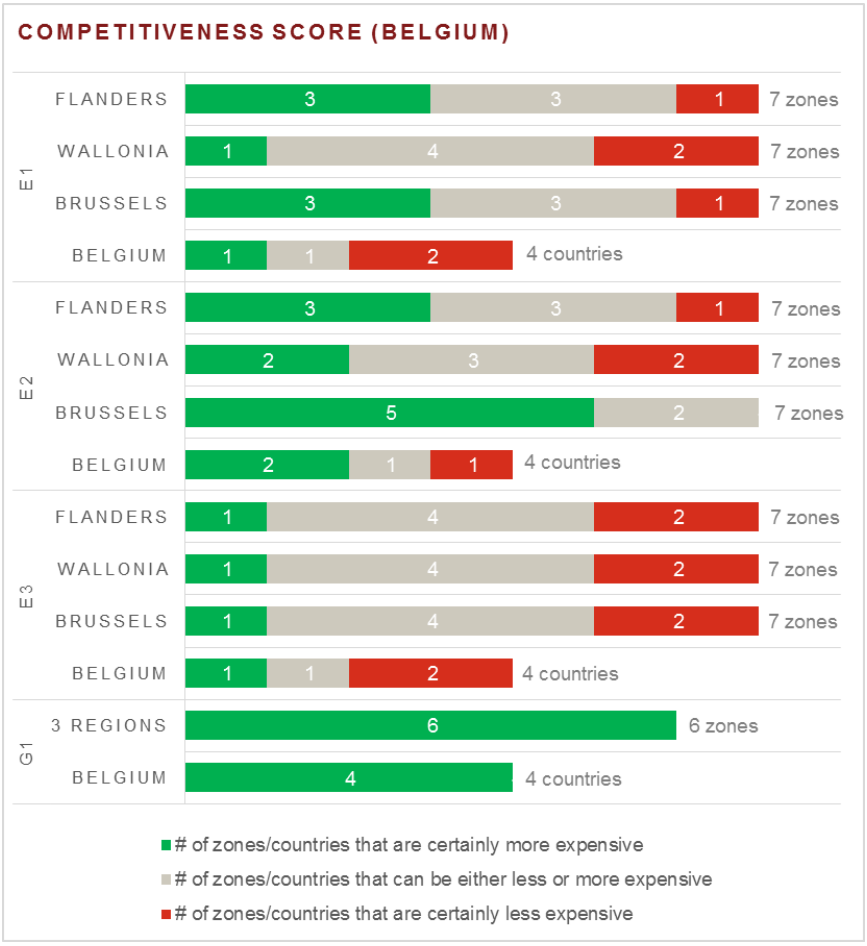
As far as natural gas is concerned, some **general conclusions** can be presented as well:

1. Commodity costs are responsible for a larger part of the industrial gas bill than of the industrial electricity bill.
2. Together with the important share of commodity cost in the total cost, price convergence on the commodity market in the United Kingdom, France, Belgium, Germany and the Netherlands makes for small differences between the zones under review (except for southern France), especially when compared to electricity.
3. The impact of transport costs and taxes and levies on the total cost is very limited in absolute numbers, but determines the competitiveness rating.

Competitiveness of Belgian energy prices

Now, in order to better interpret the **Belgian situation** in terms of energy cost for industry, we present a competitiveness scorecard that does an effort to summarize the complex and nuanced situation that we have described throughout this report. We address the question whether, based on the consumer profiles provided by the CREG and on the assumptions that we set out earlier on, the energy cost for industrial consumers in Belgium/Flanders/Wallonia/Brussels is competitive when compared to the neighbouring countries (and the price zones within those countries).

Figure 15: Competitiveness scorecard



The results vary greatly between the different consumer profiles.

For large industrial baseload consumers (profile E3), only one neighbouring country is certainly less competitive than Belgium: the United Kingdom. This does not mean that all other countries present lower costs; consumers that pay the higher range of electricity cost in the four German zones are worse off than their Belgian counterparts. Nevertheless, electricity cost in France and the Netherlands is 15 to 20% lower than in Belgium, where differences between regions are relatively limited for the consumer profile.

For smaller industrial peakload profiles, whether they are connected to lower (30-70 kV, profile E1) or higher (150 kV, profile E2) voltage levels, the picture is much more nuanced. For both consumer profiles, we observe the highest cost of the three regions in the Walloon region, a price zone compared to which only one (UK for E1) or two (UK and Germany/Tennet for E2) others are less competitive. When

connected to the local transmission network (30-70 kV), industrial peakload consumers in the Brussels and Flemish regions are relatively well-positioned compared to the other price zones, while the Walloon region offers a substantially (up to 20%) higher cost. When connected to the transmission grid, the same conclusion can be drawn for industrial peakload consumers, but with less outspoken differences between the Belgian regions.

In terms of industrial gas consumers directly connected to the transport grid (profile G1), Belgium clearly offers the most competitive prices, regardless of the region. On all three components, the cost in Belgium is among the lowest observed in the entire sample.

Given the fact that it appears from section 3.2 that the energy intensive industry located in Belgium is consuming large amounts of both gas and electricity, the extent to which the competitive disadvantage observed for some large Belgian industrial electricity consumers could be compensated by the competitive advantage observed for Belgian industrial gas consumers should be further investigated.

Update March 2015

This study was commissioned by CREG in November 2014, with the specific mission to compare costs based on the situation in October 2014. Given the fact that it is published in the spring of 2015, we provide a short update of the evolutions that have taken place since October 2014 and their possible impact on the actual situation.

Electricity

Commodity

In terms of commodity cost, evolution in Belgium was very limited, slightly downward (2% for profiles E1 and E2, nearly 1% for profile E3). In Germany, commodity cost fell sharply between October 2014 and March 2015, around 12%. In the Netherlands, commodity cost decreased almost as sharply as in Germany, with a 9 to 10% decrease of baseload and peakload commodity cost. In France, ARENH didn't change in 2015, which made for baseload commodity cost to remain almost stable. Peakload commodity cost however, where market prices play a more important role, decreased by almost 4%. In the UK, the exchange rate effect (over 8% depreciation of the Euro), is only slightly mitigated by a decrease in prices on the electricity market, and so we observe a 6 to 8% increase in commodity cost.[23]

The fact that the downward evolution of commodity prices observed in three of the neighbouring countries does not really materialize in Belgium, can be attributed to one single factor: the average price of CAL 2015 in 2014 (Cal+1, the average price paid in 2014 for electricity in 2015). While year-ahead forward prices have decreased in all neighbouring countries between 2013 and 2014, in Belgium they went up 8%.

Network costs

In Belgium, the same transmission network tariffs still apply, as is the case in France and in the UK (where a 21% increase of transmission tariffs will occurs starting April 1st 2015). In Germany, integrated distribution and transmission tariffs (for profiles E1-E2) increase strongly (6-18%) in Amprion and Transnet BW-territory while remaining rather stable in the two other zones. German transmission tariffs converge toward each other, with the most expensive zone (50 Hertz) showing decreasing rates but the country average increasing by 11%. In the Netherlands, transmission tariffs went up by 7 to 8%.

In terms of transmission tariff reductions for large baseload consumers (profile E3), the German and Dutch situation does not change in 2015. As a consequence, the abovementioned tariff increases in Germany and the Netherlands barely have an impact on energy cost for profile E3. The French government has not yet announced whether it will prolong the current 50% reduction beyond August 2015.

Taxes and levies

In Belgium, the federal surcharge for green certificates (offshore wind) and the federal contribution remained almost stable, but a new federal tariff for public service obligations in order to finance the strategic reserve exists since February 1st 2015 (0,61€/MWh). In the three regions, we observe important increases in the renewables quota of the certificate schemes (6-8% in Flanders, 18% in Brussels and 20% in the Walloon region).

In Germany, we notice a slight increase in the StromNEV §19-levy, and a decrease in the offshore liability and Ablav-surcharge of about the same amount.[24] The EEG levy base rate lowers from 62,40€/MWh to 61,7 €/MWh, but as from 2015 a new reduction system is introduced. The full rate is still due on the first GWh of consumption. After that, a triple ceiling applies (see annex B) which is partly based

[23] As March 2015 belongs to the same seasonal product as October 2014, this stability is also caused by the fact that the input for baseload prices hardly changes.
[24] As the KWK-Umlage only increases its base rate (not-applicable for the profiles under review), its increase has no impact on the result and is not mentioned.

on percentages of the gross added value. The minimal rates, however, still apply. The access to the criteria for electro-intensity have become somewhat more stringent.

In France, the CSPE contribution was increased from 16,5 to 19,5 €/MWh. This has a considerable impact on profiles E1 and E2, but only to a lesser extent on profile E3 (which pays the – slightly increased – cap).

In the Netherlands, we observe some very minor increases in the low consumption rates of the energy tax and the sustainable ODE-levy.

For the UK, tax rates for the Climate Change Levy and quota for the Renewable obligation are all fixed for an entire financial year (April 2014-March 2015) and have not evolved. As is the case on all components, the exchange rate effect (depreciation of the Euro) makes the UK 8,2% more expensive than in October 2014.

Conclusion

In the figure below, we summarize the evolutions described above in a comprehensive table. For the United Kingdom, the exchange rate effect is only shown in the representation of the total result.

Figure 16: Gross price evolutions Oct 2014 – March 2015 (Electricity)

	BELGIUM	GERMANY	FRANCE	NETHERLANDS	UK
Component 1: Commodity	↘	↘	↘	↘	↘
Component 2: Transport cost	→	↗	→	↗	→
Component 3: Taxes, levies, cert. schemes	↗	→	↗	↗	→
Total E1	↗ + 0-2%	↘ - 4-7%	↗ + 1%	↘ - 6%	↗ + 5%
Total E2	↗ + 0-2%	↘ - 3-7%	↗ +1%	↘ - 5%	↗ + 5%
Total E3	↗ + 1-2%	↘ - 8-12%	→ 0%	↘ -9%	↗ +8%

For the three electricity consumer profiles under review, we can generally draw the same conclusion on the evolution between October 2014 and March 2015. Electricity cost in the Netherlands and Germany decreases 3 to 7% for peakload consumers and 8 to 12% for baseload consumers, while a small increase can be observed in the three Belgian regions. Total electricity cost in France remains relatively stable, while the exchange rate effect pushes up UK prices by about 5% to 8%.

As a consequence, for profiles E1 and E2, Belgian competitiveness positions slightly deteriorate compared to the neighbouring countries under review (DE, NL, FR). The Netherlands - already well positioned - further improves its competitiveness position, while the UK's position further deteriorates. For profile E3, the_Belgian competitiveness position deteriorates compared to the neighbouring countries under review (DE, NL, FR). The strong German and Dutch competitiveness positions improve further, while France keeps its strong position. The UK's position further deteriorates.

For all profiles we observe a slight decrease of Belgian competitiveness, an improvement of Dutch and German competitiveness, and a general deterioration of competitiveness for UK. The French situation remains generally stable.

Gas

Commodity

In terms of commodity, we can see commodity cost in Belgium and the UK going up 3 to 5% due to depreciation of the Euro (prices at the Zeebrugge Hub are presented in GBP). In Germany, commodity cost increased by about 3%, while in the Netherlands it remained stable. In France, the premium between the (stable) PEG Nord and Sud indexes almost disappeared between October 2014 and March 2015 (from 5 to 0,5 €/MWh). In general, commodity prices in all zones under review are converging within a 1€/MWh band.

Network costs

While France and the UK are still in the same regulatory period, transport tariffs for industrial clients in Belgium – already the most competitive ones in the sample – lowered a little further (-6%). Dutch transmission tariffs went up by about the same amount, while the average evolution in Germany is rather stable.

Taxes and levies

In Belgium, the federal contribution on natural gas base rate has increased by 0,1€/MWh, while in the Netherlands, we observe a 42% increase of the Energy tax and a 61% increase of the ODE Levy (from 1,9 tot 2,7 €/MWh). For the United Kingdom, no changes are observed in terms of taxes and levies as March 2015 is considered as part of the same financial year as October 2014. In France, the TICGN tax top rate was doubled (from 1,3 to 2,6€/MWh), but the reduced rates and exemptions still exist. The (very small) *Contribution biométhane* is doubled with very low impact on the total cost. Along the same lines, we see an increase in Germany in the Biogas levy which has hardly any impact on the total cost.

Conclusion

In the figure below, we summarize the evolutions described above in a comprehensive table. For the United Kingdom, the exchange rate effect is only shown in the representation of the total result.

Figure 17: Gross price evolutions Oct 2014-March 2015 (natural gas)

	BELGIUM	GERMANY	FRANCE	NETHERLANDS	UK
Component 1: Commodity	↗	↗	↘	↗	↘
Component 2: Transport cost	↘	→	→	↗	→
Component 3: Taxes, levies, cert. schemes	→	→	↗	↗	→
Total G1	↗ + 2-3%	↗ + 3%	Nord: + 0-5% ↗ ↘ Sud: - 11-16%	↗ + 4%	↗ + 6%

Total cost of natural gas has increased in all zones under review, except for the southern part of France. In general, the conclusions in terms of competitiveness of prices in Belgium remain entirely valid when looking at 2015: total cost of natural gas in other countries remains 2 to 15% higher than in Belgium for this consumer profile. Prices in the southern part of France have come down to the level of the northern part of France.

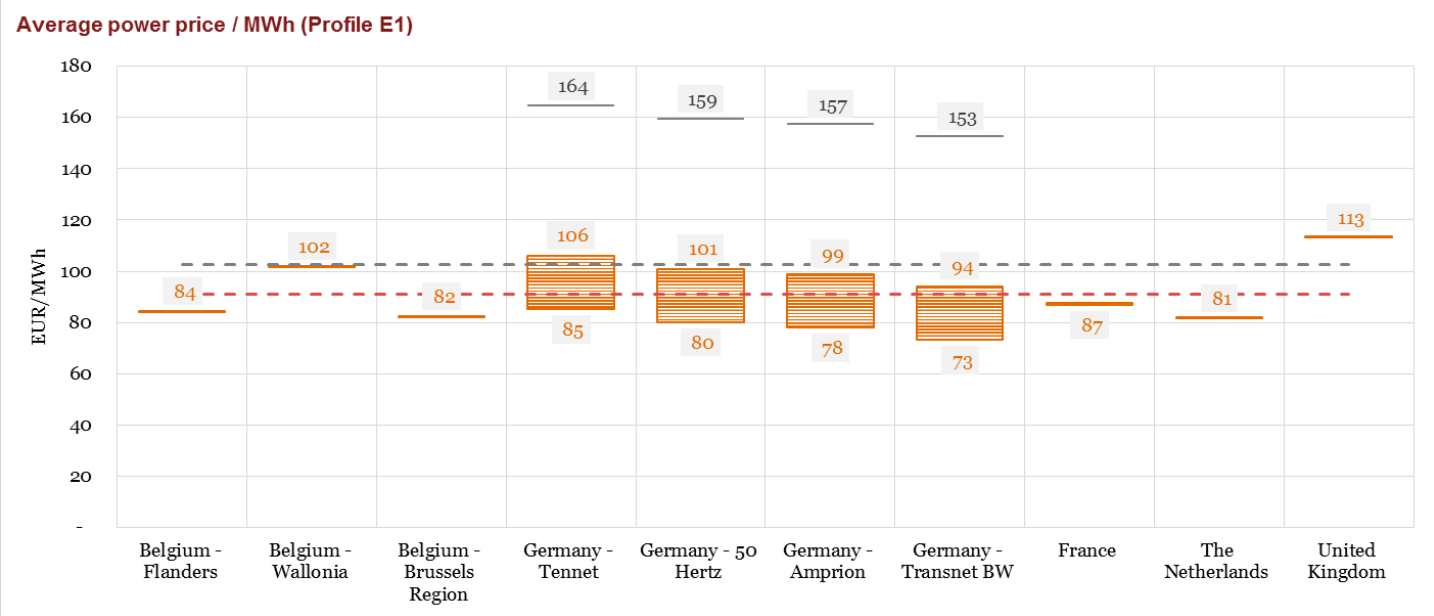
Annexes

Annex A: Graphical data

Profile E1 (Electricity)

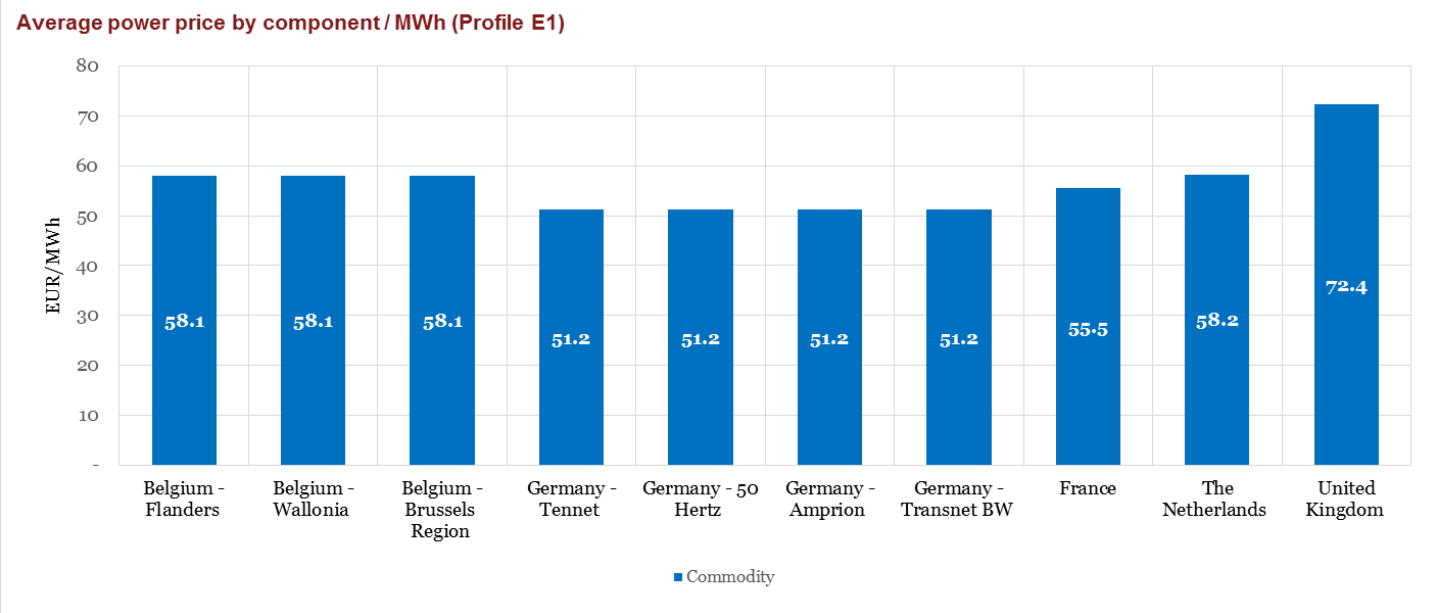
Average power price / MWh

Figure 18: Average power price in EUR/MWh (profile E1)



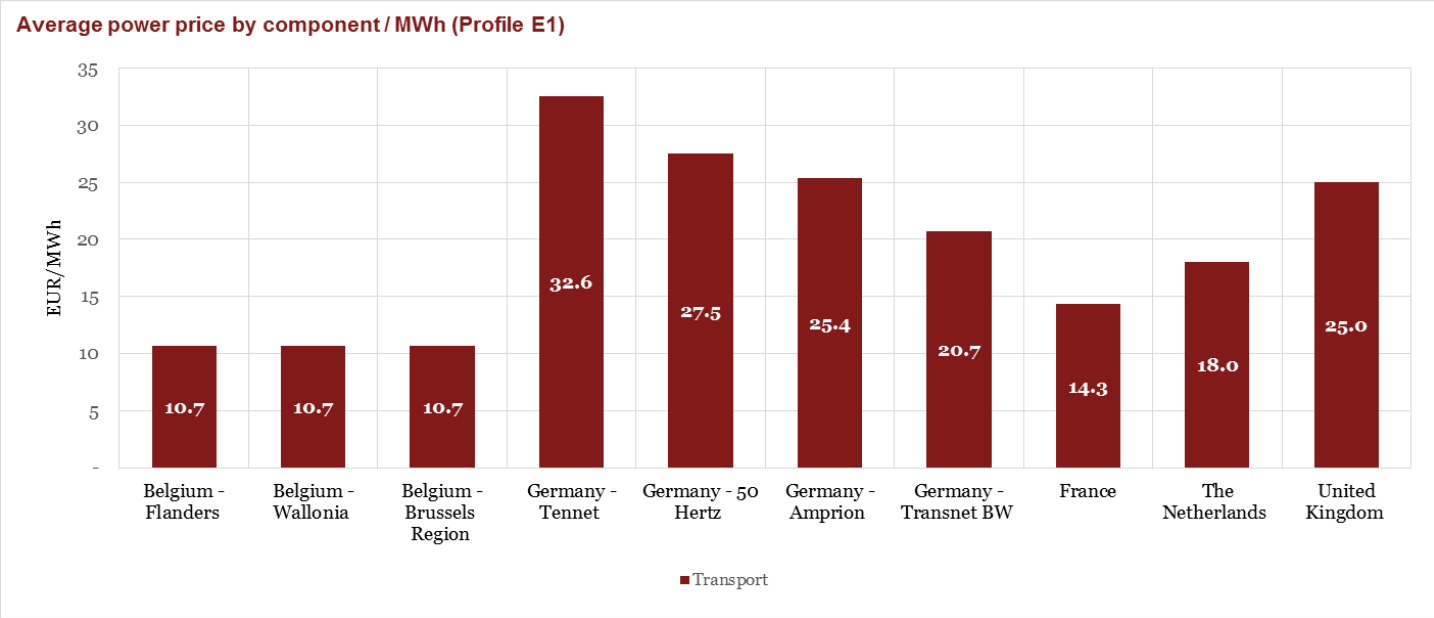
Component 1: Commodity

Figure 19: Commodity price in EUR/MWh (profile E1)



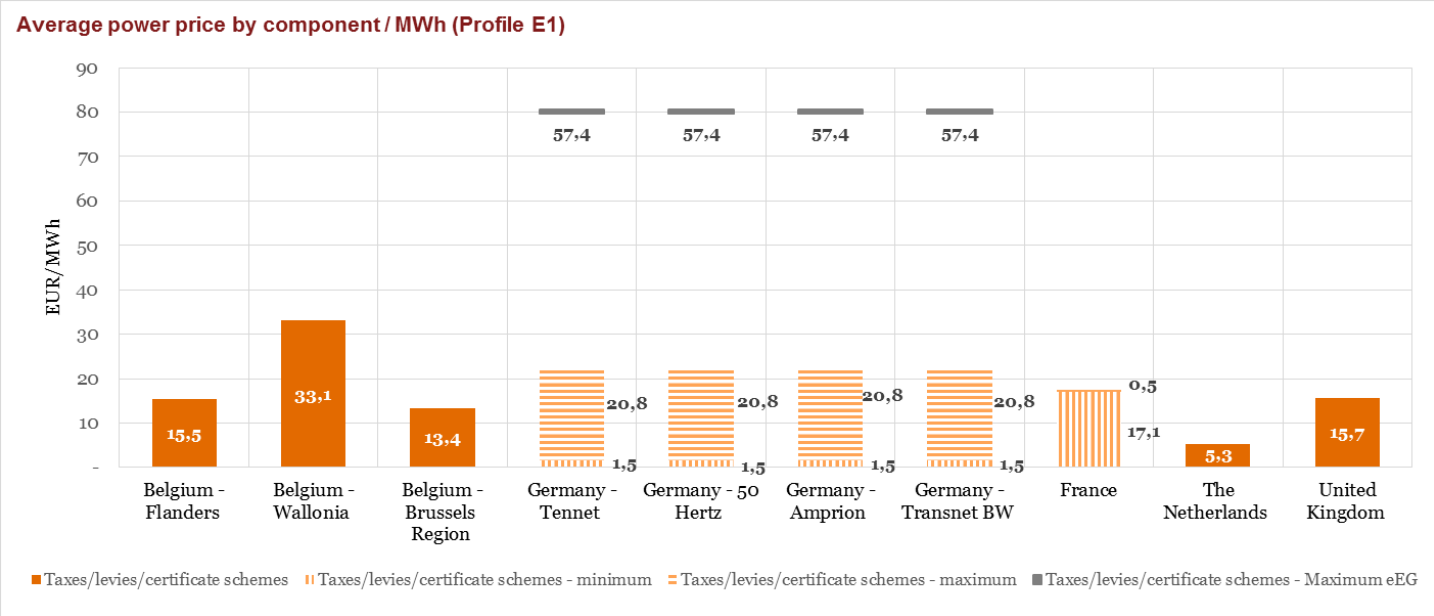
Component 2: Transport

Figure 20: Transport cost in EUR/MWh (profile E1)



Component 3 Taxes, levies & certificate scheme

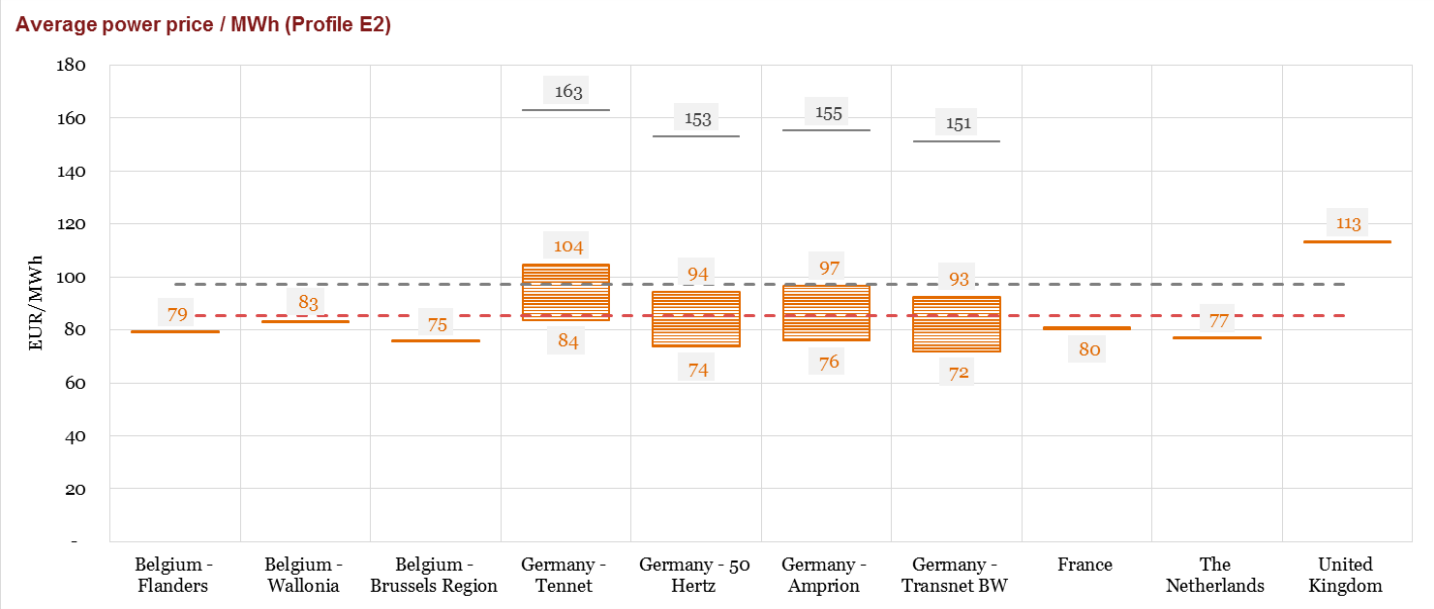
Figure 21: Taxes, levies & certificate scheme in EUR/MWh (profile E1)



Profile E2 (Electricity)

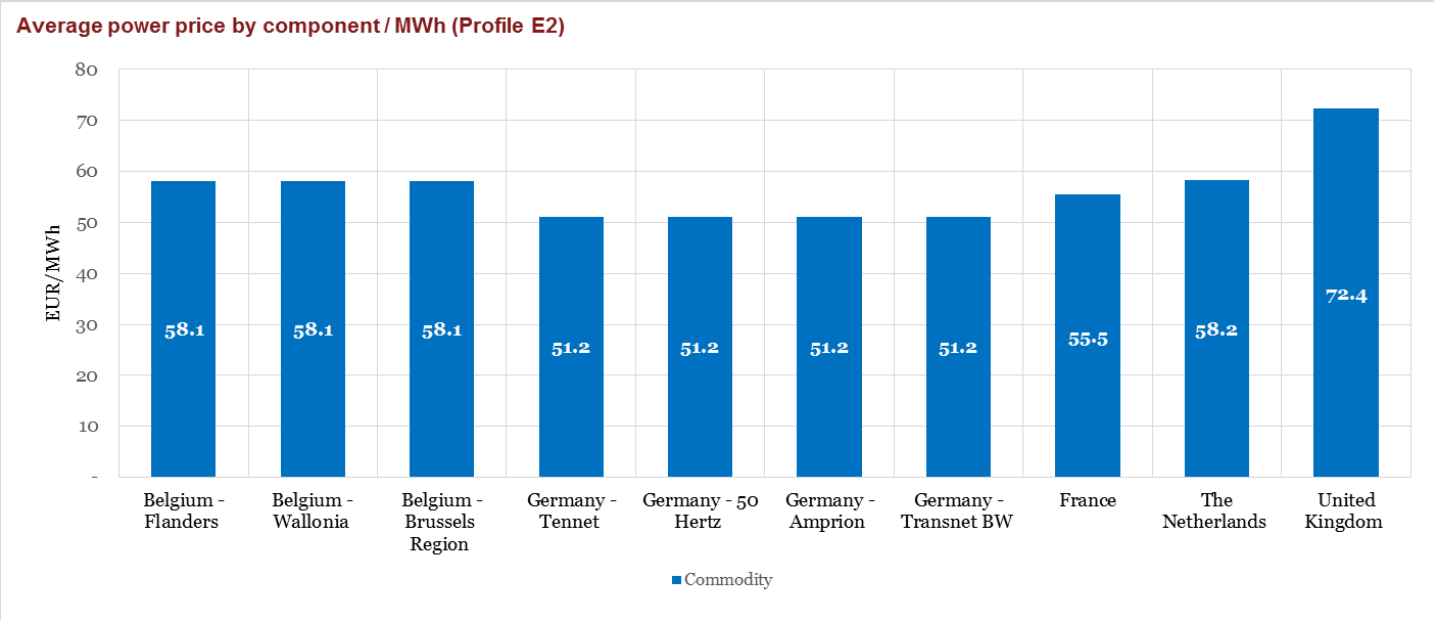
Average power price / MWh

Figure 22: Average power price in EUR/MWh (profile E2)



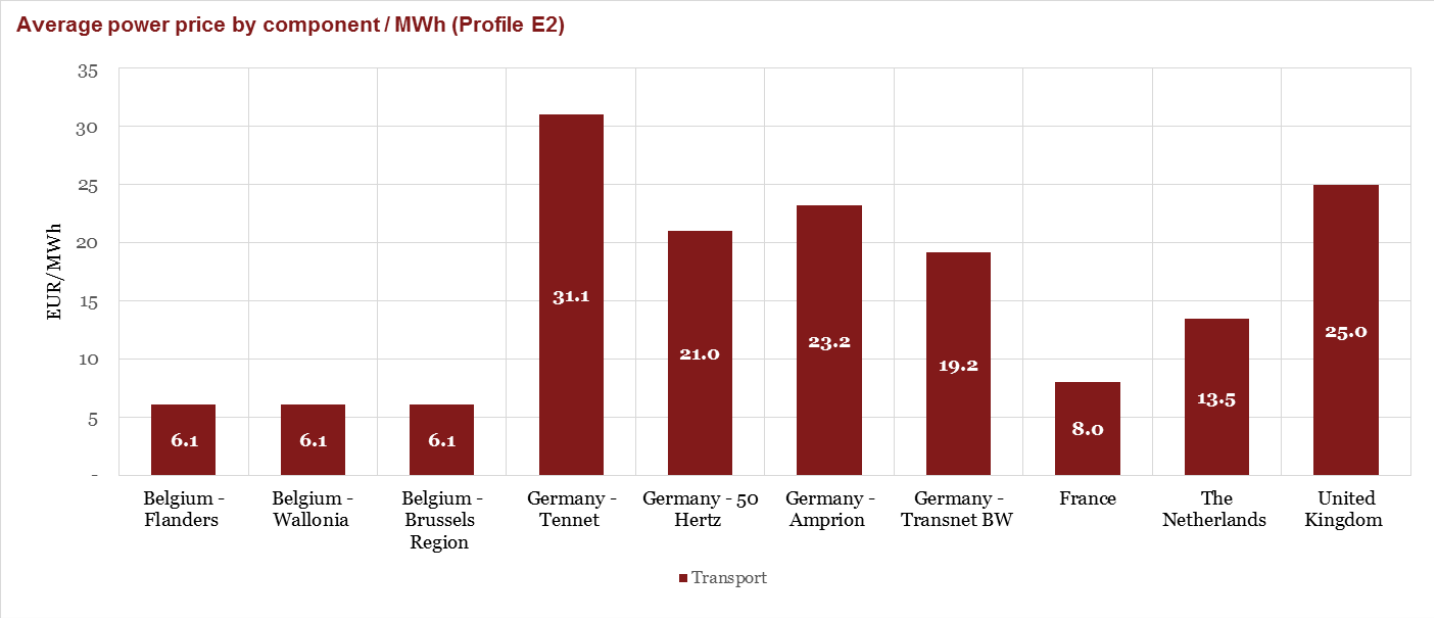
Component 1: Commodity

Figure 23: Commodity price in EUR/MWh (profile E2)



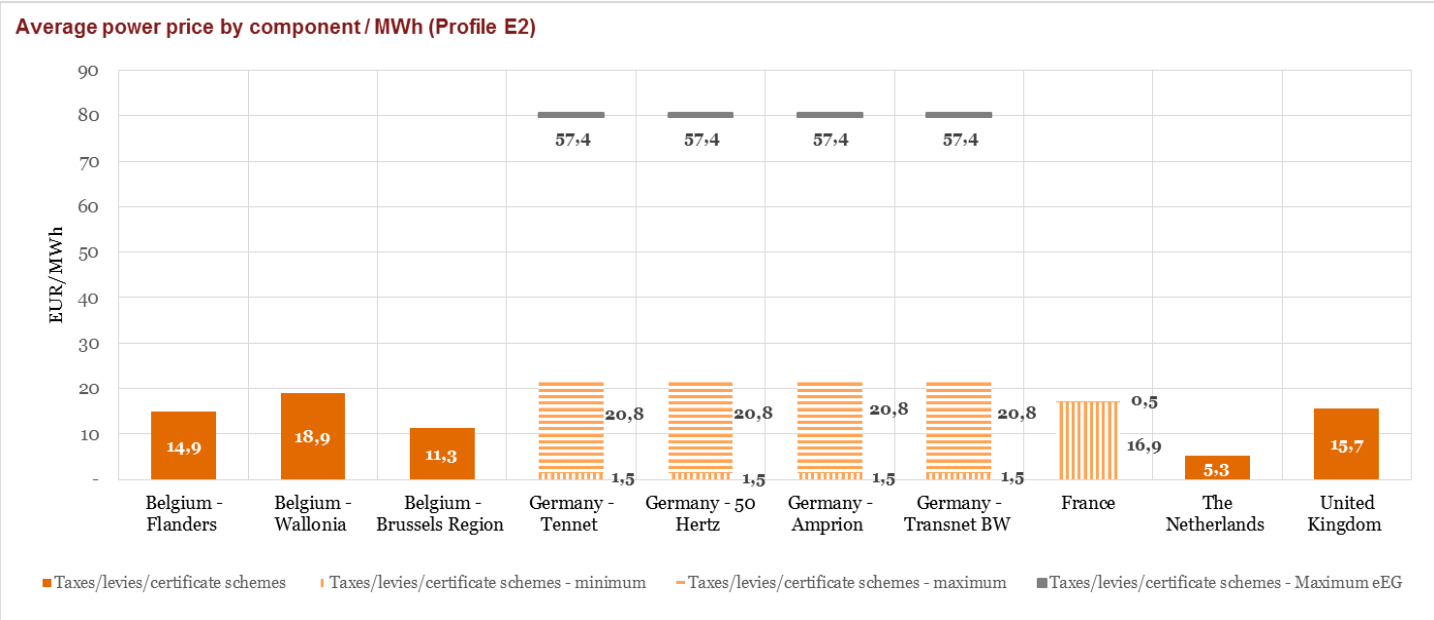
Component 2: Transport

Figure 24: Transport cost in EUR/MWh (profile E2)



Component 3 Taxes, levies & certificate scheme

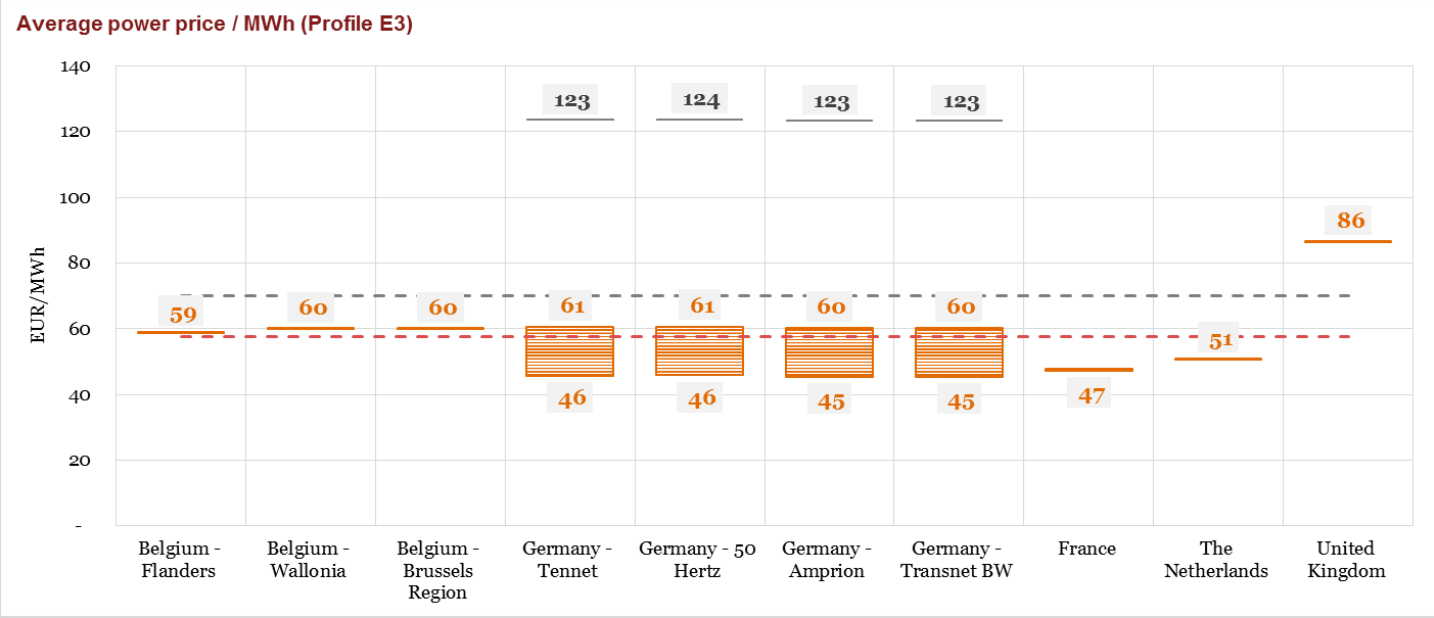
Figure 25: Taxes, levies & certificate scheme in EUR/MWh (profile E2)



Profile E3 (Electricity)

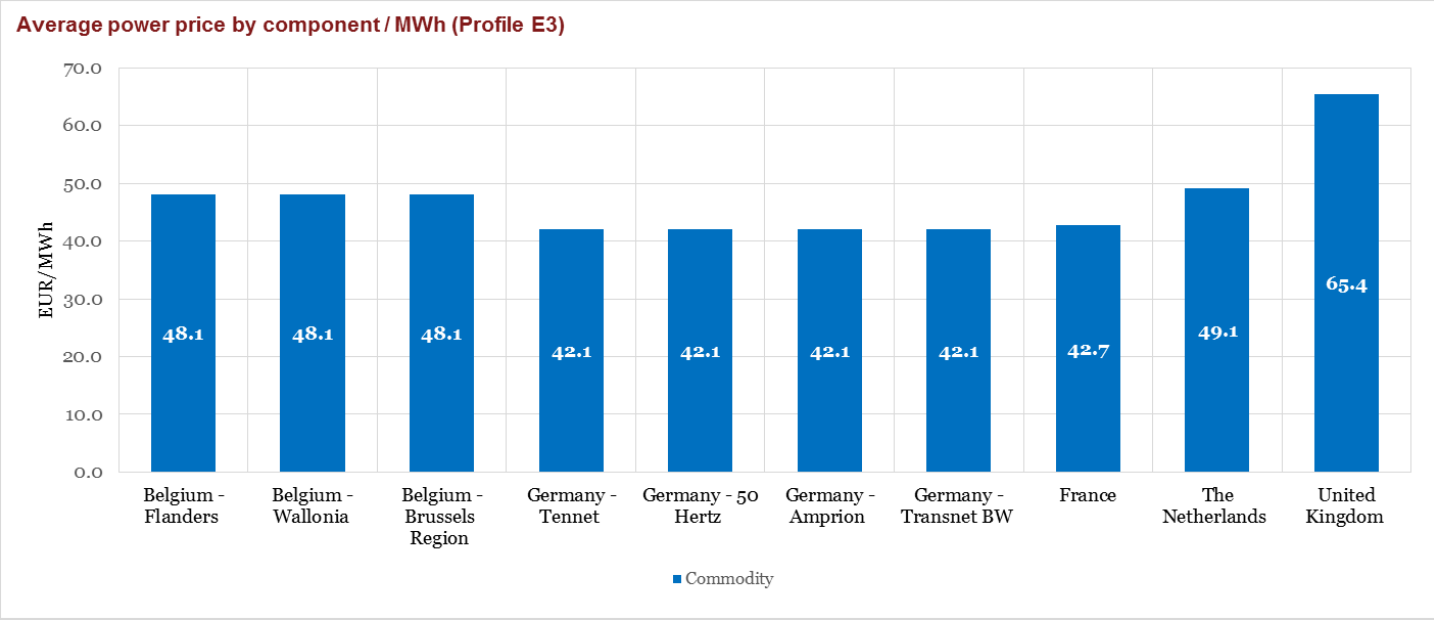
Average power price / MWh

Figure 26: Average power price in EUR/MWh (profile E3)



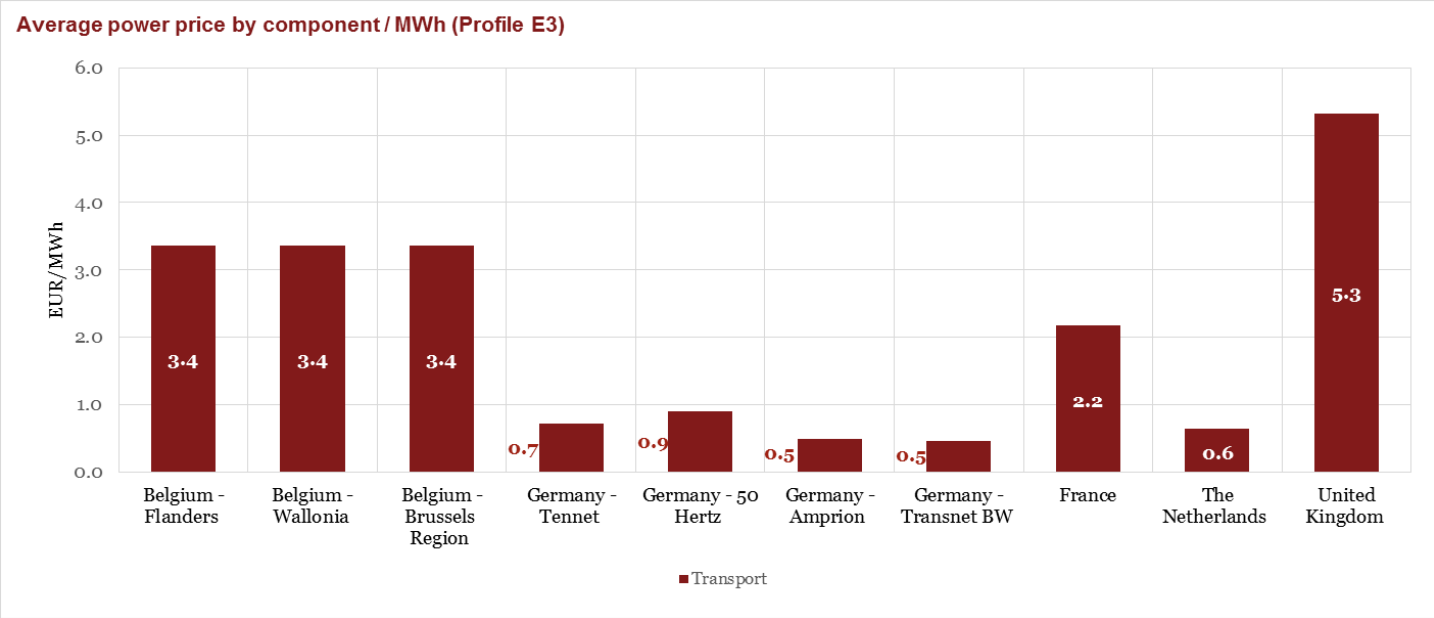
Component 1: Commodity

Figure 27: Commodity price in EUR/MWh (profile E3)



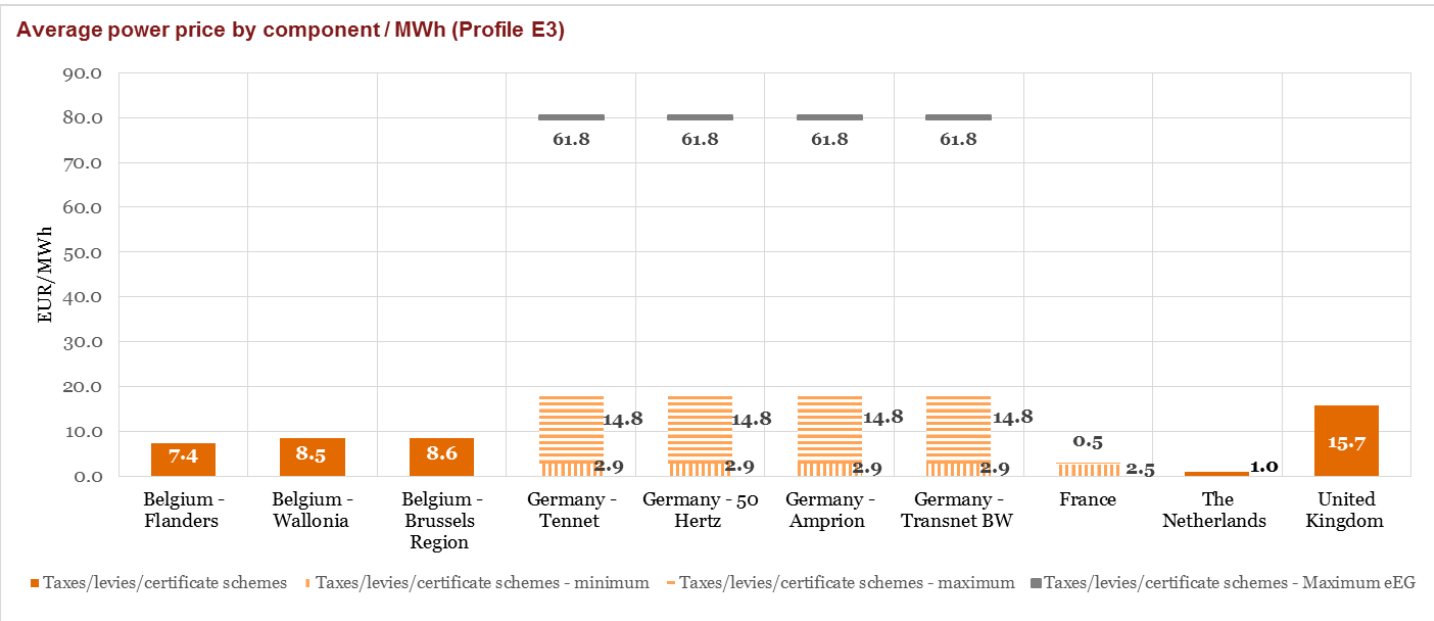
Component 2: Transport

Figure 28: Transport cost in EUR/MWh (profile E3)



Component 3 Taxes, levies & certificate scheme

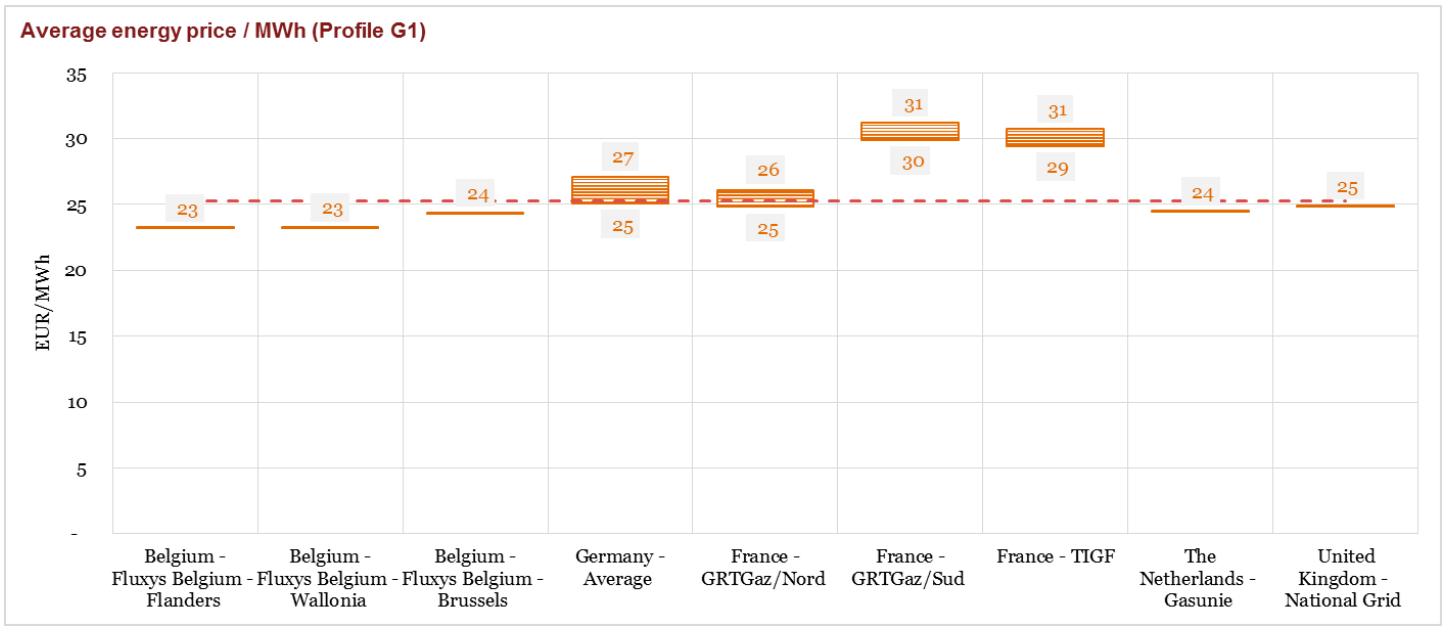
Figure 29: Taxes, levies & certificate scheme in EUR/MWh (profile E3)



Profile G1 (Gas)

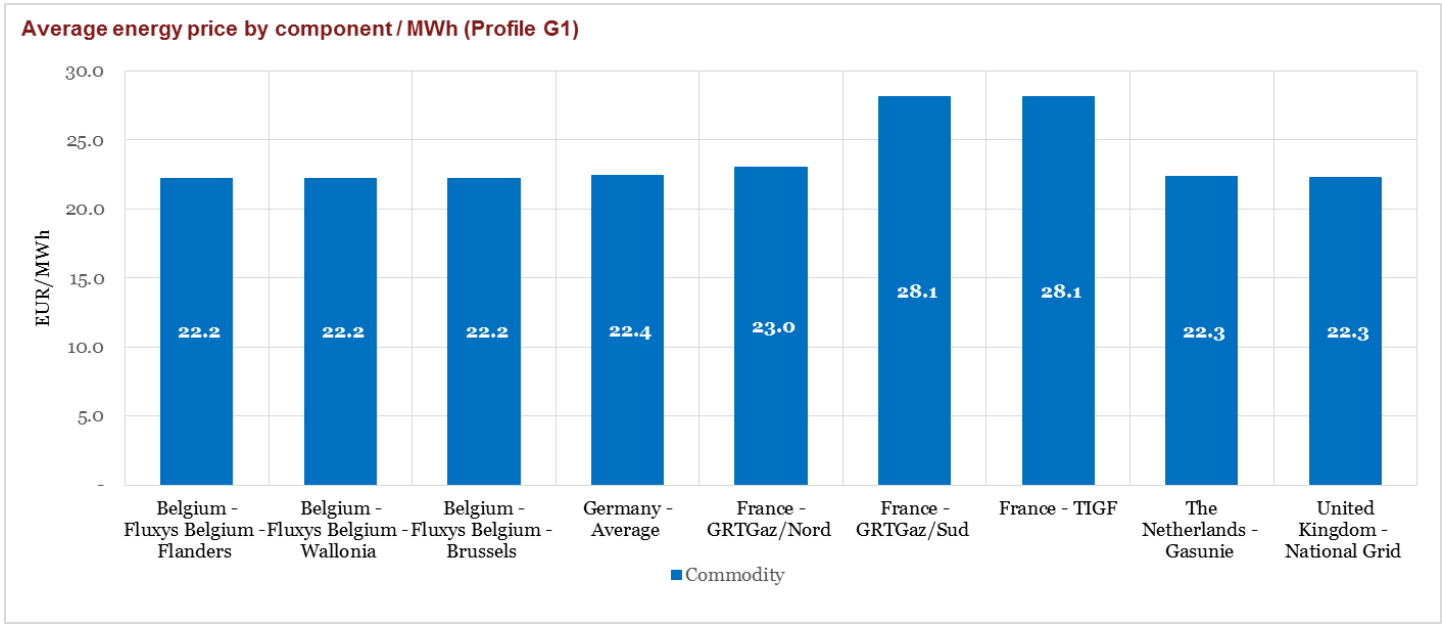
Average gas price / MWh

Figure 30: Average gas price in EUR/MWh (profile G1)



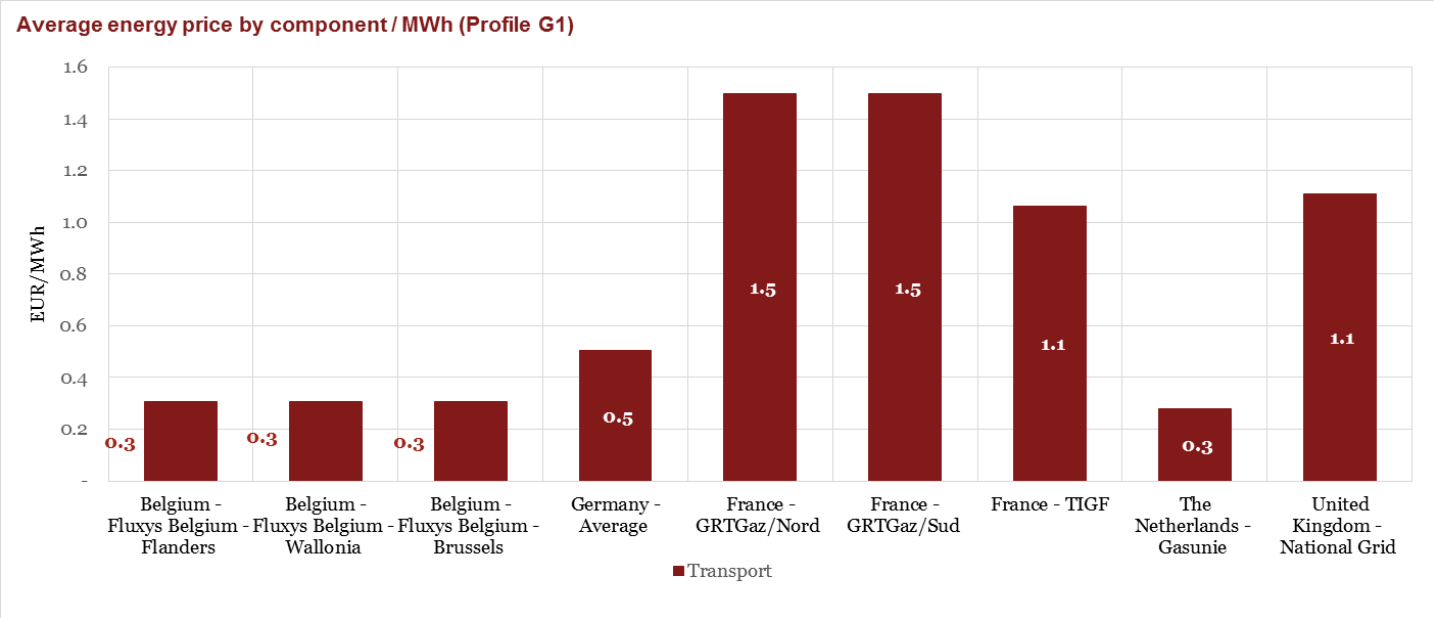
Component 1: Commodity

Figure 31: Commodity price in EUR/MWh (profile G1)



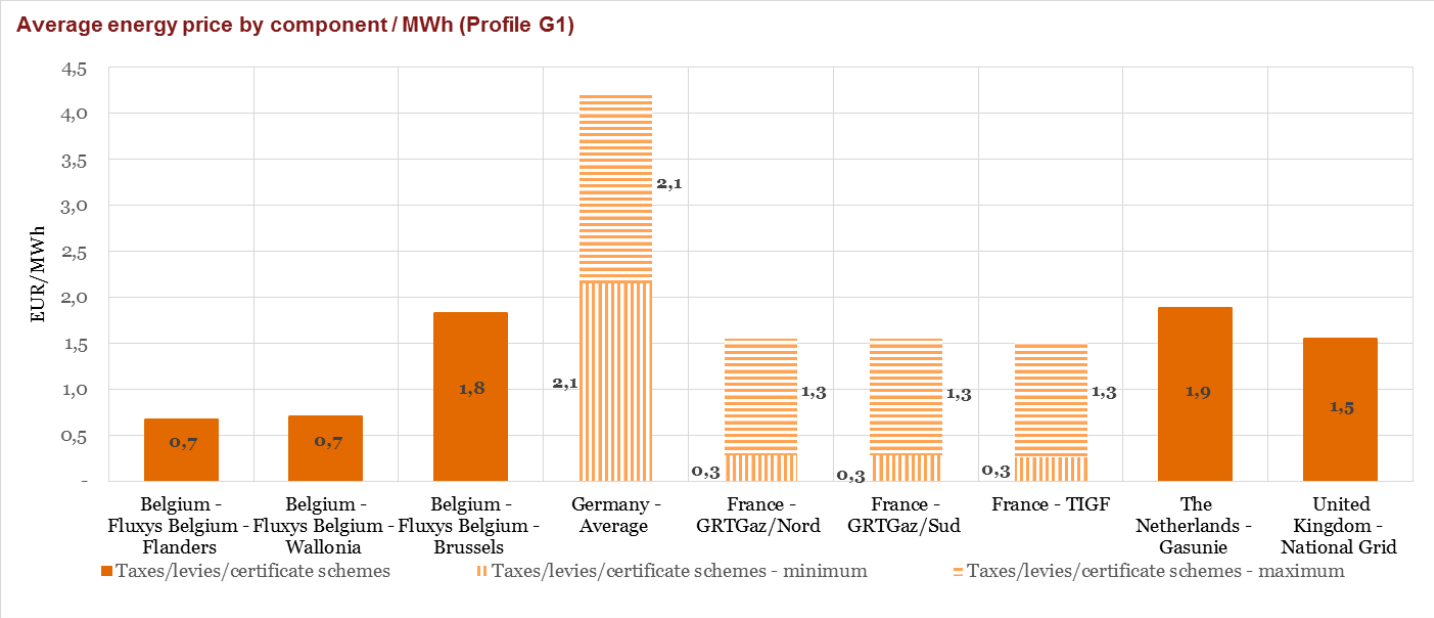
Component 2: Transport

Figure 32: Transport cost in EUR/MWh (profile G1)



Component 3: Taxes, levies & certificate schemes

Figure 33: Taxes, levies & certificate scheme in EUR/MWh (profile G1)



Annex B: Sources

Commodity prices

For commodity prices, the market data used in this study were provided by the CREG. For UK seasonal market prices, Bloomberg data were used.

Transport cost

In terms of grid organisation and grid cost, PwC analysis is entirely based on public information. All grid costs were built from the bottom-up based on the officially approved and publicly available price sheets from the concerned Transmission and Distribution Grid Operators.

For calculating grid fee reductions, we based ourselves on the Dutch electricity law (*Elektriciteitswet 1998)*, the German grid fee law (*Stromnetzentgeltverordnung, StromNEV*) and the relevant decision of the French regulator CRE (*Délibération de la Commission de régulation de l'énergie du 7 mai 2014 portant décision sur l'évolution au 1er août 2014 des tarifs d'utilisation d'un réseau public d'électricité dans le domaine de tension HTB*).

Taxes, levies and certificate schemes

For analysing all other costs applicable to the energy bill of industrial consumers, PwC research was entirely based on official and publicly available information.

For Belgium, we gathered information through consultation of the federal and regional regulator's websites as well as through analysis of the relevant legislation on the federal and the regional level.

For Germany, we gathered information through consultation of the regulator's website, and through analysis of the relevant legislation: *Energiesteuergesetz*, *Stromsteuergesetz*, *Erneubare-Energien-Gesetz*, *Konzessions-abgabenverordnung*.

For France, we gathered information through consultation of the website of the regulator, the French Customs (Douane) website and analysis of the relevant legislation.

For the Netherlands, our analysis is based on analysis of the relevant legislation, information from the regulator's website and from the the Dutch Tax Administration (Belastingdienst).

For the United Kingdom, our analysis is based on information obtained through the regulator Ofgem and the DECC (Department of Energy and Climate Change), completed by analysis of relevant legislation.

Annex C: Industry reduction criteria

As an annex to this report, we present the catalogue of criteria that can grant the possibility to reductions on transport tariffs, taxes, levies and certificate schemes for certain (groups of) electricity and gas consumers.

Electricity

Country/Zone	Criteria	Reduction
Belgium	Annual consumption (condition: energy efficiency agreement)	Progressive reductions on federal contribution and offshore surcharge: - 20-50 MWh/year : -15% - 50-1.000 MWh/year : -20% - 1.000-25.000 MWh/year : -25% - >25.000 MWh/year : -45% Annual cap of 250.000€/year means no taxes due on consumption above: - federal contribution 2014: +/- 175 GWh - offshore surcharge 2014: +/- 107 GWh
Belgium (Flanders)	Annual consumption	Progressive reductions of the renewables quota: - 1.000-20.000 MWh/year: -40%* - 20.000-100.000 MWh/year: -75% -100.000-250.000 MWh/year:-80% - >250.000 MWh: -98% * only for industry (NACE 5-33) and deep frost alimentary (46391 and 52100).
	Annual consumption	Progressive reductions of the combined heat-power quota: - 1.000-5.000 MWh/year: -10%* - 5.000-20.000 MWh/year: -15% - 20.000-100.000 MWh/year: -25% -100.000-250.000 MWh/year:-50% - >250.000 MWh: -80% * only for industry (NACE 5-33) and deep frost alimentary (46391 and 52100).
Belgium (Wallonia)	Annual consumption (condition: energy efficiency agreement)	Progressive reductions of the renewables quota[25]: - < 20.000 MWh/year: -25% - 20.000-100.000 MWh/year: -50% -100.000-300.000 MWh/year:-85% - >300.000 MWh/year: -90%
	Annual consumption	Connection fee (base rate: 0,75€/MWh) has two reduced tariffs for high voltage clients: - clients < 10 GWh/year: 0,6€/MWh - clients > 10 GWh/year: 0,3€/MWh

[25] The Walloon reductions are attributed on the basis of three month periods of consumption. We transposed them to a yearly basis in order to facilitate comparison.

Germany	Annual consumption hours	Reductions on the transmission tariff apply for all companies that exceed 10 GWh/year, if annual consumption hours exceed: - >7000 hrs/year: -80% - >7500 hrs/year: -85% - >8000 hrs/year: -90%
	Annual consumption + electricity cost/turnover	The Combined heat and power surcharge (KWK-Umlage) has a base rate of 1,78€/MWh. For users with an annual consumption that exceeds 0,1 GWh/year two reduced rates exists: - If electricity cost > 4% turnover: 0,25€/MWh - If electricity cost < 4% turnover: 0,55€/MWh
	Annual consumption + electricity cost/turnover	The StromNEV §19-Umlage has a base rate of 1,87€/MWh. For users with an annual consumption that exceeds 1 GWh/year two reduced rates exists: - If electricity cost > 4% turnover: 0,25€/MWh - If electricity cost < 4% turnover: 0,50€/MWh
	Annual consumption + electricity cost/turnover	The Offshore liability surcharge has a base rate of 2,50 €/MWh. For users with an annual consumption that exceeds 1 GWh/year two reduced rates exists: - If electricity cost > 4% turnover: 0,25€/MWh - If electricity cost < 4% turnover: 0,50€/MWh
	Annual consumption + electricity cost/gross value creation	The eEG-Umlage has a base rate of 62,40 €/MWh. Two different reductions exist. 1. If consumption exceeds 1 GWh/year AND the electricity cost exceeds 20% of gross value creation, a reduced rate of 0,50 €/MWh applies. 2. If consumption exceeds 1 GWh/year AND the electricity cost exceeds 14% of gross value creation (but less than 20%), the eEG-Umlage becomes a digressive levy: - Up to 1 GWh/year: 62,40 €/MWh - From 1 – 10 GWh/year: 6,24€/MWh - From 10-100 GWh/year: 0,624 €/MWh - Above 100 GWh/year: 0,50€/MWh
	Pension contributions + sector criteria	The Stromsteuer (Electricity tax) in Germany has a base rate of 20,5€/MWh, and a lowered rate of 15,37 €/MWh for all industrial companies. Further reductions are attributed based on the amount of pension contributions a company pays: the fewer pension contributions (on which the state has given some reductions) a company pays, the more right it has to reductions on the Electricity tax. The maximum reduction is 90%. A company that belongs to a sector that uses electricity as a raw material is exempt from the tax.
	Electricity cost	For the Concession fee (Konzessionsabgabe) on electricity, all industrial consumers benefit from a basic rate of 1,1 €/MWh.

		If an industrial consumer's total electricity bill is below an annually fixed threshold (2014: 118,9 €/MWh), it is exempt from the Concession fee. In other words: companies that pay the full rate on the eEG-Umlage will almost certainly pay the concession fee as well. The concession fee can be seen as an amplifier of other reductions.
France	Annual consumption + Annual consumption hours	A 50% reduction on the transmission tariff applies for all companies that meet both criteria: - Annual consumption > 50 GWh/year - Consumption hours > 7000 hrs/year
	Annual consumption	The CSPE-surcharge has a base rate of 16,5€/MWh. Two reductions apply, based on consumption criteria: - Cap at 597.889€/year (actual cap of +/- 36 GWh/year) - If consumption > 7 GWh/year, cap at the level of 0,5% of the company's added value.
	Electricity cost/added value + sector criteria	The TICFE-tax has a base rate of 0,5 €/MWh. In two cases, users are exempted: - Electricity cost >50% added value - Company is active in metallurgy, electrolysis, non-metal minerals or chemical sector
Netherlands	Annual (off-peak) consumption	A substantial reduction ("volumecorrectie") on transport tariffs is granted to large baseload consumers when they meet both criteria: - Annual consumption > 50 GWh/year - Annual off peak consumption > 65% of all 2920 annual off-peak hours Reductions are incremental and cannot exceed 90%.
	Annual consumption	The energy tax is a digressive tax: - 0-10 MWh/year : 118,5 €/MWh - 10-50 MWh/year: 43,1 €/MWh - 50-10.000 MWh/year : 11,5 €/MWh - >10.000 MWh/year : 0,5 €/MWh
	Annual consumption	The ODE-levy is a digressive levy: - 0-10 MWh/year : 2,3 €/MWh - 10-50 MWh/year: 2,7 €/MWh - 50-10.000 MWh/year : 0,7 €/MWh - >10.000 MWh/year : 0,03 €/MWh
UK	Energy efficiency	The Climate Change Levy has a base rate of 6,68€/MWh. When users have signed up to a Climate Change Agreement (sectoral or individual), they obtain a 90% reduction.

Gas

Country/Zone	Criteria	Reduction
Belgium	Annual consumption	Progressive reductions on federal contribution (0,6706 €/MWh) - 20-50 GWh/year : -15% - 50-250 GWh/year : -20% - 250-1.000 GWh/year : -25% - 1.000 GWh/year : -45% Annual cap of 750.000€ means no taxes due on consumption above +/- 1,1 GWh (at 2014 rates)
	Energy efficiency + energy cost/added value OR produce value	Energy contribution with a base rate of 0,9889 €/MWh. Companies part of an energy efficiency agreement pas 0,0942€/MWh. Two exemptions exist: - if energy cost > 3% of the value of the produce - if energy cost > 0,5% of added value
Germany	Pension contributions + sector criteria	The Energy tax on gas in Germany has a base rate for industrial use of 5,5€/MWh, and a standard reduction to 4,12 €/MWh. Further reductions are attributed based on the amount of pension contributions a company pays: the fewer pension contributions (on which the state has given some reductions) a company pays, the more right it has to reductions on the Energy tax. The minimum rate is 2,07€/MWh.
France	Carbon market participation + sector criteria	The TICGN tax has a base rate of 1,27 €/MWh. Carbon market participants benefit from a reduced rate of 1,19€/MWh. Companies use gas as a primary source in their industrial process are exempted from the tax.
Netherlands	Annual consumption	The energy tax is a digressive tax: - 0-170.000 m³/year : 0,1894€/m³ - 170.000-1.000.000 m³/year: 0,446 €/m³ - 1.000.000-10.000.000 m³/year: 0,0163 €/m³ - >10.000.000 m³/year : 0,117 €/m³ Natural gas used for industrial heating (agriculture, …) benefits from even lower rates.
	Annual consumption	The ODE-levy is a digressive levy: - 0-170.000 m³/year : 0,0046€/m³ - 170.000-1.000.000 m³/year: 0,0017 €/m³ - 1.000.000-10.000.000 m³/year: 0,0005 €/m³ - >10.000.000 m³/year : 0,0004 €/m³
UK	Energy efficiency	The Climate Change Levy has a base rate of 2,4 €/MWh. When users have signed up to a Climate Change Agreement (sectoral or individual), they obtain a 35% reduction.