FORBEG

A European comparison of electricity and natural gas prices for residential, small professional and large industrial consumers

May 2021

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Acronym	Definition
AMR	Automatic meter reading
BE	Belgium
BT	Basse Tension
CHP	Combined Heat and Power
CU	Consumption unit
CHPC	Combined Heat and Power Certificates
DCM	Distribution Charging Methodology
DE	Germany (abbreviation from ‘Deutschland’)
DSO	Distribution System Operator
EAN	European Article Number
EEAG	Guidelines on State aid for environmental protection and energy 2014-2020
EHV	Extra-High Voltage
FR	France
FPS	Federal Public Service (see FOD in Dutch or SPF in French)
GC	Green Certificates
GRAPA	La Garantie de revenus aux personnes âgées
GRDF	Gaz Réseau Distribution France
HH	Half Hourly
HHI-Index	Herfindahl-Hirschman Index
HT	Haute Tension
IGO	Inkomensgarantie voor ouderen
kV	kilo Volt
kWh	kilo Watt-hour
KWKG	Kraft-Wärme-Kopplungsgesetz (see CHP in English)
LS	Laagspanning
LT	Long-term

LTSO	Local Transmission System Operator
MPA	Meter Point Administration Number
MS	Middenspanning
MWh	Mega Watt-hour
NBB	National Belgian Bank
NCG	NetConnect Germany
NHH	Non-Half Hourly
NL	The Netherlands
OFGEM	Office of Gas and Electricity Markets (UK)
PPP	Purchasing Power Parities
PSWC	Public Social Welfare Centre
RTI	Reference Tax Income
SME	Small and medium-sized enterprise
SR	Switching rate
ST	Short-term
TSO	Transmission System Operator
UK	The United Kingdom
VAT	Value-Added Tax
YMR	Yearly meter reading

● Glossary

Acronym	**Definition**
Industrial consumers	In this study, we refer to E0, E1, E2, E3, G1 and G2 as large industrial consumers.
Residential consumers	In this study, we refer to E-RES, G-RES as residential consumers
Small professional consumers	In this study, we refer to E-SSME, E-BSME and G-PRO as small professional consumers or as small and medium-sized enterprises
TRANS-HS	TRANS-HS comes from “Transformatorstation hoogspanning” for which DSOs are directly connected to the transformer stations. (Fluvius, 2017).
TRANS-MT	TRANS-MT comes from “Transformation moyenne tension” for which DSOs are directly connected to the transformer stations.
MS	MS comes from “Middenspanning” and encompasses consumers connected to the distribution grid on a tension level ranging from 1 to 26 kV.
MT	MT comes from “Moyenne tension” and encompasses consumers connected to the distribution grid on a tension level ranging from 1 to 26 kV.
LS	LS comes from “Laagspanning” and encompasses consumers connected to the distribution grid on a tension level < 1 kV.
BT	BT comes from “Basse tension” and encompasses consumers connected to the distribution grid on a tension level < 1 kV.

1. Executive summary

1. Executive summary

Executive summary – English

In this study, energy (electricity and natural gas) prices for residential, small professional and industrial consumers are compared between Belgium and four neighbouring countries: France, Germany, the Netherlands and the United Kingdom. This report focuses explicitly on prices in application as of January 2021. When deemed more relevant, the results are presented at regional level rather than on a countrywide basis.

The **consumer profiles** under review were set by the Terms of Reference of this study and remain in line with the previous comparative studies conducted by PwC for the CREG and the VREG[1]. In total, 13 different consumer profiles were studied: 8 for electricity (1 residential, 2 small professional and 5 industrial consumers) and 5 for natural gas (1 residential, 1 small professional and 3 industrial consumers). The tables below synthesize, albeit non-exhaustively, specific characteristics of our consumer profiles for which further hypotheses can be found in chapter 3.

Electricity consumer profiles

Profile	Consumer type	Annual demand (MWh)	Contracted capacity (kW)	Annual peak (kW)
E-RES	Residential	3,5	7,4	5,9
E-SSME	Small professional	30	37,5	30
E-BSME	Small professional	160	125	100
E0	Industrial	2.000	625	500
E1	Industrial	10.000	2.500	2.000
E2	Industrial	25.000	5.000	5.000
E3	Industrial	100.000	13.000	13.000
E4	Industrial	500.000	62.500	62.500

[1] Previous studies can be found on the regulators' websites: study on industrial consumers for the CREG (https://www.creg.be/sites/default/files/assets/Publications/Studies/F20190507EN.pdf) and studies on residential consumers for the CREG (https://www.creg.be/sites/default/files/assets/Publications/Studies/F180628pwc.pdf) and the VREG (https://www.vreg.be/sites/default/files/document/rapp-2019-03.pdf). Last year's study on the residential and industrial consumers can be found on the CREG website (https://www.creg.be/sites/default/files/assets/Publications/Studies/F20200520EN.pdf) and the errata (https://www.creg.be/sites/default/files/assets/Publications/Studies/F20200520-errata.pdf)

Natural gas consumer profiles

Profile	Consumer type	Annual demand (MWh)	Contracted capacity (kW)
G-RES	Residential	23,26	-
G-PRO	Small professional	300	-
G0	Small professional	1.250	-
G1	Industrial	100.000	15.000
G2	Industrial	2.500.000	312.500

The comparison looks at three **components** of the energy bill: commodity cost, network cost and all other costs (taxes, levies and certificate schemes). A fourth component, the VAT, is considered only for both electricity and natural gas residential profiles.

An extensive description of the price composition and components (chapter 4 and 5) precedes prices comparison results (chapter 6). Energy costs are analysed following a bottom-up approach leading to a detailed description of the various price components, including the general hypotheses on which our study is based and their application within the considered countries to maximise the objectivity of the study.

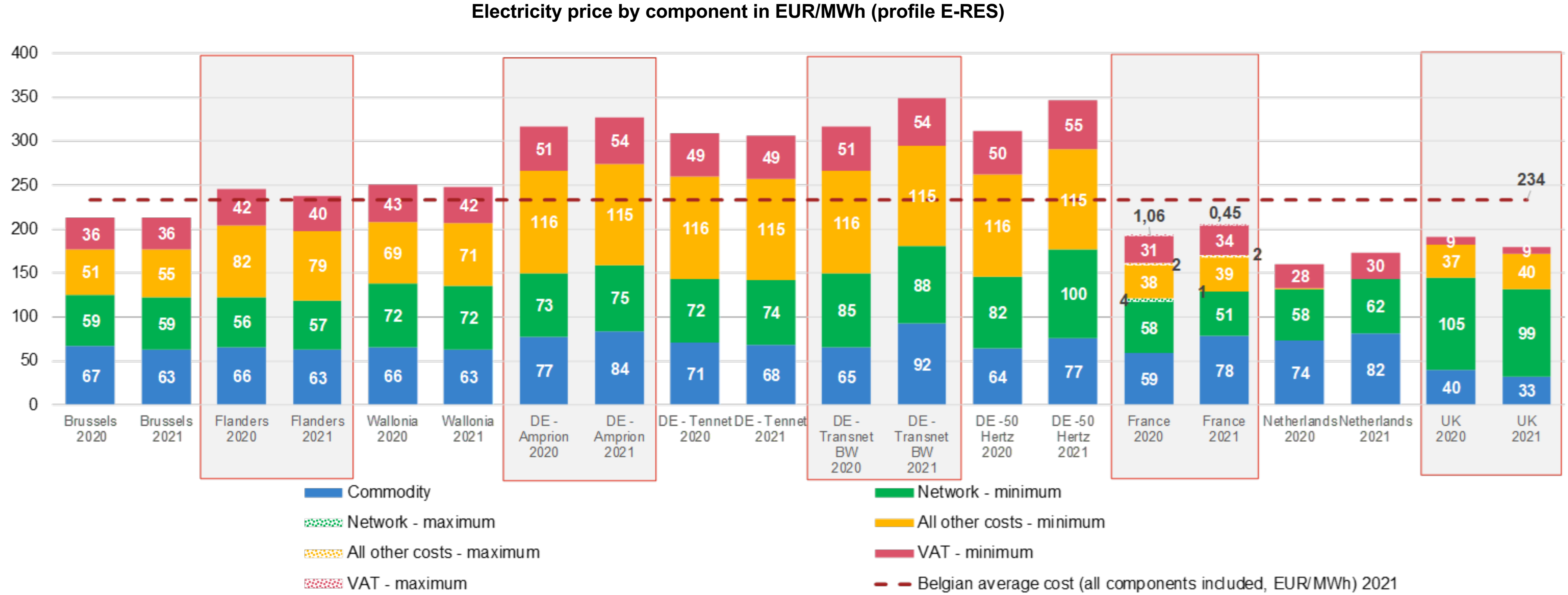
For both electricity and natural gas, this report notes great differences in the price structure, including the setting of network costs and tax regimes between different regions and countries, which adds to the complexity of the comparison.

Comparison of electricity prices

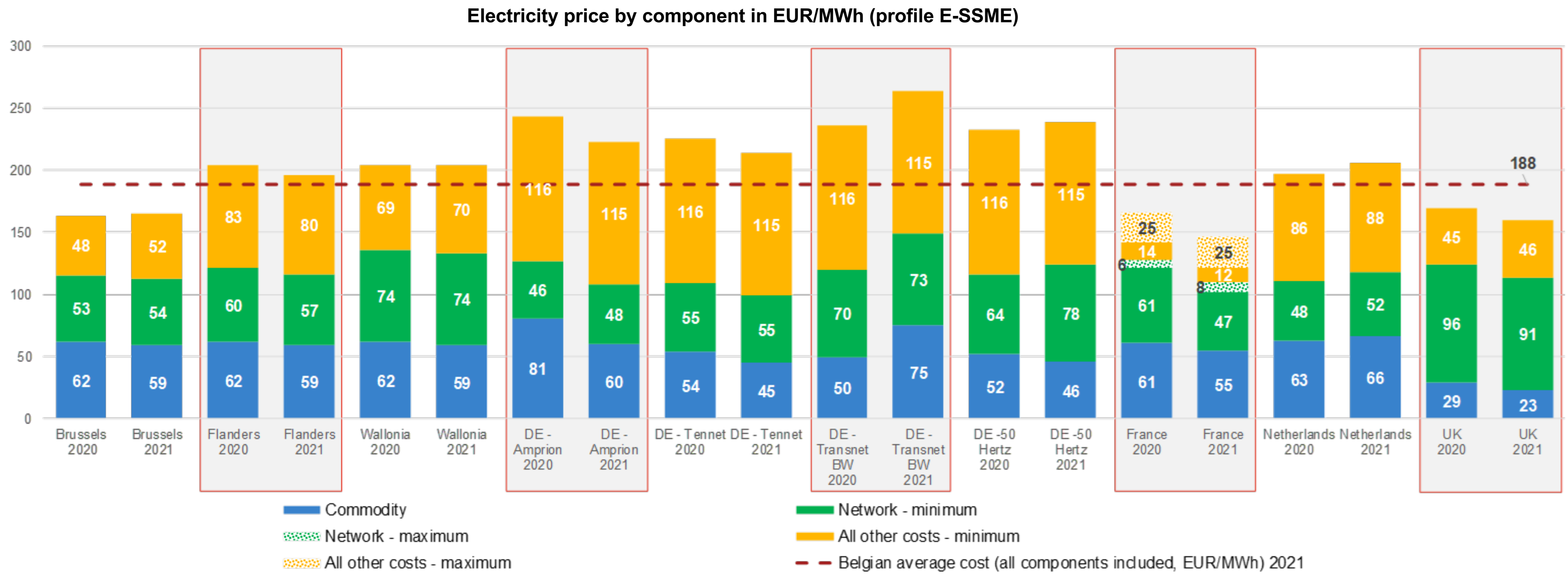
Comparison of electricity prices for residential and small professional consumers

This study reveals large differences between the regions and zones under review.

For residential consumers (E-RES profile), the Netherlands has the lowest annual bill, partly due to a large rebate on taxes ("belastingvermindering"). On the other hand, Germans pay the most (i.e. almost twice as much as Dutch households) and have the highest tariffs for the all other costs component (i.e. taxes, levies and certificate systems). Compared to the countries studied, Belgium has relatively high prices and is the second most expensive country after Germany. This results from high all other costs but also from significant network costs in Wallonia. In Belgium, Brussels is the cheapest of the three regions, with prices falling due to significantly lower tax levels, while Wallonia is the most expensive region. In comparison to last year the total invoice has increased in 6 of the 10 regions/countries under review. The largest increase is seen in the German 50 Hertz region and this is due to an increase in the commodity and network costs, which also impact the VAT component. Flanders and Wallonia have seen a small decrease of their total invoice. Yet the Belgian position has not changed since last year. France, the Netherlands and the UK remain significantly cheaper, the German regions remain 31% to 50% more expensive than the Belgian regions.

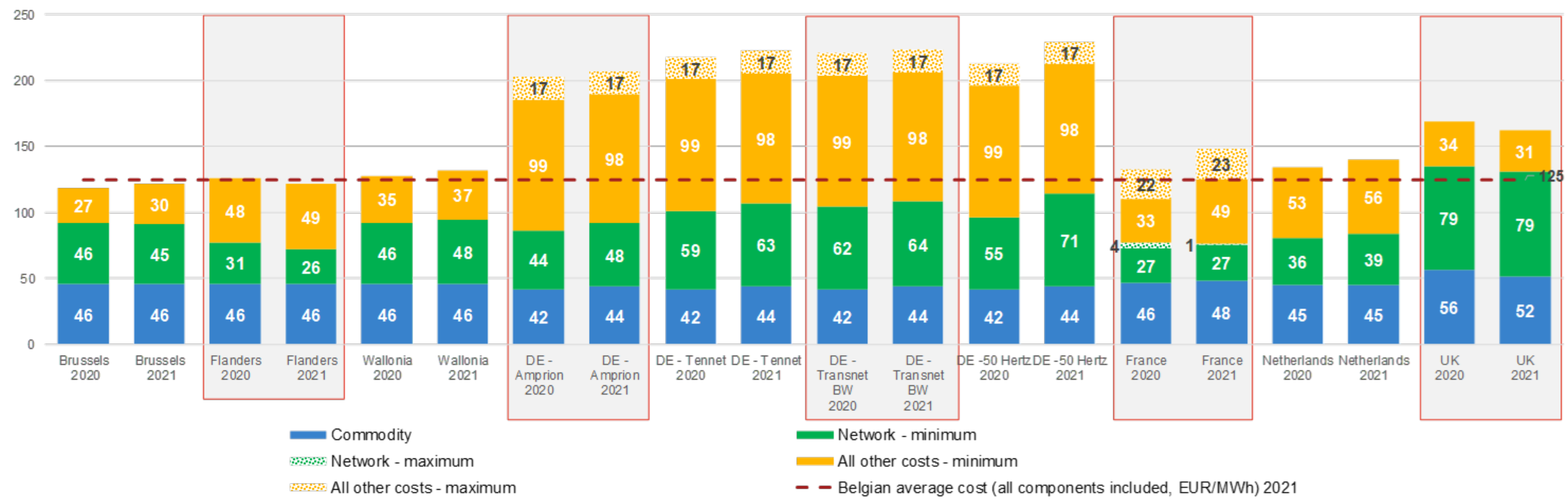


The situation is relatively similar for the E-SSME profile, among small professional consumers, as Germany still has the highest annual bill of all and Belgium has relatively high prices. The most notable difference is the weaker competitive position of the Netherlands, because the tax refund only applies to households and does not benefit small Dutch professionals, and Belgium is now cheaper which was not the case for E-RES. Similar to E-RES, the United Kingdom is still the 2nd most competitive country under review. However, this position is less clear now because no VAT is considered for E-SSME and the UK had a competitive advantage regarding this component because they applied a much lower rate (5%). Like the E-RES profile, Brussels remains the cheapest Belgian region, followed by Flanders. There have been a few changes compared to 2020. Firstly, in 2020 Brussels could have been the cheapest region depending on the reduction in France. Secondly, Flanders is now more competitive than Wallonia because of a decrease for every component. The difference with the cheaper countries, France and the UK, has widened. While electricity prices for small, professional consumers in these countries fell sharply, the Belgian average remained more or less the same. Brussels is now also always more expensive than France and the UK.



As for E-BSME, Germany lags again with far higher bills as a result of much higher tax levels, particularly due to the *EEG-Umlage*. Flanders potentially offers the cheapest annual invoice, last year this was France. As far as neighbouring countries are concerned, Belgian prices are now better aligned, as Germany and the United Kingdom are certainly more expensive. Inside the country, regional positions remain stable: thanks to lower taxes, Brussels is the cheapest region before Flanders and Wallonia. The difference between Brussels and Flanders is negligible and is not even distinguishable in the figure below. Wallonia is the most expensive region in Belgium.

Electricity price by component in EUR/MWh (profile E-BSME)

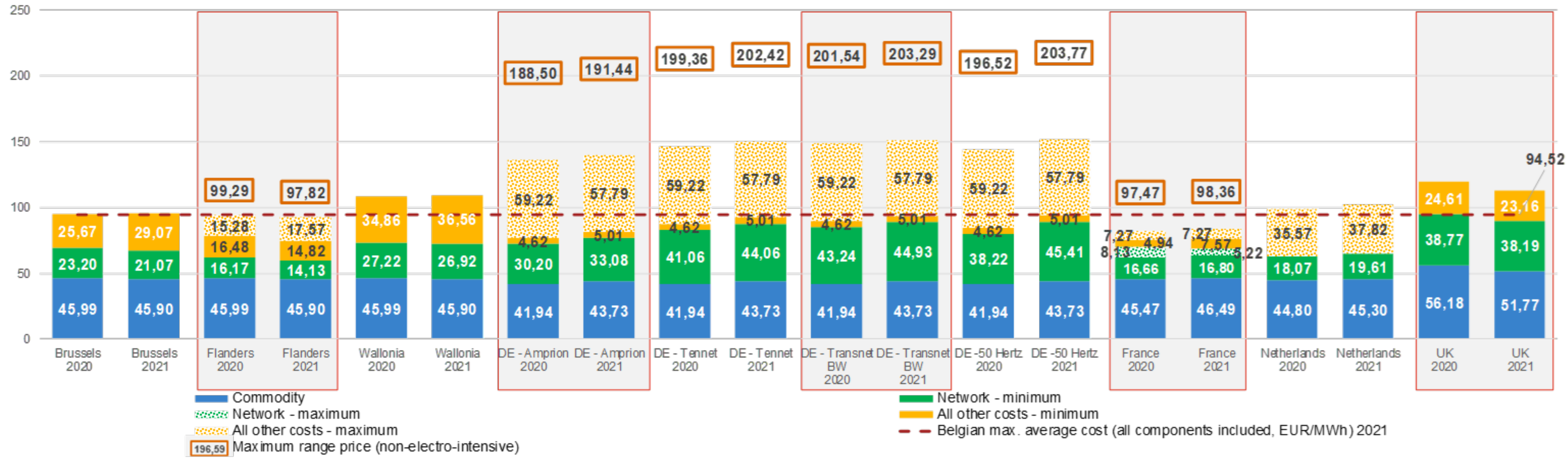


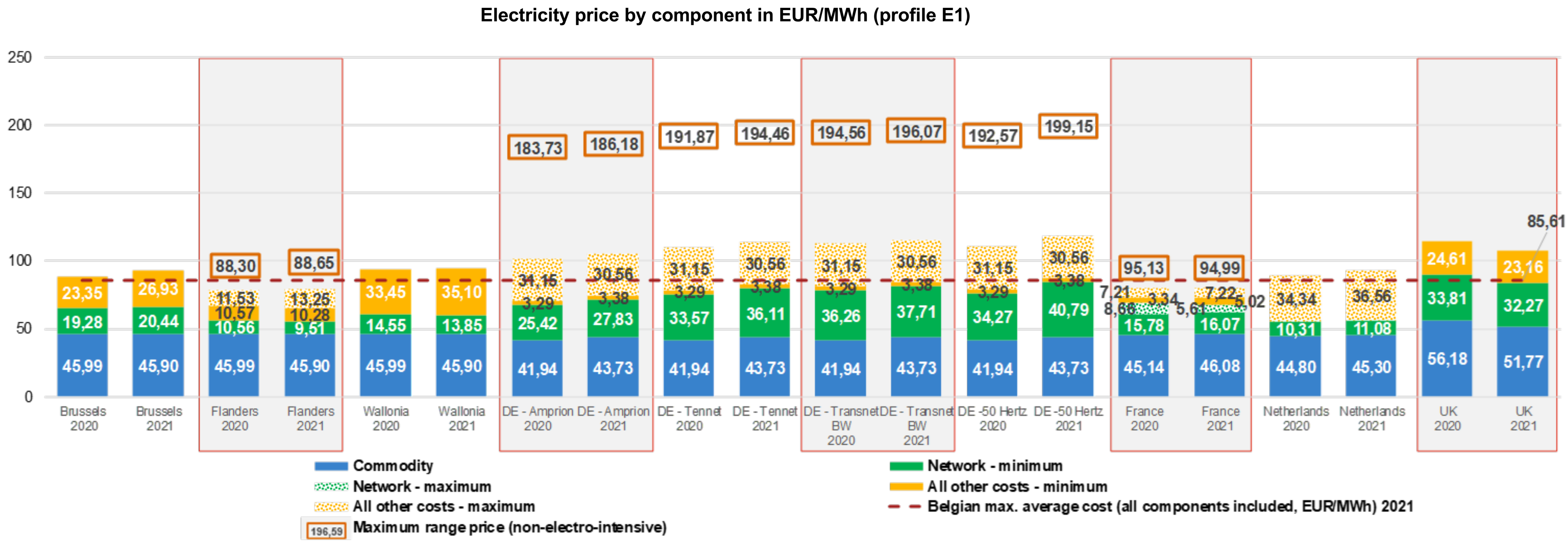
The different components examined for each country and region can vary considerably and have an impact on the competitive position of each country. If commodity prices are reasonably convergent across countries - except the United Kingdom - there are significant differences in the components network costs and all other costs. The former certainly plays a role in Belgium. At the same time, the all other costs component makes Germany the most expensive country, but also leads to higher Belgian prices, especially for E-RES and E-SSME.

Comparison of electricity prices for industrial consumers

The lowest cost of electricity for the E0, E1 and E2 consumer profiles is potentially in the Netherlands, slightly ahead of France and Flanders. Relatively low network costs, but especially the reduction of all other costs (i.e. taxes, levies and certificate systems) partly explain these lower prices. Overall, Belgium has an average annual bill compared to the countries studied, while the United Kingdom is by far more expensive. The results for Germany are highly variable. While they offer average prices that are somewhat comparable to those in Belgium when the reductions on all other costs apply to electro-intensive consumers, German industrial consumers face the highest prices when these reductions do not apply. In Belgium, the cost of electricity is higher in Wallonia for profiles E0, E1 and E2 whereas Brussels aligns with Flanders - except for profile E1. An important difference between 2020 and 2021 is the cap in Flanders which was only applied on Green Certificates (GC) in 2020 and is also applied on Combined Heat and Power Certificates (CHPC) in 2021. Since the reduction in Flanders is now applied on a bigger cost (GC and CHPC), the minimum of the all other costs component is lower than last year.

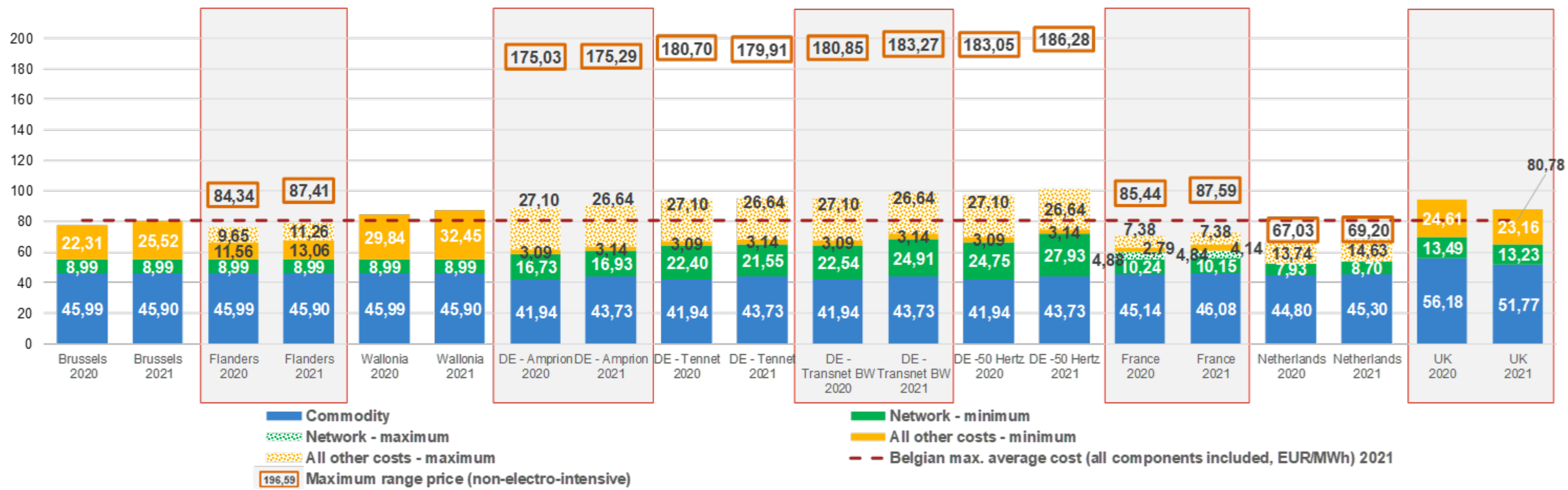
Electricity price by component in EUR/MWh (profile E0)





Electricity price by component in EUR/MWh (profile E1)
250
200
150
100
50
0
183,73
186,18
191,87
194,46
194,56
196,07
192,57
199,15
88,30
88,65
95,13
94,99
85,61
Brussels 2020
Brussels 2021
Flanders 2020
Flanders 2021
Wallonia 2020
Wallonia 2021
DE - Amprion 2020
DE - Amprion 2021
DE - Tennet 2020
DE - Tennet 2021
DE - Transnet BW 2020
DE - Transnet BW 2021
DE -50 Hertz 2020
DE -50 Hertz 2021
France 2020
France 2021
Netherlands 2020
Netherlands 2021
UK 2020
UK 2021
Commodity
Network - maximum
All other costs - maximum
196,59 Maximum range price (non-electro-intensive)
Network - minimum
All other costs - minimum
Belgian max. average cost (all components included, EUR/MWh) 2021

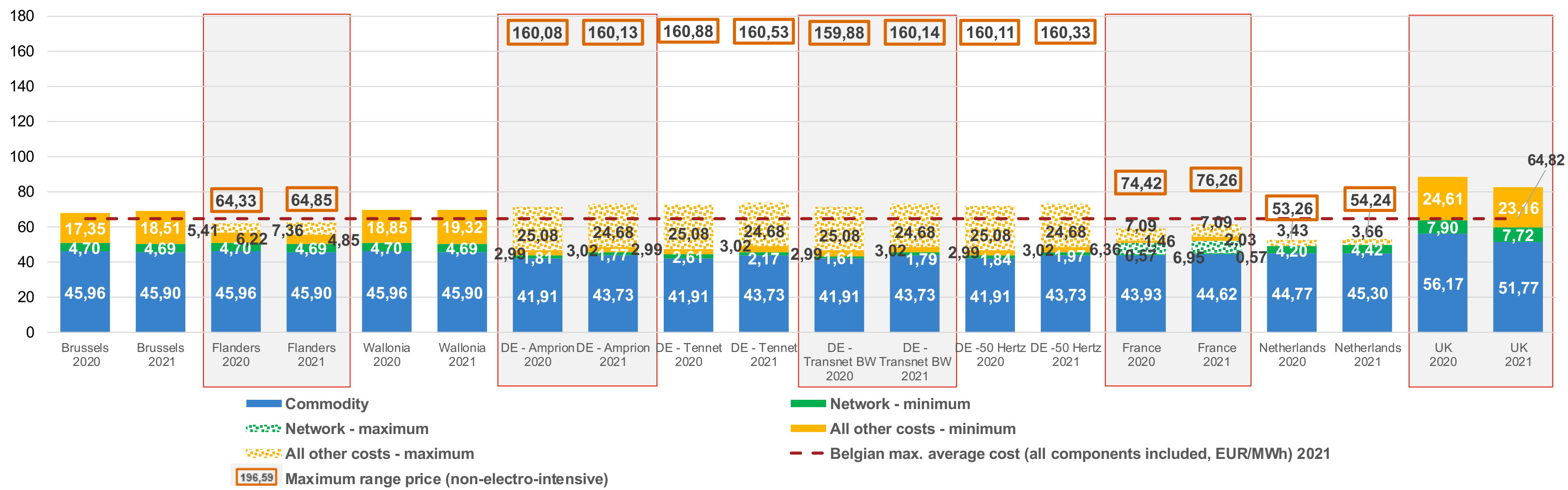
Electricity price by component in EUR/MWh (profile E2)



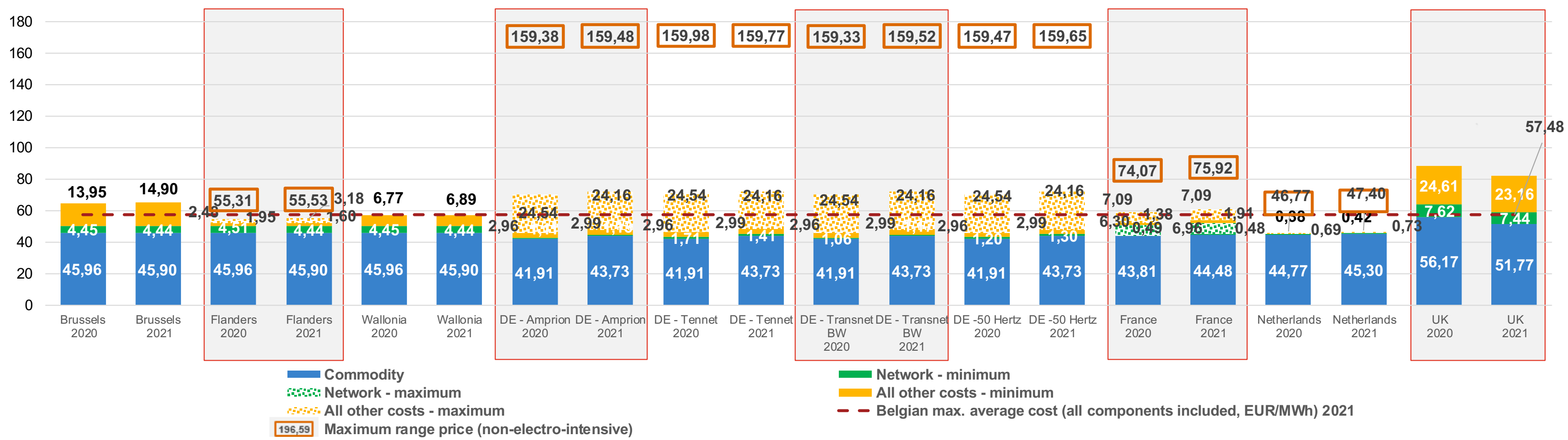
When considering the E3 and E4, the situation has not really changed compared to the smaller industrial profiles. Firstly, the Netherlands still has the potential lowest invoice of all. Secondly, the United Kingdom remains the most expensive country, except when considering German tariffs for non-electro-intensive consumers. Lastly, Belgium shows relatively high average prices.

However, the competitive position of the Belgian regions changes between E3 and E4: Wallonia is the most expensive region for E3, while Brussels for E4. Since the commodity costs and network costs are harmonised over all Belgian regions this purely depends on the all other costs component. However it is important to note that the biggest energy consumer in Brussels is closer to an E3 profile than E4 and this is thus a purely theoretical observation for this region.

Electricity price by component in EUR/MWh (profile E3)



Electricity price by component in EUR/MWh (profile E4)



Overall, the countries under consideration face converging commodity prices, except for the United Kingdom which remains an outlier in 2021. Differences between countries also lie in the network and all other costs components. Belgium offers relatively aligned network costs but does not grant reductions on these costs, which may harm its competitiveness compared to countries that do. Similarly, Belgium's taxes, levies and certification scheme costs would be aligned with those of other countries, if the latter did not apply reductions for electricity-intensive consumers. Flanders is the only Belgian region that remains close to these countries because of the cap on renewable energy financing.

Regarding electricity for industrial consumers, the report highlights the great complexity due to government interventions to reduce electricity costs for certain categories of large industrial consumers. These interventions aim to influence the burden of grid costs and the components of all other costs (i.e. taxes, levies, certificate systems). According to our panel, Flanders, France, Germany and the Netherlands apply network costs and tax reductions/caps granted based on a series of specific economic criteria generally related to electro-intensity. If specific reductions can directly be applied on prices (e.g. network costs reductions in Germany), we also have to present some results according to a wide range of possibilities. As far as tax reductions are concerned, the criteria (annual offtake from 10 GWh or activity) set by the Netherlands are the least demanding. The application of these reductions leads to a significant change in the competitive position of the countries: Germany has the highest possible electricity cost for each profile studied, for consumers who do not meet the reduction criteria; the Netherlands and Flanders, which are already relatively cheap without reductions, become even cheaper; France becomes cheaper than the Belgian regions, including Flanders, thanks to these reductions. As Flanders is the only Belgian region to have implemented such a mechanism to limit the all other costs for industrial consumers, Brussels and Wallonia are more expensive for consumers who would benefit from their electro-intensive nature in Flanders.

Finally, France is the only country to have reduced the cost of commodities thanks to the ARENH mechanism. The regions/countries that do not offer a special reduction/exemption for electro-intensive consumers are Brussels, Wallonia and the UK, and those regions are also the least competitive regions/countries

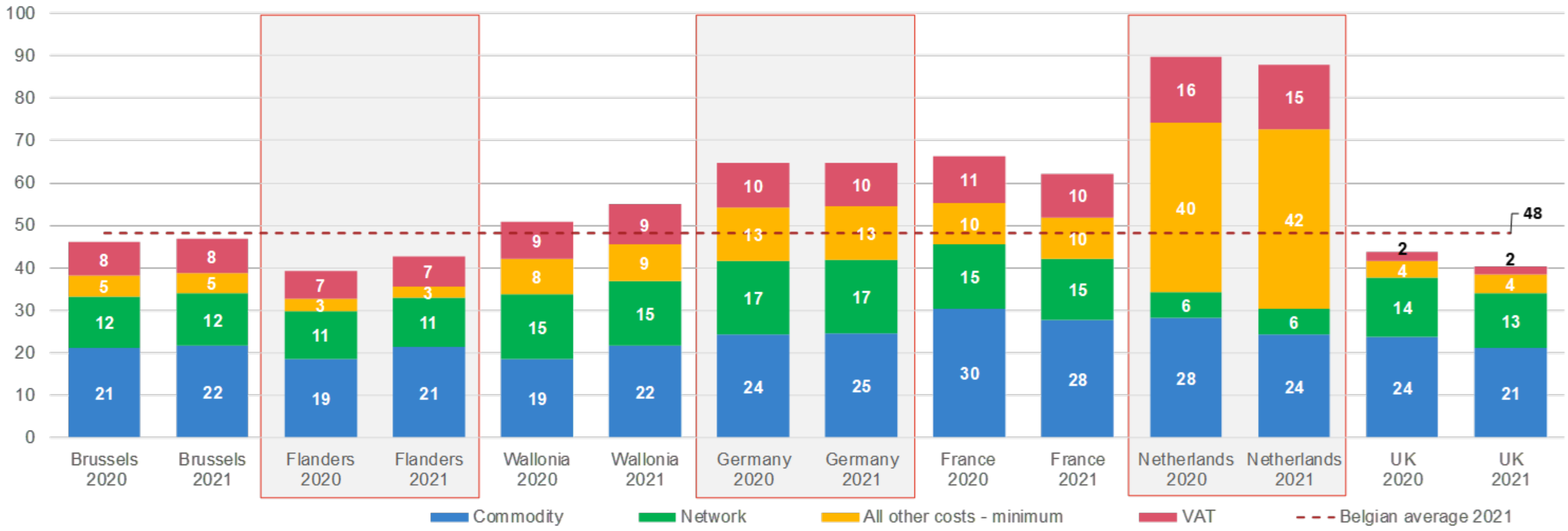
Comparison of natural gas prices

Comparison of natural gas prices for residential and small professional consumers

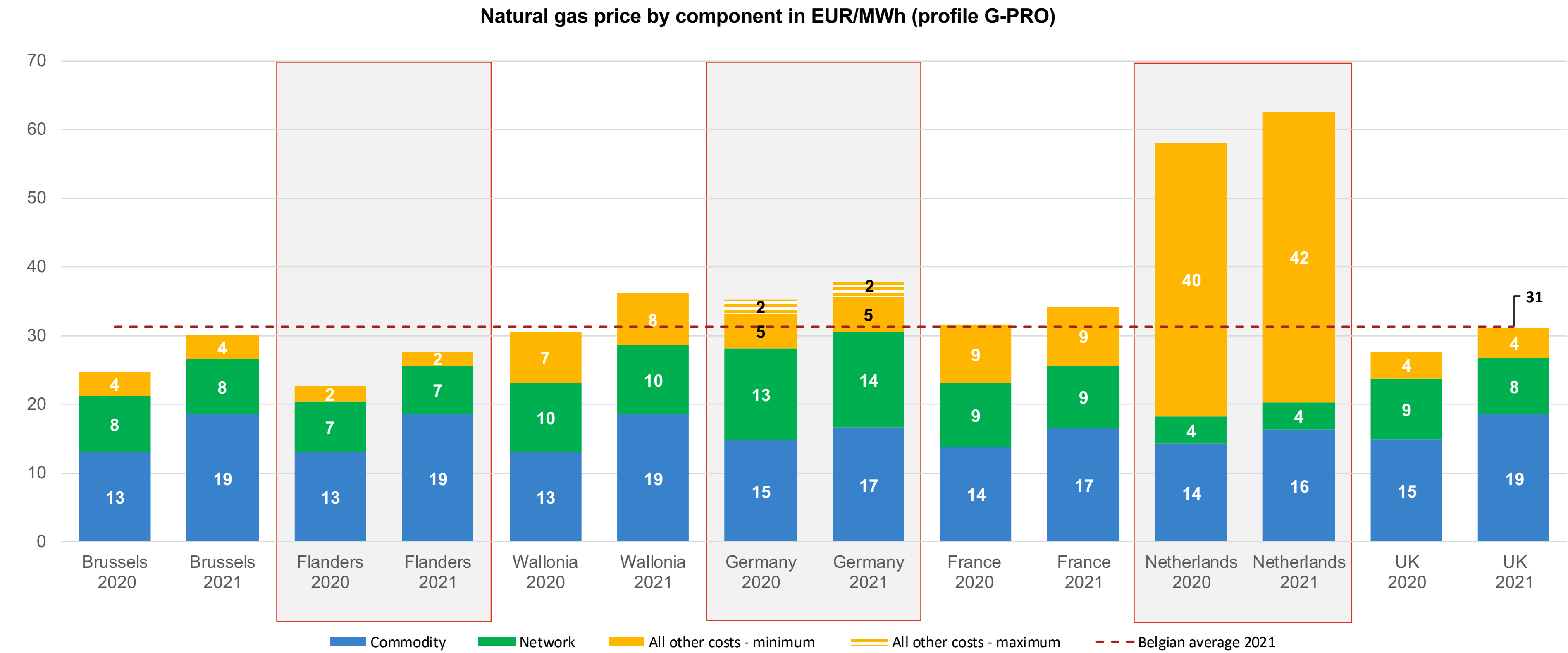
Compared to the results obtained for electricity, results drawn from the comparison of natural gas prices differ significantly.

For residential consumers (G-RES), UK is the least expensive country/region, whereas the Netherlands is the most expensive country. In both cases, taxes play a determining role in their relative competitive position, with UK displaying the 2nd lowest fares and the Netherlands the largest. The competitive positioning of the regions/countries has changed compared to 2020 where Flanders was the cheapest and not the UK. This is mainly because of the commodity component, which increased in Flanders and decreased in the UK. Although this change from 2020 is the reason their positions have now reversed, it is ultimately the lower VAT rate in the UK (5%) that is the decisive factor. Belgium is the second cheapest country, even though significant differences between the regions are observed – and most notably between Flanders and the other regions. In addition to taxes, Flanders also offers the lowest network costs of all three Belgian regions, which explains its relatively lower prices.

Natural gas price by component in EUR/MWh (profile G-RES)



As for small professional consumers (G-PRO), Flanders shows the lowest total invoice followed by Brussels and then the UK. Driven by the low tax levels in Brussels and Flanders, the average Belgian invoice is the least expensive, before the UK, but is also more than twice cheaper than the Dutch's natural gas bill for this profile. Again, the lower natural gas taxes encountered in Belgium (except in Wallonia) account for its good competitive position.



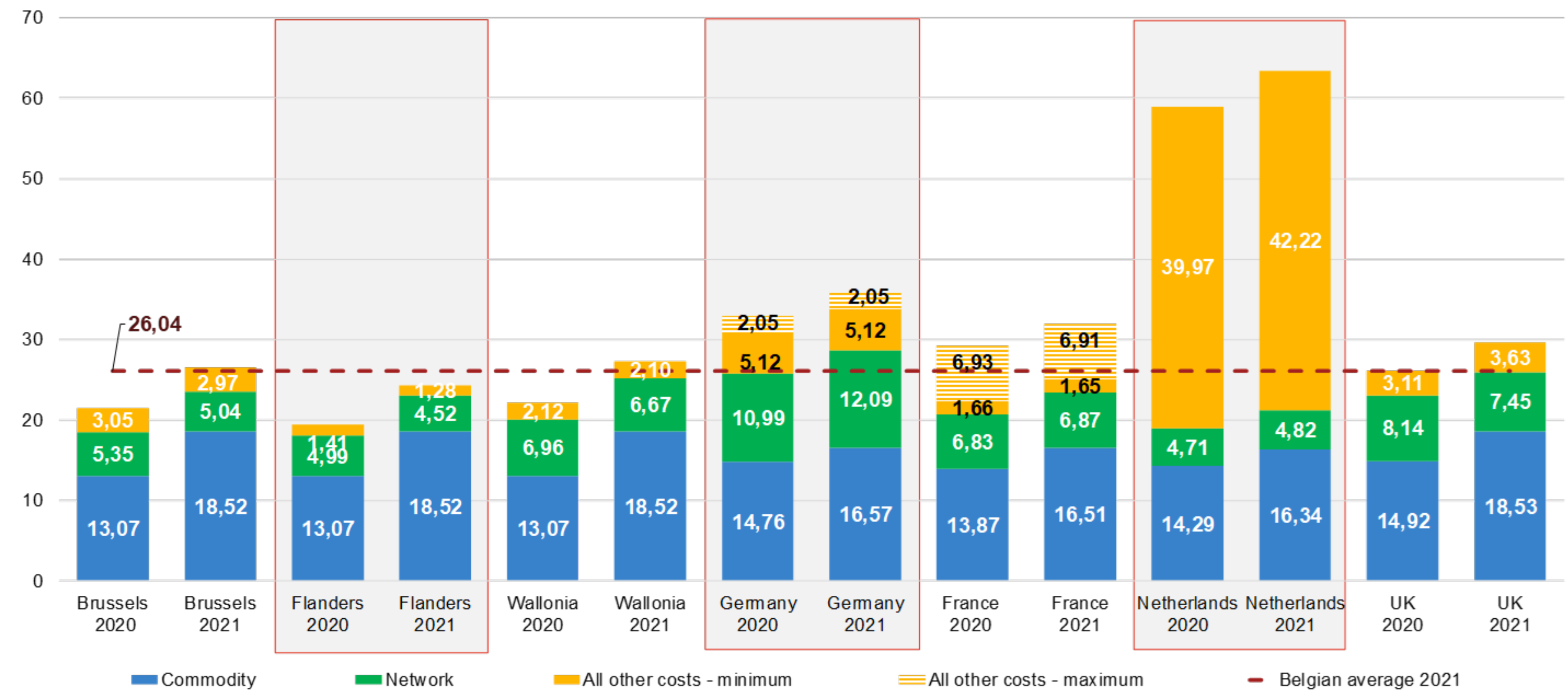
In general, Belgium aligns relatively well compared to its neighbouring countries mostly as a result of low tax prices, which is a remarkable difference compared to electricity. In terms of commodity costs, they are fairly convergent across countries, particularly considering G-PRO. As for network costs, even though these network costs for Belgium are on the average, Flanders certainly benefits from the smallest regional network costs to display lower fares within Belgium. When comparing to 2020 we do not observe any big changes in the total invoice, but for G-RES the small decrease in the UK has made them the most competitive country instead of Flanders.

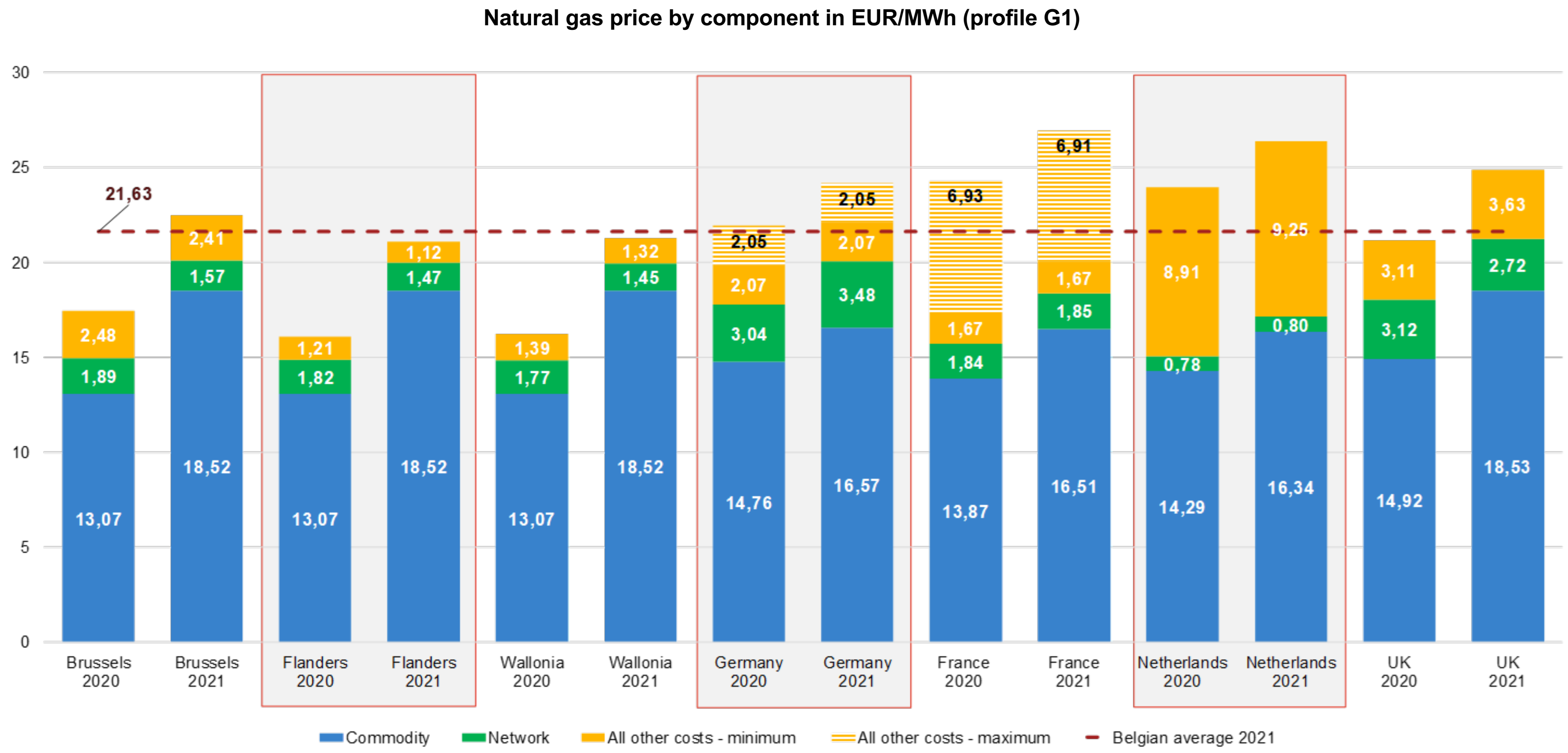
Comparison of natural gas prices for industrial consumers

Overall, Belgium is very competitive when it comes to natural gas even though their competitive position has weakened because of the large increase of the commodity cost. For profiles G0 and G1 Belgium is the most or 2nd most competitive country depending on the reduction in France. However, for G2 it will depend on the type of consumer since all countries offer reductions that can affect their competitive position. In Belgium, Brussels is the least competitive region (except for the G0 profile) while Flanders is the most competitive Belgian region for all industrial profiles. However, the price difference between Flanders and Wallonia is almost negligible for the G1 and G2 profiles.

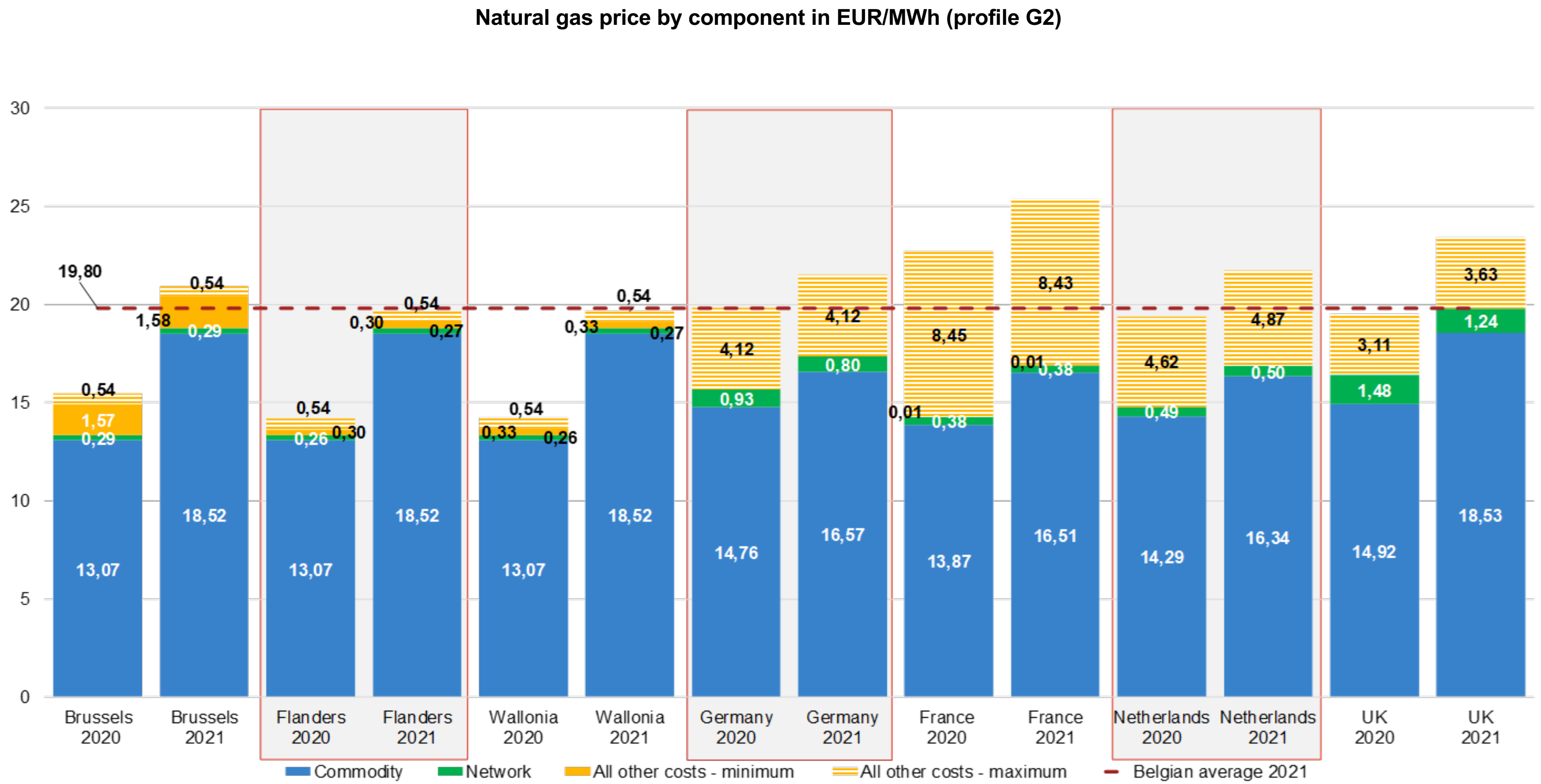
For natural gas, government intervention in network costs and taxes appears to be less common. Moreover, the complexity is much lower, even if reductions or exemptions exist (e.g. exemptions for consumers using natural gas as a raw material or 'feedstock'). Only Germany and France offer reduction starting G0 while the other regions/countries only have a range to take into consideration for G2.

Natural gas price by component in EUR/MWh (profile G0)





Natural gas price by component in EUR/MWh (profile G1)
30
25
20
15
10
5
0
21,63
Brussels 2020
Brussels 2021
Flanders 2020
Flanders 2021
Wallonia 2020
Wallonia 2021
Germany 2020
Germany 2021
France 2020
France 2021
Netherlands 2020
Netherlands 2021
UK 2020
UK 2021
13,07
1,89
2,48
18,52
1,57
2,41
13,07
1,82
1,21
18,52
1,47
1,12
13,07
1,77
1,39
18,52
1,45
1,32
14,76
3,04
2,07
2,05
16,57
3,48
2,07
2,05
13,87
1,84
1,67
6,93
16,51
1,85
1,67
6,91
14,29
0,78
8,91
16,34
0,80
9,25
14,92
3,12
3,11
18,53
2,72
3,63
Commodity
Network
All other costs - minimum
All other costs - maximum
Belgian average 2021



Natural gas price by component in EUR/MWh (profile G2)
30
25
20
15
10
5
0
19,80
Brussels 2020
Brussels 2021
Flanders 2020
Flanders 2021
Wallonia 2020
Wallonia 2021
Germany 2020
Germany 2021
France 2020
France 2021
Netherlands 2020
Netherlands 2021
UK 2020
UK 2021
Commodity
Network
All other costs - minimum
All other costs - maximum
Belgian average 2021

Comparison of electricity and natural gas total bills

Comparison of the total bill for residential and small professional consumers

In electricity and natural gas bills, the commodity component accounts for a fair share of the total bill. However, this usually weighs the most on the natural gas bill. In this respect, Belgium offers relatively competitive prices compared to the other studied countries. Yet, as Belgium displays particularly low tax levels, most especially in Brussels and in Flanders, the Belgian natural gas bill as a whole is more favourable than in most other countries. It is important to note that the competitive position of Belgium is worse, or at least more ambiguous, than in 2020 because of a large increase of the commodity component.

When it comes to electricity, the network costs and, particularly, the taxes, levies and certificate schemes rather drive the bill. In this respect, France and the UK have much lower fares than in Belgium, which remains more favourable than Germany.

At a regional level, Flanders has the lowest total invoice which is different from what we observed for electricity where Brussels was the most competitive Belgian region. Whether we look at electricity or natural gas Wallonia is always the most expensive region for residential and small professional profiles. Although Wallonia faces higher prices than the other two Belgian regions, its relative competitive position remains in line.

While the natural gas total invoice increased in all Belgian regions this is not the case for electricity where we see a small decrease in Flanders and Wallonia. While this does not change the positioning of the regions in Belgium it does have an impact on the relative competitive position compared to the other countries under review.

Comparison of the total bill for industrial consumers

While the commodity component has a big impact on the competitive position of a region/country starting G0 other components play a more important role for the smaller industrial electricity consumers. Regarding electricity, the lower commodity cost in Germany makes them more and more competitive the bigger the profile gets.

as benefits from a sizeable competitive advantage on the other countries in terms of electricity commodity cost.

Next to commodity, the taxes, for which many countries implemented mechanisms to lower electro-intensive consumers' financial burden, mainly drive the electricity bill. Given that only Flanders has such kind of mechanism, which encompasses GC and CHPC in 2021, Belgium faces a competitive disadvantage for these consumers.

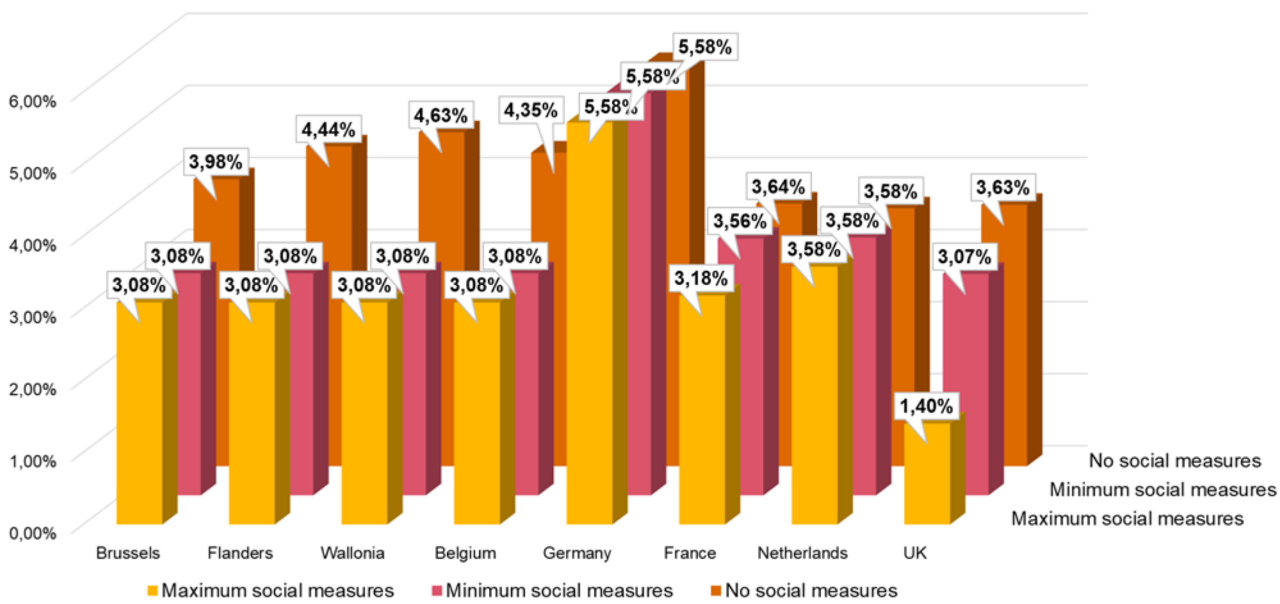
Concerning natural gas, Belgium had the lowest commodity cost in 2020, but have the second highest commodity cost in 2021. Even with this big change Belgium is still really competitive regarding industrial natural gas suppliers because of the low network and all other costs. For industrial natural gas consumers, Belgium offers the lowest network costs component of all countries under review, with the exception of the Netherlands for G1. Lastly, Belgium even has the lowest all other costs component for profile G0 and G1.

Efforts in paying for energy bills for vulnerable consumers

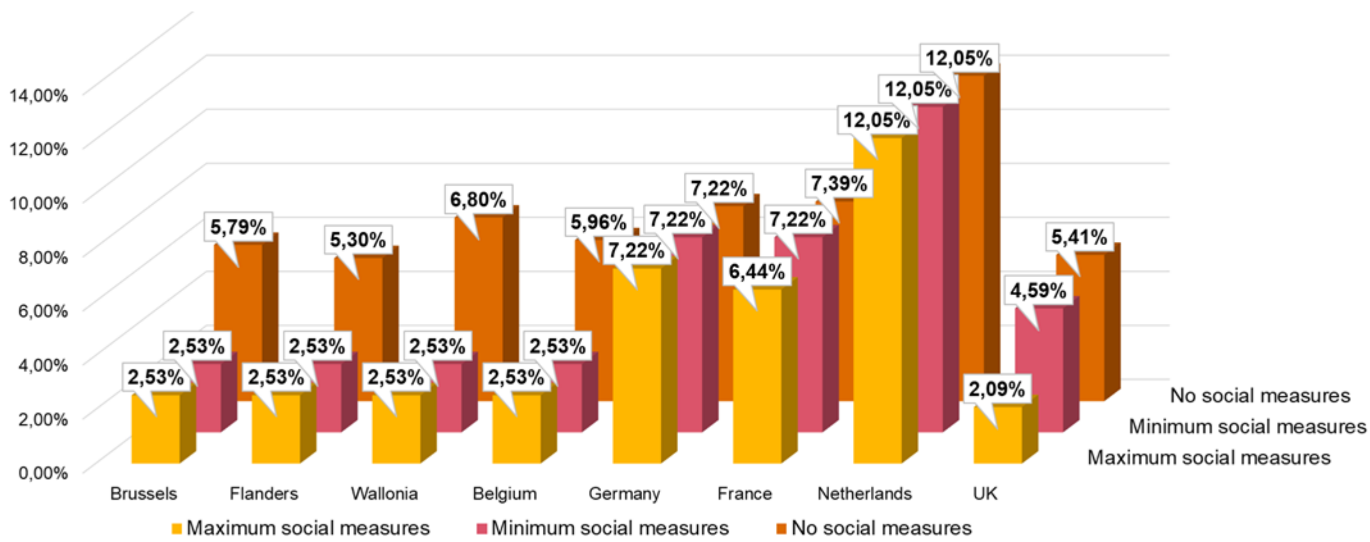
Chapter 8 aims at assessing the differences in financial efforts made by vulnerable consumers to pay for their electricity and/or natural gas bills given their income level. Within the studied countries, various governments' tools exist to reduce one's energy bill. These tools can range from social tariffs to direct financial support to lower one's bill (e.g. chèque-énergie in France). The resulting variety increases complexity to perform cross-country comparison.

Most countries provide government intervention aimed at lessening the energy bill. Belgium tends to ensure relatively lower, or at least in line, effort rates (i.e. the share of a household income dedicated to energy expenses) compared to neighbouring countries, and even more particularly for natural gas. Two elements lie behind this observation: firstly, relatively high disposable and living income levels (used to assess different scenarios) for residential consumers in Belgium, compared to countries under study, help dilute energy costs and thus lower effort rates. Secondly, Belgium offers significant reductions on energy prices through social tariffs. Chapter 8 provides further insights on these observations as notably perceivable from the figures below.

Electricity effort rate compared to disposable income (in %)



Natural gas effort rate compared to disposable income (in %)

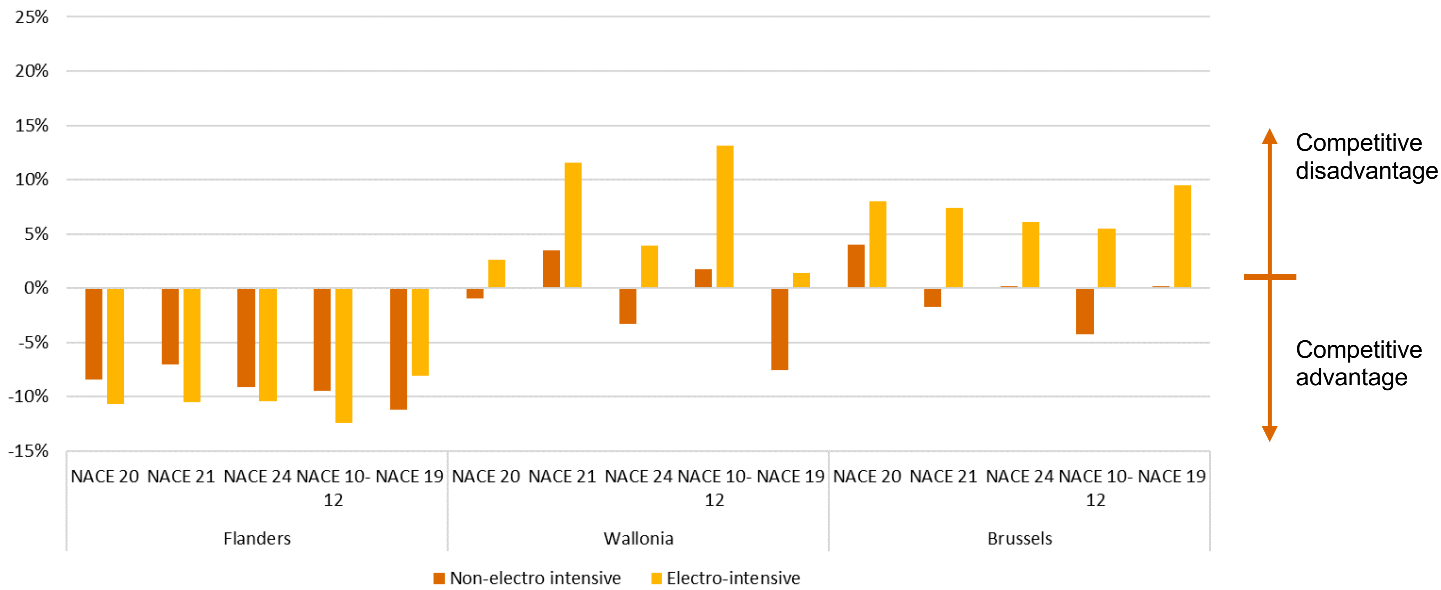


Evaluation of Belgian industries competitiveness

In a last chapter, sector- and region-specific electricity and natural gas prices are analysed through their impact on Belgian industrial consumers' competitiveness compared to their competitors abroad. These results cover industrial consumers from the selected sectors as detailed in chapter 3.3., namely: food and beverages (NACE 10-12), coke and refined petroleum products (NACE 19), chemicals (NACE 20), pharmaceuticals (NACE 21) and manufacture of basic metals (NACE 24). These sectors range from 0,10% to 2,04% of Belgium's gross value added and from 0,53% to 2,04% of the total employment[2].

As we observed that the United Kingdom was a distinctive high-end outlier, particularly in the case of electro-intensive consumers, results were differentiated depending on its inclusion in the comparison. It stands out from our results that industrial consumers in Belgium that compete with non-electro-intensive consumers in the neighbouring countries display a relative competitive advantage in terms of total energy cost regardless of the inclusion of the UK as depicted in the figures below. Belgium's competitive position subsequently changed compared to last year, the competitive advantage for Flanders is getting smaller, the competitive advantage for Brussels and Wallonia is getting much smaller or disappearing. In contrast, electro-intensive consumers' situation varies on the inclusion of the UK in the comparison. The UK included, Flanders displays a competitive advantage compared to neighbouring countries. Brussels and Wallonia are the Belgian regions facing significant competitive disadvantages, although less pertinent for Brussels as few industrial consumers reside on its territory.

Sectoral weighted energy costs differences (electricity and natural gas) between the Belgian regions and the average of 4 European countries (Germany, France, the Netherlands and the United Kingdom) for electro-intensive and non-electro-intensive consumers



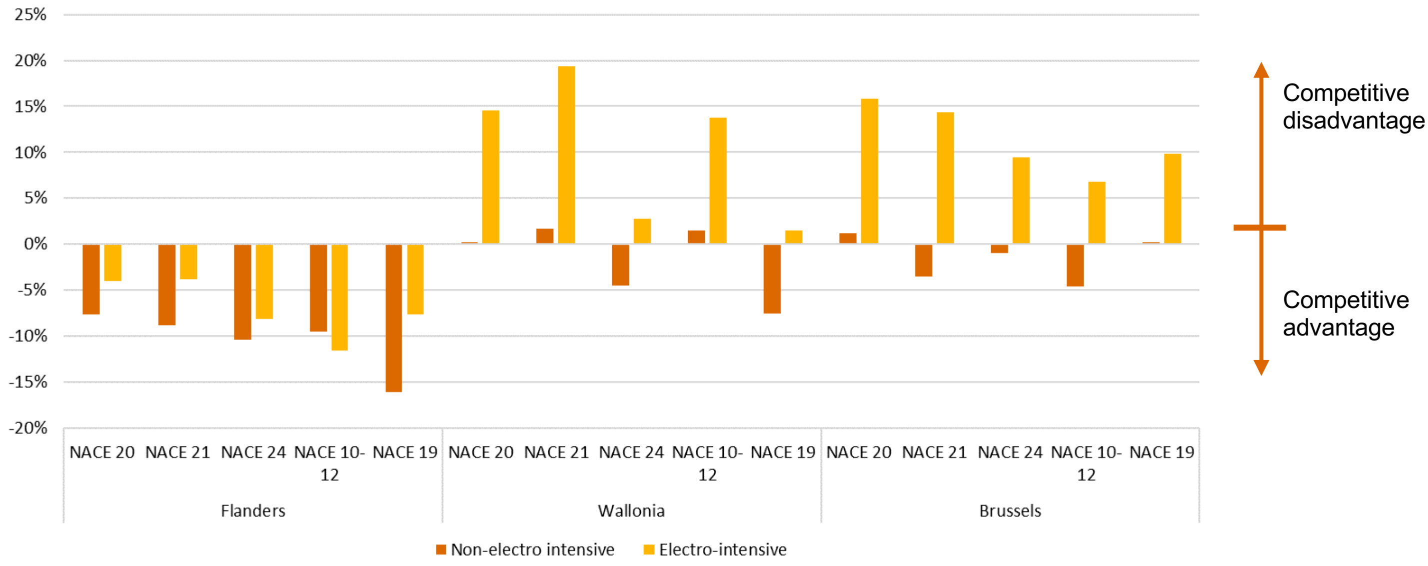
If results are similar regarding non-electro-intensive consumers once the UK excluded, the picture is different for electro-intensive consumers as all sectors face competitive disadvantages in Brussels and in Wallonia as can be seen in the figure below. This constitutes a competitiveness issue when compared to France, Germany and the Netherlands. For these consumers, the relatively low natural gas cost imposed on industrial consumers in Belgium does not offset the competitive disadvantage faced with electricity prices. Even if the consumption of natural gas might be superior to electricity consumption for some industrial sectors, the lower cost per energy unit of natural gas induces that electricity plays the determining role in the total energy cost competitiveness. Oppositely, Flanders keeps benefitting from competitive advantages even though they are not as important as when the UK is included. In this regard, it is to be noted that Flanders makes for the most favourable region in Belgium due to the introduction of a combined cap on GC and CHPC in 2021. Before this cap was only applicable on GC.

Once the UK excluded, one can observe a similar situation, but slight changes are noticeable: while the Flemish competitive advantage slightly increased for non-electro-intensive consumers, this advantage decreases for

[2] These are 2016 national values, which were retrieved from Eurostat.

electro-intensive consumers. This can be explained by the fact that between non-electro-intensive consumers and electro-intensive consumers in the UK, there is little to no variation, while a significant difference is observed between the two types of consumers in Flanders.

Sectoral weighted energy costs differences (electricity and natural gas) between the Belgian regions and the average of 3 European countries (Germany, France and the Netherlands, excluding the United Kingdom) for electro-intensive and non-electro-intensive consumers



It can be stated that non-electro-intensive consumers are somewhat protected in Belgium, given the lower prices they benefit from compared to other countries. However, electro-intensive consumers which are more exposed to a lack of competitiveness due to high electricity prices are at a clear disadvantage in Wallonia and Brussels compared to their counterparts in neighbouring countries. Consequently, results highlight the need to reflect upon possible adjustments to the current tax reduction schemes which apply to industrial consumers and which have been introduced by the federal and regional governments in Belgium. The general objective should be to generate a trend towards more competitive total energy prices for sectors at risk of competitivity disadvantage without transferring the cost on other consumers.

This report could serve as a basis for a more detailed discussion of potential federal and/or regional interventions to strengthen the competitiveness of Belgian consumers by acting, for example, on tariffs and/or taxes. Regarding the latter, the European Commission provides a framework through the EEAG[3] that could be exploited with regards to the design and/or adaptation of taxes supporting the development of renewable energy.

[3] Guidelines on State aid for environmental protection and energy 2014-2020.

Samenvatting – Nederlands

In deze studie worden de energieprijzen (elektriciteit en aardgas) voor residentiële, kleine professionele en industriële consumenten vergeleken tussen België en vier buurlanden: Frankrijk, Duitsland, Nederland en het Verenigd Koninkrijk. Dit rapport spitst zich toe op de prijzen die van kracht waren in januari 2021. Indien relevant worden de resultaten op regionaal niveau weergegeven in plaats van op nationaal niveau.

De onderzochte **consumentenprofielen** werden vastgelegd door het bestek van de studie en zijn in lijn met de voorgaande vergelijkende studies van PwC voor de CREG en VREG.[4] In het totaal werden 13 verschillende consumentenprofielen bestudeerd: 8 voor elektriciteit (1 residentiële, 2 kleine professionele en 5 industriële consumenten) en 5 voor aardgas (1 residentiële, 1 kleine professionele en 3 industriële consumenten). Onderstaande tabel geeft een niet-exhaustief overzicht van de specifieke karakteristieken van de consumentenprofielen. Bijkomende hypothesen zijn te vinden in hoofdstuk 3.

Elektriciteit consumentenprofielen

Profiel	Consument type	Jaarlijkse vraag (MWh)	Gecontracteerde capaciteit (kW)	Jaarlijkse piek (kW)
E-RES	Residentieel	3,5	7,4	5,9
E-SSME	Kleine professionele consumenten	30	37,5	30
E-BSME	Kleine professionele consumenten	160	125	100
E0	Industrieel	2.000	625	500
E1	Industrieel	10.000	2.500	2.000
E2	Industrieel	25.000	5.000	5.000
E3	Industrieel	100.000	13.000	13.000
E4	Industrieel	500.000	62.500	62.500

[4] Voorgaande studies zijn beschikbaar op de site van de regulatoren: studie over industriële consumenten voor de CREG (https://www.creg.be/sites/default/files/assets/Publications/Studies/F20190507EN.pdf) en studies voor de residentiële consumenten voor de CREG (https://www.creg.be/sites/default/files/assets/Publications/Studies/F180628pwc.pdf) en VREG (https://www.vreg.be/sites/default/files/document/rapp-2019-03.pdf). De studie van vorig jaar over de residentiële en industriële verbruikers is te vinden op de website van de CREG (https://www.creg.be/sites/default/files/assets/Publications/Studies/F20200520EN.pdf) en het bijhorende erratum (https://www.creg.be/sites/default/files/assets/Publications/Studies/F20200520-errata.pdf)

Aardgas consumentenprofielen

Profiel	Consument type	Jaarlijkse vraag (MWh)	Gecontracteerde capaciteit (kW)
G-RES	Residentieel	23,26	-
G-PRO	Kleine professionele consumenten	300	-
G0	Kleine professionele consumenten	1.250	-
G1	Industrieel	100.000	15.000
G2	Industrieel	2.500.000	312.500

De vergelijking neemt drie componenten van de prijs in aanmerking: energiekost, netwerkkost en alle andere kosten (belastingen, heffingen en certificatenstelsels). Een vierde component, BTW, wordt enkel in aanmerking genomen voor de residentiële consumentenprofielen voor elektriciteit en aardgas.

De resultaten van de prijsvergelijking (hoofdstuk 6) worden voorafgegaan door een uitgebreide uiteenzetting van de prijssamenstelling en de componenten (hoofdstukken 4 en 5). Energiekosten worden geanalyseerd volgens de *bottom-up* methode en dit leidt tot een gedetailleerde beschrijving van de verschillende prijscomponenten met inbegrip van de algemene hypothesen waarop onze studie steunt en de toepassing ervan binnen de beschouwde landen om de objectiviteit van de studie te maximaliseren.

Voor zowel elektriciteit als aardgas worden in dit verslag sterke verschillen opgemerkt in de prijsstructuur, met name bij de vaststelling van de netwerkkosten en de belastingregelingen tussen de verschillende regio's en landen waardoor de complexiteit van de vergelijking verhoogt.

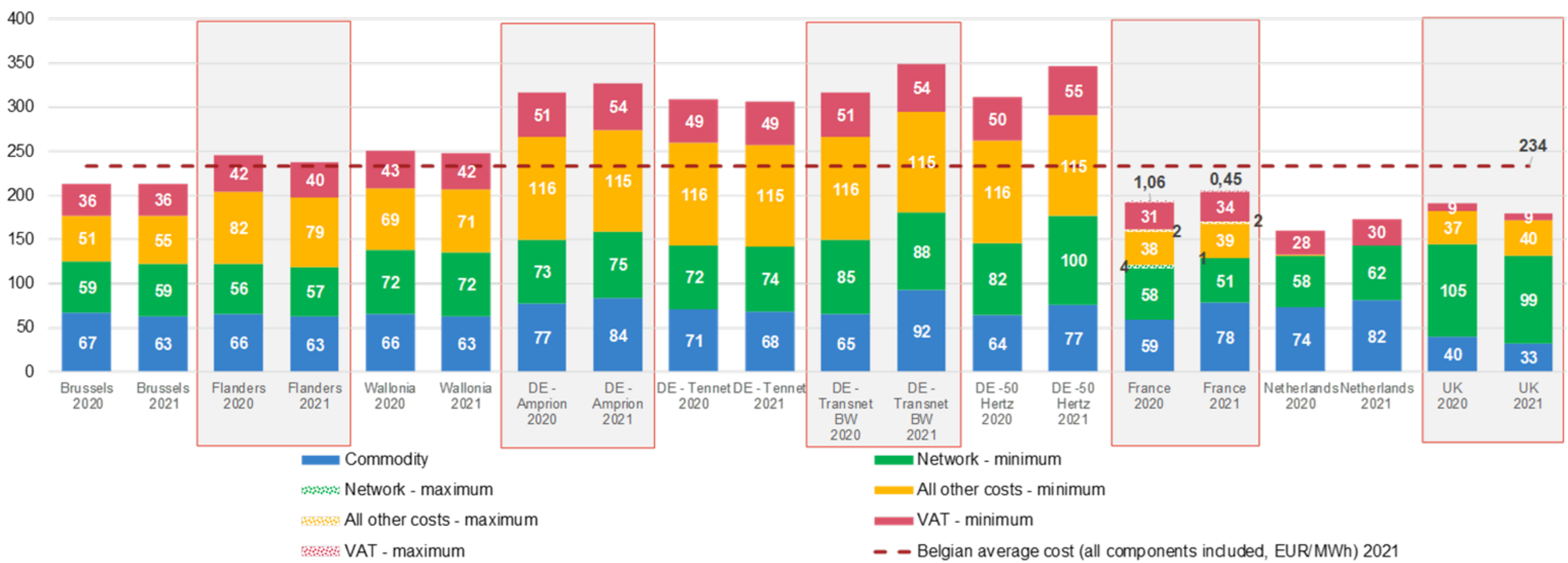
Vergelijking van elektriciteitsprijzen

Vergelijking van de elektriciteitsprijzen voor residentiële en kleine professionele consumenten

Er werden grote verschillen opgemerkt tussen de regio’s en zones in deze studie.

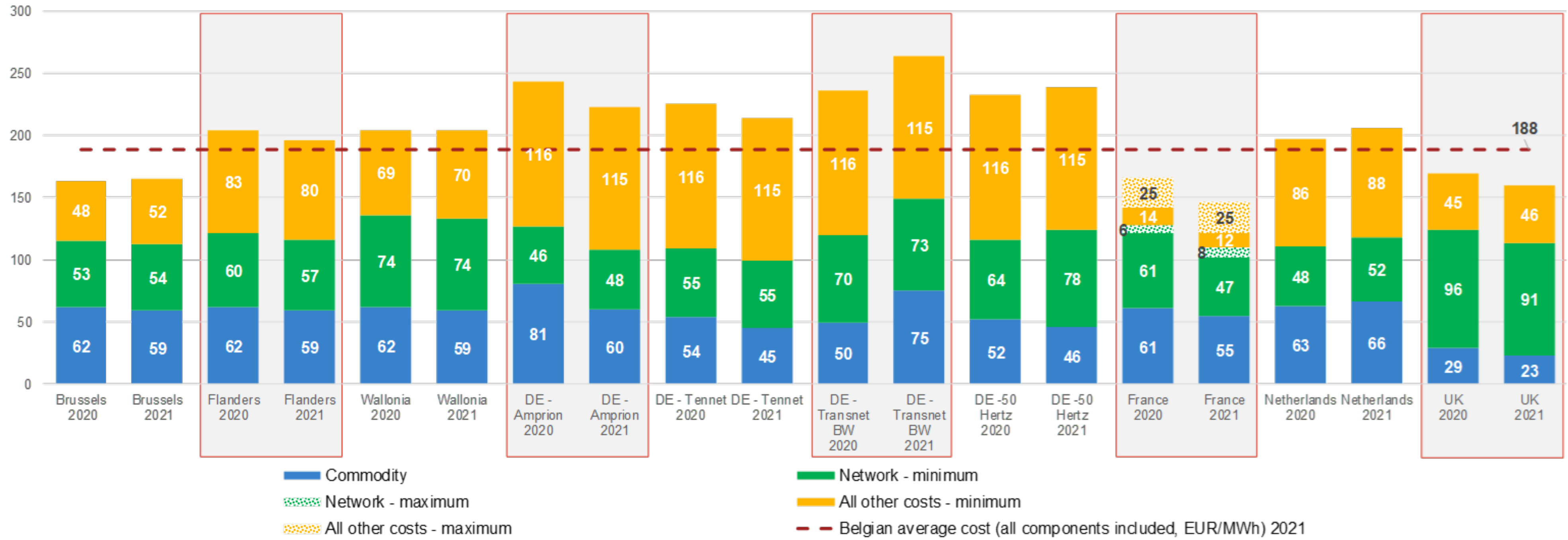
Voor de residentiële consumenten (E-RES profiel) heeft Nederland de laagste jaarfactuur, voonamelijk door een aanzienlijke belastingvermindering, terwijl de Duitsers het meest betalen (d.w.z. bijna twee keer zo hoog als de Nederlandse huishoudens) en de hoogste tarieven ondervinden voor het onderdeel alle andere kosten component (d.w.z. belastingen, heffingen en certificatenregelingen). In vergelijking met de bestudeerde landen heeft België relatief hoge prijzen en is het op één na duurste land, na Duitsland. Dit is het gevolg van de hoge alle andere kosten, maar ook van de aanzienlijke netwerkkosten in Wallonië. In België is Brussel de goedkoopste van de drie regio's, met prijzen die door de belastingniveaus aanzienlijk lager liggen, terwijl Wallonië de duurste regio is. Ten opzichte van vorig jaar is de totale jaarfactuur in 6 van de 10 regio's/landen gestegen. De grootste stijging doet zich voor in de Duitse regio 50 Hertz en is te wijten aan een stijging van de grondstof- en netwerkkosten, die ook gevolgen heeft voor de BTW-component. In Vlaanderen en Walloniëzien we een kleine daling van de totale jaarfactuur. Toch is de Belgische positie sinds vorig jaar niet veranderd. Frankrijk, Nederland en het Verenigd Koninkrijk blijven aanzienlijk goedkoper, de Duitse regio's blijven 31% tot 50% duurder dan de Belgische regio's.

Elektriciteitsprijs per component in EUR/MWh (profiel E-RES)



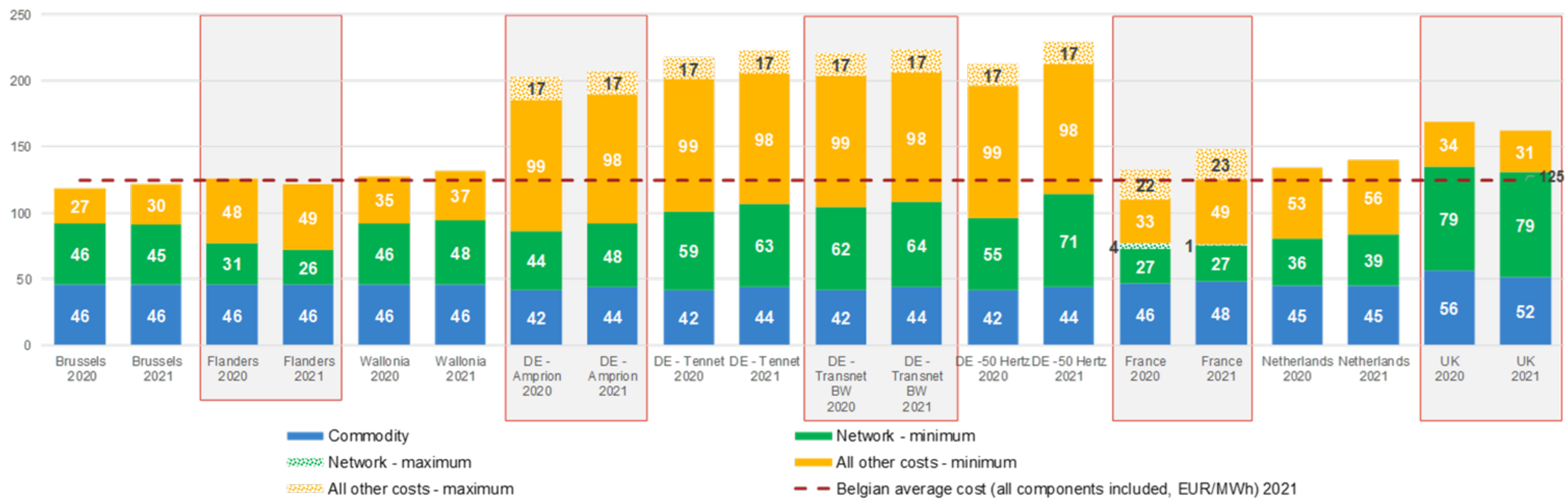
De situatie is relatief vergelijkbaar voor het E-SSME profiel, onder de kleine professionele consumenten, aangezien Duitsland nog steeds de hoogste jaarlijkse factuur van allemaal in rekening brengt en België relatief hoge prijzen laat zien. Het meest opvallende verschil is de zwakkere concurrentiepositie van Nederland aangezien de belastingteruggave enkel geldt voor huishoudens en niet ten goede komt aan kleine Nederlandse professionals . Hierdoor is België nu goedkoper wat niet het geval was voor het E-RES profiel. Net als bij E-RES is het Verenigd Koninkrijk nog steeds het op één na meest concurrerende land. Deze positie is nu echter minder duidelijk omdat er geen BTW in aanmerking wordt genomen voor E-SSME. Het Verenigd Koninkrijk had namelijk een concurrentievoordeel met betrekking tot deze component omdat het een veel lager tarief (5%) toepaste. Net als in het E-RES-profiel blijft Brussel de goedkoopste Belgische regio, gevolgd door Vlaanderen. Er zijn wel enkele wijzigingen ten opzichte van 2020. Ten eerste kon Brussel in 2020 het goedkoopste gewest zijn, afhankelijk van de vermindering in Frankrijk. Ten tweede is Vlaanderen nu meer competitief dan Wallonië door een daling van elke component. Het verschil met de goedkopere landen, Frankrijk en het VK, wordt groter. Terwijl de elektriciteitsprijzen voor de kleine, professionele consumenten in deze landen sterk daalden, blijft het Belgische gemiddelde ongeveer gelijk. Ook Brussel is nu steeds duurder dan Frankrijk en het VK.

Elektriciteitsprijzen per component in EUR/MWh (profiel E-SSME)



Wat het E-BSME profiel betreft, blijft Duitsland weer achter met veel hogere rekeningen als gevolg van veel hogere belastingniveaus, met name als gevolg van de EEG-*Umlage*. Vlaanderen biedt potentieel de goedkoopste jaarfactuur aan, vorig jaar was dit nog Frankrijk. Ten opzichte van de buurlanden liggen de Belgische prijzen nu meer in lijn met de buurlanden, aangezien Duitsland en het Verenigd Koninkrijk zeker duurder zijn. Binnen het land blijven de regionale posities stabiel; door de lagere belastingen is Brussel het goedkoopste gewest ten opzichte van Vlaanderen en Wallonië. Het onderscheid tussen Brussel en Vlaanderen is verwaarloosbaar en is niet te zien in onderstaande figuur. Die laatste is de duurste Belgische regio.

Elektriciteitsprijzen per component in EUR/MWh (profiel E-BSME)



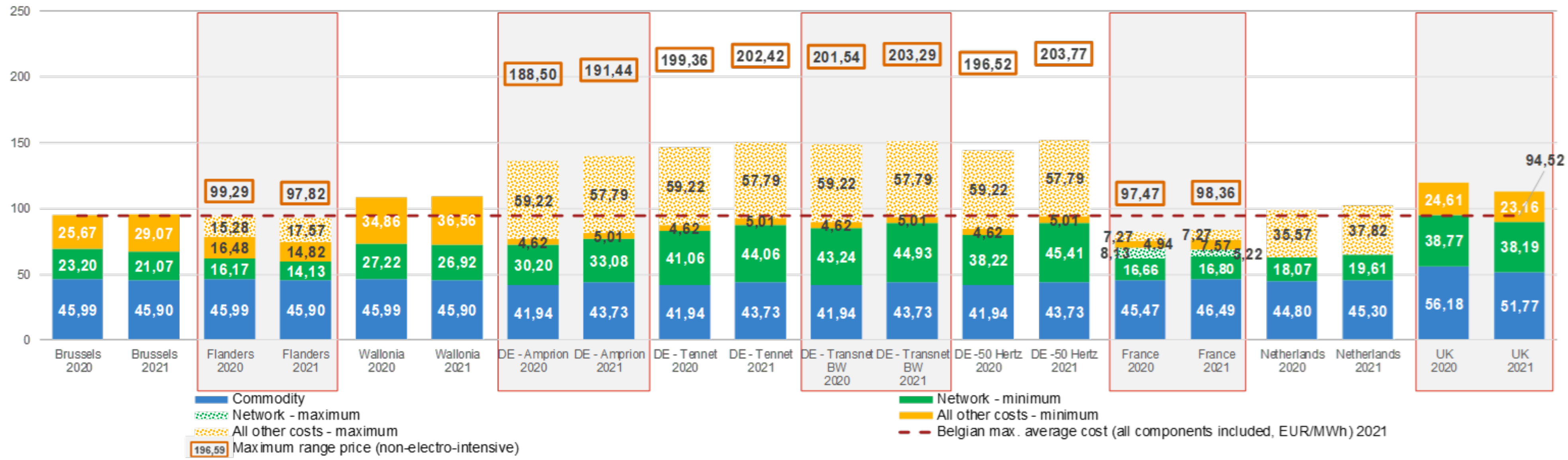
De verschillende componenten die voor elk land en elke regio worden onderzocht, kunnen aanzienlijk verschillen en de concurrentiepositie van elk land beïnvloeden. Hoewel de energiekost in de verschillende landen - met uitzondering van het Verenigd Koninkrijk - redelijk convergeren, zijn er grote verschillen in de netwerkkosten en in de alle andere kosten-componenten. De eerste speelt zeker een rol binnen België, terwijl alle andere kosten van Duitsland het duurste land maken en daarenboven ook de Belgische prijzen opdrijven, voornamelijk voor E-RES en E-SSME.

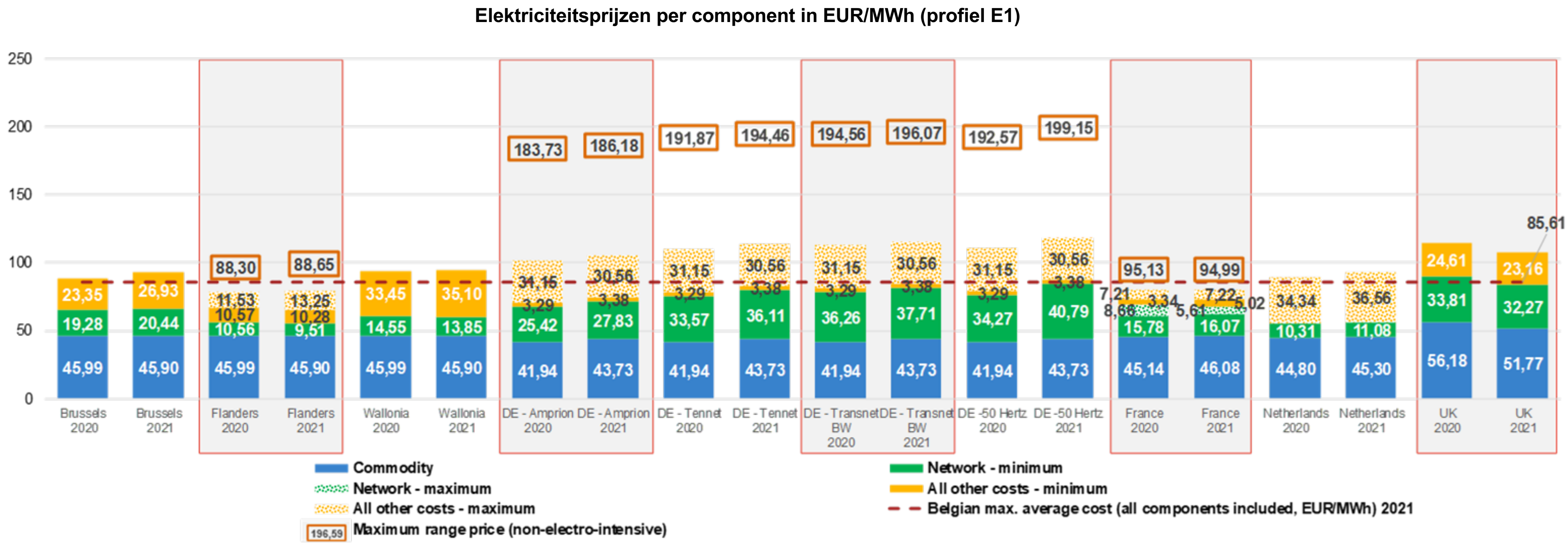
Vergelijking van de elektriciteitsprijzen voor industriële consumenten

De laagste elektriciteitskosten voor de consumentenprofielen E0, E1 en E2 zijn in Nederland te vinden, iets lager dan in Frankrijk en Vlaanderen. Deze lagere prijzen zijn deels het gevolg van relatief lage netwerkkosten, maar vooral van de veel lagere alle andere kosten component (d.w.z. belastingen, heffingen en certificaatregelingen).

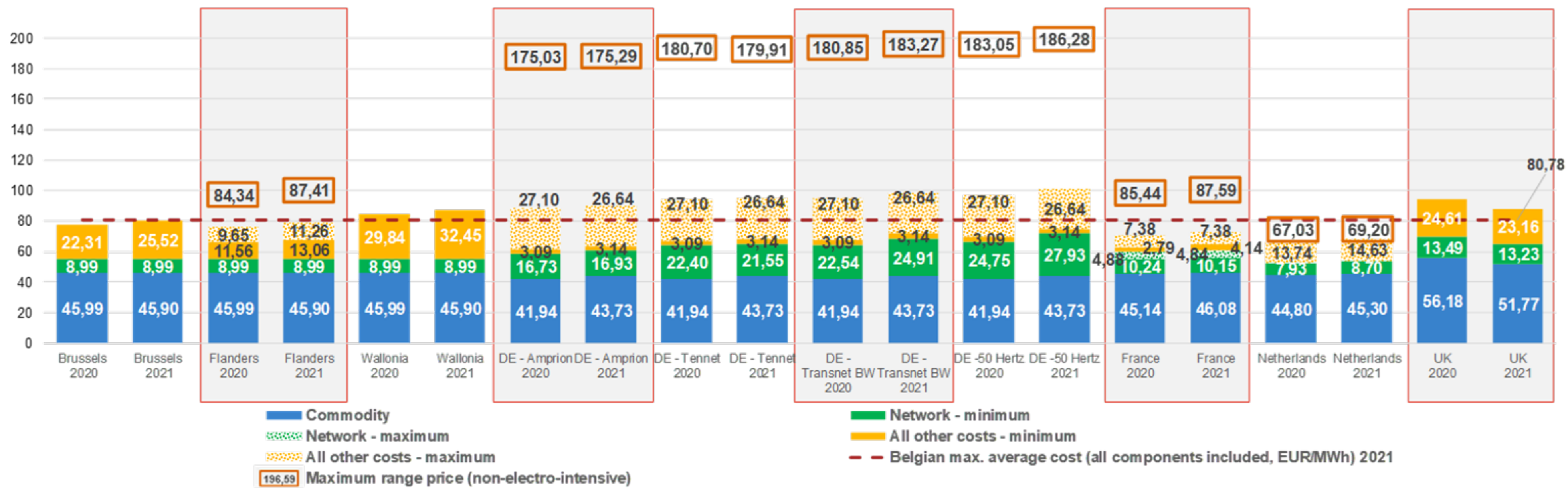
In zijn geheel genomen geeft België een gemiddelde jaarfactuur weer in vergelijking met de bestudeerde landen, terwijl het Verenigd Koninkrijk veel duurder is. De Duitse resultaten zijn zeer afwisselend: terwijl ze gemiddelde prijzen bieden die enigszins vergelijkbaar zijn met die van België wanneer de verminderingen van de alle andere kosten gelden voor elektro-intensieve verbruikers, worden Duitse industriële verbruikers geconfronteerd met de duurste prijzen wanneer deze verminderingen niet van toepassing zijn. Binnen België zijn de elektriciteitskosten aanzienlijk hoger in Wallonië voor de profielen E0, E1 en E2, terwijl Brussel is afgestemd op de prijzen van Vlaanderen - met uitzondering van profiel E1. Een belangrijk verschil tussen 2020 en 2021 is het plafond in Vlaanderen dat in 2020 alleen op groenestroomcertificaten werd toegepast en in 2021 ook op warmte-krachtcertificaten wordt toegepast. Aangezien de vermindering in Vlaanderen nu wordt toegepast op een grotere kostenpost (groenestroom- en warmte-krachtcertificaten), is het minimum van de component alle andere kosten lager dan vorig jaar.

Elektriciteitsprijzen per component in EUR/MWh (profiel E0)




Elektriciteitsprijzen per component in EUR/MWh (profiel E1)
Brussels 2020
Brussels 2021
Flanders 2020
Flanders 2021
Wallonia 2020
Wallonia 2021
DE - Amprion 2020
DE - Amprion 2021
DE - Tennet 2020
DE - Tennet 2021
DE - Transnet BW 2020
DE - Transnet BW 2021
DE -50 Hertz 2020
DE -50 Hertz 2021
France 2020
France 2021
Netherlands 2020
Netherlands 2021
UK 2020
UK 2021
Commodity
Network - minimum
Network - maximum
All other costs - minimum
All other costs - maximum
Belgian max. average cost (all components included, EUR/MWh) 2021
Maximum range price (non-electro-intensive)

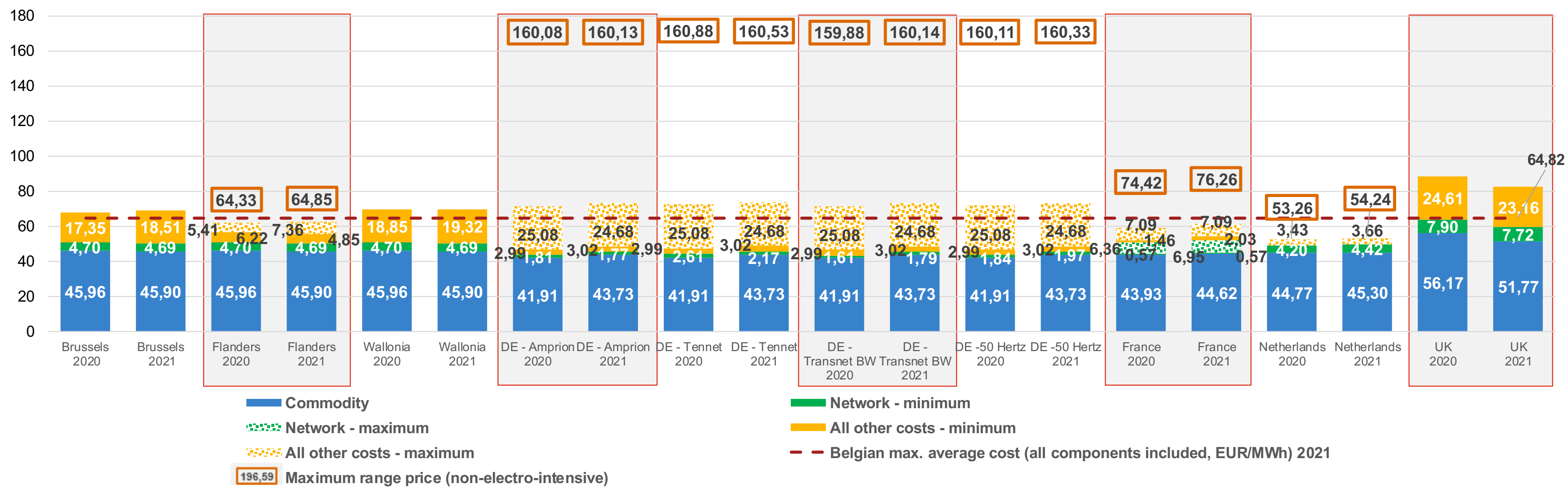
Elektriciteitsprijzen per component in EUR/MWh (profiel E2)



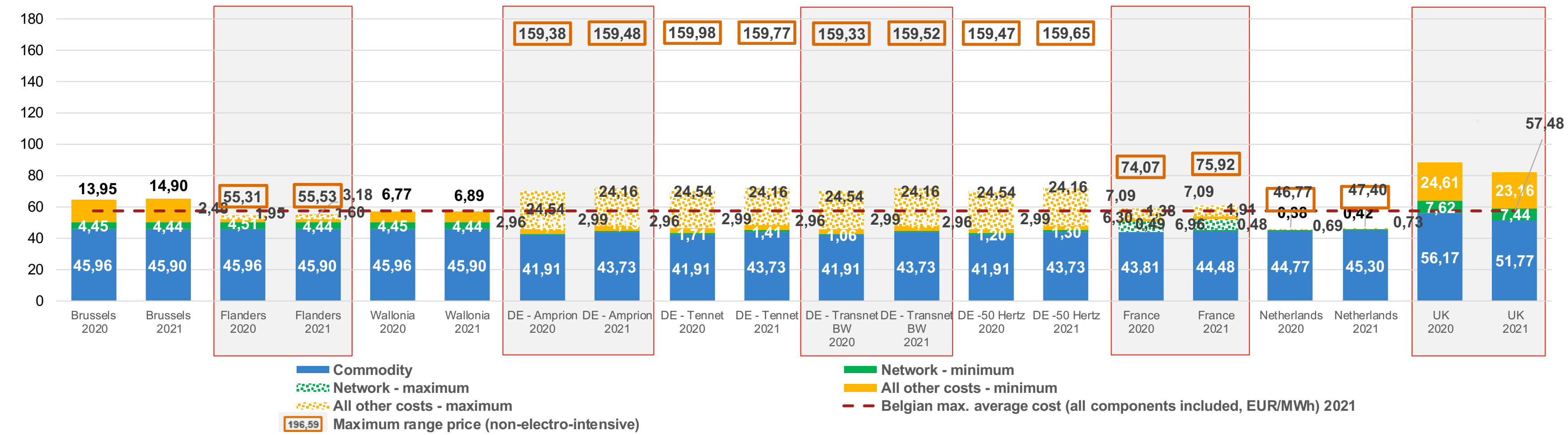
De situatie is niet echt gewijzigd ten opzichte van de vorige profielen. Ten eerste is Nederland nog steeds het land dat potentieel de laagste jaarfactuur heeft van alle regio's/landen. Ten tweede blijft het Verenigd Koninkrijk het duurste land, behalve wanneer rekening wordt gehouden met de Duitse tarieven voor niet-elektro-intensieve verbruikers. Tenslotte vertoont België relatief hoge gemiddelde prijzen.

De concurrentiepositie van de Belgische gewesten verandert echter tussen E3 en E4: Wallonië is het duurste gewest voor E3, terwijl Brussel dat is voor E4. Aangezien de energiekost en de netwerkkosten over alle Belgische gewesten zijn geharmoniseerd, hangt dit louter af van de component alle andere kosten. Het is echter belangrijk op te merken dat de grootste energieverbruiker in Brussel dichter bij een E3 profiel ligt dan bij een E4 profiel en dit is dus een zuiver theoretische vaststelling voor dit gewest.

Elektriciteitsprijzen per component in EUR/MWh (profiel E3)



Elektriciteitsprijzen per component in EUR/MWh (profiel E4)



Globaal gezien hebben de betrokken landen te maken met convergerende energiekosten, met uitzondering van het Verenigd Koninkrijk dat ook in 2021 een uitschieter is. Verder zijn de verschillen tussen de landen terug te vinden in de netwerk- en alle andere kosten componenten. België biedt relatief vergelijkbare netwerkkosten, maar kent geen reducties toe op deze kosten, wat zijn concurrentievermogen ten opzichte van landen die dat wel doen, kan ondermijnen. Daarenboven zouden de kosten van de Belgische belastingen, heffingen en certificatenstelsels ook in overeenstemming zijn met die van andere landen, indien deze laatste geen verminderingen zouden toepassen voor elektro-intensieve consumenten. Vlaanderen is het enige Belgische gewest dat in lijn blijft met deze bestudeerde landen, hoofdzakelijk dankzij het plafond voor de financiering van hernieuwbare energie.

Met betrekking tot elektriciteit voor industriële afnemers, wordt in dit verslag de grote complexiteit benadrukt die het gevolg is van de tussenkomsten van de regeringen om de elektriciteitskosten voor sommige categorieën van grote industriële afnemers te verlagen. Dergelijke tussenkomsten zijn specifiek ontworpen om in te spelen op het gewicht van de componenten van de netwerkkosten en alle andere kosten (d.w.z. belastingen, heffingen, certificaatregelingen). Vlaanderen, Frankrijk, Duitsland en Nederland passen de netwerkkosten en de toegekende belastingsverminderingen/maxima toe op basis van een groot aantal zeer specifieke economische criteria, die doorgaans verband houden met de elektro-intensiteit van de bedrijfsactiviteiten. Indien specifieke verminderingen rechtstreeks op de prijzen kunnen worden toegepast (bijvoorbeeld verminderingen van de netwerkkosten in Duitsland), moeten enkele resultaten ook op een breed scala worden weergegeven. Wat de belastingvermindering betreft, zijn de door Nederland vastgestelde criteria (jaarlijkse afname vanaf 10 GWh of activiteit) het minst streng. De toepassing van deze verminderingen brengt een aanzienlijke wijziging van de concurrentiepositie van de landen met zich mee: Duitsland presenteert de hoogst mogelijke elektriciteitskosten voor alle onderzochte profielen, voor verbruikers die niet voldoen aan de reductiecriteria; Nederland en Vlaanderen, die al relatief goedkoop zijn zonder reducties, worden nog goedkoper; Frankrijk wordt goedkoper dan de Belgische regio's, inclusief Vlaanderen, als gevolg van deze reducties. Aangezien Vlaanderen het enige Belgische gewest is dat een dergelijk mechanisme heeft ingevoerd om de alle andere kosten voor industriële consumenten te beperken, zijn Brussel en Wallonië duurder voor consumenten die in aanmerking zouden komen voor het Vlaamse mechanisme voor elektro-intensieve consumenten. Ten slotte is Frankrijk het enige land dat kortingen heeft op de energiekost via het ARENH-mechanisme. De regio's/landen die geen speciale korting/vrijstelling voor elektro-intensieve consumenten bieden, zijn Brussel, Wallonië en het Verenigd Koninkrijk, en deze regio's zijn ook de minst concurrerende regio's/landen

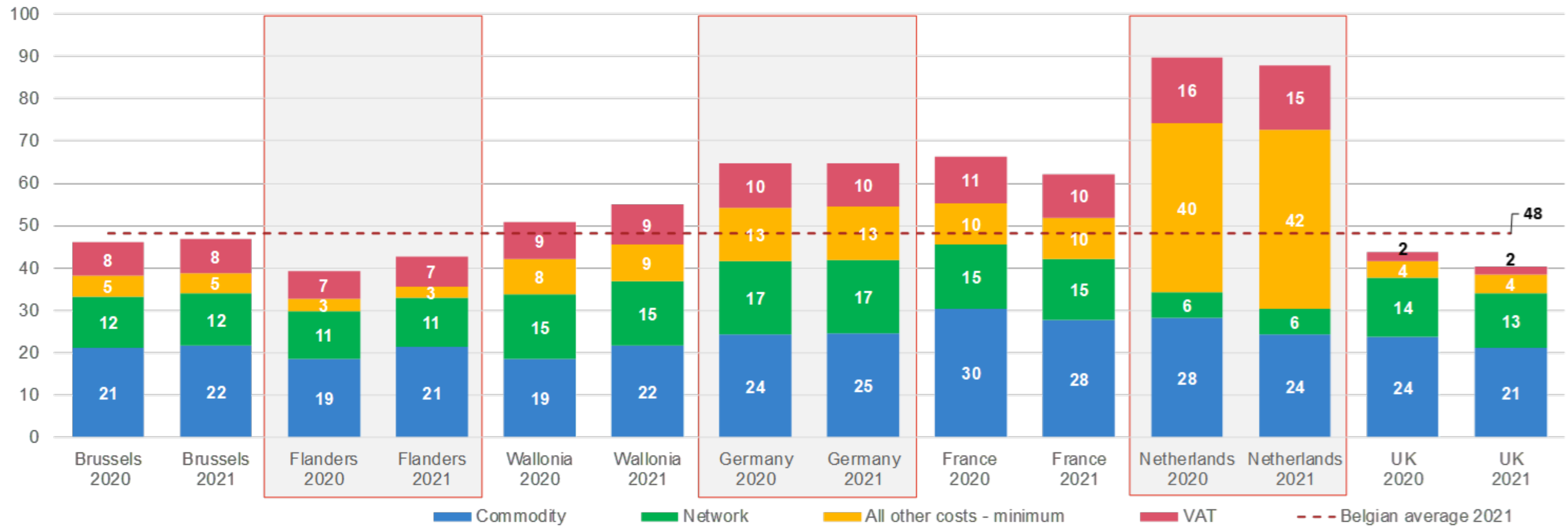
Vergelijking van de aardgasprijzen

Vergelijking van de aardgasprijzen voor residentiële en kleine professionele consumenten

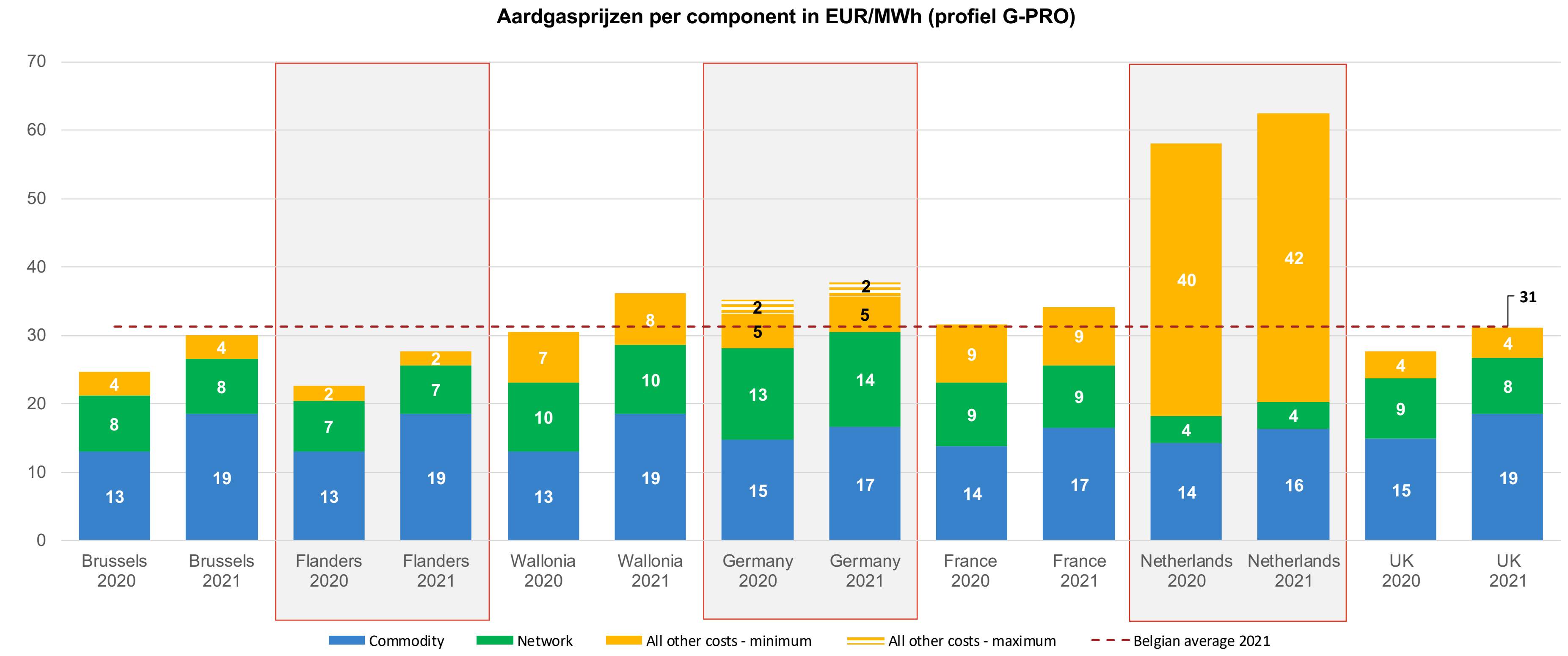
De resultaten van de vergelijking van de aardgasprijzen verschillen in grote mate van de resultaten van de vergelijking van de elektriciteitsprijzen die hierboven werden uiteengezet.

Voor residentiële consumenten (G-RES) is het VK het minst dure land, terwijl Nederland het duurste land is. In beide gevallen spelen belastingen een bepalende rol in hun relatieve concurrentiepositie, waarbij het VK de op één na laagste tarieven heeft en Nederland de duurste. De concurrentiepositie van de regio's/landen is veranderd ten opzichte van 2020, toen Vlaanderen het goedkoopst was en niet het VK. Dit komt vooral door de energiekost-component, die is toegenomen in Vlaanderen en afgenomen in het VK. Hoewel deze verandering ten opzichte van 2020 de reden is dat hun posities nu zijn omgekeerd is het uiteindelijk het lagere BTW-tarief in het VK (5%) dat doorslaggevend is. In zijn geheel is België het op één na goedkoopste land, hoewel er aanzienlijke verschillen tussen de regio's worden waargenomen - voornamelijk tussen Vlaanderen en de andere regio's. Naast de belastingen biedt Vlaanderen ook de laagste netwerkkosten van de drie Belgische regio's, wat de relatief lagere prijzen verklaart.

Aardgasprijzen per component in EUR/MWh (profiel G-RES)



Wat de kleine professionele consumenten (G-PRO) betreft, toont Vlaanderen opnieuw de laagste totale factuur, gevolgd door Brussel en dan het VK. Gedreven door de lage belastingniveaus in Brussel en Vlaanderen is de gemiddelde Belgische factuur het goedkoopst, lager dan in het VK, maar ook meer dan twee keer goedkoper dan de Nederlandse aardgasfactuur voor dit profiel. Ook hier zijn de lagere aardgasbelastingen in België (behalve in Wallonië) verantwoordelijk voor de goede concurrentiepositie.



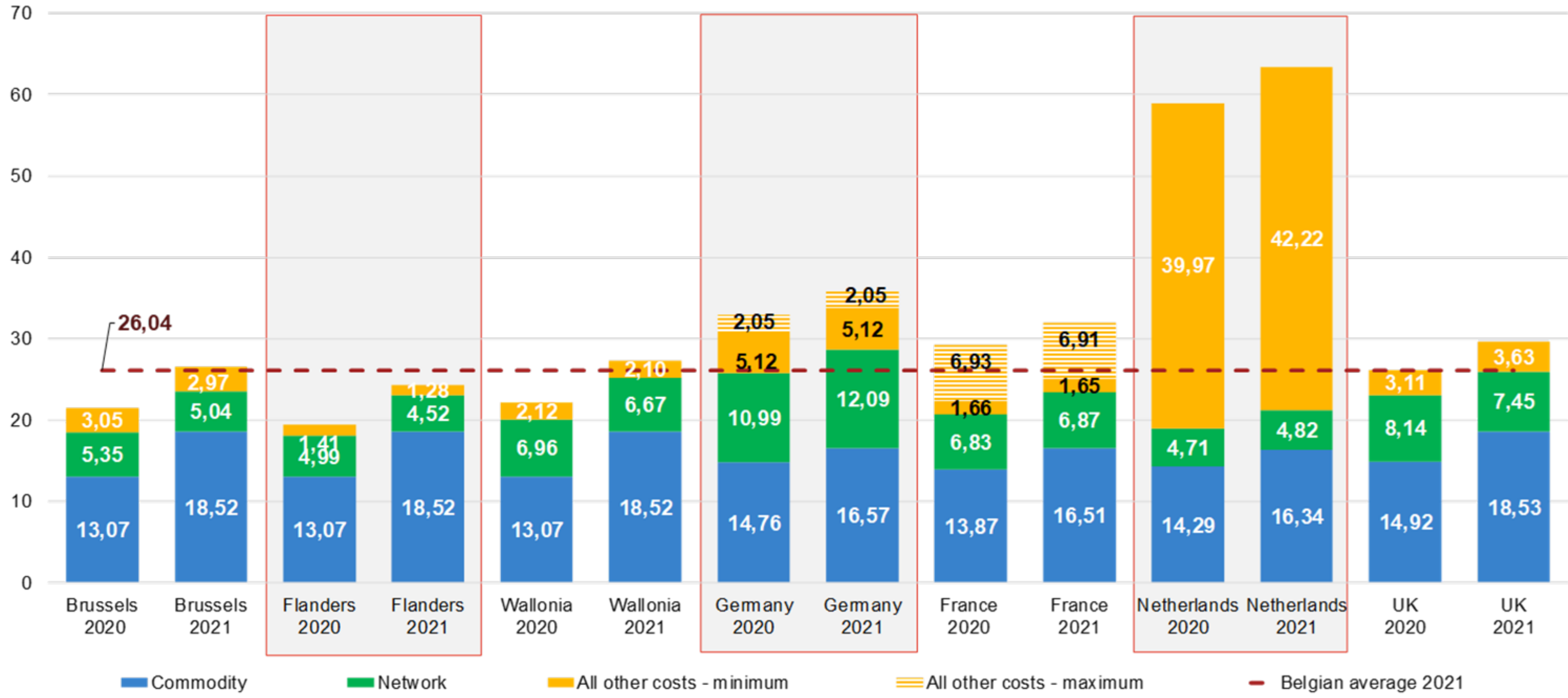
In het algemeen werd vastgesteld dat België op dezelfde lijn blijft als zijn buurlanden, voornamelijk als gevolg van de lage belastingtarieven, wat een opmerkelijk verschil is met elektriciteit. Wat de energiekost betreft, zijn deze vrij convergent tussen de landen, voornamelijk gelet op G-PRO. Wat de netwerkkosten betreft, hoewel die van België op nationaal niveau op het gemiddelde liggen, profiteert Vlaanderen zeker van de kleinste regionale netwerkkosten en toont daarom de laagste tarieven binnen België. Indien we de resultaten met 2020 vergelijken zien we geen grote veranderingen in de totale jaarfactuur, maar voor G-RES heeft de kleine daling in het VK van hen het meest concurrerende land gemaakt in plaats van Vlaanderen.

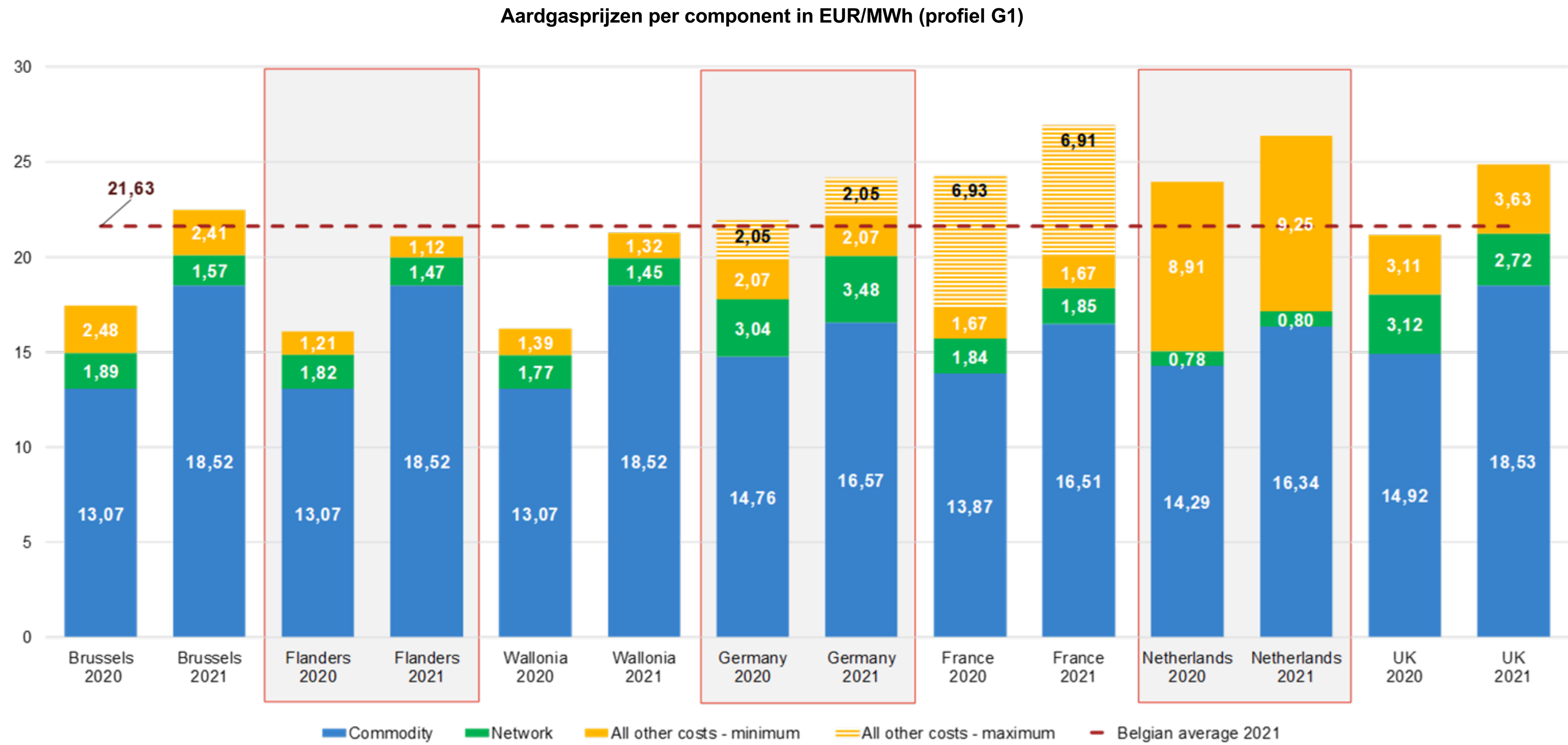
Vergelijking van aardgasprijzen voor industriële consumenten

Globaal gezien is België zeer concurrerend op het gebied van aardgas, ook al is de concurrentiepositie verzwakt door de sterke stijging van de energiekost. Voor de profielen G0 en G1 is België het meest of het op één na meest competitieve land, afhankelijk van de vermindering in Frankrijk. Voor G2 hangt het echter af van het type verbruiker aangezien alle landen verminderingen aanbieden die hun concurrentiepositie kunnen beïnvloeden. In België is Brussel het minst concurrerende gewest (behalve voor het G0 profiel) terwijl Vlaanderen het meest concurrerende Belgische gewest is voor alle industriële profielen. Het prijsverschil tussen Vlaanderen en Wallonië is echter bijna verwaarloosbaar voor de G1- en G2-profielen.

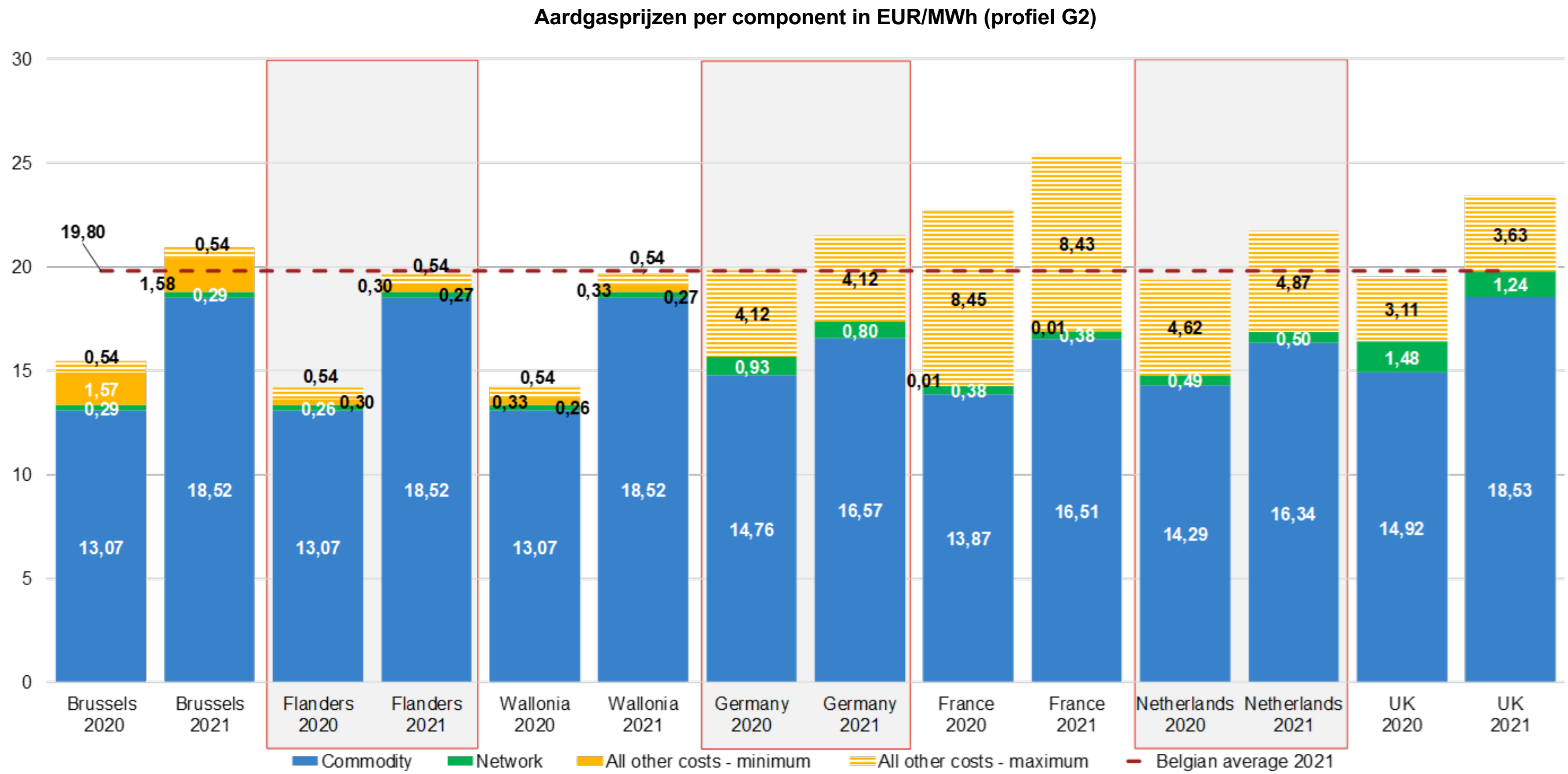
Op het gebied van aardgas lijken overheidsinmengingen met betrekking tot netwerkkosten en belastingen minder gebruikelijk en is het veel minder complex, ook al bestaan er wel degelijk verminderingen en/of vrijstellingen (bijv. vrijstellingen voor consumenten die aardgas als grondstof gebruiken). Enkel Duitsland en Frankrijk bieden verminderingen vanaf G0, terwijl de andere regio's/landen alleen een verminderingen hebben voor G2.

Aardgasprijzen per component in EUR/MWh (profiel G0)





Aardgasprijzen per component in EUR/MWh (profiel G1)
30
25
20
15
10
5
0
21,63
Brussels 2020
Brussels 2021
Flanders 2020
Flanders 2021
Wallonia 2020
Wallonia 2021
Germany 2020
Germany 2021
France 2020
France 2021
Netherlands 2020
Netherlands 2021
UK 2020
UK 2021
13,07
1,89
2,48
18,52
1,57
2,41
13,07
1,82
1,21
18,52
1,47
1,12
13,07
1,77
1,39
18,52
1,45
1,32
14,76
3,04
2,07
2,05
16,57
3,48
2,07
2,05
13,87
1,84
1,67
6,93
16,51
1,85
1,67
6,91
14,29
0,78
8,91
16,34
0,80
9,25
14,92
3,12
3,11
18,53
2,72
3,63
Commodity
Network
All other costs - minimum
All other costs - maximum
Belgian average 2021



Aardgasprijzen per component in EUR/MWh (profiel G2)
30
25
20
15
10
5
0
19,80
1,58
0,54
0,29
18,52
0,54
1,57
0,29
13,07
0,54
0,26
0,30
13,07
0,30
0,54
0,27
18,52
0,54
0,33
0,26
13,07
0,33
0,54
0,27
18,52
4,12
0,93
14,76
4,12
0,80
16,57
8,45
0,01
0,38
13,87
8,43
0,01
0,38
16,51
4,62
0,49
14,29
4,87
0,50
16,34
3,11
1,48
14,92
3,63
1,24
18,53
Brussels 2020
Brussels 2021
Flanders 2020
Flanders 2021
Wallonia 2020
Wallonia 2021
Germany 2020
Germany 2021
France 2020
France 2021
Netherlands 2020
Netherlands 2021
UK 2020
UK 2021
Commodity
Network
All other costs - minimum
All other costs - maximum
Belgian average 2021

Vergelijking van de totale factuur voor elektriciteit en aardgas

Vergelijking van de totale factuur voor residentiële en kleine professionele consumenten

Zowel in de elektriciteits- als in de aardgasfactuur maakt de energiekost-component een aanzienlijk deel uit van de totale factuur. Dit weegt echter meestal het meest door in de aardgasrekening. In dit opzicht biedt België relatief competitieve prijzen in vergelijking met de andere bestudeerde landen. België vertoont bijzonder lage belastingniveaus, vooral in Brussel en Vlaanderen, en de Belgische aardgasfactuur is in zijn geheel gunstiger dan in de meeste andere landen. Het is belangrijk op te merken dat de concurrentiepositie van België slechter, of op zijn minst meer ambigu, is dan in 2020 als gevolg van een sterke stijging van de energiekost-component.

Wat elektriciteit betreft, wordt de rekening eerder bepaald door de kosten van het netwerk en vooral door de belastingen, heffingen en certificaten. Frankrijk en het Verenigd Koninkrijk hebben in dit opzicht veel lagere tarieven dan België, dat nog steeds gunstiger is dan Duitsland.

Op gewestelijk niveau heeft Vlaanderen de laagste totale jaarfactuur, wat verschilt van wat we hebben waargenomen voor elektriciteit, waar Brussel de meest competitieve Belgische regio was. Of we nu kijken naar elektriciteit of aardgas, Wallonië is altijd het duurste gewest voor residentiële en kleine professionele profielen. Hoewel Wallonië met hogere prijzen wordt geconfronteerd, dan de andere twee Belgische gewesten, ligt zijn relatieve concurrentiepositie op dezelfde lijn.

Terwijl de totale jaarfactuur van aardgas is gestegen in alle Belgische gewesten, is dit niet het geval voor elektriciteit, waar we een kleine daling zien in Vlaanderen en Wallonië. Hoewel dit de positionering van de gewesten in België niet wijzigt, heeft het wel een invloed op de relatieve concurrentiepositie ten opzichte van de andere landen.

Vergelijking van de totale factuur voor industriële consumenten

Terwijl de energiekost-component een grote invloed heeft op de concurrentiepositie van een regio/land vanaf G0 spelen andere componenten een belangrijkere rol voor de kleinere industriële elektriciteitsverbruikers. Wat elektriciteit betreft, maakt de lagere energiekost-component in Duitsland deze meer en meer concurrerend naarmate het profiel groter wordt.

Naast de energiekost zijn het vooral de belastingen die de elektriciteitsfactuur bepalen. De meeste landen hebben mechanismen ingevoerd om de financiële lasten van elektro-intensieve verbruikers te verlichten. Aangezien alleen Vlaanderen een dergelijk mechanisme heeft, dat in 2021 groenestroomcertificaten en warmte-krachtcertificaten omvat, heeft België een concurrentienadeel voor deze verbruikers.

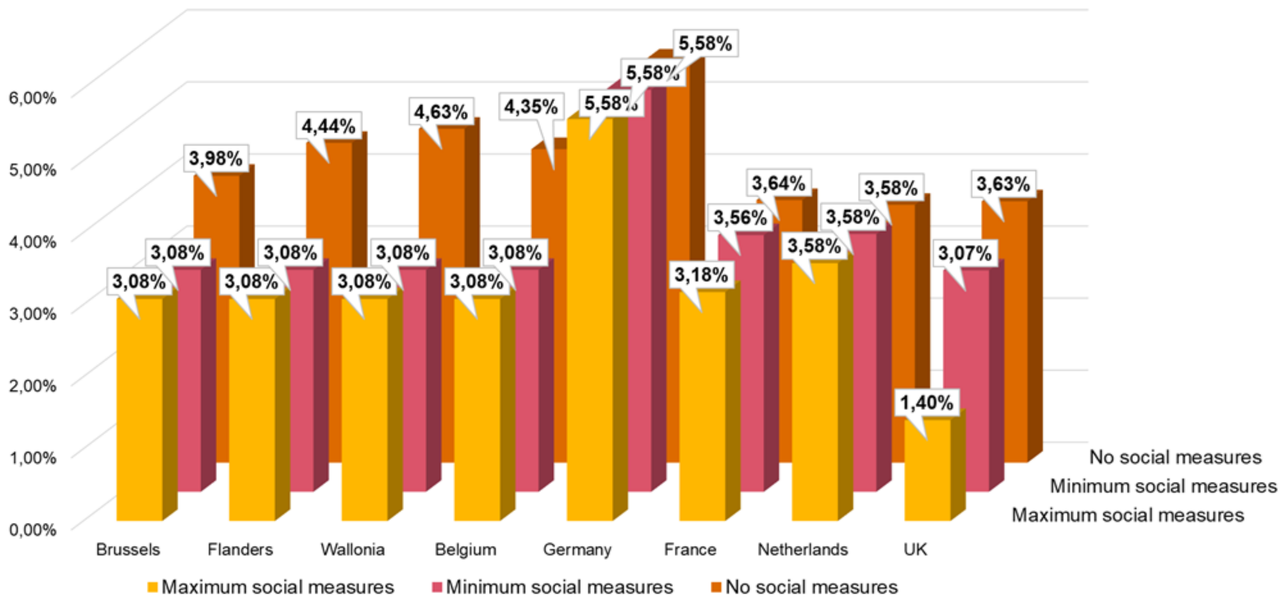
Wat aardgas betreft, had België de laagste energiekost in 2020, maar de op één na hoogste grondstofkosten in 2021. Zelfs met deze grote verandering is België nog steeds zeer competitief wat industriële aardgasverbruikers betreft en dit is voornamelijk vanwege de lage netwerk- en alle andere kosten. Voor industriële aardgasverbruikers biedt België de laagste netwerkkostencomponent van alle onderzochte landen, met uitzondering van Nederland voor G1. België heeft zelfs de laagste component voor de alle andere kosten component voor de profielen G0 en G1.

Inspanningen voor het betalen van de energiefacturen voor kwetsbare consumenten

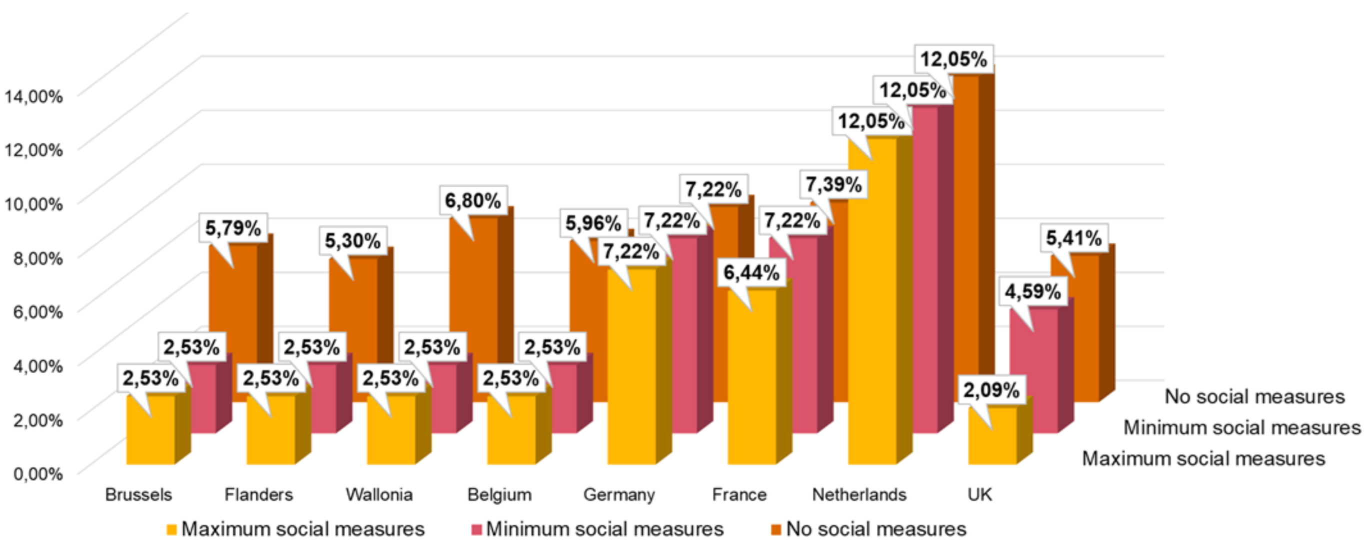
Hoofdstuk 8 heeft tot doel de verschillen te beoordelen tussen de financiële inspanningen die kwetsbare consumenten leveren om hun elektriciteits- en/of aardgasrekeningen te betalen in verhouding tot hun inkomen. Binnen de bestudeerde landen worden de consumenten geconfronteerd met zeer uiteenlopende instrumenten van de overheid om de impact van hun energierekening op hun totale inkomsten te verlagen. Deze instrumenten kunnen variëren van sociale tarieven tot directe financiële steun (bijvoorbeeld chèque-énergie in Frankrijk). De resulterende verscheidenheid verhoogt de complexiteit van de vergelijkingen tussen landen.

Zelfs als de meeste landen een overheidstussenkomst voorzien om de energiefactuur te verlagen, heeft België de neiging om te zorgen voor relatief lagere, of op zijn minst gelijke, inspanningsniveaus (d.w.z. het aandeel van het besteedbaar inkomen van een huishouden dat bestemd is voor energie-uitgaven) in vergelijking met de buurlanden, en in het bijzonder voor aardgas. Twee elementen liggen aan de basis van deze vaststelling: ten eerste, liggen het beschikbaar en leefbaar inkomen (gebruikt om verschillende scenario's te beoordelen) relatief hoog voor de residentiële consumenten in België, in vergelijking met de andere onderzochte landen, en dit draagt bij tot de verwatering van de energiekosten en dus tot een lager inspanningspercentage. Ten tweede biedt België aanzienlijke verminderingen van de energieprijzen via de sociale tarieven. Hoofdstuk 8 geeft meer inzicht in deze waarnemingen, die met name in de volgende cijfers zijn weergegeven.

Inspanningspercentage voor elektriciteit ten opzichte van het beschikbaar inkomen (in %)



Inspanningspercentage voor aardgas ten opzichte van het beschikbaar inkomen (in %)



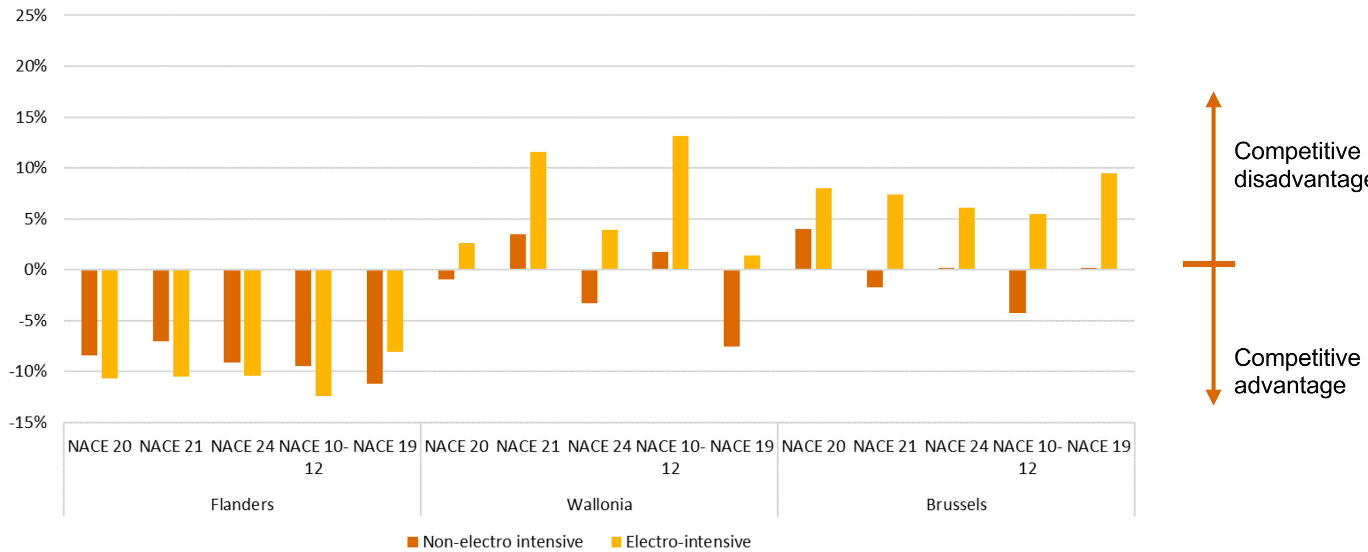
Evaluatie van de Belgische industriële competitiviteit

In een laatste hoofdstuk worden de sector- en regio-specifieke elektriciteits- en aardgasprijzen geanalyseerd aan de hand van hun impact op het concurrentievermogen van de Belgische industriële verbruikers ten opzichte van hun concurrenten in het buitenland. Deze resultaten hebben betrekking op industriële verbruikers uit de geselecteerde sectoren, zoals beschreven in hoofdstuk 3.3., namelijk: voedingsmiddelen en dranken (NACE 10-12), cokes en geraffineerde aardolieproducten (NACE 19), chemische producten (NACE 20), farmaceutische producten (NACE 21) en de vervaardiging van metalen in primaire vorm (NACE 24). Deze sectoren variëren van 0,10% tot 2,04% van de bruto toegevoegde waarde in België en van 0,53% tot 2,04% van de totale werkgelegenheid.[5]

Aangezien reeds werd vastgesteld dat het Verenigd Koninkrijk een onderscheiden "high end" uitschieter is, vooral in het geval van de elektro-intensieve verbruikers, zijn de resultaten gedifferentieerd naargelang het Verenigd Koninkrijk in aanmerking wordt genomen of niet. Uit onze resultaten blijkt dat industriële consumenten in België die concurreren met niet-elektro-intensieve verbruikers in de buurlanden een duidelijk concurrentievoordeel hebben op het vlak van de totale energiekost, ongeacht we het Verenigd Koninkrijk in aanmerking nemen of niet en dit wordt weergegeven in de onderstaande figuren. De concurrentiepositie van België is gewijzigd ten opzichte van vorig jaar, het concurrentievoordeel voor Vlaanderen wordt kleiner, het concurrentievoordeel voor Brussel en Wallonië wordt veel kleiner of verdwijnt.

De situatie van de elektro-intensieve consumenten verschilt daarentegen indien het Verenigd Koninkrijk al dan niet in aanmerking wordt genomen voor de vergelijking. Het Met inbegrip van het VK vertoont Vlaanderen een concurrentievoordeel ten opzichte van de buurlanden. Brussel en Wallonië zijn de Belgische gewesten die aanzienlijke concurrentienadelen ondervinden, hoewel dit voor Brussel minder relevant is aangezien er weinig industriële verbruikers op zijn grondgebied zijn gevestigd.

Gewogen energie (elektriciteit en aardgas) kostenverschillen tussen de Belgische regio's en de gemiddelde kosten van de buurlanden (inclusief het VK) voor elektro-intensieve en niet-elektro-intensieve verbruikers



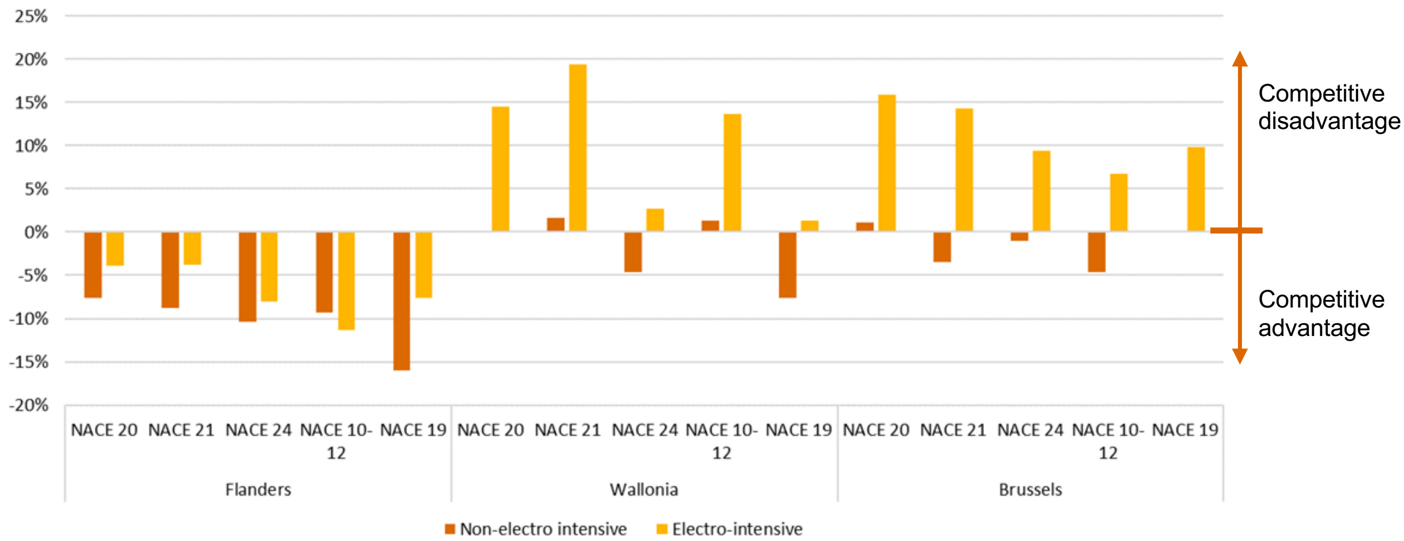
Als het Verenigd Koninkrijk buiten beschouwing wordt gelaten, krijgt men een verschillend beeld voor de niet-elektro-intensieve verbruikers, aangezien alle sectoren in Brussel en Wallonië met concurrentienadelen te kampen hebben, zoals blijkt uit onderstaande figuur. Dit zorgt voor een concurrentieprobleem ten opzichte van Frankrijk, Duitsland en Nederland - het Verenigd Koninkrijk is het minst concurrerende land. De relatief lage aardgaskosten voor deze industriële verbruikers in België wegen niet op tegen het concurrentienadeel dat het gevolg is van de hogere elektriciteitsprijzen. Ook al zou het aardgasverbruik voor sommige industriële sectoren hoger kunnen liggen dan het elektriciteitsverbruik, zullen de lagere kosten per energie-eenheid van aardgas er voor zorgen dat de elektriciteitskost een bepalende rol speelt in het totale concurrentievermogen op het gebied van energiekosten. Daartegenover staat dat Vlaanderen blijft profiteren van competitieve voordelen, ook al zijn deze niet zo belangrijk indien het Verenigd Koninkrijk in aanmerking wordt genomen. In dit verband moet worden

[5] Dit betreft nationale waarden voor 2016, die werden opgevraagd bij Eurostat.

opgemerkt dat Vlaanderen het meest gunstige gewest van België is door de invoering van een gecombineerd plafond op groenestroomcertificaten en warmte-krachtcertificaten sinds 2021. Voorheen was dit plafond enkel van toepassing op groenestroomcertificaten.

Wanneer het VK buiten beschouwing wordt gelaten, kan een soortgelijke situatie worden waargenomen, maar er zijn kleine veranderingen merkbaar: terwijl het Vlaamse concurrentievoordeel licht is toegenomen voor niet-elektro-intensieve consumenten, neemt dit voordeel af voor elektro-intensieve consumenten. Dit kan worden verklaard door het feit dat er tussen niet-elektro-intensieve consumenten en elektro-intensieve consumenten in het VK weinig tot geen variatie is, terwijl er in Vlaanderen een significant verschil wordt waargenomen tussen de twee soorten consumenten.

Gewogen energie (elektriciteit en aardgas) kostenverschillen tussen de Belgische regio's en de gemiddelde kosten van de buurlanden (exclusief het VK) voor elektro-intensieve en niet-elektro-intensieve verbruikers



Er kan worden gesteld dat niet-elektro-intensieve consumenten in België enigszins beschermd zijn, gezien de lagere prijzen die zij genieten in vergelijking met andere landen. Elektro-intensieve consumenten die door de hoge elektriciteitsprijzen meer blootgesteld zijn aan een gebrek aan concurrentiekracht, zijn in Wallonië en Brussel echter duidelijk in het nadeel ten opzichte van hun concurrenten in de onderzochte buurlanden. Bijgevolg wijzen de resultaten op de noodzaak om na te denken over mogelijke aanpassingen van de huidige regelingen met betrekking tot het verminderen van de belastingen die van toepassing zijn op industriële verbruikers en die door de federale en gewestelijke overheden in België zijn ingevoerd. De algemene doelstelling zou moeten zijn om te streven naar meer competitieve totale energieprijzen voor sectoren die een concurrentienadeel dreigen te ondervinden zonder de kosten naar andere consumenten door te rekenen.

Dit rapport zou als basis kunnen dienen voor een meer gedetailleerde bespreking van mogelijke federale en/of regionale interventies om het concurrentievermogen van de Belgische consumenten te versterken door bijvoorbeeld op te treden op het vlak van tarieven en/of belastingen. Wat dit laatste betreft, biedt de Europese Commissie via het EEAG een kader dat kan worden benut met het oog op het ontwerp en/of de aanpassing van de belastingen ter ondersteuning van de ontwikkeling van hernieuwbare energie.

Résumé – Français

Dans cette étude, les prix de l'énergie (électricité et gaz naturel) pour les consommateurs résidentiels, les petits professionnels et les industriels sont comparés entre la Belgique et quatre pays voisins : la France, l'Allemagne, les Pays-Bas et le Royaume-Uni. Ce rapport se concentre spécifiquement sur les prix en vigueur en janvier 2021. Lorsqu'ils sont jugés plus pertinents, les résultats sont présentés au niveau régional plutôt qu'au niveau national.

Les **profils de consommateurs** examinés ont été définis par le cahier des charges de cette étude et restent conformes aux précédentes études comparatives menées par PwC pour la CREG et la VREG[6]. Au total, treize profils de consommateurs différents ont été définis : huit pour l'électricité (un résidentiel, deux petits professionnels et cinq industriels) et cinq pour le gaz naturel (un résidentiel, un petit professionnel et trois industriels). Les tableaux ci-dessous synthétisent, bien que de manière non exhaustive, les caractéristiques spécifiques de nos profils de consommateurs pour lesquels des hypothèses supplémentaires sont formulées au chapitre 3.

Profils des consommateurs électricité

Profil	Type de consommateur	Consommation annuelle (MWh)	Capacité contractée (kW)	Pointe de consommation annuelle (kW)
E-RES	Résidentiel	3,5	7,4	5,9
E-SSME	Petit professionnel	30	37,5	30
E-BSME	Petit professionnel	160	125	100
E0	Industriel	2.000	625	500
E1	Industriel	10.000	2.500	2.000
E2	Industriel	25.000	5.000	5.000
E3	Industriel	100.000	13.000	13.000
E4	Industriel	500.000	62.500	62.500

[6] Les études précédentes peuvent être consultées sur les sites web des régulateurs : étude sur les consommateurs industriels pour la CREG (https://www.creg.be/sites/default/files/assets/Publications/Studies/F20190507EN.pdf) et études sur les consommateurs résidentiels pour la CREG (https://www.creg.be/sites/default/files/assets/Publications/Studies/F180628pwc.pdf) et la VREG (https://www.vreg.be/sites/default/files/document/rapp-2019-03.pdf). L'étude de l'année dernière sur les consommateurs résidentiels et industriels est disponible sur le site web de la CREG. (https://www.creg.be/sites/default/files/assets/Publications/Studies/F20200520EN.pdf) et l'erratum (https://www.creg.be/sites/default/files/assets/Publications/Studies/F20200520-errata.pdf).

Profils des consommateurs gaz naturel

Profil	Type de consommateur	Consommation annuelle (MWh)	Capacité contractée (kW)
G-RES	Résidentiel	23,26	-
G-PRO	Petit professionnel	300	-
G0	Industriel	1.250	-
G1	Industriel	100.000	15.000
G2	Industriel	2.500.000	312.500

L'étude comparative porte sur trois composantes de la facture : la composante énergétique pure ou *commodity*, les coûts de réseau (transport et distribution) ou *network costs* et tous les autres coûts facturés aux consommateurs (taxes, prélèvements et systèmes de certificats, etc.) ou *all other costs*. Une quatrième composante, la TVA ou *VAT*, n'est prise en compte que pour les profils résidentiels.

Les résultats de la comparaison des prix (chapitre 6) sont précédés d'une description détaillée de la structure et des composantes des prix (chapitres 4 et 5). Les coûts de l'énergie sont analysés selon une approche « bottom-up » menant à une description détaillée des différentes composantes du prix, en ce compris les hypothèses générales sur lesquelles repose l'étude et leur application dans les pays considérés.

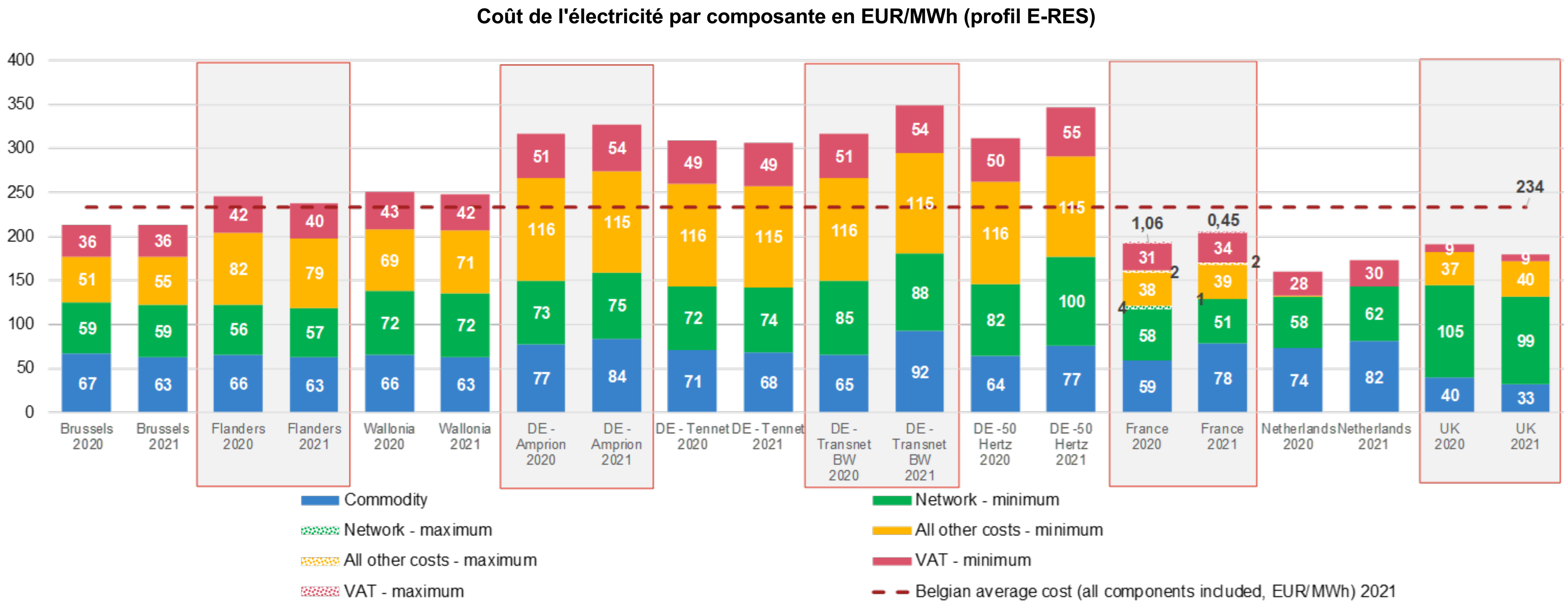
Pour l'électricité comme pour le gaz naturel, ce rapport constate de fortes différences dans la structure des prix, notamment dans la détermination des coûts de réseau et des régimes fiscaux entre les différent(e)s régions et pays, ce qui renforce la complexité de la comparaison.

Comparaison des prix de l'électricité

Comparaison des prix de l'électricité pour les consommateurs résidentiels et les petits professionnels

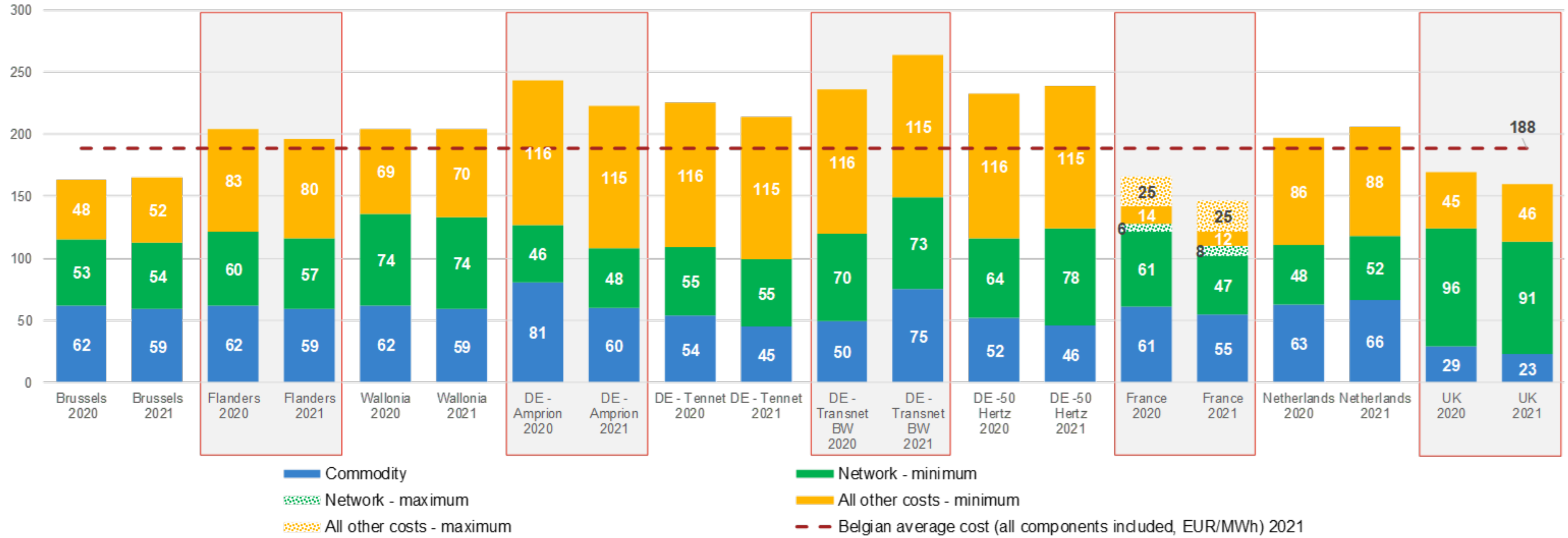
Cette étude a révélé de grandes différences entre les régions et les zones étudiées.

Pour les consommateurs résidentiels (profil E-RES), les Pays-Bas a la facture annuelle la plus basse, notamment en raison d'une réduction (« *Belastingvermindering* ») importante sur les taxes financées par l'Etat, alors que les Allemands paient le plus (c'est-à-dire près de deux fois plus que les ménages néerlandais) suite à la composante *all other costs* la plus élevée(c'est-à-dire les taxes, les prélèvements et les systèmes de certificats). En comparaison avec les pays étudiés, la Belgique affiche des prix relativement élevés et se classe au deuxième rang des pays les plus chers après l'Allemagne. Cela s'explique par le niveau élevé de la composante *all other costs*, mais aussi par les coûts de réseau importants en Wallonie. En Belgique, Bruxelles est la région la moins chère des trois, les prix y étant tirés vers le bas par des taxes nettement inférieures, tandis que la Wallonie est la région la plus chère. Par rapport à l'année dernière, la facture totale a augmenté dans 6 des 10 régions/pays étudiés. L'augmentation la plus importante est observée dans la région allemande de 50 Hertz et elle est due à une augmentation des coûts de réseau, qui ont également un impact sur la composante TVA. La Flandre et la Wallonie ont connu une légère diminution de leur facture totale. Pourtant, la position de la Belgique n'a pas changé depuis l'année dernière. La France, les Pays-Bas et le Royaume-Uni restent nettement moins chers, les régions allemandes restent 31% à 50% plus chères que les régions belges.



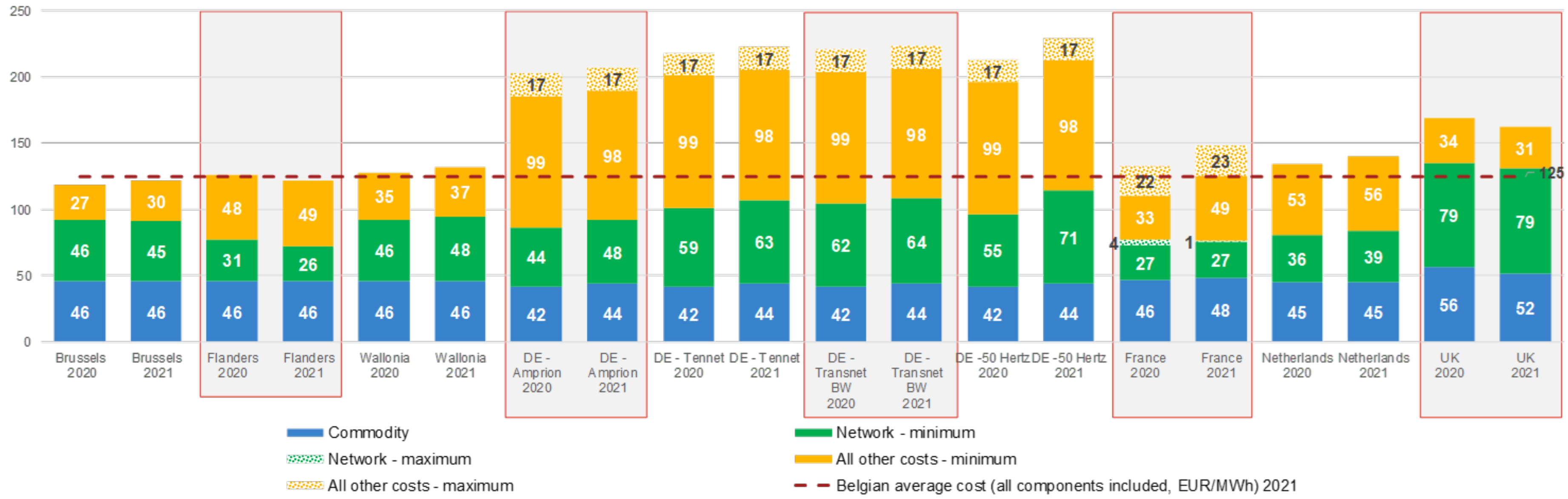
La situation est relativement similaire pour le profil E-SSME, faisant partie des profils petits consommateurs professionnels, car l'Allemagne a toujours la facture annuelle la plus élevée et la Belgique affiche des prix relativement importants. Les différences les plus notables se trouvent aux Pays-Bas où la position concurrentielle se détériore car le remboursement de taxes, qui ne s'applique qu'aux ménages, ne profite pas aux petits professionnels néerlandais. La Belgique est maintenant moins cher que les Pays-Bas ce qui n'était pas le cas pour E-RES. Comme pour E-RES, le Royaume-Uni reste le deuxième pays le plus compétitif de l'étude. Toutefois, cette position est moins claire pour E-SSME car la TVA n'est pas prise en compte pour les PME et le Royaume-Uni avait un avantage concurrentiel concernant cette composante car il appliquait un taux beaucoup plus faible (5%). Comme pour le profil E-RES, Bruxelles reste la région belge la moins chère, suivie par la Flandre. Il y a eu quelques changements par rapport à 2020. Premièrement, en 2020, Bruxelles avait la possibilité d'être la région la moins chère en fonction de la réduction en France. Ensuite, la Flandre est désormais plus compétitive que la Wallonie en raison d'une baisse pour chaque composante. L'écart avec les pays les moins chers, la France et le Royaume-Uni, s'élargie. Alors que les prix de l'électricité pour les petits consommateurs professionnels de ces pays ont fortement baissé, la moyenne belge est restée plus ou moins la même. Bruxelles est désormais aussi toujours plus chère que la France et le Royaume-Uni. .

Coût de l'électricité par composante en EUR/MWh (profil E-SSME)



Pour le profil E-BSME, l'Allemagne est à nouveau le pays le plus cher avec des factures bien plus élevées en raison de taxes beaucoup plus élevées, notamment à cause de l'*EEG-Umlage*. La Flandre offre potentiellement la facture annuelle la moins chère, l'année dernière c'était la France. Par rapport aux pays voisins, les prix belges sont maintenant mieux alignés car l'Allemagne et le Royaume-Uni sont certainement plus chers. En Belgique, les positions régionales restent stables : grâce à des taxes moins élevées, Bruxelles est la région la moins chère devant la Flandre et la Wallonie. La distinction entre Bruxelles et la Flandre est négligeable et n'est pas visible dans la figure ci-dessous.Cette dernière est la région belge la plus chère.

Coût de l'électricité par composante en EUR/MWh (profil E-BSME)

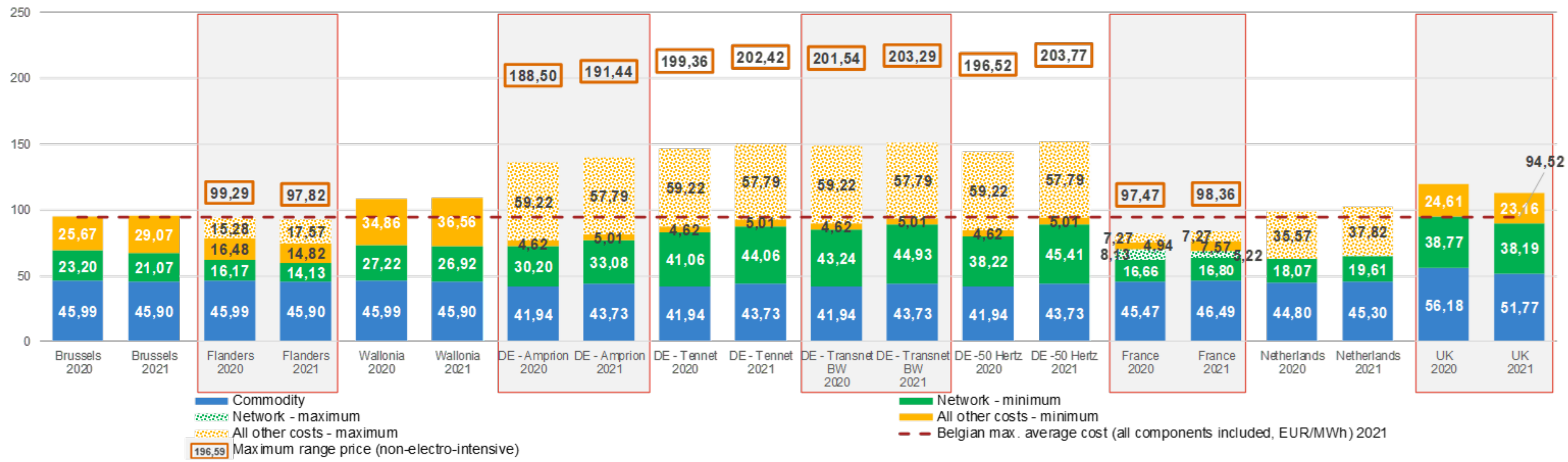


Les différentes composantes examinées pour chaque pays et chaque région peuvent varier considérablement et avoir un impact sur la position concurrentielle de chaque pays. Si les prix de la composante énergétique pure (*commodity*) sont raisonnablement convergents d'un pays à l'autre - à l'exception du Royaume-Uni -, on constate des écarts importants dans les composantes coûts de réseau (*network costs*) et tous les autres coûts (*all other costs*). Les "coûts de réseau" jouent certainement un rôle en Belgique, tandis que "tous les autres coûts" font de l'Allemagne le pays le plus cher et entraînent également une hausse des prix belges, en particulier pour E-RES et E-SSME.

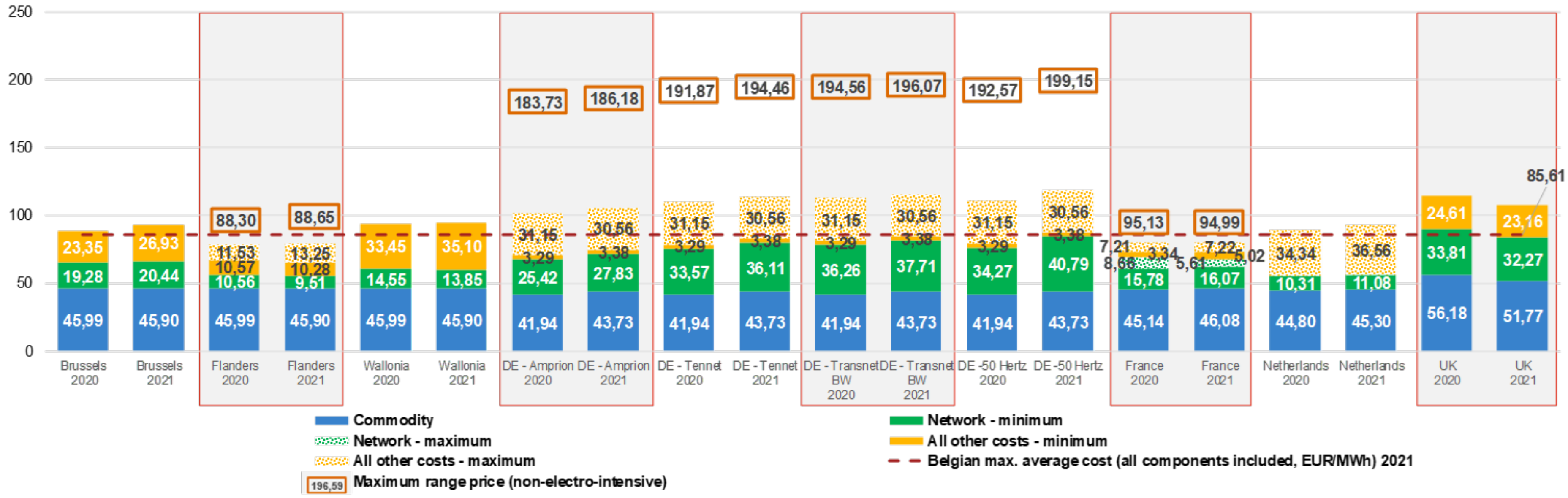
Comparaison des prix de l'électricité pour les consommateurs industriels

Le coût de l'électricité le plus bas pour les profils de consommateurs E0, E1 et E2 se trouve potentiellement aux Pays-Bas, légèrement devant la France et la Flandre. Ces prix plus bas s'expliquent en partie par des coûts de réseau relativement faibles, mais surtout par une composante "tous les autres coûts" (c'est-à-dire les taxes, les prélèvements et les systèmes de certificats) beaucoup plus faible. Dans l'ensemble, la Belgique affiche des factures annuelles moyennes par rapport aux pays étudiés, tandis que le Royaume-Uni est le plus cher – en excluant les prix non-électro-intensifs allemands. Les résultats allemands sont très variables : alors qu'ils offrent des prix moyens comparables à ceux de la Belgique lorsque les réductions sur "tous les autres coûts" s'appliquent aux consommateurs électro-intensifs, les consommateurs industriels allemands sont confrontés aux prix les plus élevés lorsque ces réductions ne s'appliquent pas. En Belgique, le coût de l'électricité est sensiblement plus élevé en Wallonie pour les profils E0, E1 et E2, tandis que Bruxelles est alignée sur les prix de la Flandre - sauf pour le profil E1. Une différence importante entre 2020 et 2021 concerne le plafonnement en Flandre qui n'était appliqué qu'au certificats verts en 2020 et qui est également appliqué au certificats de cogénération en 2021. Puisque la réduction en Flandre est maintenant appliquée sur un coût plus important (certificats verts et certificats de cogénération), le minimum de la composante "tous les autres coûts" est plus basse que l'année dernière.

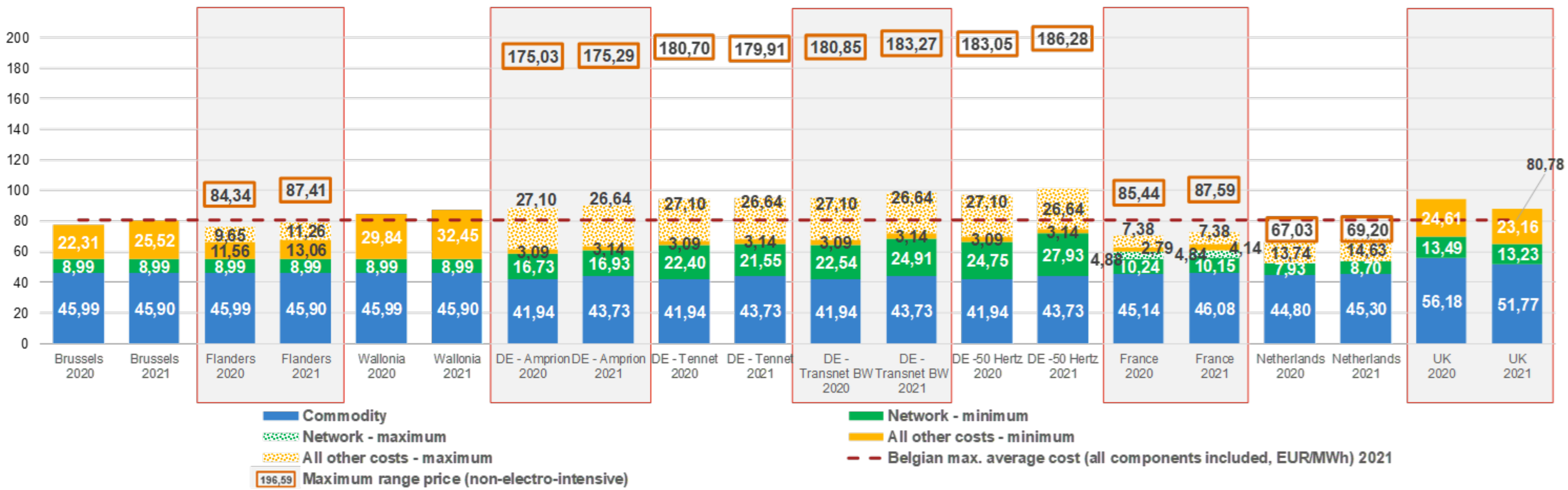
Coût de l'électricité par composante en EUR/MWh (profil E0)



Coût de l'électricité par composante en EUR/MWh (profil E1)



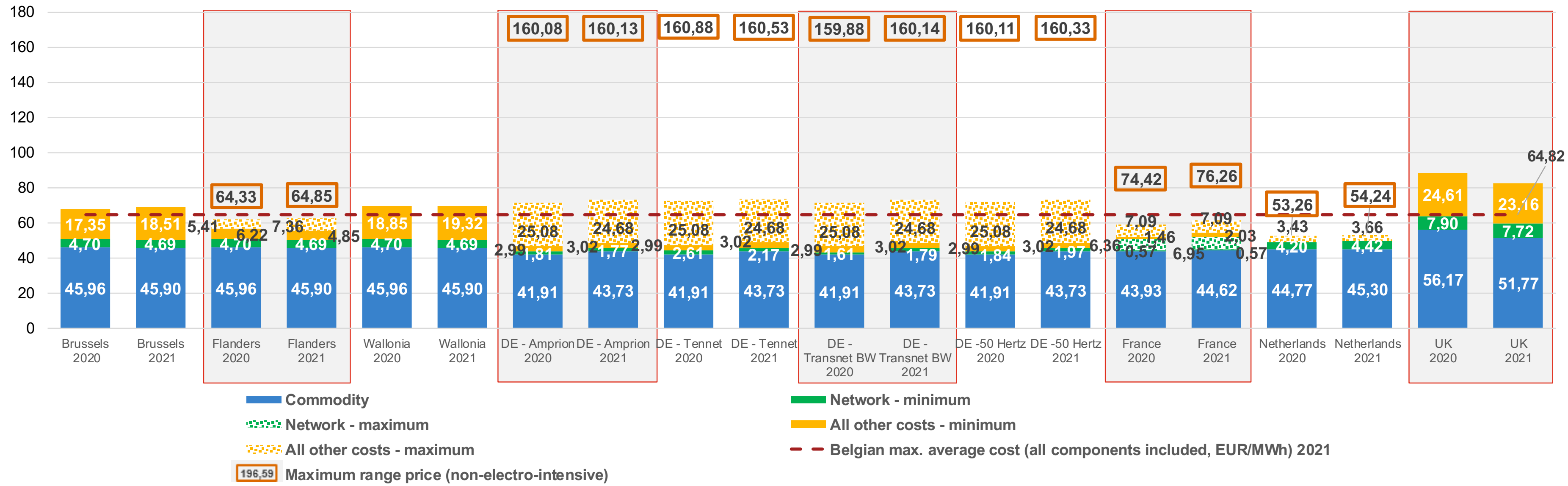
Coût de l'électricité par composante en EUR/MWh (profil E2)



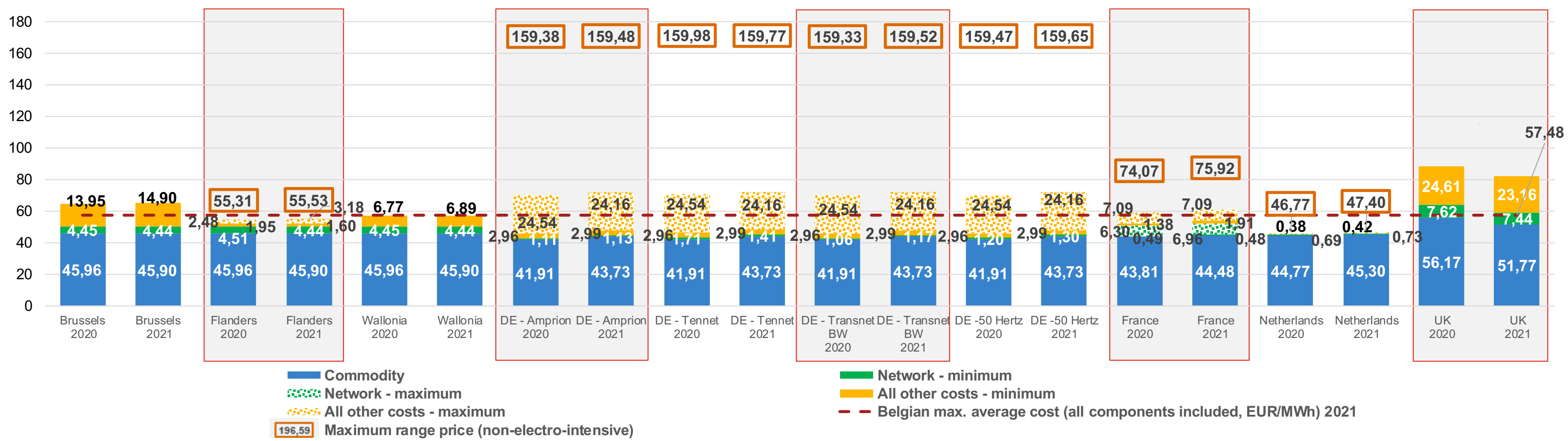
La situation n'a pas vraiment changé par rapport aux profils précédents. Tout d'abord, les Pays-Bas ont toujours (potentiellement) la facture la plus basse de toutes les régions/pays considérés. Ensuite, le Royaume-Uni reste le pays le plus cher, sauf si l'on considère les tarifs allemands pour les consommateurs non-électro-intensifs. Enfin, la Belgique affiche des prix moyens relativement élevés.

Cependant, la position concurrentielle des régions belges change entre E3 et E4. La Wallonie est la région la plus chère pour E3, tandis que Bruxelles pour E4. Puisque les coûts des produits de base et les coûts de réseau sont harmonisés pour toutes les régions belges, cela dépend uniquement de la composante "tous les autres coûts". Il est toutefois important de noter que le plus gros consommateur d'énergie de Bruxelles est plus proche d'un profil E3 que d'un profil E4 et qu'il s'agit donc d'une observation purement théorique pour cette région.

Coût de l'électricité par composante en EUR/MWh (profil E3)



Coût de l'électricité par composante en EUR/MWh (profil E4)



Dans l'ensemble, les pays considérés sont confrontés à des prix convergents de la composante énergétique pure (*commodity*), le Royaume-Uni est encore toujours une exception en 2021. Les différences entre les pays résident particulièrement dans les coûts de réseau et la composante "tous les autres coûts". La Belgique offre des coûts de réseau relativement alignés, mais elle n'accorde pas de réductions sur ces coûts, ce qui peut nuire à sa compétitivité par rapport aux pays qui le font. De même, les coûts belges associés aux taxes, prélèvements et certificats seraient similaires à ceux des autres pays, si ces derniers n'appliquaient pas de réductions pour les consommateurs électro-intensifs. La Flandre est la seule région belge à rester en contact avec ces pays, vraisemblablement grâce au plafonnement (*cap*) sur le financement des énergies renouvelables.

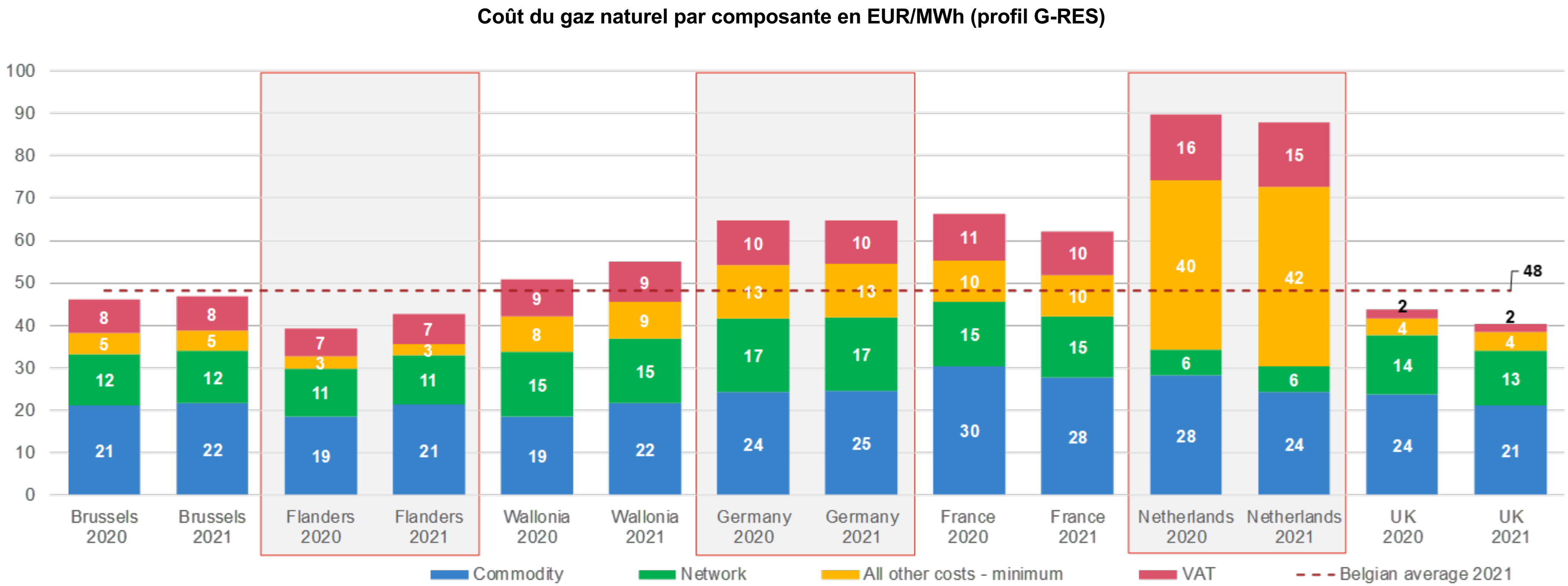
En ce qui concerne l'électricité pour les consommateurs industriels, ce rapport souligne la grande complexité due aux interventions des gouvernements pour réduire les coûts de l'électricité pour certaines catégories de gros consommateurs. Ces interventions sont spécifiquement conçues pour jouer sur le poids des coûts de réseau et de la composante "tous les autres coûts" (c'est-à-dire les taxes, les prélèvements et certificats). D'après notre panel, la Flandre, la France, l'Allemagne et les Pays-Bas appliquent des coûts de réseau et des réductions/plafonds fiscaux accordés en fonction d'une série de critères économiques généralement liés à l'électro-intensité. Cela nous oblige à présenter les résultats selon un éventail assez large de possibilités. Quant aux réductions sur les taxes, les critères (prélèvement annuel à partir de 10 GWh ou nature de l'activité) fixés par les Pays-Bas sont les moins exigeants. L'application de ces réductions entraîne un changement important dans la position concurrentielle des pays : l'Allemagne présente le coût de l'électricité le plus élevé possible pour chaque profil étudié pour les consommateurs qui ne répondent pas aux critères de réduction sur l'électro-intensivité ; les Pays-Bas et la Flandre, qui sont déjà relativement bon marché sans réduction, deviennent encore moins chers ; la France devient moins chère que les régions belges, y compris la Flandre, grâce à ces réductions. La Flandre étant la seule région belge à avoir mis en œuvre un tel mécanisme pour limiter les tous les autres coûts pour les consommateurs industriels électro-intensifs, Bruxelles et la Wallonie sont plus chères pour les consommateurs qui bénéficieraient de réductions en Flandre étant donné leur nature électro-intensive. Enfin, la France est le seul pays à avoir réduit le coût de la composante énergétique pure (*commodity*) grâce au mécanisme ARENH. Les régions/pays qui n'offrent pas de réduction/exemption spéciale pour les consommateurs électro-intensifs sont Bruxelles, la Wallonie et le Royaume-Uni, et ces régions sont également les régions/pays les moins compétitifs.

Comparaison des prix du gaz naturel

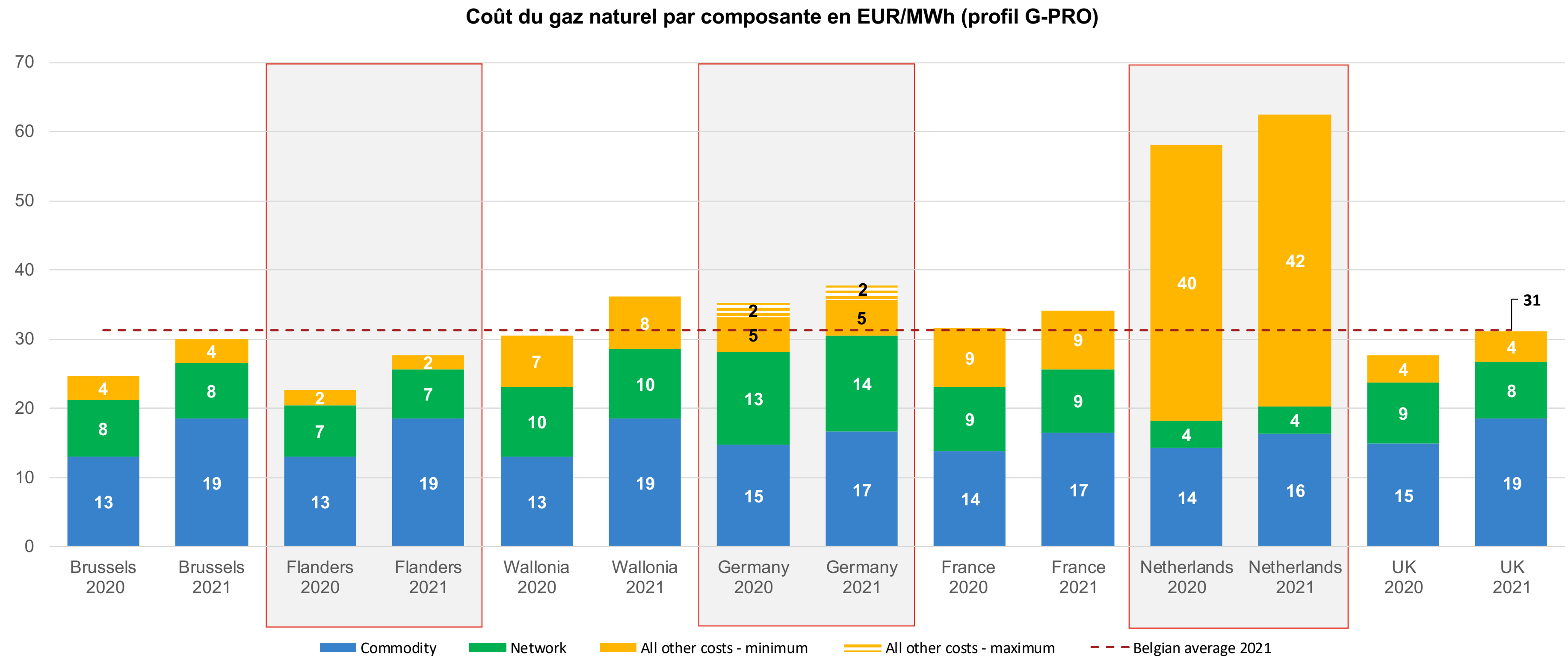
Comparaison des prix du gaz naturel pour les consommateurs résidentiels et les petits professionnels

Par rapport aux résultats obtenus pour l'électricité, les résultats tirés de la comparaison des prix du gaz naturel diffèrent sensiblement.

Pour les consommateurs résidentiels (G-RES), le Royaume-Uni est le pays/région le moins cher, tandis que les Pays-Bas est le pays le plus cher. Dans les deux cas, les taxes jouent un rôle déterminant dans leur position concurrentielle relative, le Royaume-Uni affichant le 2e tarif le plus bas et les Pays-Bas le plus élevé. Le positionnement concurrentiel des régions/pays a changé par rapport à 2020, où la Flandre était la moins chère et non le Royaume-Uni. Cela est principalement dû à la composante énergétique pure, qui a augmenté en Flandre et diminué au Royaume-Uni. Bien que ce changement par rapport à 2020 soit la raison pour laquelle leurs positions se sont maintenant inversées, c'est finalement le taux de TVA plus faible au Royaume-Uni (5%) qui est le facteur décisif. Dans l'ensemble, la Belgique est le deuxième pays le moins cher, même si des différences significatives sont observées entre les régions - et plus particulièrement entre la Flandre et les autres régions. Outre les taxes, la Flandre offre également les coûts de réseau les plus bas des trois régions belges, ce qui explique ses prix relativement bas.



Quant au petit professionnel (G-PRO), la Flandre affiche à nouveau la facture totale la plus basse de toutes devant Bruxelles et le Royaume-Uni. En raison des faibles niveaux d'imposition à Bruxelles et en Flandre, la facture belge moyenne est la moins chère avant celle du Royaume-Uni. Elle est également plus de deux fois moins chère que la facture de gaz naturel des Pays-Bas pour ce profil. Là encore, les taxes moins élevées rencontrées en Belgique (sauf en Wallonie) expliquent sa bonne position concurrentielle.

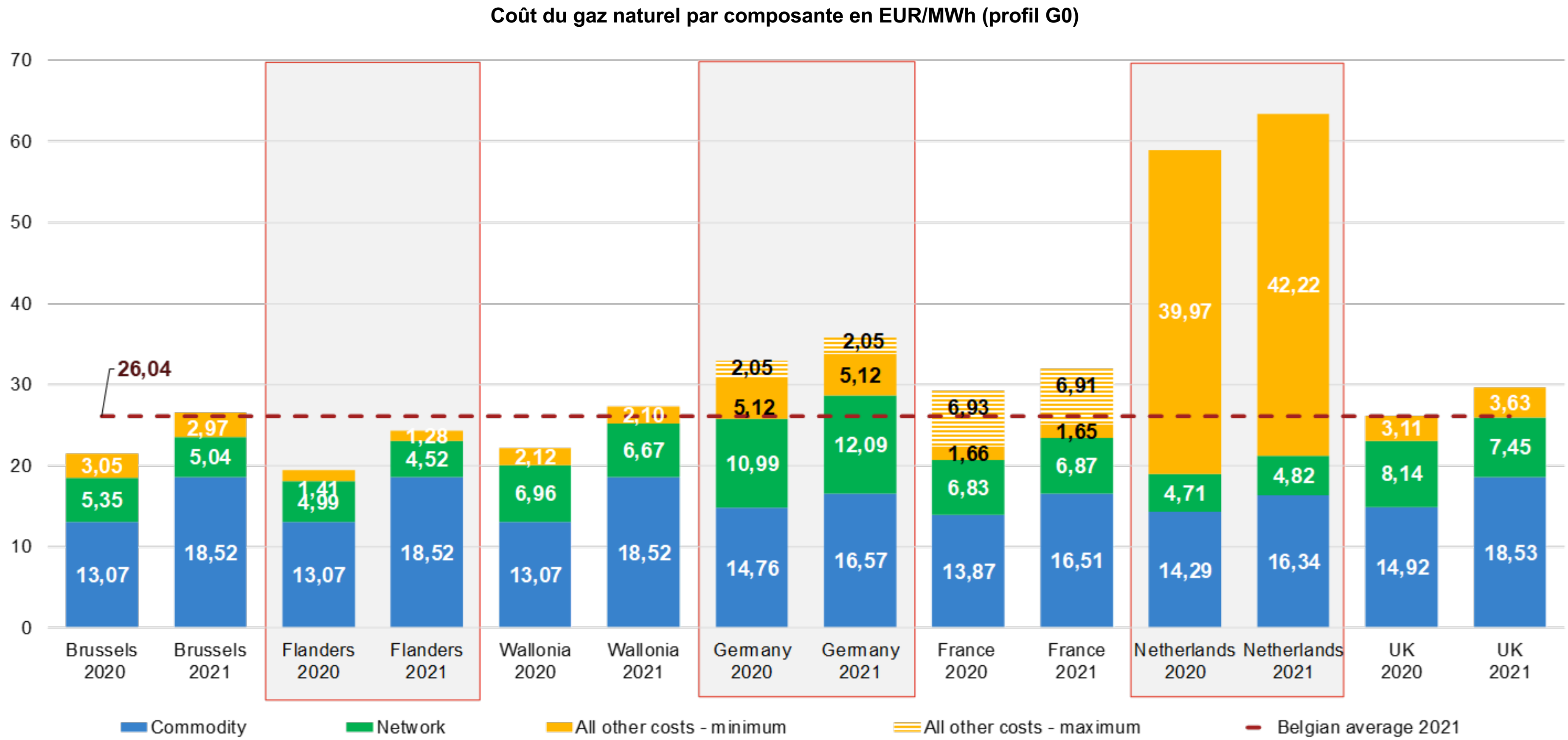


En général, il a été observé que la Belgique s'aligne relativement bien par rapport aux prix de ses pays voisins, principalement en raison de faibles taxes, ce qui constitue une différence remarquable par rapport à l'électricité. Les coûts de la composante énergétique pure (*commodity*) sont assez convergents d'un pays à l'autre, en particulier si l'on considère les G-PRO. En ce qui concerne les coûts de réseau, si ceux de la Belgique sont relativement dans la moyenne, la Flandre bénéficie certainement des coûts de réseau régionaux les plus faibles et affiche les tarifs les moins élevés au sein de la Belgique. Par rapport à 2020, nous n'observons pas de grands changements dans la facture totale, mais pour G-RES une légère baisse au Royaume-Uni a fait de ce pays le plus compétitif au lieu de la Flandre.

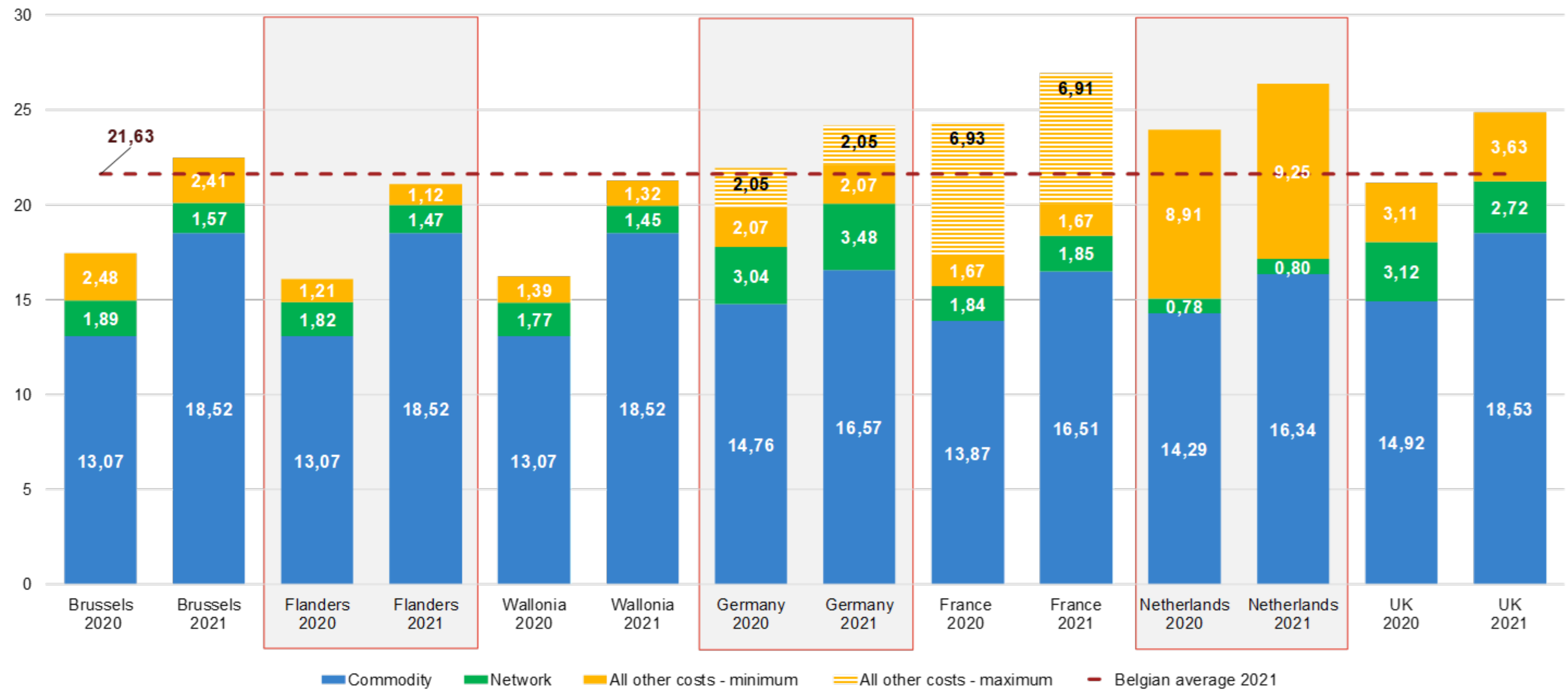
Comparaison des prix du gaz naturel pour les consommateurs industriels

Globalement, la Belgique est très compétitive en ce qui concerne le gaz naturel, même si sa position concurrentielle s'est affaiblie, vis-à-vis de 2020, en raison de la forte augmentation du coût de la composante énergétique pure. Pour les profils G0 et G1, la Belgique est le pays le plus ou le deuxième plus compétitif en fonction de la réduction en France. Cependant, pour le profil G2, cela dépendra du type de consommateur puisque tous les pays offrent des réductions qui peuvent affecter leur position concurrentielle. En Belgique, Bruxelles est la région la moins compétitive (sauf pour le profil G0) alors que la Flandre est la région belge la plus compétitive pour tous les profils industriels. Cependant, la différence de prix entre la Flandre et la Wallonie est presque négligeable pour les profils G1 et G2.

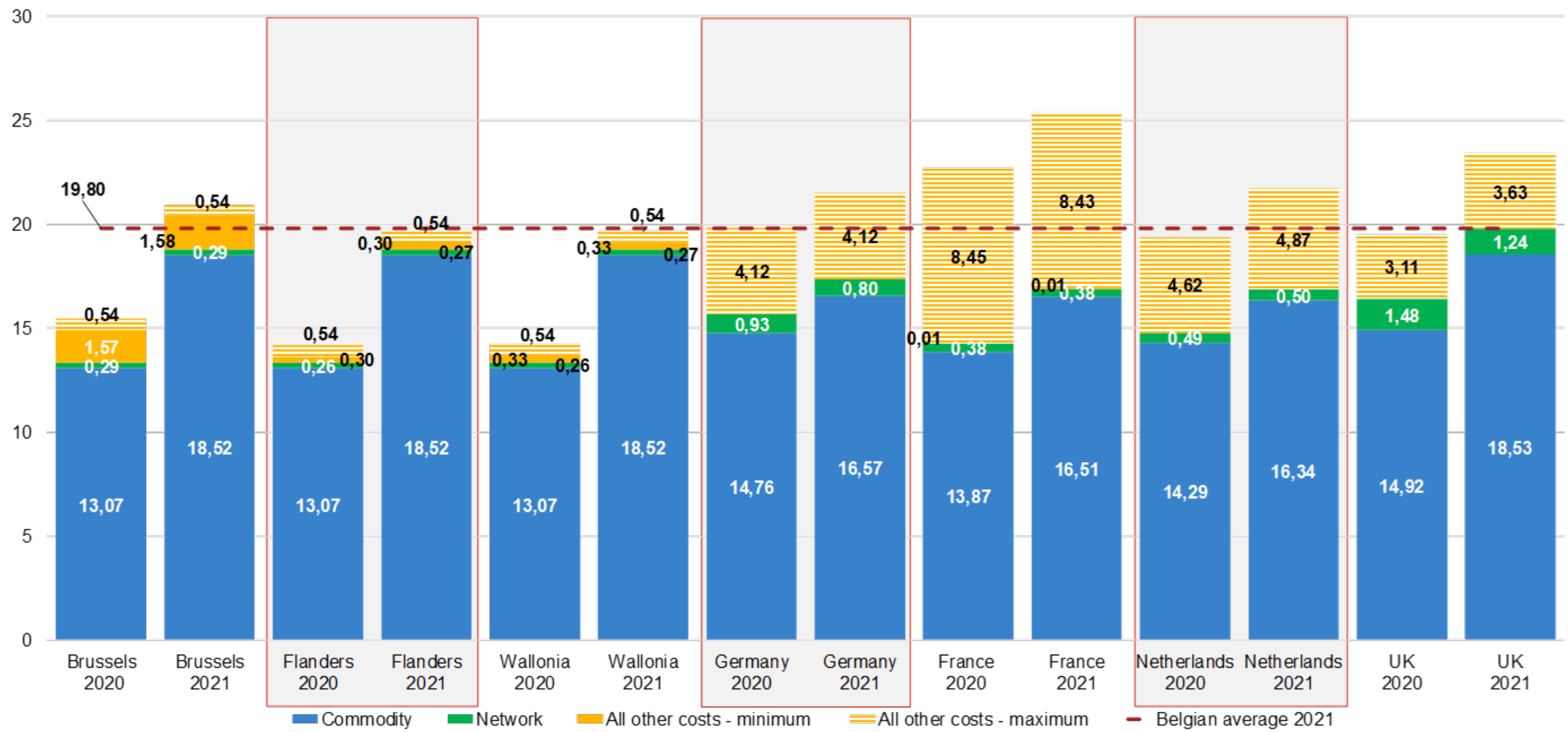
Pour le gaz naturel, l'intervention des pouvoirs publics dans les coûts de réseau et les taxes semble moins fréquente. En outre, la complexité est bien moindre, même si des réductions ou des exemptions existent (par exemple, des exemptions pour les consommateurs qui utilisent le gaz naturel comme matière première ou " feedstock "). Seules l'Allemagne et la France proposent des réductions à partir de G0, tandis que les autres régions/pays ne disposent que d'une fourchette pour G2.



Coût du gaz naturel par composante en EUR/MWh (profil G1)



Coût du gaz naturel par composante en EUR/MWh (profil G2)



Comparaison des factures totales d'électricité et de gaz naturel

Comparaison de la facture totale pour les consommateurs résidentiels et les petits professionnels

Dans les factures d'électricité et de gaz naturel, la composante énergétique pure (*commodity*) représente une part conséquente de la facture totale. Toutefois, celle-ci représente généralement plus sur la facture de gaz naturel. Néanmoins, la Belgique offre des prix relativement compétitifs par rapport aux autres pays étudiés. De plus, la Belgique affiche des niveaux de taxation particulièrement bas, surtout à Bruxelles et en Flandre, ce qui permet que la facture de gaz naturel dans son ensemble soit plus favorable que dans la plupart des autres pays. Il est important de noter que la position concurrentielle de la Belgique est plus mauvaise, ou du moins plus ambiguë, qu'en 2020 en raison d'une forte augmentation de la composante énergétique pure.

Quant à l'électricité, la facture est plutôt influencée par les coûts du réseau et, en particulier, par les taxes, les prélèvements et les certificats. À cet égard, la France et le Royaume-Uni ont des tarifs beaucoup plus bas qu'en Belgique, qui reste plus favorable que l'Allemagne.

Au niveau régional, la Flandre présente la facture totale la plus basse, ce qui est différent de ce que nous avons observé pour l'électricité où Bruxelles était la région belge la plus compétitive. Que l'on considère l'électricité ou le gaz naturel, la Wallonie est toujours la région la plus chère pour les profils résidentiels et les petits professionnels. Bien que la Wallonie doive faire face à des prix plus élevés que les deux autres régions belges, sa position concurrentielle relative reste la même.

Alors que la facture totale du gaz naturel a augmenté dans toutes les régions belges, ce n'est pas le cas pour l'électricité où l'on constate une légère baisse en Flandre et en Wallonie. Bien que cela ne change pas le positionnement des régions en Belgique, cela a un impact sur la position concurrentielle relative par rapport aux autres pays étudiés.

Les consommateurs résidentiels et petits professionnels ont une facture dans la moyenne des pays voisins, tandis que le profil le plus important de cette catégorie (E-BSME) ont une facture avantageuse, pour l'électricité. Pour le gaz naturel, le profil résidentiel a une facture moins élevée que ses voisins, tandis que le profil professionnel de cette catégorie retrouve nue facture dans la moyenne de ses voisins.

Comparaison de la facture totale pour les consommateurs industriels

Si la composante énergétique pure a un impact important sur la position concurrentielle d'une région/pays à partir de G0, d'autres composantes jouent un rôle plus important pour les petits consommateurs industriels d'électricité. En ce qui concerne l'électricité, le coût de la composante énergétique pure relativement basse en Allemagne permet aux différents profils, de ce pays, d'être de plus en plus compétitifs à mesure que leur consommation augmente.

La composante énergétique pure est très importante pour le gaz naturel à partir de G0, tandis que cette composante devient de plus en plus importante pour les consommateurs d'électricité à mesure que leur consommation augmente. Si la composante "*commodity*" a un impact important sur la position concurrentielle d'une région ou d'un pays à partir de G0, d'autres composantes jouent un rôle plus important pour les petits consommateurs industriels d'électricité. L'Allemagne bénéficie d'un avantage concurrentiel considérable sur les autres pays en termes de coûts énergétique pure de l'électricité.

Outre les produits de base, les taxes, pour lesquelles de nombreux pays ont mis en place des mécanismes visant à réduire la charge financière des consommateurs électro-intensifs, constituent la principale composante de la facture d'électricité. Étant donné que seule la Flandre dispose de ce type de mécanisme, qui englobe les certificats verts et les certificats de cogénération en 2021, la Belgique est confrontée à un désavantage concurrentiel pour ces consommateurs.

En ce qui concerne le gaz naturel, la Belgique avait le coût énergétique le plus bas en 2020, mais elle a le deuxième coût le plus élevé en 2021. Malgré ce changement important, la Belgique reste très compétitive en ce qui concerne les fournisseurs de gaz naturel industriel, en raison du faible coût du réseau et de la composante

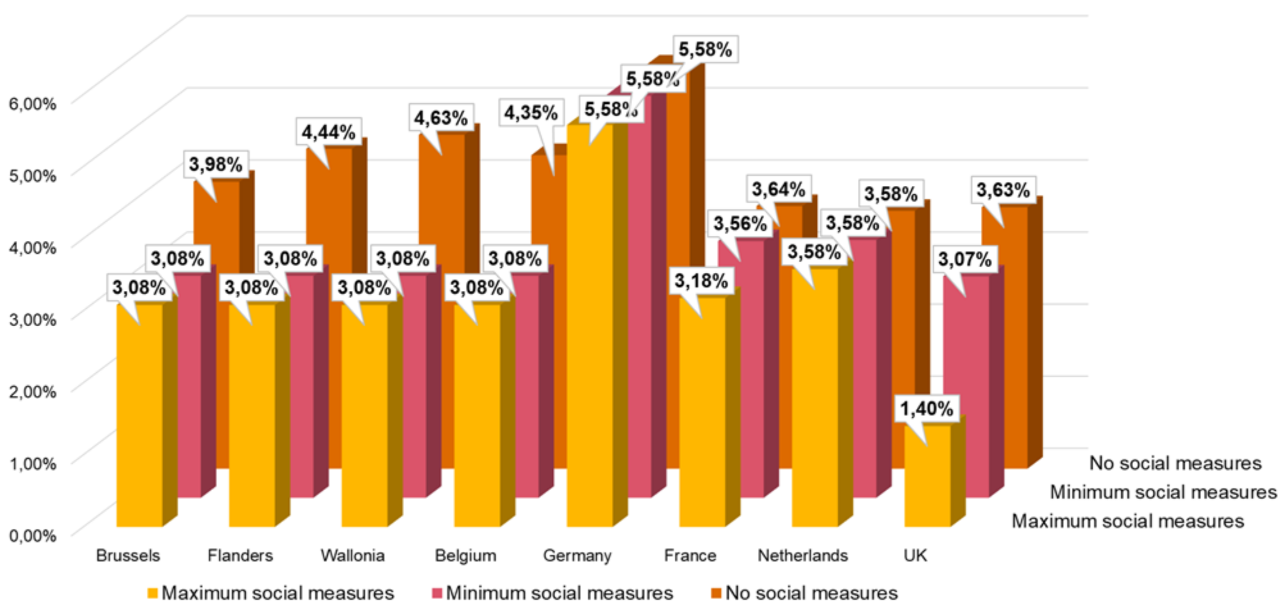
« tous les autres coûts ». Pour les consommateurs industriels de gaz naturel, la Belgique offre la composante de coûts de réseau la plus basse de tous les pays étudiés, à l'exception des Pays-Bas pour G1. Enfin, la Belgique présente également la composante tous autres coûts la plus faible pour les profils G0 et G1.

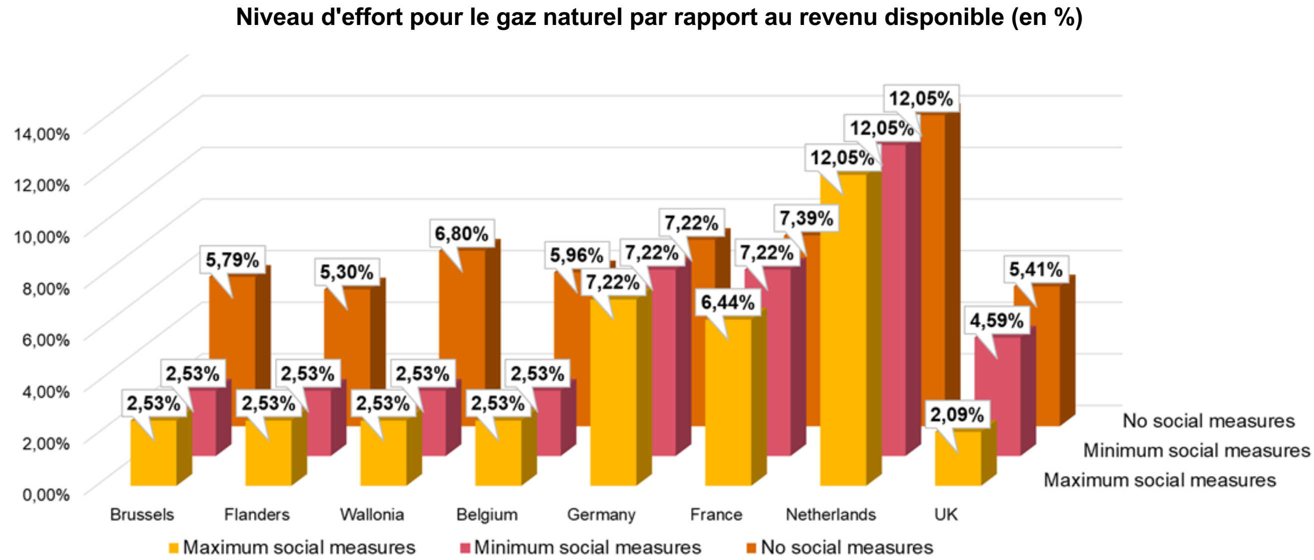
Niveaux d’efforts des consommateurs vulnérables pour payer les factures d'énergie

Le chapitre 8 évalue les différences d'efforts financiers consentis par les consommateurs vulnérables pour payer leurs factures d'électricité et/ou de gaz naturel en fonction de leurs revenus. Au sein des pays étudiés, les consommateurs sont confrontés à des outils gouvernementaux très divers pour réduire leur facture d'énergie sur le revenu total. Ces outils peuvent aller de tarifs sociaux à des aides financières directes pour réduire la facture (par exemple, le chèque énergie en France). La variété qui en résulte accroît la complexité des comparaisons entre pays.

Même si la plupart des pays prévoit une intervention gouvernementale visant à atténuer la facture énergétique, la Belgique tend à assurer des niveaux d'effort (c'est-à-dire la part du revenu d'un ménage consacrée aux dépenses énergétiques) relativement plus faibles, ou du moins conformes, par rapport aux pays voisins, et plus particulièrement pour le gaz naturel. Deux éléments sous-tendent ce constat : premièrement, les niveaux comparativement élevés de revenu disponible et de revenu de base (employés pour réaliser différents scénarios) des consommateurs résidentiels en Belgique, par rapport aux pays voisins étudiés, contribuent à diluer les coûts liés à l’énergie et donc à diminuer les niveaux d'effort. Deuxièmement, la Belgique offre des réductions significatives sur les prix de l'énergie par le biais de tarifs sociaux et les niveaux de revenus belges sont relativement (bien) alignés face aux pays voisins pour les consommateurs résidentiels vulnérables. Ces observations sont développées au chapitre 8 et sont notamment illustrées par les graphiques repris ci-dessous.

Niveau d'effort pour l'électricité par rapport au revenu disponible (en %)





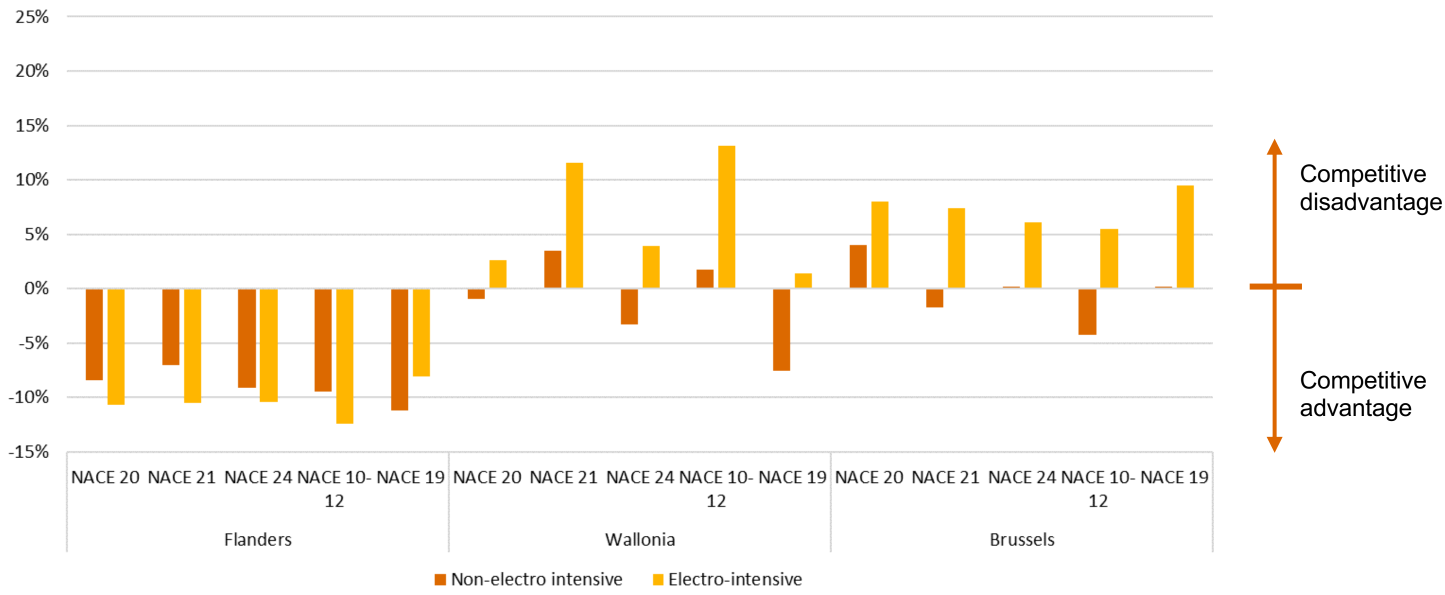
Évaluation de la compétitivité des industries belges

Dans le dernier chapitre, les prix de l'électricité et du gaz naturel spécifiques aux secteurs industriels et aux régions sont analysés à travers leur impact sur la compétitivité des consommateurs industriels belges par rapport à leurs concurrents à l'étranger. Ces résultats couvrent les consommateurs industriels des secteurs sélectionnés, tel que détaillé au chapitre 3.3, à savoir : alimentation et boissons (NACE 10-12), coke et produits pétroliers raffinés (NACE 19), produits chimiques (NACE 20), produits pharmaceutiques (NACE 21) et fabrication de métaux de base (NACE 24). Ces secteurs représentent entre 0,1 % et 2,04 % de la valeur ajoutée brute de la Belgique et entre 0,53 % et 2,04 % de l'emploi total[7].

Etant donné que le Royaume-Uni affiche des prix particulièrement élevés, en particulier dans le cas des consommateurs électro-intensifs, les résultats ont été différenciés en fonction de son inclusion ou non dans la comparaison. Il ressort que les consommateurs industriels belges en concurrence avec les consommateurs non-électro-intensifs des pays voisins présentent un avantage concurrentiel clair en termes de coût total de l'énergie, et ce, indépendamment de l'inclusion du Royaume-Uni comme en atteste les figures ci-dessous. La position concurrentielle de la Belgique a substantiellement changé par rapport à l'année dernière, l'avantage concurrentiel de la Flandre se réduit, l'avantage concurrentiel de Bruxelles et de la Wallonie se réduit considérablement ou disparaît. En revanche, la situation des consommateurs électro-intensifs varie selon l'inclusion du Royaume-Uni. Royaume-Uni compris, la Flandre affiche un avantage concurrentiel par rapport aux pays voisins. Bruxelles et la Wallonie sont les régions belges confrontées à des désavantages concurrentiels importants, bien que moins pertinents pour Bruxelles car peu de consommateurs industriels résident sur son territoire.

[7] Données issues d'Eurostat pour l'année 2016.

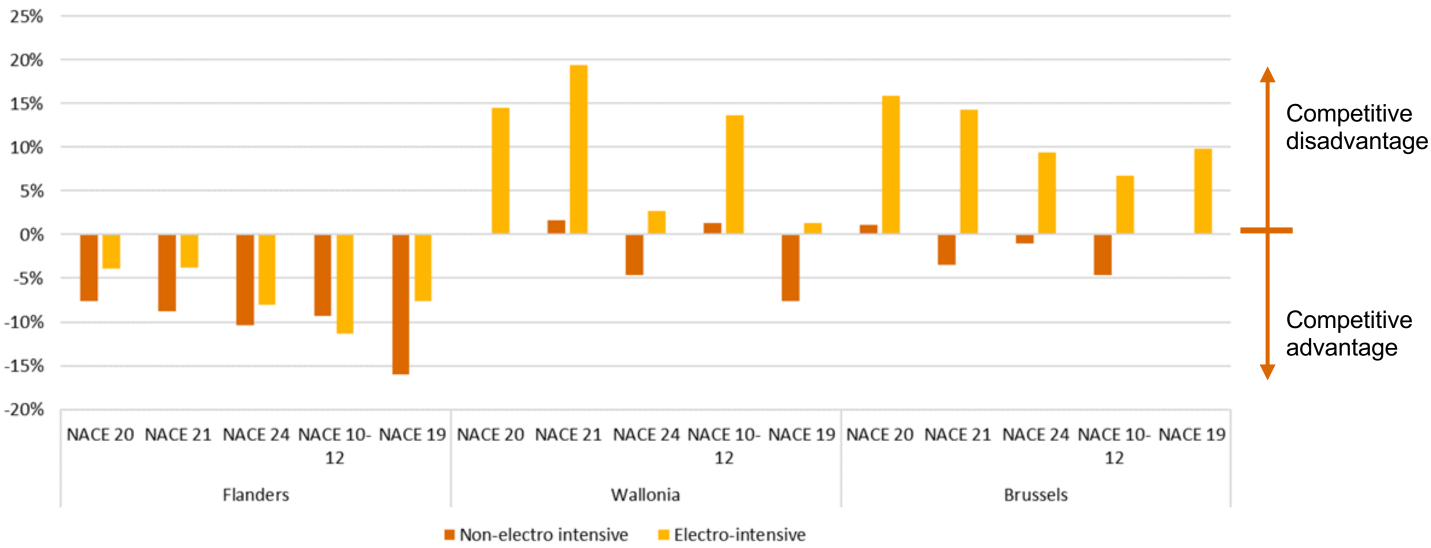
Différences sectorielles des coûts énergétiques (électricité et gaz naturel) entre les régions belges et la moyenne de 4 pays européens (Allemagne, France, Pays-Bas et Royaume-Uni) pour les consommateurs électro-intensifs et non-électro-intensifs



Si les résultats sont similaires pour les consommateurs non-électro-intensifs quand le Royaume-Uni est exclu, cela change pour les consommateurs électro-intensifs vu que, à Bruxelles et en Wallonie, tous les secteurs sont confrontés à des désavantages concurrentiels comme le montre la figure ci-dessous. Cela constitue un problème de compétitivité par rapport à l'Allemagne, la France et les Pays-Bas. Pour ces consommateurs, le coût relativement faible du gaz naturel imposé aux consommateurs industriels en Belgique ne compense pas le désavantage concurrentiel face au prix de l'électricité. Même si la consommation de gaz naturel peut être supérieure à la consommation d'électricité pour certains secteurs industriels, le coût inférieur par unité d'énergie du gaz naturel fait que l'électricité joue un rôle déterminant dans la compétitivité des coûts énergétiques totaux. A l'inverse, la Flandre continue à bénéficier d'avantages concurrentiels même s'ils ne sont pas aussi importants que lorsque le Royaume-Uni est inclus. À cet égard, il convient de noter que la Flandre est la région la plus avantageuse de Belgique en raison de l'introduction d'un plafond (« *cap* ») sur les certificats verts et les certificats de cogénération en 2021. Auparavant, ce plafond n'était applicable qu'aux certificats verts.

Une fois le Royaume-Uni exclu, on peut observer une situation similaire, mais de légers changements sont perceptibles : alors que l'avantage concurrentiel flamand a légèrement augmenté pour les consommateurs non-électro-intensifs, cet avantage diminue pour les consommateurs électro-intensifs. Cela peut s'expliquer par le fait qu'entre les consommateurs non électro-intensifs et les consommateurs électro-intensifs au Royaume-Uni, il y a peu ou pas de variation de prix, alors qu'une différence significative est observée entre les deux types de consommateurs en Flandre.

Différences sectorielles des coûts énergétiques (électricité et gaz naturel) entre les régions belges et la moyenne de 3 pays européens (Allemagne, France et Pays-Bas, Royaume-Uni exclu) pour les consommateurs électro-intensifs et non-électro-intensifs



On peut affirmer que les consommateurs non-électro-intensifs sont quelque peu protégés en Belgique étant donné les prix inférieurs dont ils bénéficient par rapport aux autres pays. Cependant, les consommateurs électro-intensifs, qui sont potentiellement plus exposés à une perte de compétitivité en raison de prix élevés de l'électricité, sont clairement désavantagés en Wallonie et à Bruxelles par rapport à leurs homologues des pays voisins. Par conséquent, les résultats soulignent la nécessité de réfléchir à une adaptation des régimes actuels de réduction d'impôts qui s'appliquent aux consommateurs industriels et qui ont été introduits par les gouvernements fédéral et régionaux en Belgique. L'objectif général devrait être d'évoluer vers des prix totaux de l'énergie plus compétitifs pour les secteurs à risque sur le plan de la compétitivité sans transférer le coût des mesures sur les autres consommateurs.

Ce rapport pourrait servir de base à une discussion plus approfondie des interventions fédérales et/ou régionales potentielles pour renforcer la compétitivité des consommateurs belges en agissant, par exemple, sur les tarifs et/ou les taxes. En ce qui concerne ces dernières, la Commission européenne fournit un cadre par le biais de l'EEAG qui pourrait être exploité en ce qui concerne la conception et/ou l'adaptation des taxes soutenant le développement des énergies renouvelables.

2. Introduction

2. Introduction

This report is commissioned by the Belgian federal regulator for electricity and natural gas (CREG) and the three Belgian regional regulators: Brugel (Brussels), the CWaPE (Wallonia) and the VREG (Flanders) – and supported by FORBEG[8]. In the framework of their larger mission of supervising transparency and competition on the market, ensuring market conditions serve the public interest and safeguarding consumers' interests, PwC was asked to conduct a study comparing energy prices for residential, small professional and industrial consumers in Belgium and the neighbouring countries.

The purpose of this study is to compare the electricity and natural gas prices, in total as well as per component, billed to residential, small professional and large industrial consumers in the three Belgian regions (Brussels, Flanders and Wallonia) with those in Germany, France, the Netherlands and the United Kingdom. This report comes as the second edition of a multiple-year evaluation that will be conducted until 2023. As such, electricity and natural gas prices used in this study were retrieved in January 2021.

In addition to the price analysis, the purpose of this study is to further investigate the impact of energy price differences on two peculiar consumers groups, namely the vulnerable residential consumers and the Belgian industry. For the vulnerable consumers the report will estimate the effort made by the government(s) and/or other instances to help these customers pay their energy bills while for the industrial consumers we will analyse how the price differences impact the Belgian industry. It also pays special attention to reduction schemes that are beneficial to electro-intensive industrial consumers qualifying for certain criteria.

This report consists of four different sections.

The **first section** (described in chapter 3 to 5) consists of the actual price comparison for all considered consumers. Methodologically, a bottom-up approach was employed to build up the energy cost wherever possible. As such, the three main components were identified: the commodity price, the network cost, and all other costs (i.e. taxes, levies and certificate schemes). When it comes to residential consumers, the VAT was also included. In this section, chapter 3 first describes the dataset by setting the general assumptions employed, defining the consumer profiles considered and finally presenting an overview of the different zones identified in all five countries under review. While the Terms of Reference of this study set the consumer profiles' consumption volume and annual peak power, assumptions were taken to further complete our profiles' characteristics (e.g. contracted capacity, monthly peak, etc.), which are also listed in this section. Then, chapter 4 and 5 provide a detailed description of the deconstructed energy cost for electricity and natural gas, extensively describing the existing regulatory framework.

In the **second section** (described in chapter 6 and 7), we present the results per consumer profile, using a twofold approach: how total energy prices are in Belgium compared to the other four countries, and how the three components of the energy price explain the observed final results. While chapter 6 presents the final results per consumer profile, chapter 7 draws general conclusions and introduces a first overview of the observed results in terms of competitiveness for Belgian residential, small professional and industrial energy consumers.

The **third section** of this study (described in chapter 8) addresses the efforts made by the government(s) and/or other instances to help vulnerable consumers pay their energy bills. This section particularly focuses on identifying social measures that are implemented by national governments and/or other instances, which are then quantified to derive the financial importance of one's energy consumption over its revenues. Through this, it is

[8] FORBEG is the forum of the Belgian electricity and gas regulators. It is an informal consultation body consisting of representatives of BRUGEL, the CREG, CWaPE and VREG.

intended to illustrate the magnitude of countries' interventions in order to alleviate the energy cost weighing on vulnerable residential consumers.

In the **fourth section** of this report (described in chapter 9), we propose a detailed analysis of the impacts of the price differences with the neighbouring countries, obtained through the first section, on the competitiveness of the industry in the three Belgian regions. Particular attention is brought to the total energy cost for the industry on a macro-economic level where the aggregation of electricity and natural gas prices make up the total energy cost. This investigation is conducted for the five most important Belgian industrial sectors, which were identified through a preliminary exercise to be found in section 3, and assesses their competitive advantages and disadvantages compared to industries from neighbouring countries, at a national and regional level. Finally, several general conclusions and recommendations are formulated based on the report's insights.

A preliminary version of this report was submitted for review to the Belgian federal energy regulator (CREG), the regional energy regulators of Flanders (VREG), Wallonia (CWAPE) and Brussels (Brugel) as well as the national energy regulators of France (CRE), Germany (Bundesnetzagentur), the Netherlands (ACM) and the United Kingdom (OFGEM). This final report integrates all remarks formulated by those Regulatory Authorities.

3. Description of the dataset

3. Description of the dataset

General assumptions

We listed below general assumptions necessary for the overall comprehension regarding the selected consumer profiles and countries.

1. *January 2021.* This study gives an overview of the prices and tariffs as of January 2021.

2. *Economically rational actors.* We assume the 13 selected profiles (8 for electricity and 5 for natural gas) are economically rational actors trying to optimise their energy cost when possible.

3. *Exemptions and reductions.* In various cases, we noticed the existence of – most of the time progressive – reductions or exemptions on taxes, levies, certificate schemes, or grid usage costs. Whenever economic criteria - such as exercising a well-defined industrial activity or paying a specific part of your company revenue as energy cost - are used to determine the eligibility for those exemptions and reductions, we do not present a single value but a range of possibilities as a result with a minimum and a maximum case.

4. *Commodity prices (B-SME and industrial consumers).* All commodity prices market data is provided by the CREG, except for the commodity price in the UK, which was provided by PwC based on Bloomberg market indices.

5. *Electricity/Natural gas sales margin (B-SME and industrial consumers).* While using the formula provided by the CREG to compute commodity prices, we do not add any sales margin – both for electricity and natural gas – to ensure better objectivity when comparing these different countries and consumers types. However, such a margin is *de facto* included as we consider offers, products and tariffs available on the natural gas/electricity market.

6. *Natural gas pressure level and caloric value.* As later exhibited, (some) industrial natural gas consumers are directly connected to the transport grid but are not connected to the same natural gas pressure level in every country (e.g. the Netherlands). We consider the most plausible pressure level for each country and client profile. We also consider the caloric value of natural gas for each country.

7. *Exchange rates.* When it comes to the UK, we systematically used the January 2021 average exchange rate to convert Pound Sterling to Euro[9] (0,90624 GBP/EUR or 1,1035 EUR/GBP for 2021). The commodity cost formula was entirely computed in Pound Sterling, hereafter converted in Euro at the January 2021 exchange rate.

8. *Value Added Tax (VAT).* We consider that VAT is deductible for professionals and is thus only taken into account for residential consumers (E-RES and G-RES). Besides, as the VAT is considered as a separate component for residential consumers, all prices reported in this document either exclude VAT or specifically mention its inclusion.

[9] European Central Bank

9. *The United Kingdom (UK).* When mentioning the United Kingdom, we talk about Great Britain, including England, Wales and Scotland, leaving aside Northern Ireland.

10. *Auto-production*. In this study, we assume none of the selected profiles produces electricity on their own (on-site electricity production or domestic production). We, therefore, conclude that electricity consumption and invoicing correspond to one's electricity offtake.

11. *Meter ownership.* We assume that residential and small professional consumers do not own their specific meter. However, industrial consumers are considered to own their meter.

12. *Unique contracts*. We assume that residential consumers have a contract with a supplier, including all costs.

13. *Payment method.* When multiple payment methods exist, the most common option is to be considered for residentials.

14. *Reductions.* When it comes to residential consumers, we do not take into account reductions such as promotional offers or temporary offers. For industrial consumers, we take into account certain exemptions or reductions as specified in the law, for instance.

15. *Exclusion of products.* As a rule, each product considered to compute residential consumers' commodity products should be available to all types of residential consumers. For instance, products unavailable during the period of the price comparison, products that require the acquisition of a share, products that require pre-financing, or products that are only available on certain conditions are excluded from the price comparison resulting in the selection of another product.

16. *Holders of a sectoral (energy efficiency) agreement.* Some reductions are only applicable for holders of a sectoral agreement. Since we have already taken the assumption that our profiles are economically rational and would thus have a sectoral agreement if they qualify for the conditions (e.g. we presume British industrial consumers to be part of the climate change agreement, therefore leveraging energy efficiency and emission reduction to obtain tax reductions). As a reflection of each country's diversity of companies and of the sectoral agreements penetration rates, we explicitly specify which profiles are considered to qualify and therefore have a sectoral agreement.

Consumer profiles

Information provided by the steering committee

Table 1: Consumer profiles for electricity

		E-RES (Electricity Residential)	E-SSME (Electricity Small SME)	E-BSME (Electricity Big SME)	E0 (Electricity 0)	E1 (Electricity 1)	E2 (Electricity 2)	E3 (Electricity 3)	E4 (Electricity 4)
Date	**Unit**	January 2021	January 2021	January 2021	January 2021	January 2021	January 2021	January 2021	January 2021
Annual demand**	**MWh**	3,5	30	160	2.000	10.000	25.000	100.000	500.000
Consumption profile		-	-	-	Baseload (working days only)	Baseload (working days only)	Baseload (working days only)	Baseload (including weekends)	Baseload (including weekends)
Consumption hours eq.[10]	**h/year**	-	-	1.600	4.000	5.000	5.000	7.692	8.000
Grid operator		DSO (LS)	DSO (LS)	DSO (1-26 kV)	DSO (1-26 kV)	DSO (TransHS)	LTSO	TSO	TSO
Connection capacity*	**kVA**	9,2	46,9	156	781	3.125	6.944	18.056	86.806
Contracted capacity*	**kW**	7,4	37,5	125	625	2.500	5.000	13.000	62.500
Annual peak*	**kW**	5,9	30	100	500	2.000	5.000	13.000	62.500
Monthly peak*	**kW**	5,3	27	90	450	1.800	4.500	11.700	56.250
Metering		YMR	YMR	AMR	AMR	AMR	AMR	AMR	AMR

* Figures displayed in this part/graph were assessed based on hypotheses accepted by the steering committee. While this study does not aim at stating these figures represent the exact values for all consumers, we assume they are plausible proxies necessary to compute prices across studied countries and regions. Figures are derived from values provided by the steering committee based on the below-listed hypotheses:

- **The contracted capacity** is assumed to equal 80% of the connection capacity with a 100% cos φ (up to E1) or 90% cos φ (from E2 to E4);
- **The annual peak** is assumed to equal 80% of contracted capacity for consumers connected to the distribution grid (E-RES to E1);
- **The annual peak** is assumed to equal 100% of contracted capacity for consumers connected to the transmission grid (E2 to E4) as the larger the consumption profile, the more stable ("baseload") the consumption. These consumers are more likely to know precisely their peak consumption and, therefore, sign for an identical contracted capacity.
- **The monthly peak** is assumed to equal 90% of annual peak.

[10] These are the theoretical number of hours of electricity consumption of each consumer, obtained by dividing the annual demand by the annual peak.

** Whenever possible a distinction is made between day and night tariffs for profiles E-RES and E-SSME. This study assumes a day/night split of 1,6/1,9 MWh for E-RES and a 18/12 MWh split for E-SSME

Table 2: Detailed view of the connection level of consumer profiles for electricity per country

Profiles	Wallonia	Flanders	Brussels	Netherlands	France	Germany	UK
E-RES	BT sans mesures de pointe HP/HC (<1 kV)	LS zonder piekmeting D/N (<1 kV)	BT (T09) (<1 kV)	Fase 1: 1 x 10 t/m 3 x 25 Ampere	BT ≤ 36 kVA	Niederspannung (<1 kV)	NHH Demand tariff – Domestic two rate (< 6 kV)
E-SSME	BT sans mesures de pointe HP/HC (<1 kV)	LS zonder piekmeting D/N (<1 kV)	BT (T09) (<1 kV)	3 x 80 Ampere	BT ≥ 36 kVA	Niederspannung (<1 kV)	NHH Demand tariff – Small non-domestic customer with two rate (<6 kV)
E-BSME	MT avec mesure de pointe (1-26 kV)	1-26 kV Hoofdvoeding (T03)	26-1 kV (TO3) Alim. Principale	Afnemers MS (1-20 kV)	HTA_1 (1 - 40 kV)	Mittelspannung (1 kV - 50 kV)	HH Demand tariff-HV HH Metered (6 - 22 kV)
E0	MT avec mesure de pointe (1-26 kV)	1-26 kV Hoofdvoeding (T03)	26-1 kV (TO3) Alim. Principale	Afnemers MS (1-20 kV)	HTA_1 (1 - 40 kV)	Mittelspannung (1 kV - 50 kV)	HH Demand tariff-HV HH Metered (6 - 22 kV)
E1	T-MT avec mesure de pointe (26-36 kV)	Trans-HS Hoofdvoeding (26-36 kV)	Trans MT (26-36 kV)	Afnemers Trafo HS+TS/MS (25-50 kV)	HTA_1 (1 - 40 kV)	Mittelspannung (1 kV - 50 kV)	HH Demand tariff-HV HH Metered (6 - 22 kV)
E2	LTSO (30-70 kV)	LTSO (30-70 kV)	LTSO (30-70 kV)	Afnemers TS (25-50 kV)	HTB_1 (50 - 130 kV)	Umspannung Hoch-/Mittelspannung (50 -110 kV)	EHV EDCM (22 - 132 kV)
E3	TSO (> 150 kV)	TSO (> 150 kV)	TSO (> 150 kV)	TSO (> 150 kV)	HTB_2 (130 - 150 kV)	Hochspannung (220 - 350 kV)	TSO (150 kV)
E4	TSO (> 150 kV)	TSO (> 150 kV)	TSO (> 150 kV)	TSO (> 150 kV)	HTB_2 (130 - 150 kV)	Hochspannung (220 - 350 kV)	TSO (150 kV)

Table 3: Consumer profiles for natural gas

		G-Res (Natural gas Residentials)	G-Pro (Natural gas Professionals)	G_0 (Natural gas 0)	G_1 (Natural gas 1)	G_2 (Natural gas 2)
Date		January 2021	January 2021	January 2021	January 2021	January 2021
Annual demand	MWh	23,26	300	1.250	100.000	2.500.000
Consumption profile		-	-	Baseload (working days only)	Baseload (including weekends)	Baseload (including weekends)
Consumption hours eq.[11]	h/year	-	-	3.000	6.667	8.000
Contracted capacity	kW	-	-	-	15.000	312.500
Metering		YMR	YMR	MMR	AMR	AMR

Table 4: Detailed view of the connection level of consumer profiles for natural gas per country

Profiles	Wallonia	Flanders	Brussels	Netherlands	France	Germany	UK
G-RES	T2	T2	T2	G4: 0 t/m 10m^3(n)/h	T2	G4	Consumption band < 73.200 kWh
G-PRO	T3	T3	T3	G25: 25 t/m 40m^3(n)/h	T2	G40	73.200 < Consumption band < 732.000 kWh
G0	T4	T4	T4	G100: 40 t/m 65 m^3(n)/h	T3	G100	Consumption band ≥ 732.000 kWh
G1	T6	T6	T5	TSO	T4	G1000	Consumption band ≥ 732.000 kWh
G2	TSO	TSO	TSO	TSO	TSO	TSO	TSO

[11] These are the theoretical number of hours of natural gas consumption of each consumer, obtained by dividing the annual demand by the annual peak.

Identification of industrial sectors

The macro-economic analysis carried out in this study intends to depict the industrial fabric of the Belgian economy as a whole and, more specifically, the economy of the Belgian regions: Brussels, Flanders and Wallonia. Through this analysis, a certain number of relevant industrial sectors are determined that will be subjected to the natural gas and electricity price comparison.

There are two crucial objectives that justify the selection of sectors for which the price comparison is particularly of interest. First, it is to ensure consistency between the selected industrial profiles and the active industrial sectors. Second, it is to use this macro-economic analysis when assessing the impact of the described results for natural gas and electricity prices on the Belgian economy and its regions.

Throughout this study, we use a variety of macro-economic data relating to the manufacturing industry. This industry can be identified over numerous sectors as defined in the Statistical Classification of Economic Activities in the European Community, commonly referred to as NACE[12].

The industrial fabric of a country can generally be grouped into two different parts:

1. The ***manufacturing industry***, including basic industries and all other industrial activities:

    - Basic industries:

Table 5: Economic activities related to basic manufacturing industries with NACE classification

NACE code	Sector – Economic activity
13 – 15	Manufacture of textiles, wearing apparel, leather and related products
16	Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
17	Manufacture of paper and paper products
18	Printing and reproduction of recorded media
19	Manufacture of coke and refined petroleum products
20	Manufacture of chemicals and chemical products
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations
22	Manufacture of rubber and plastic products
23	Manufacture of other non-metallic mineral products
24	Manufacture of basic metals

[12] NACE: Nomenclature des Activités économiques dans la Communauté Européenne

- Other sectors of the manufacturing industries:

Table 6: Economic activities related to other sectors of the manufacturing industry with NACE classification

NACE code	Sector – Economic activity
10 – 12	Manufacture of food products; beverages and tobacco products
25	Manufacture of fabricated metal products, except machinery and equipment
26	Manufacture of computer, electronic and optical products
27	Manufacture of electrical equipment
28	Manufacture of machinery and equipment n.e.c.
29	Manufacture of motor vehicles, trailers and semi-trailers
30	Manufacture of other transport equipment
31 – 32	Manufacture of furniture; other manufacturing
33	Repair and installation of machinery and equipment

2. The ***extractive industry***, including industries extracting minerals from solid forms (e.g. coal and mineral ores), liquid forms (e.g. oil) or gaseous forms (e.g. natural gas)

Throughout this investigation, we solely focus on the manufacturing industry, taking into account the limited importance (in Belgium) and specific energy consumption profiles of extractive industries.

A four-step approach drives this exercise:

1. First, we portray the Belgian national and regional industrial fabrics, focusing on employment, value added and specialisation criteria.
2. Second, the energy intensity of these previously mentioned sectors is analysed to have a better insight into the energy cost role in the total cost structure among these sectors.
3. Third, export intensity indicating the exposition level of certain industrial activities regarding international competition and potential relocation risk is exhibited.
4. Fourth, we present the potential consumption reduction and energy efficiency using energy intensity data.

This study is the second edition of a multiple-year evaluation that goes on until 2023 and to ensure consistency the selected sectors will remain the same throughout every edition. The analysis below thus stays the same as last year.

Main industrial sectors for the Belgian national and regional economy

In this part, we depict the relative significance of each sub-sector of the national manufacturing industry regarding value added and employment. This inquiry also considers the Belgian economy specialisation level at a national and regional scale in comparison with neighbouring countries. The manufacturing sectors belonging to NACE classification 10 to 33, in Belgium solely, but in Wallonia, Flanders and Brussels as well are under study. While on all sectors mentioned in Table 5 and Table 6 are under review, only a few, based on the highest relevant values, are displayed in charts to make it visually understandable.

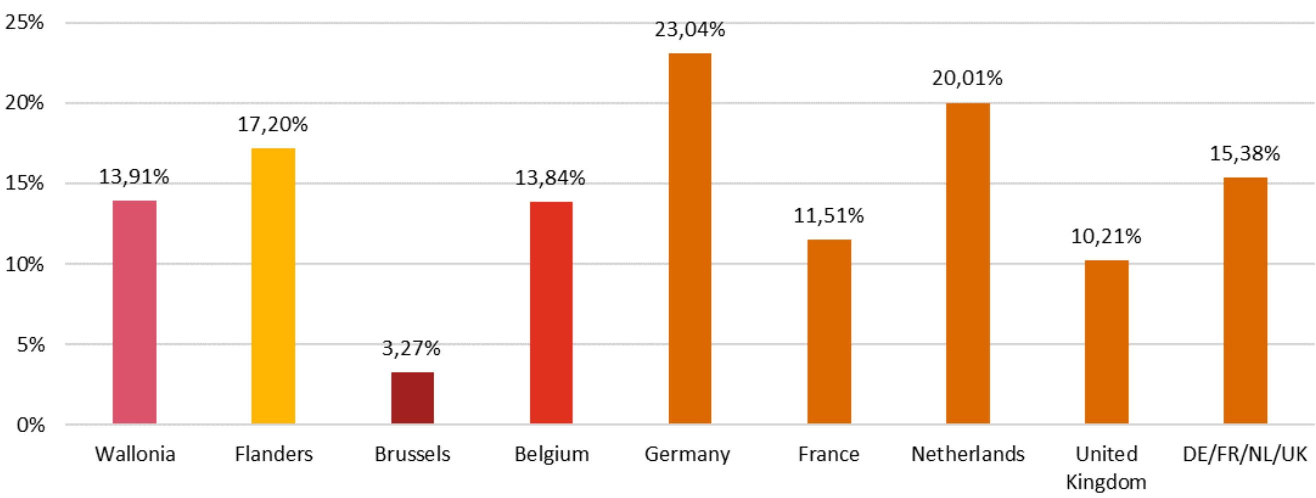
National accounts aggregated per industry coming from Eurostat dataset and the National Belgian Bank (NBB) serve as the basis for the analysis. The most recent and comprehensive datasets are from 2016.

The importance of the manufacturing industry based on value added

The first investigation intents to determine the relative significance of the Belgian manufacturing industry (NACE 10 – 33) regarding value added. Therefore, we compare the value added of this sector with the total GDP of the regional and national economy. This analysis is benchmarked with the relative importance of the manufacturing industry in each of the neighbouring countries (Germany, France, the Netherlands and the United Kingdom) and their weighted average[13].

The following figure (Figure 1) displays higher relative importance of the previously mentioned manufacturing industry in Germany than in any other regions, followed by the Netherlands. Noteworthy, Flanders has the third-highest share of value added of the industry in the total GDP amongst all countries and regions from our study panel. At a regional level, only the manufacturing industry in Flanders has a higher "value-added/GDP ratio" than the average for neighbouring countries. Nevertheless, the manufacturing industry is less important in terms of value-added for the Belgian economy than for the average of neighbouring countries - partially due to the weight of the German economy.

Figure 1: Value added of the industry in total GDP



Source: Eurostat (2016 data), NBB (2016 data)

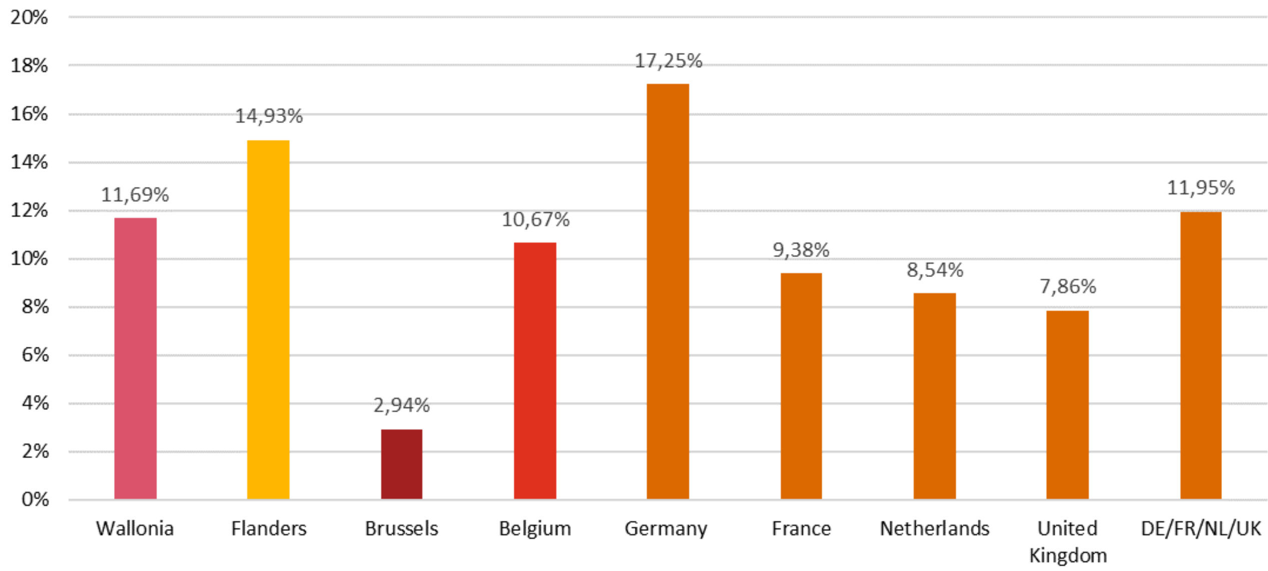
The importance of the manufacturing industry based on employment

The second analysis of this section intends to determine the relative importance of the manufacturing industry in Belgium with regards to employment. We, therefore, compare the employment generated by the previously mentioned manufacturing industry, i.e. NACE 10 to 33 with the employment of the Belgian economy, nationally or regionally.

When examining the relative weight of industrial employment between zones, similar results are obtained as in the previous analysis of the relative importance of manufacturing industry in terms of value-added. The only difference is that, when considering manufacturing industry, Wallonia is slightly above the Belgian average in terms of relative employment (Wallonia is very similar to the Belgian average in terms of relative value-added).

[13] The average is weighed depending on the size of the different economies.

Figure 2: Importance of industry employment on total employment



Source: Eurostat (2016 data), NBB (2016 data)

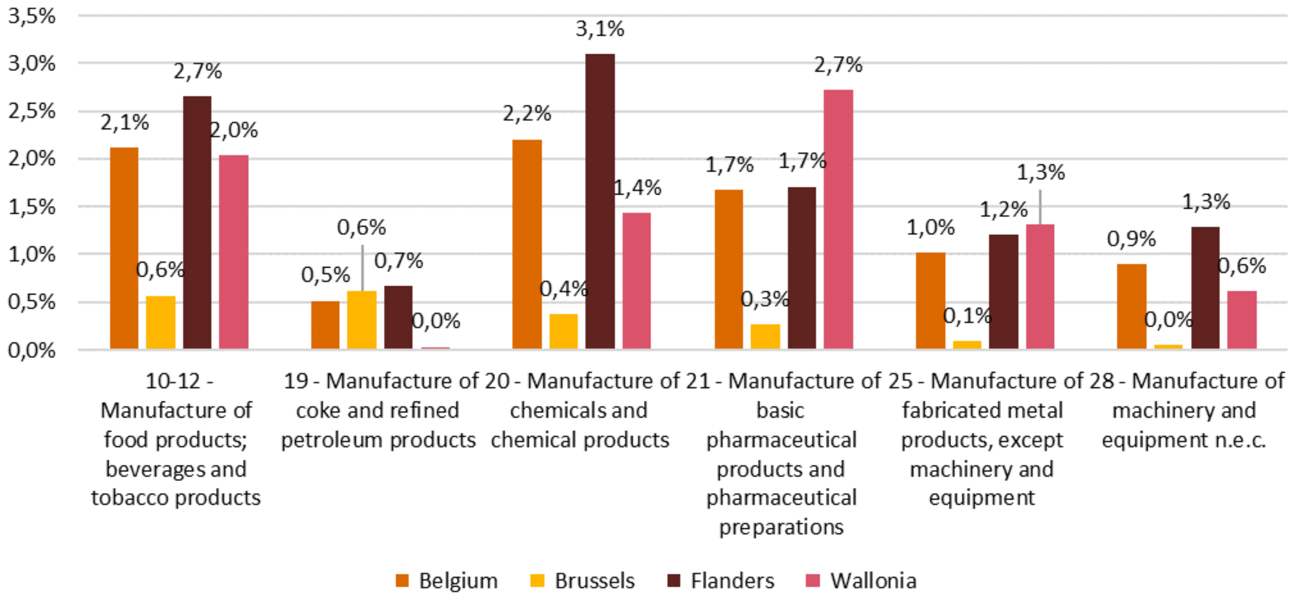
The identification of the most important manufacturing sectors based on value added

The following analysis aims to define the most important industrial sectors in terms of relative value added. Thus, for each sub-sector (within NACE codes 10-33), we compare the creation of value added to the total GDP of the economy (national or regional). The following figure presents the five main sectors of the manufacturing industry (NACE 10-33) in terms of their relative contribution to national or regional GDP. The sector NACE 19 (Manufacture of coke and refined petroleum products) is also considered due to its important weight for Brussels compared to other sectors for this region.

For the Belgian economy, these are the food and drink (NACE 10-12), the chemical (NACE 20)[14], the pharmaceutical (NACE 21), the metalworking (NACE 25) and machinery and equipment (NACE 28) sectors. It is interesting to note that these top five sectors for Belgium are also the top five in Flanders and Wallonia. Nevertheless, this analysis highlights important regional differences. Firstly, the chemical sector is important for Flanders in terms of value added (3,1% of total Flanders GDP). Second, the pharmaceutical industry is important for Wallonia (2,7% of the total GDP of Wallonia). It is also important to note that the petroleum products sector is almost non-existent in Wallonia. Thirdly, Wallonia also focuses on the food and drinks sector (2% of total Walloon GDP). It is also important to note that, when basic metals (no. 6 at Belgian level with 0,7%) and manufactured metals are added together (1%), their importance approaches the chemicals sector at Belgian level (most important sector with 2,2%).

[14] One must be aware that the line between the petrol and chemical sectors might be thin. Therefore, we suggest the following definitions: sector 19 "includes the transformation of crude petroleum and coal into usable products. The dominant process is petroleum refining, which involves the separation of crude petroleum into component products through such techniques as cracking and distillation. This division includes the manufacture of gases such as ethane, propane and butane as products of petroleum refineries" (European Commission, 2020); sector 20 "includes the transformation of organic and inorganic raw materials by a chemical process and the formation of products. It distinguishes the production of basic chemicals that constitute the first industry group from the production of intermediate and end products produced by further processing of basic chemicals that make up the remaining industry classes" (European Commission, 2020).

Figure 3: Value added of most important sectors in terms of GDP

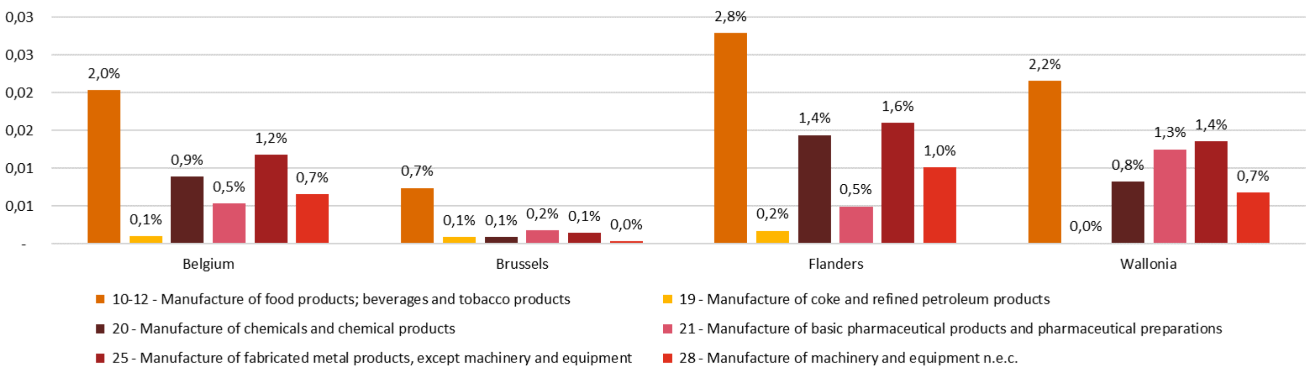


Source: Eurostat (2016 data), NBB (2016 data)

The identification of the most important manufacturing sectors based on employment

The fourth analysis under this heading aims at identifying the most important industrial sectors in terms of relative employment. Thus, for each sub-segment (within NACE codes 10-33), we compare the level of employment with total employment in the Belgian economy. The regional level analysis is subject to the same computations. As depicted by Figure 4, the food sector (NACE 10-12) is the largest in terms of relative employment, followed by the metalworking sector (NACE 25), at both the national and regional level (except for Brussels). It is also interesting to note that the refining sector and the pharmaceutical sector are low labour-intensive, whereas the food and metal industries are high labour-intensive. The lower predominance of the chemical sector in Flanders and the pharmaceuticals sector in Wallonia compared to the previous analysis is also noticeable.

Figure 4: Share of employment in total employment for the main sectors (Nace 10 - 33)



Source: Eurostat (2016 data), NBB (2016 data)

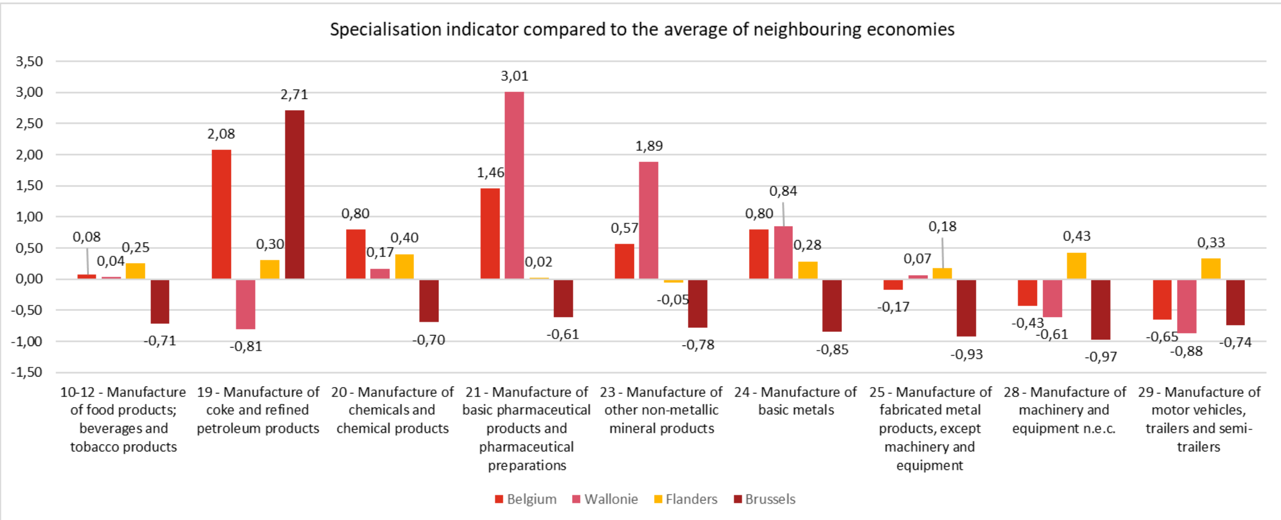
The relative specialisation of Belgian manufacturing sectors compared to neighbouring countries

The final analysis in this section focuses on the specialisation indicator for the different sub-sectors of the manufacturing industry (NACE 10-33). The specialisation indicator results from the relative value added[15] comparison of each sector with that of the average of neighbouring economies[16]. When positive, the indicator highlights that the value added created by a specific sector in Belgium (or in one of its regions) is greater than the average value added created in neighbouring countries. Conversely, when a value for a specific sector is negative, the value added created by that sector in Belgium (or in one of its regions) is below the average for neighbouring countries. The specialisation indicator is calculated according to the following formula:

$$Specialisation\ indicator\ for\ Sector_i in\ Region_j = \left(\frac{Relative\ added - value\ of\ Sector_i\ in\ Region_j}{European\ average\ of\ the\ relative\ added - value\ of\ Sector_i} - 1\right)$$

Figure 5 shows that the basic metals (NACE 24), and the pharmaceutical sector (NACE 21) are the two most essential specialisations of the Belgian economy (specialisation indicator of 2,71 and 3,01 respectively). Of the top six sectors in terms of relative value added, three are not specialised. These are the fabricated metals (NACE 25), and the machinery equipment (NACE 28) and the motor vehicles (NACE 29) industries. It is interesting to note that the Belgian economy is more specialised in basic metals than in fabricated metal products, even though the latter is the more important sector in terms of GDP. At a regional level, Wallonia is (besides the pharmaceutical industry) highly specialised in other non-metallic minerals (NACE 23). At the same time, Flanders is (besides the chemical sector) highly specialised in the manufacture of machinery and equipment (NACE 28).

Figure 5: Specialisation indicator compared to the average of neighbouring countries



Source: Eurostat (2016 data), NBB (2016 data), PwC computations

Sectors with the highest energy costs in comparison with total costs and energy intensity

This section seeks to pinpoint the sectors of the manufacturing industry (NACE 10-33) with the highest energy costs. The first analysis is a cost approach which aims to identify the cost of energy (natural gas-electricity-steam) as part of the total value added. The second approach is product-based: we look at the consumption of natural gas and electricity and compare it with the creation of value added.

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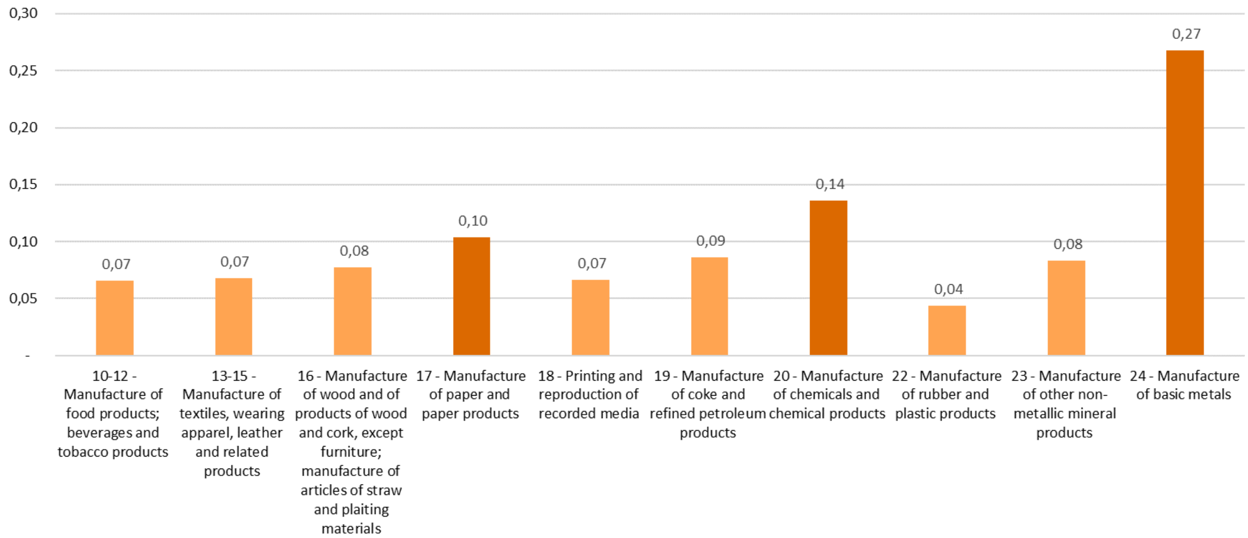
[15] The relative value added is the absolute value added of a specific NACE sector over the absolute value added of all NACE sectors. The data is retrieved from NBB and Eurostat (2016 data).

[16] The European average throughout this section refers to the average of the neighbouring countries under scope in this report: Germany, France, the Netherlands and the United Kingdom.

The first analysis compares the cost of energy (natural gas-electricity-steam) of each sector with the sector's value added. The analysis is based on the input-output tables of the Federal Planning Bureau with figures from 2015.[17] For this purpose, we identify the value of intermediate energy consumption (NACE 35) for each sector of the Manufacturing industry (NACE 10-33). We then divide this figure by the sector's value added.

The following figure (Figure 6) shows the sectors whose energy costs (natural gas-electricity-steam) account for more than 5% of their total value added. For several of the most critical sectors in terms of GDP, the cost of energy (natural gas-electricity-steam) is relatively low. Therefore, these sectors are not represented in the figure below. This is the case for the pharmaceutical (NACE 21), automotive (NACE 29), metallurgy (NACE 25) and machinery and equipment (NACE 28) sectors. Three sectors stand out as sectors where the cost of energy accounts for a considerable share of total value added. These are the paper (NACE 17), chemicals (NACE 20) and basic metals (NACE 24) industries.

Figure 6: Cost of energy (electricity/natural gas/steam) as part of the total value added

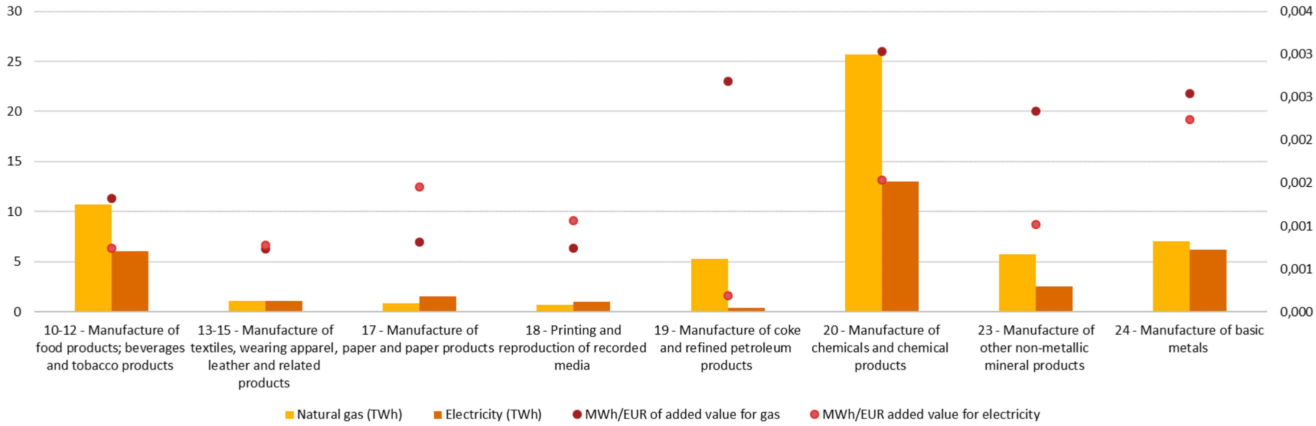


The second analysis consists of identifying the most energy-intensive sectors of the Belgian economy, based on a product approach. Energy intensity is the result of dividing the energy consumption (in MWh) of each sector by its value added (in EUR). The data on the value added of each sector come from Eurostat, while the energy consumption accounts come from the Federal Planning Bureau.

In Figure 7, the Belgian chemicals sector (NACE 20) appears to be, by far, the highest energy consumer (natural gas and electricity) per value added followed by the food and beverages industry (NACE 10-12) and the basic metals sector (NACE 24). However, the highest natural gas consumer per value added is the chemicals sector (NACE 20) followed by the manufacture of coke (NACE 19) and metallic products (NACE 23 and 24). The highest electricity consumer per value added is the basic metal industry (NACE 24), followed by the chemicals industry (NACE 20).

[17] Theses input-output tables are published every 5 years.

Figure 7: Electricity and natural gas consumption compared with value added creation



The textile manufacture (NACE 13-15), the paper manufacture (NACE 17) and the printing manufacture (NACE 18) have low energy consumption levels, and average consumption per value added. While the food and beverages industry (NACE 10-12) have relatively low average consumptions per valued added, similar to the paper manufacture (NACE 17), the manufacture of coke (NACE 19) displays the lowest average consumption per valued added for electricity.

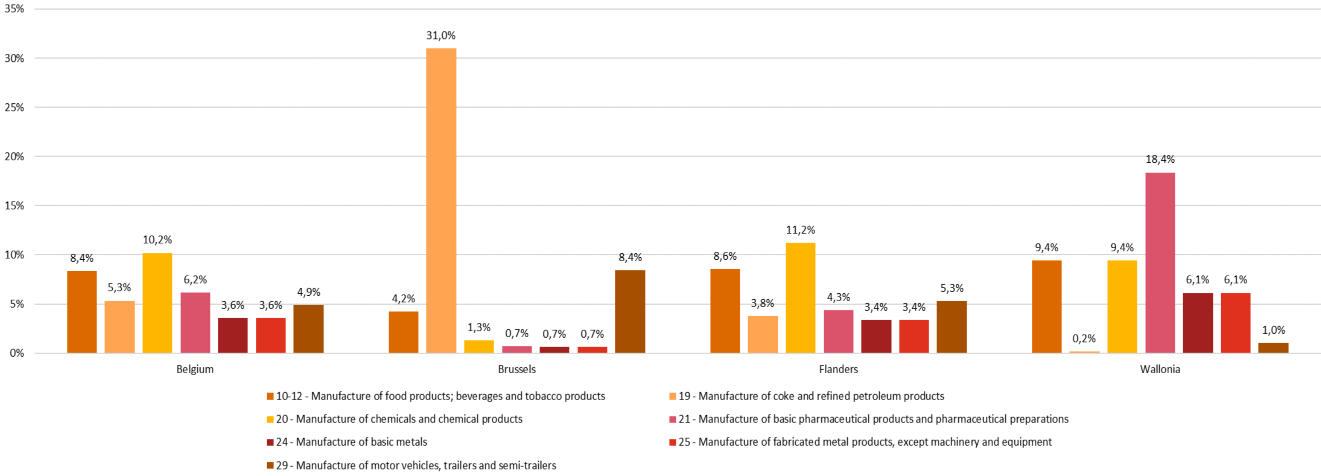
Most industrial sectors have a higher natural gas intensity than electricity intensity. The only exceptions to this observation are the textiles (NACE 13-15), paper (NACE 17) and printing (NACE 18) industries, which have a higher electricity intensity than natural gas.

Sectors most exposed to international competition (including the relocation risk)

In this chapter, we look at the exposure of sectors to international competition, through analysing the relative share of exports to total exports for each industrial sector. Based on data published by the National Bank of Belgium, we determine the value of exports in each sector and its relative importance in the total exports of an economy (regional or national).

The first 7 manufacturing industry sectors with the highest relative share of exports in the total exports of the Belgian economy are, in descending order, the chemical (NACE 20), the food and beverages (NACE 10-12), the pharmaceuticals (NACE 21), the coking and refining (NACE 19), the automotive (NACE 29) and the base and fabricated metals (NACE 24-25) sectors. These sectors are, therefore, the most exposed to international competition.

Figure 8: Relative share of exports compared to total exports



The three regions fall under the analysis of these 7 most important sectors in terms of relative exports. The top 5 sectors (each with a relative share of exports >5% of the region's total exports) in Flanders and Wallonia are also among the top 7 sectors in terms of the relative share of exports in Belgium. In Flanders, the chemical sector has the largest relative share of exports (11% of the region's total exports). As far as Wallonia is concerned, the pharmaceuticals (NACE 21) sector stands out as the sector with the largest relative share of exports (18,4% of total regional exports) followed by the manufacture of food and drinks (NACE 10-12) and the manufacture of chemicals (NACE 20) both with 9,4%. In Brussels, the coking and refining sector (NACE 19) is by far the sector with the largest relative share of exports (31% of the region's total exports)[18].

However, this should be considered with caution. Assuming two sectors (A and B) whose exports represent an identical fraction of their sectoral production, if sector A is more substantial than sector B, then the implemented indicator (export of sector I over total exports) logically gives a result more significant for sector A as for sector B while being exposed to a similar relocation risk.

Following, the next figure (Figure 9) seeks to identify for which sectors of the Belgian economy there is a significant risk of relocation. To do so, we compare the value of exports of each sector with the value of the sector's gross output[19]. The more an economic activity depends on exports, the more it is exposed to a risk of relocation (regardless of other physical or geographical criteria). The production data for each sector come from the input-output tables of the Federal Planning Bureau. The latest available data are from 2015.

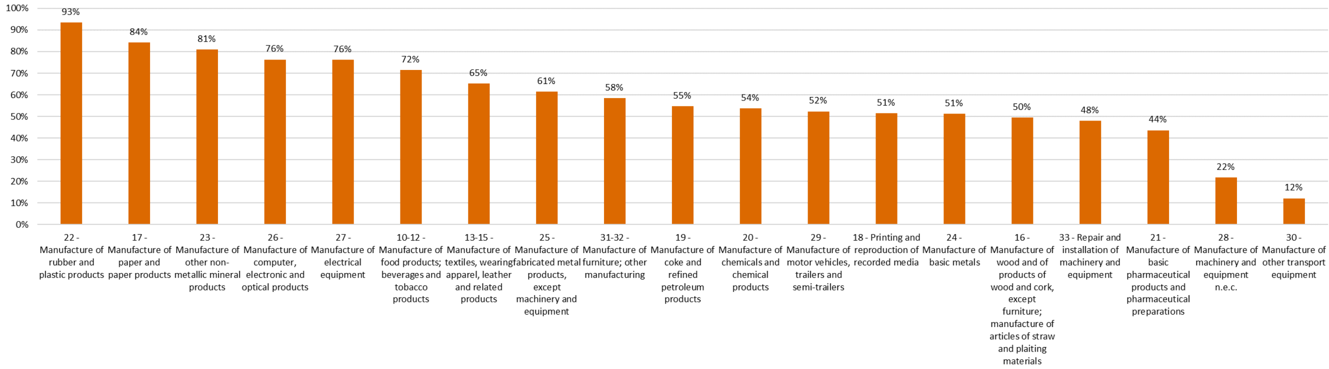
The chart below shows that the sectors of Belgian manufacturing industry with the highest "exports to gross output" ratios are the plastics (NACE 22), the manufacture of paper (NACE 17), the manufacture of other non-metallic mineral products (NACE 23), the manufacture of electronic products (NACE 26), and the manufacture of electrical equipment (NACE 27). The sectors all have a ratio of exports to gross output of more than 75 %, meaning that these sectors are more likely to be at risk to relocate.

Among others, woodworking (NACE 16), machinery equipment (NACE 28 and 33) and basic pharmaceutical products (NACE 21) are relatively less exposed to the risk of relocation. They each have a ratio of exports to gross output of less than 50%.

[18] This high share of oil exports certainly comes as a result of important imports realised in the first place. Petroleum products are the second most important goods imported via the port of Brussels (Brussels studies, 2017).

[19] According to the Federal Planning Bureau, gross output is a measure of an industry's sales or receipts, which can include sales to final users in the economy (GDP) or sales to other industries (intermediate inputs). Gross output can therefore be measured as the sum of an industry's value added and intermediate inputs.

Figure 9: Exports compared with gross output



Sectors with the lowest potential in relation to consumption reduction (energy efficiency)

This section aims to identify the sectors of the Belgian economy, which may or may not have the possibility of significantly improving their energy efficiency in the short term. To that end, we compared the energy intensity of each sector of the Belgian manufacturing industry (based on the categorisation of industrial sectors in NACE 2008) with that of the same sectors in neighbouring countries (Germany, the Netherlands and France). The energy consumption (in MWh) per EUR of value added created for each sector measures the energy intensity. The data on the value added of each sector comes from Eurostat, while the energy consumption accounts come from the national statistical offices[20]. Noteworthy, not enough detailed data on energy consumption in the United Kingdom were available[21]. This analysis was carried out separately for electricity and natural gas.

Energy efficiency analysis

Sector 'i' of the Belgian economy (b) can be deemed to have the potential for improvement in terms of energy efficiency, compared to sector 'i' in another country (p), if it consumes more energy to produce the same unit of output.

Energy intensity of sector 'i' of the Belgian economy > Energy intensity of sector 'i' of country 'p'

$$\frac{Energy\ consumption_b^i}{Added - value_b^i} > \frac{Energy\ consumption_p^i}{Added - value_p^i}$$

It is worth noting two caveats from a methodological point of view. First, macroeconomic data on a vast scale drives the analysis. It is therefore not possible to draw precise conclusions on a microeconomic basis that relate to a specific economic process. Secondly, we cannot establish a direct link between differences in energy efficiency at the macroeconomic level on the one hand and the capacity to improve energy efficiency on the other. Once again, we must take account of the fact that within sectors and countries, there are significant differences in terms of infrastructure, industrial processes and production that can explain these differences.

As a reminder Figure 10, also presented in section 2, shows that the two main energy-intensive Belgian sectors are the food and beverage industry (NACE 10-12) the base pharmaceuticals industry (NACE 20) - this is particularly the case for the energy intensity of natural gas. The Belgian wood industry is the least energy-intensive sector, as this figure shows when considering both electricity and natural gas.

[20] Federal Plan Bureau for Belgium, CBS Statline for the Netherlands, De Statis for Germany, and Insee for France.

[21] The energy intensity split between electricity and natural gas is not available.

Figure 10: Electricity and natural gas compared with the value added creation

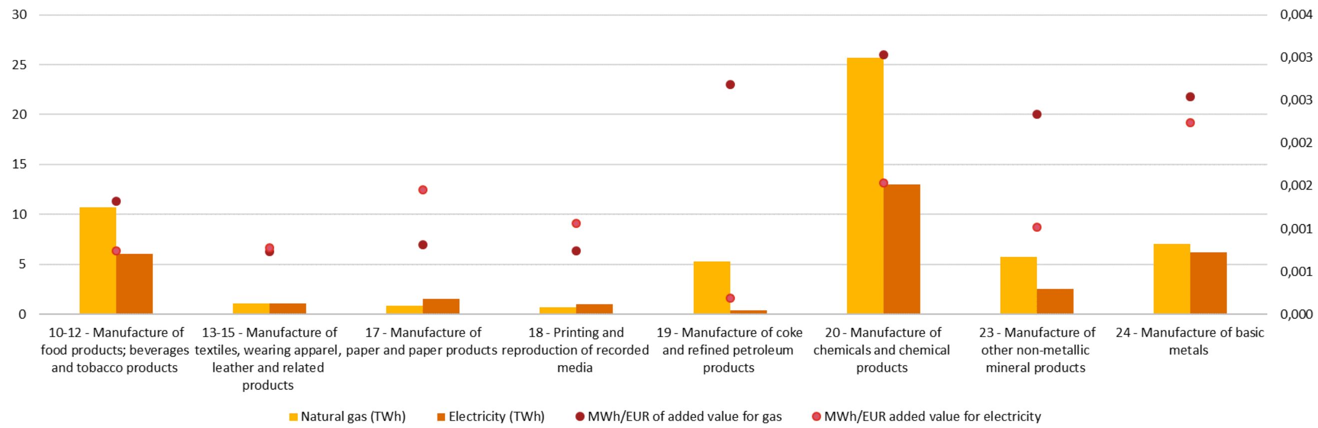


Figure 11 and Figure 12 show that most Belgian sectors have the potential for improvement in terms of energy efficiency (electricity and natural gas) when compared with the weighted average of neighbouring countries (Germany, the Netherlands and France). This is the case for the food and drink (NACE 10-12), the textile (NACE 13-15), the printing (NACE 18) and the chemical (NACE 20) industries, both for natural gas and electricity consumption. These sectors could, therefore, potentially adapt to uncompetitive electricity and natural gas prices with increased energy efficiency.

However, some Belgian sectors do not have the possibility of significantly improving their energy efficiency. This is the case of the NACE 16 and 25 sectors, which respectively represent the wood, the paper, the chemical, and the fabricated metal manufactures. As Figure 11 shows, the energy efficiency gap is particularly large in electricity for basic metals (NACE 24), in natural gas for chemical (NACE 20). The higher electricity intensity experienced by France in many sectors greatly influences the high average for electricity in the neighbouring countries.

Nevertheless, Belgium is also below France, Germany and the Netherlands and in terms of natural gas efficiency (Figure 12) for the paper (NACE 17) and plastic products (NACE 22). This means that, with uncompetitive prices, these sectors would be unable to adapt by significantly increasing their energy efficiency in the short term. Aside from the two previously mentioned industries, Belgium is above the average of neighbouring countries in terms of natural gas efficiency (Figure 12) for other sectors.

A third example is the Belgian base metals industry, which has an electricity intensity far below the average of neighbouring countries (Figure 11), but a natural gas intensity slightly above the average of neighbouring countries (Figure 12). The high average electricity intensity of the neighbouring countries is mainly due to the French base metals industry. In other words, this sector has the potential for short-term improvement in terms of natural gas efficiency but not electricity efficiency. This is also interesting because Figure 10 shows that the Belgian base metals industry is a relatively important natural gas consumer.

Notably, data are missing for the coke and refining sector (NACE 19). Moreover, Figure 12 does not present the extremely high natural gas intensity of the Dutch sector 0,03 MWh per EUR of value added). Data on the energy intensity of this sector were not available for France.

Figure 11: Electricity consumption compared to the value-added creation

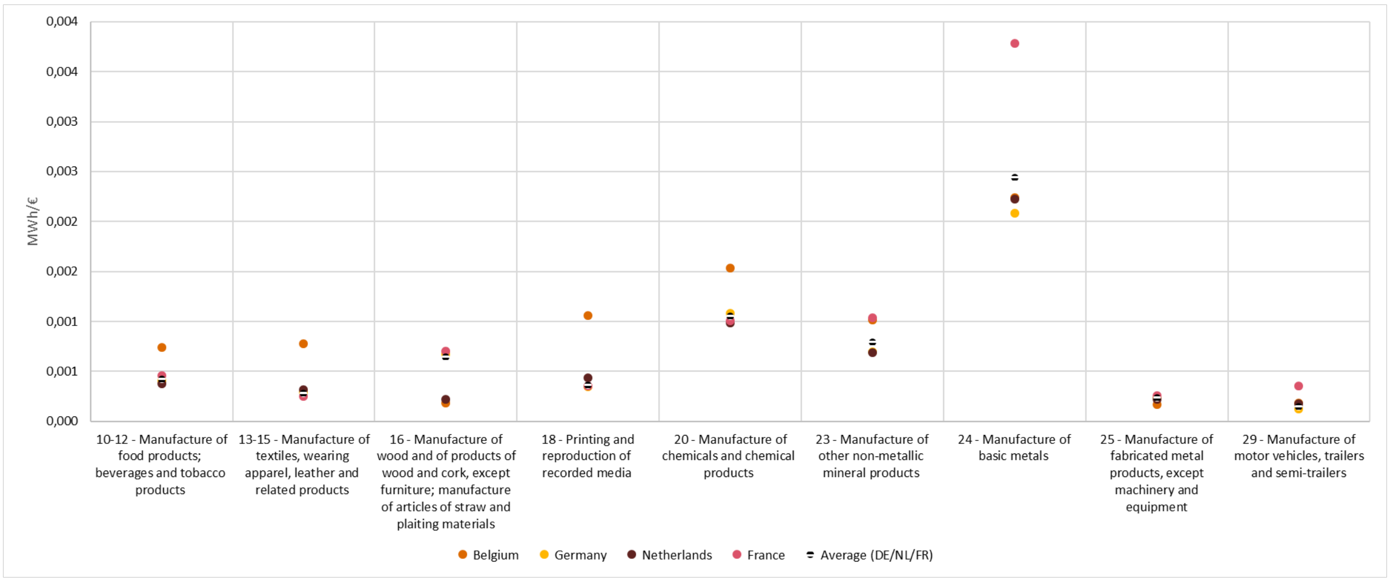
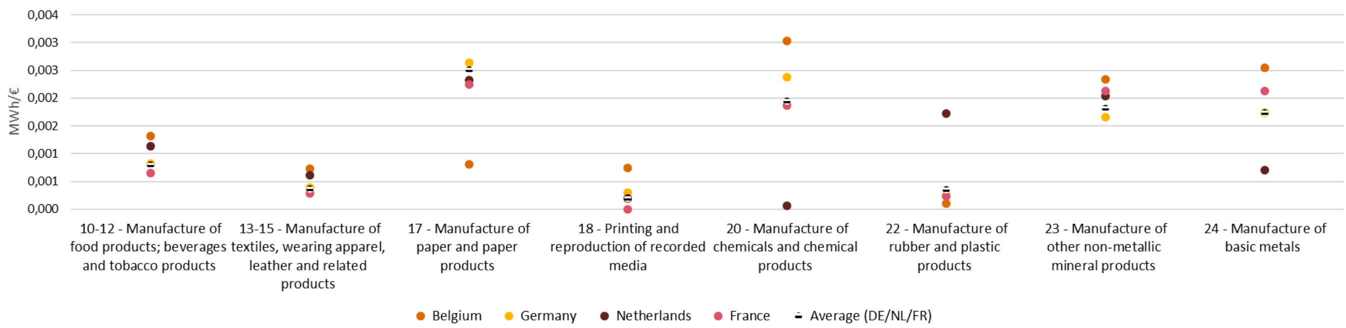


Figure 12: Natural gas consumption compared to the value-added creation



Selection of the most important sectors for our analysis

This section concludes our economic analysis by presenting a selection of the most important sectors related to electricity and natural gas prices and competitiveness.

The methodology we use to select the most important sectors is as follows:

First, we rank sectors from the highest to the lowest results with regards to the analysis: value added, employment, specialisation, cost of energy/value added, electricity consumption (absolute), natural gas consumption (absolute), electricity consumption per unit value added, natural gas consumption per unit value added, exports. In Figure 13, the smaller the number, the higher the ranking of the sector for the analysis. Next, we calculate the ranking score for each sector across all analyses, leading to a final ranking of each sector.

To illustrate this, we show a few examples. The second column illustrates the analysis we present in the section "The importance of the manufacturing industry based on value added", which concerns the value added of each sector in relation to the total GDP of the economy. We see that the most important sector in terms of relative value added is the chemical sector (NACE 20), which receives a score of 1 in Table 7, followed by the food and beverage industry (NACE 10-12), which receives a score of 2.

Another example concerns the comparison with neighbouring countries in terms of the potential for improving energy efficiency. For this analysis, we consider that the more energy efficient a sector is compared to the average of neighbouring countries, the less potential it has for improving energy efficiency. It is important to note several caveats regarding this approach. First, for some analyses, rankings for certain sectors are not available. This is mainly the case for analyses that depend on data based on the Belgian energy consumption accounts of the Federal Planning Bureau.

Secondly, for some analyses, some sectors benefit from the ranking position of another sector. This is notably the case for the pharmaceutical industry (NACE 21), which is often associated with the chemical industry (NACE 20); since for some analyses only combined data for NACE 20-21 codes are available. It also applies for the base and fabricated metal industries (NACE 24-25), which are sometimes analysed together due to the lack of available data.

Thirdly, only analyses related to national data have been considered. In other words, all sectoral classifications based on regional approaches have been excluded from this matrix.

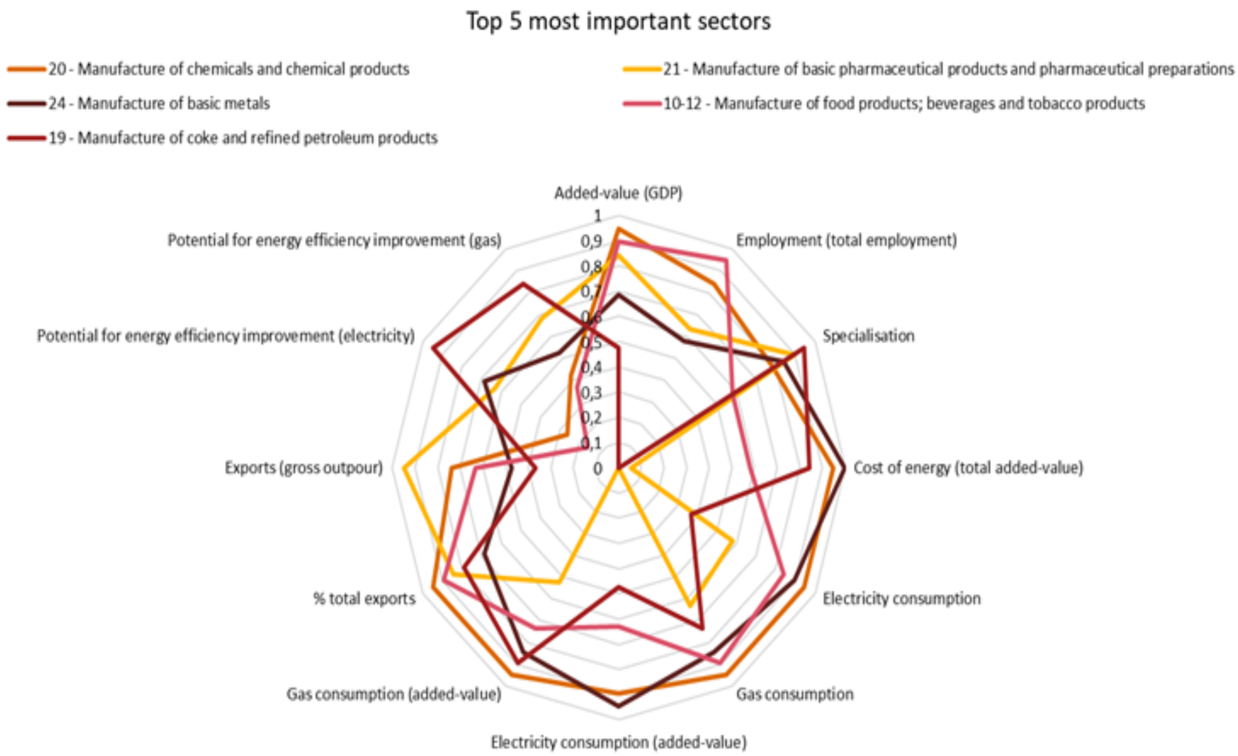
Finally, the calculation of the average score of all analyses is based on a simple average. No weight was given to any particular analysis, as all analyses were considered important in determining the most important sectors.

Table 7: Sectors ranking

NACE Code	Final sector ranking	Value added (GDP)	Employment (total employment)	Specialisation	Cost of energy (total value added)	Electricity consumption	Natural gas consumption	Electricity consumption (value added)	Natural gas consumption (value added)	% of total exports	Exports / gross output	Potential for energy efficiency improvement (electricity)	Potential for energy efficiency improvement (natural gas)	Average score
NACE 20	1	1	3	4	18	1	1	2	1	1	5	14	11	5,2
NACE 21	2	3	7	2	1	8	7	19	9	3	1	7	6	6,1
NACE 24	3	6	8	3	19	2	3	1	3	6	10	6	9	6,3
NACE 10-12	4	2	1	8	11	3	2	7	5	2	7	16	12	6,3
NACE 19	5	10	19	1	16	12	5	10	2	4	12	1	3	7,9
NACE 23	6	7	6	5	15	4	4	5	4	10	15	12	8	7,9
NACE 25	7	4	2	12	6	9	10	14	13	7	11	4	5	8,1
NACE 28	8	5	4	15	4	10	11	13	14	8	3	13	13	9,4
NACE 17	9	16	17	10	17	5	8	3	6	12	13	5	2	9,5
NACE 13-15	10	13	10	6	13	6	6	6	8	11	4	17	14	9,5
NACE 29	11	9	5	19	9	11	12	11	11	5	2	11	10	9,6
NACE 22	12	8	9	11	10	14	14	17	19	9	16	2	1	10,8
NACE 31-32	13	14	11	14	8	15	15	8	12	14	8	15	15	12,4
NACE 18	14	17	13	9	12	7	9	4	7	18	18	18	18	12,5
NACE 16	15	18	14	7	14	18	19	12	16	16	17	3	4	13,2
NACE 26	16	12	16	16	3	16	16	16	18	13	6	10	16	13,2
NACE 33	17	11	12	13	2	13	13	9	10	19	19	19	19	13,3
NACE 27	18	15	15	17	7	17	17	15	17	15	9	9	7	13,3
NACE 30	19	19	18	18	5	19	18	18	15	17	14	8	17	15,5

With these four criteria in mind, we can conclude that the 5 most important sectors for our analysis are – ranked by importance–: the manufacture of chemicals and chemical products (NACE 20), the manufacture of basic pharmaceutical products and pharmaceuticals (NACE 21), the manufacture of basic metals (NACE 24), the food and beverage industry (NACE 10-12), the manufacture of coke and refined petroleum products (NACE 19). The next figure depicts the first five sectors. The larger the area covered by the sector, the higher the sector ranks in each of the analyses in this chapter.

Figure 13: Radar chart of the top five most important sectors



The radar chart depicts the ranking of the top five sectors, which will later be subjected to a more in depth analyses. The higher the value on the chart (from 0 to 1), the higher the sectors ranks based on the criteria. Those scores matter as they are critical to depict the importance of the manufacturing sectors to the Belgian economy. Our analysis indicates they are possibly profoundly impacted by electricity and natural gas prices differences with the neighbouring countries.

Electricity

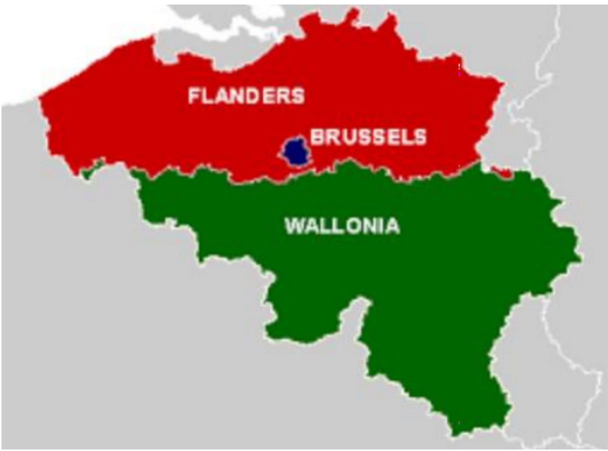
Electricity: Countries/Zone(s) identified

In this chapter, we aim at determining how a country or a region is organised as a territory. As such, we identify the transmission system operators (TSO) and distribution system operators (DSO) for each country and region. Furthermore, given that variations in prices may be due to local considerations, we specify whether a country is divided into zones for which results are presented individually rather than at national level.

Belgium

Belgium is divided into three regions, Flanders, Wallonia and Brussels as mapped below.

Figure 14 : Belgium national electricity market



Belgium's transmission grid is run by a single operator, Elia, which therefore covers the entire territory. While most charges imposed by Elia Transmission Belgium as TSO are homogenised across the country, differences appear at regional levels. Consequently, the three regions are individually evaluated as some of their characteristics vary from one another due to the existence of differing (i) distribution charges (regarding E-RES to E1) (ii) transmission charges (regarding E-RES to E1) and (iii) taxes, levies and certificate schemes (regarding all profiles). Besides, while it is deemed that commodity cost for industrial consumers is interchangeable across Belgium, it is not the case when it comes to residential and small professional consumers.

Flanders

Distribution grids are the responsibility of each Belgian region. The table below displays a review of all DSOs in Flanders that operate on the regional distribution grid and their relative market share. Flanders counts 10 inter-municipal utility companies for electricity which are operated by Fluvius.

Table 8 : Electricity distributed and market share for each Flemish DSO (electricity)[22]

DSO	Number of EAN connections (2021)	Market share (%)
Imewo	643.557	18,24%
Fluvius Antwerpen	591.424	16,76%
Iverlek	547.828	15,53%
Gaselwest	450.284	12,76%
Fluvius Limburg	445.402	12,62%
Intergem	320.413	9,08%
Iveka	230.582	6,53%
Fluvius West	140.216	3,97%
PBE	94.540	2,68%
Sibelgas	64.403	1,83%
Total	**3.528.649**	**100%**

22 (VREG, 2020)

As distribution tariffs vary from one DSO to another, we, therefore, make use of a weighted average value for all 10 DSOs.

Wallonia

When it comes to Wallonia, there are 11 DSOs, mostly operated by ORES (Ores Hainaut, Ores Namur, Ores Brabant Wallon, Ores Luxembourg, Ores Verviers, Ores Est, Ores Mouscron) and RESA as they account for more than 95% of the market[23]. The distribution tariffs differ between DSOs, and a weighted average is being computed for profiles from E-RES to E1. Even if ORES and RESA represent the DSOs with the broadest coverage, all DSOs in Wallonia are considered in this study. TRANS MT[24] is the highest tension level in Wallonia. As in Flanders, the number of EAN connections for each DSO represents the backbone for the market shares computations, shown in the table below.

Table 9: Electricity distributed and the market share for each DSO in Wallonia (electricity)

DSO	Number of EAN connections (2020)	Market share (%)[25]
AIEG	25.810	1,37%
AIESH	20.712	1,10%
RESA	450.342	23,90%
ORES Namur	241.299	12,81%
ORES Hainaut	581.444	30,86%
ORES Est	59.324	3,15%
ORES Luxembourg	157.673	8,37%
ORES Verviers	80.949	4,30%
ORES Brabant Wallon	194.272	10,31%
ORES Mouscron	54.513	2,89%
Réseau d'Energies de Wavre	17.982	0,95%
Total	**1.884.320**	**100%**

Brussels

The DSO for electricity in Brussels is Sibelga, therefore accounting for 100% of the region's market shares. In 2019, Sibelga supplies 722.433 EAN connection points with electricity.[26]

The table below exhibits the first impact caused by regional service obligations as a consequence of the grid connection levels. The regions can enforce public service obligations on grid operators running below or equal to 70 kV on their territory (repercussions on profiles E-RES to E2).

Table 10 : Overview of voltage distribution to Belgian system operators

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

Certificate schemes represent the second regional impact within Belgium that results from the local competence regarding renewable energy obligations matter on their territory. Flanders, Wallonia and Brussels institute their specific green certificate scheme on all electricity consumers within the affected region (all profiles under review). In addition to assessing Belgium over the three regions, we consider different hypotheses: the consumer profiles E1 to E4 take part in an energy efficiency agreement, and all industrial profiles are affiliated with the sectoral NACE-BEL classification codes 5-33 (all industries).

[23] (CWaPE, 2020) – Bilan de la situation du marché de l'électricité pour l'année 2020 ; Gaselwest no longer operates in Wallonia since January 1st 2019.

[24] See Glossary, p.12

[25] Data received from the CWaPE (T3 2020)

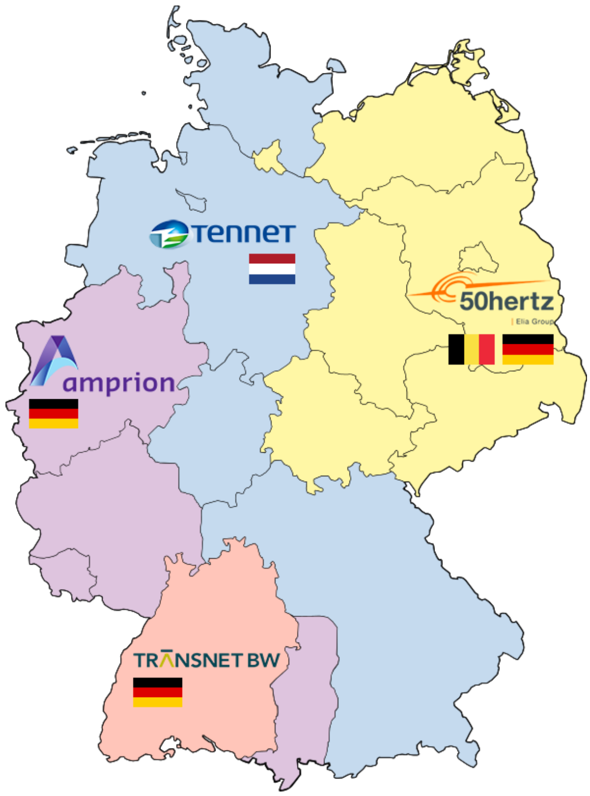
[26] (Sibelga, 2020) - Statistiques 2019

Germany

Regarding Germany, consumers can participate in a single electricity market. We, therefore, assumed the commodity price is the same in the whole territory for consumers E-BSME to E4 who are highly likely to negotiate their electricity contracts with suppliers. With regards to profiles E-RES and E-SSME, the standard contract ("Grundversorgung") and its supplier depends on the region. Consequently, the commodity cost is determined per DSO region because the standard contract supplier is different.

In Germany, four different TSOs are currently active; the following figure shows their geographical spread.

Figure 15 : Map of the German transmission system operators



- *West Region:* consists of Nordrhein-Westfalen, Rheinland-Pfalz and Saarland where Amprion is running the transmission grid.
- *South-West Region*: consists of Baden-Württemberg where Transnet BW is the TSO.
- *Central Region:* consists of Niedersachsen, Hessen, Bayern, Schleswig-Holstein where Tennet operates the transmission grid.
- *East Region:* consists of former East-Germany and Hamburg where 50Hertz is the local operator.

Regarding the geographical and economic eminence of these four areas (e.g. the smallest region has a similar population size than Belgium as a country), these zones are logically considered the same way we considered the three Belgian areas. We thus separately evaluate them.

In respect to the Belgium analysis, our profiles E-RES to E2 also pay a distribution cost, which is further discussed in the section "Component 2 – network costs" for the residential profiles (p. 204) and "Component 2 – network costs" for the industrial profiles (p. 242). These four transmission zones appear to be the most accurate analysis regarding Germany as the country counts around 883 distribution system operators[27]. Considering the high number of DSOs in Germany, this increases complexity in observing German prices. Therefore, for the profiles E-RES to E2 under review (as they are connected to the distribution grid), we only take the prices from two predominant DSOs (a rural and an urban) for each of the transmission zones. An average distribution price is then derived from the two DSOs' existing prices and is used as a unique price for the transmission zone in question. The table below, summarises studied DSOs and their respective market shares.

[27] (Bundesnetzagentur, 2019)

Table 11 : Market shares of German electricity DSOs

TSO	DSO	Number of EAN connections (2019)	Market share (%)
Tennet	Bayernwerk	2.303.773	70,43%
	SWM	967.178	29,57%
	Total	**3.270.951**	**100%**
50 Hertz	E-Dis	1.395.378	37,24%
	Stromnetz Berlin	2.351.575	62,76%
	Total	**3.746.953**	**100%**
Amprion	Westnetz	4.325.813	79,36%
	RNG-Netz 2 – Köln	1.124.963	20,64%
	Total	**5.450.776**	**100%**
Transnet BW	Netze BW	2.153.084	84,57%
	Stuttgart Netze	392.925	15,43%
	Total	**2.546.009**	**100%**

Contrary to other countries/regions the market shares of the DSOs are not used as weights because they are only a selection of the hundreds of German DSOs. The distribution tariffs of every DSO thus has the same weight. As regards taxes, levies and certificate schemes, we observe no regional differences for electricity consumers, nor even local taxes[28].

France

Concerning the electricity market, France is investigated as a single area. Concretely, the same commodity, distribution, transmission and taxes and levies prices apply to the whole territory. With regards to transmission, the RTE ("Réseau de Transport d'Electricité") is the transmission System Operator (TSO) who is in charge of the transmission network. In contrast, Enedis constitutes the largest French DSO with an approximate market share of 95%[29] (mainland). We thus consider this sole DSO for all consumer profiles connected to the distribution grid (E-RES to E1).

The Netherlands

Like France, the Netherlands is examined as a single zone. No regional differences appear when it comes to commodity costs, taxes, levies and certificate schemes: it is a single electricity market, and energy is imposed on a national level.

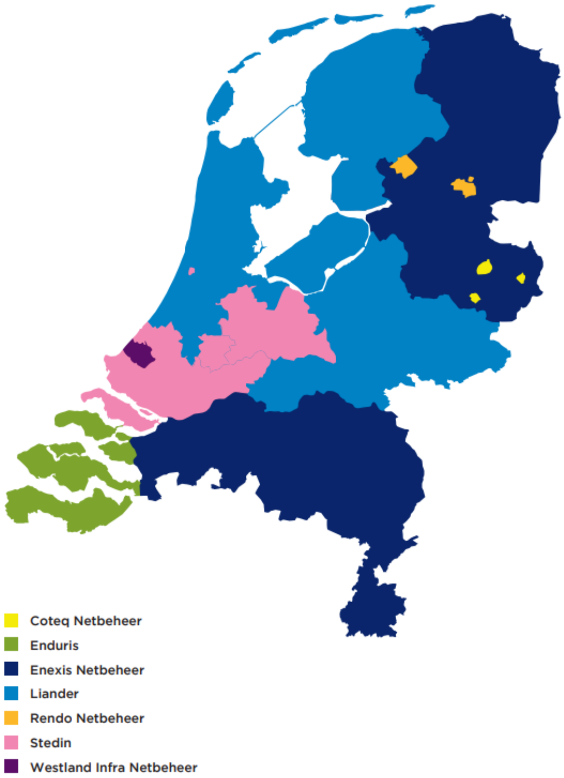
The Netherlands counts only one TSO – TenneT. For this reason, the same pricing methodology is applied throughout the national transmission grid. The network cost for the two largest consumer profiles – E3 and E4 – encompasses the transmission tariffs appointed by TenneT. Contrastingly, the Dutch profiles E-RES to E2 are connected to the national distribution grid that provides the entire network below the 110 kV voltage standard. Consequently, the network cost for profiles E-RES to E2 profiles dwell in the distribution tariff imposed by the DSOs.

The Netherlands' distribution network comprises seven DSOs with different sizes and prominence, as the map below exhibits. Each DSO applies different and separate tariffs. In this case, distribution costs and transmission costs are aggregated in a cumulated fee.

[28] 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*). As that tax varies depending on the contract type or the city size, we consider the average paid concession fee.

[29] (Enedis, 2020)

Figure 16 : Map of the Netherlands electricity distribution system operators



These seven DSOs differ by the size, number and type of clients. We thus expose a weighted average of distribution tariffs accordingly to the number of grids connections related to each DSO. The table below demonstrates an overview of the number of connections for all DSOs and their associated market share.

Table 12: Market shares and the number of connections for each Dutch DSO (electricity)

DSO	Market share[30] (%)
Liander	37,49%
Enexis	33,65%
Stedin	25,07%
Enduris	2,56%
Westland	0,54%
Coteq	0,43%
Rendo	0,26%
Total	**100%**

When combining Liander, Enexis, and Stedin, these companies represent 95% of the market shares. Their prices subsequently have a higher impact on the weighted average distribution tariffs.

The United Kingdom

Similarly, to France and the Netherlands, the United Kingdom is analysed as a single area. Again, commodity costs, taxes, levies and certificate schemes observe no regional variation as there is one single electricity market and taxes on a national level. The United Kingdom has three different transmission system operators: National Grid (for England and Wales), Scottish Hydro Electric Transmission (SHET), and Scottish Power Transmission

[30] The market share was given to PwC by the CREG (2020)

(SPT). In addition to these TSOs, six distribution system operators are currently functioning[31]. The TSOs and DSOs rate different tariffs in the fourteen zones that counts the United Kingdom.

Figure 17 : The United Kingdom electricity distribution networks

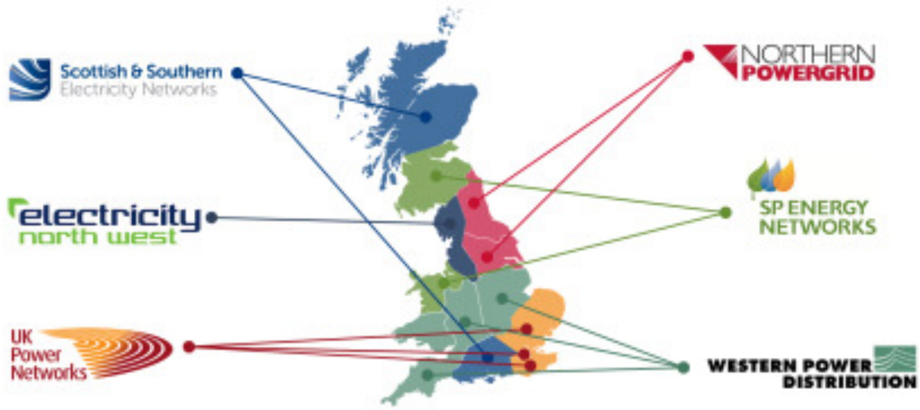
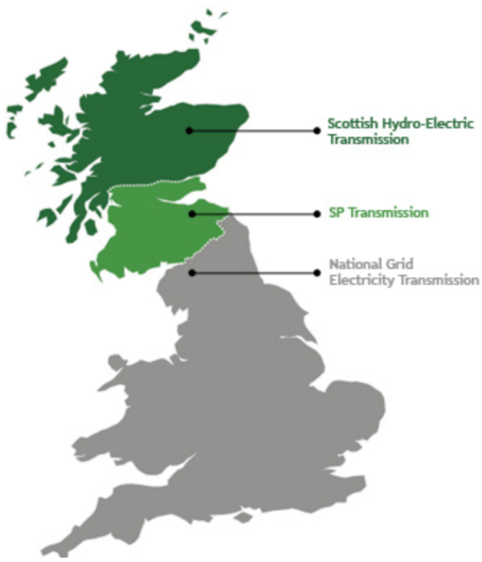


Figure 18 : The United Kingdom electricity transmission networks



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

Table 13 : TSOs and DSOs in the United Kingdom zones

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

Concerning network costs – transmission and distribution tariffs for the E-RES to E2 profiles–, we present, once again, a weighted average amount for the fourteen zones.

Table 14 : Market shares of the United Kingdom electricity DSOs

DSO	Number of connections[32] (2018)	Market share (%)
Eastern Power Networks	3.627.858	12,18%
Southern Electric Power Distribution	3.049.924	10,24%
Western Power Distribution East Midlands	2.647.059	8,89%
Western Power Distribution West Midlands	2.383.887	8,34%
Electricity North West Limited	2.298.786	8,01%
London Power Networks	2.345.807	7,88%
Northern Powergrid Yorkshire	2.296.864	7,72%
South Eastern Power Networks	2.481.944	7,71%
SP Distribution	2.007.341	6,74%
Northern Powergrid Northeast	1.602.128	5,38%
Western Power Distribution South West	1.512.961	5,42%
SP Manweb	1.613.218	5,08%
Western Power Distribution South Wales	1.133.101	3,81%
Scottish Hydro Electric Power Distribution	772.984	2,60%
Total	**29.773.862**	**100%**

Lastly, we consider that industrial consumers analysed in this study, are all embodied in the Climate Change Agreement.

[32] (OFGEM, 2019)

Natural gas

Natural gas: Countries/Zone(s) identified

In this chapter, we aim at determining how a country or a region is organised as a territory. As such, we identify the transmission system operators (TSO) and distribution system operators (DSO) for each country and region. Besides, given that variations in prices may be due to local considerations, we specify whether a country is divided into zones for which results are presented individually rather than at national level.

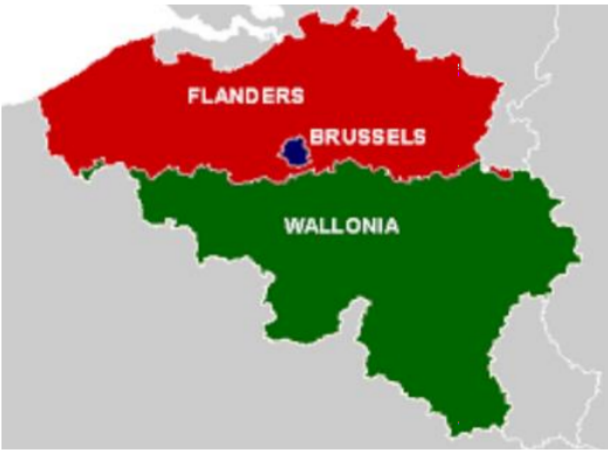
Belgium

No regional variations are observed in Belgium regarding transport and commodity costs. There is a single Transmission System Operator which is Fluxys Belgium, resulting in an equivalent transport price across the country.

The transport system is currently directly providing around 230 clients, and we consider G2 as part of these direct connections[33].

In a similar fashion as for electricity, a distinct analysis is conducted for the three Belgian regions that are mapped out in Figure 19.

Figure 19 : Belgium national natural gas market



Flanders

As exhibited in the consumer profiles, we consider that profiles G-RES to G1 (considered as T6) are connected to the distribution grid. Flanders counts 10 DSOs for natural gas distribution, 9 operated by Fluvius and one by Enexis[34]. Again, in this case, we present the distribution tariffs from the DSOs are assigned a weight based on the number of EAN connections for natural gas in the region.

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

[34] Enexis active in the Belgian area of Baarle-Hertog, is not considered in the study.

Table 15 : Market shares of Flemish natural gas DSOs[35]

DSO	Number of EAN connections (2021)	Market share (%)
Fluvius Antwerpen	444.039	19,31%
Imewo	434.563	18,90%
Iverlek	366.510	15,94%
Gaselwest	307.261	13,36%
Fluvius Limburg	270.681	11,77%
Intergem	212.282	9,23%
Iveka	158.863	6,91%
Fluvius West	57.730	2,51%
Sibelgas	47.548	2,07%
Total	**2.299.477**	**100%**

Wallonia

Wallonia counts 6 DSOs which are operated by ORES and RESA[36]. The distribution tariffs are thus presented through an average value based on the number of EAN connections.

Table 16 : Market shares of DSOs in Wallonia for natural gas

DSO	Number of EAN connections (2020)	Market share (%)
ORES BW	94.307	12,42%
ORES HAINAUT	323.172	42,57%
ORES LUX	12.575	1,66%
ORES MOUSCRON	35.735	4,71%
ORES NAMUR	44.724	5,89%
RESA	248.606	32,75%
Total	**759.119**	**100%**

Brussels

As for Brussels, there is a single DSO – Sibelga – in this region. Inevitably, it represents 100% of the region's market shares. In 2019, Sibelga supplies 512.401 EAN connection points with natural gas.[37]

Germany

Respecting commodity costs, we distinguish two market areas in Germany[38]: handled by *Gaspool* and *Netconnect Germany (NCG),* which are called Market Area Managers (MAMs). They are composed of eleven different transmission system operators. While most of the TSOs are active in a single market, some are engaged in both.

[35] Data provided by VREG, situation 1/01/2021.

[36] Gaselwest no longer operates in Wallonia since January 1st 2019.

[37] (Sibelga, 2020) - Statistiques 2019

[38] (FNB gas, 2019)

Figure 20 : German national natural gas market

i. **Gaspool area** relies on the following TSOs: Gascade Gastranport, GTG Nord, ONTRAS Gastransport, Nowega and Gasunie Deutschland Transport Services.

ii. **NetConnect Germany (NCG)** relies on the following TSOs: Bayernets, Fluxys TENP, GRTgaz Deutschland, Terranets BW, Thyssengas and Open Grid Europe.

As the two MAMs have secure connections and a leading convergence policy[39], we consider a single result for the German natural gas analysis. The upcoming areas merger supports this choice[40]. Respecting commodity costs, we demonstrate an average value of Gaspool and NCG prices for industrial profiles (G0 to G2) and compute a product portfolio for residential consumers (G-RES and G-PRO) that are determined by the DSOs selection we address further in this section

Respecting network costs, transport prices are computed as the average exit tariffs of the eleven TSOs providing directly connected industrial consumers as a bedrock to evaluate the G2 profile tariffs. Other profiles are considered to pay for distribution, which already integrates transport costs in Germany. The basic contract or "*Grundversorgung*" for natural gas consumers depends on the regional DSO.

With over 700 DSOs[41] within the country, we once again present an average of the distribution tariffs of a large rural and a large urban DSO from each of the four previously defined market areas. The selected DSOs and there market share is detailed in the table below.[42]

[39] (Gaspool, 2016) For instance: Gaspool and NetConnect jointly support continuation of natural gas quality conversion fee.

[40] (Marketsgebietzusammenlungen, 2019) The two market areas are expected to merge as of 01/10/2021 to become a nationwide natural gas market area.

[41](European Commission, 2019)

[42] These DSOs that were selected are slightly different from the DSOs that were selected for electricity. This is due to the fact that geographical coverage of the distribution of electricity and natural gas are not identical within a certain area. So has Stromnetz Berlin been replaced by Netzgesellschaft Berlin-Brandenburg and Stuttgart Netze by Karlsruhe Netz.

Table 17 : Normalised market shares of German natural gas DSOs

DSO	Number of EAN connections (2018)	Market share (%)
Bayernwerk	89.193	51,61%
SWM	83.642	48,39%
Total	**172.835**	**100%**
E-Dis	34.873	16,37%
NBB	178.200	83,63%
Total	**213.073**	**100%**
Westnetz	448.572	64,56%
RNG-Netz 2 – Köln	246.278	35,44%
Total	**694.850**	**100%**
Netze BW	150.960	84,32%
Karlsruhe Netz	28.074	15,68%
Total	**179.034**	**100%**

Contrary to other countries/regions the market shares of the DSOs are not used as weights because they are only a selection of the hundreds of German DSOs. The distribution tariffs of every DSO thus has the same weight. Considering the natural gas price applied to the selected profiles, the sole component that does not produce regional variation is the taxes and levies item.

France

France displays a single market area for natural gas, Trading Region France (TRF), since the merger of former market areas PEG Nord and TRS in 2018. Consequently, the French results are presented as an unique price zone. The country has two distinct transport operators, as depicted in Figure 21, which are:

i. GRTgaz is operating in the North, the South-East and the central region;

ii. TEREGA[43] is focusing in the South-West.

Network costs displayed by both TSOs are weighted based on their annual offtakes to come up with a single price. As for distribution costs, given that GRDF (Gaz Réseau Distribution France) supplies 95%[44] of the country's natural gas, it is considered as the unique DSO whose prices only are used in this study.

As it is the case in some other studied countries, French natural gas transport and distribution costs are integrated – except for consumers directly connected to the grid.

[43] TIGF became TEREGA in April 2018.

[44] (CRE, 2019); (GRDF, 2019)

Figure 21: French national gas market

Residential and small professional natural gas contracts appear to be on six different price zones in France, established according to the distance between the nearest natural gas storage centre and the place of consumption, to pass on the difference in transport costs between cities[45]. The lack of information regarding the number of EAN connections per zone led us to select one area – the largest in terms of the number of cities covered (i.e. price zone 1)[46].

Concerning commodity prices, North and South regions are weighted based on their annual volume consumption. As no regional differences in taxes were noticed, France is considered as a single zone.

The Netherlands

In the Netherlands, suppliers can apply a regional surcharge depending on the distance of the region from Groningen for commodity costs, with ten different areas. In practice, the consulted suppliers (in the selection of underlying report) do not apply differentiated tariffs according to the region. Thus, we consider the commodity component to be the same within the country.

There is a single natural gas market (TTF) in the Netherlands, monitoring and managing all-natural gas entering the Dutch transport system. The TTF was established in 2003 to concentrate natural gas trading in a sole marketplace and offers a single Transmission System Operator – Gasunie Transport Services. The natural gas transport grid directly provides 328 industrial clients, assuming that profiles G1 and G2 are among these clients[47]. Thence, we display the Netherlands as a harmonised zone. However, Dutch natural gas distribution is ensured by seven DSOs whose tariffs are weighted based on their respective number of EAN connections described below. Therefore, the Netherlands is treated as one zone, with weighted averages for the distribution tariffs.

[45] (Selectra, 2020)

[46] Ibidem

[47] Gasunie Transport Services is obliged by the Gas Act (Article 10, paragraph 6b) to provide a direct connection point when the applicant has a flow rate greater than 40 m³(n) per hour (equal to 350.400 m³/year). Considering a 9,77 kWh/m³ as disclosed by Gasunie Transport Services, we estimate that profile G1 has a flow rate of 2.047m³/h (= (2.500.000.000 kWh/9,77)/5000) and G2 of 31.986 m³/h (= (100.000.000 kWh/9,77)/8000). While our profile G0 could have been directly connected to the TSO based on minimum flow rate level (43 m³/h), we decided to assume this consumer remains connected to the distribution grid's highest-pressure category to further represent prices variations across consumer profiles.

Figure 22 : Map of the Netherlands natural gas distribution system operators

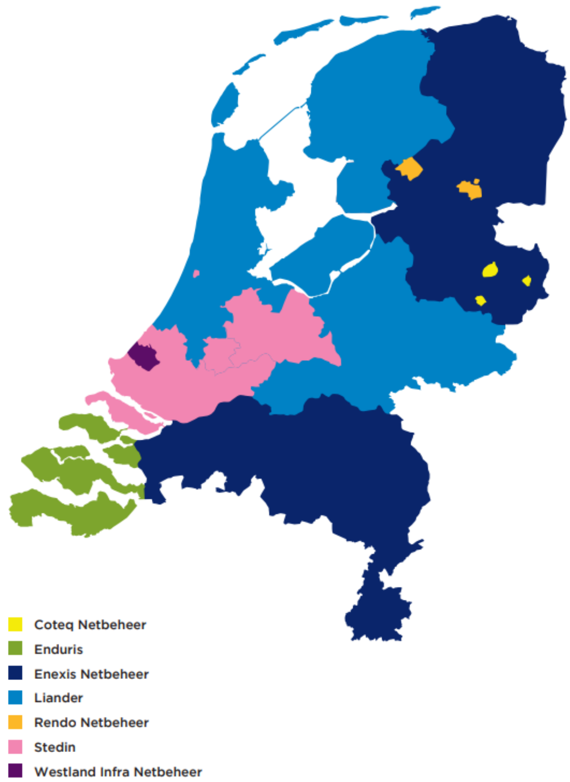


Figure 23 : Market shares of Dutch natural gas DSOs

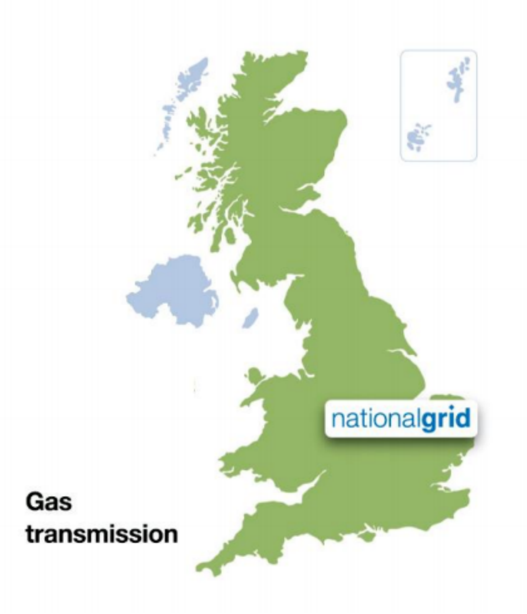
DSOs	Market share[48] (%)
Liander	34,42%
Enexis	31,62%
Stedin	27,19%
Enduris	2,63%
Cogas Infra & Beh	1,96%
Rendo	1,44%
Westland Infra	0,74%
Total	**100%**

[48] The market shares were given to PwC by the CREG (2019).

The United Kingdom

As in some other studied countries, a single zone is determined for the United Kingdom regarding natural gas, leaving out Northern Ireland given that there is a single natural gas market (NBP: National Balancing Point) in the UK. Besides, there is a unique natural gas transmission operator, known as *National Grid Gas plc*.

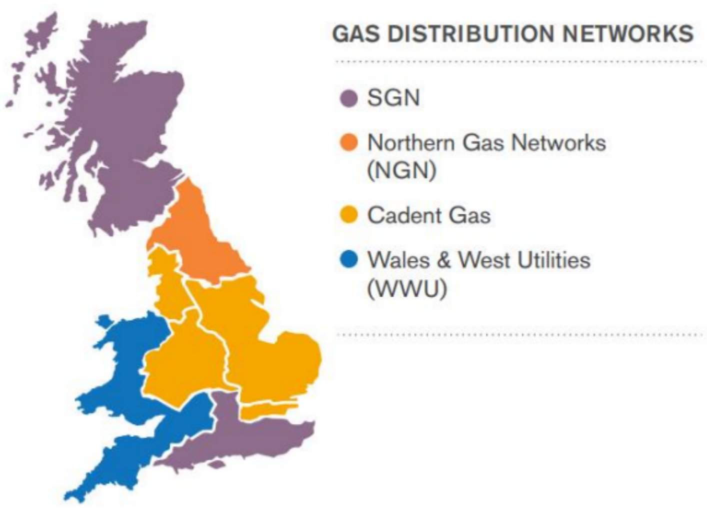
Figure 24 : The United Kingdom national natural gas market



In addition to this unique TSO, one can find nine natural gas distribution networks, owned and managed by the four different operators:

i. **Cadent Gas (4):** West Midlands, North West England, East of England and North London;
ii. **Northern Gas Networks (1):** North East England including North East, North, West and East Yorkshire and Northern Cumbria;
iii. **Wales & West Utilities (2):** Wales and South West England;
iv. **SGN (2):** Scotland and Southern England, including South London.

Figure 25 : The United Kingdom natural gas distribution networks



Additionally, Independent Gas Transporters owns and manages several smaller networks, which are not reckoned in this analysis.

Table 18 exhibits the British DSOs for which market shares could be identified. Whereas SGN and Wales & West Utilities both operate two DSOs, the specific market shares for these DSOs could not be retrieved. Nevertheless, prices displayed by SGN and Wales & West Utilities are identical for all their DSOs, which is why we only use market share at their global level. Consequently, only 7 DSOs are detailed in the table below. Due to the lack of accurate[49] information for each natural gas distribution operators, we used a rough estimate of the number of EAN connections from the operators' websites.

Table 18 : Market shares of the United Kingdom's natural gas DSOs

DSOs	Number of EAN connections (2019)	Market share (%)
Scotland and Southern England	5.900.000	26,76%
East of England (part of Cadent Gas[50])	4.019.395	18,23%
Northern Gas Networks	2.700.000	12,25%
North West (part of Cadent Gas)	2.690.935	12,20%
Wales and West Networks	2.500.000	11,34%
London (part of Cadent Gas)	2.274.533	10,32%
West Midlands (part of Cadent Gas)	1.963.755	8,91%
Total	**22.048.618**	**100%**

British prices used in this study are weighted averages of prices found by each DSO.

Summary table on the number of zones per country

Table 19 : Summary table on the number of zones per country

Country	Number of zones	
	Electricity	Natural Gas
Belgium	3	3
Germany	4	1
France	1	1
The Netherlands	1	1
The United Kingdom	1	1
Total	**10**	**7**

[49] Apart from Cadent Gas, only a rough estimate of the number of EAN connections is available.

[50] In 2017, National Grid Distribution began business under a new brand, Cadent. Cadent Gas gathers four DSOs in charge of different regions.

4. Residential and small professional consumers

4. Residential and small professional consumers

This chapter aims at providing an extensive introduction to the prices, price components and the assumptions taken for each country and region. It mainly focuses on residential (E-RES and G-RES) and small professional (E-SSME, E-BSME and G-PRO) consumers of electricity and natural gas. Before delving into the description of regional and national prices, we present the standard methodology used to assess the cost of the commodity.

Residential and small professional consumers' commodity computation methodology

The following section gives more details regarding the implemented method for data collection to construct the European comparison of electricity and natural gas prices for residential and small professional consumers. This methodology only applies for profiles E-RES, E-SSME and G-RES as for other profiles it is deemed that:

- Larger consumers are more inclined to negotiate their contracts with suppliers directly, thereby being offered more tailor-made contracts.
- Comparison websites used for this methodology do not all accept values associated with our consumer profiles, which limits the consistency of the analysis across countries.

Defining the number of products

The market concentration of the retail market (HHI-index) determines the number of selected products for each of the studied areas. According to the HHI-index, the more concentrated a market is (large combined market share of few suppliers), the fewer products are considered. The less focused a market is (several suppliers with rather low market shares), the more products are deemed to reflect the market dynamics.

The following table illustrates the number of products selected based on HHI-index:

Table 20 : Number of products according to the HHI-index

HHI-index	Description	Number of products
HHI ≤ 1.000	Little concentrated market	5
1.000 < HHI ≥ 2.000	Concentrated market	4
HHI > 2.000	Highly concentrated market	3

The HHI-index for each country and each utility was fetched from the 2018 Retail Markets Monitoring Report from the Council of European Energy Regulators, and this needs to be updated with each report release[51].

While this methodology provides a balanced perspective of the market prices, one must be aware that it does not entirely depict the market situation given that this exercise limits the number of chosen products. Nonetheless, the methodology considered does meet the objective of this study.

Selection of products portfolio

Again, based on the country-specific HHI-index for each utility, we determine several products to be selected. Before elaborating the followed methodology, it is essential to define the term: standard product. The latter is considered, in this study, as either the product to which one is subscribed by default (i.e. when no specific action was taken to opt for a particular supplier product) and that secures the continuity of energy supply or the most

[51] (CEER, 2018) With the exception of Germany, as German authorities do not report HHI indices. We thus used the HHI reported by the European Fact Sheets from the European Commission for Germany (European commission, 2014). As no update was published the 2021 update of this study keeps the same HHI as the previous year.

common product from the market incumbent.[52] As introduced, several products – in addition to the standard product - are picked to constitute the portfolio. The products were not chosen arbitrarily, but according to a specific following methodology:

- The first product to find is the standard product[53] of the market incumbent;
- The second product to consider is the cheapest product on the market, without considering any lump-sum reduction. A price comparison tool[54] is used to fetch the most affordable product in each region[55];
- The third product to consider is the cheapest product of the market incumbent through the price comparison tool of each respective region. In some instances, these comparison websites may be not up to date and are presenting prices of contracts from a previous month[56];
- The fourth/fifth product to consider is one/two of the cheapest products of the second-largest supplier that has not been taken into account yet.

Weight of each product within the product portfolio

The selected products are weighted as follows:

- The switching rate or SR (in %) for each utility in its respective country is the weight associated with to the cheapest product. Depending on the country, a distinction is made between the switching rates for household and non-household consumers but without further specifying rates for different profiles of non-household consumers.
- The remaining share (100% - SR) is then used to weight the other products as follows:
    - If the remaining products are two products of the market incumbent, their weights are the remaining share (100% - SR) divided by two[57].
    - If other products from other market players are considered, the normalised market shares of the implicated market players are extrapolated to the remaining percentage (100% - SR)[58] .

---

[52] In Germany, the term *Grundversorgung* is used, and this product can be defined similarly as in Belgium. In France, the "Tarif bleu", which is regulated by the French government, was used. In the Netherlands, the *Modelcontracten*, which has to be approved by the ACM and is thus also regulated, is the Dutch standard product. We took the "Model contract" from Essent, which is the most significant player on the Dutch market (as part of Innogy). In the UK, the standard product of the market incumbent, British Gas, was selected.

[53] The term "standard product" is not used in all the countries under examination so what we took as the standard product of all countries under the scope of this study might have some differences. Since this study starts from the Belgian perspective the Belgian terminology 'standard product' was taken.

[54] Price comparison tools employed are specific to each country. The ones used are reported in the respective sections assessing the cost of commodity.

[55] A limitation of this method exists as it is possible that in some cases, suppliers take the new network charges into consideration in their products, which has an impact on the ranking of price comparison tools.

[56] It is possible that in the beginning of the month (or even later), price comparison tools do not publish the most recent information available at that moment in time. In those cases, prices of contracts from previous months could be taken into account

[57] Example: if the switching rate amounts to 20%, the remaining 80% are used to weigh the two remaining products of the market incumbent, which each account for 40%.

[58] Example: if the switching rate amounts to 20%, the remaining 80% are used to weigh the remaining products. If the market share of the incumbent is 40% and that of the next largest supplier is 20%, in a first step, their market shares are 'normalised' (respectively 40%/60% = 66,67% and 20%/60% = 33,33%). These market shares are then extrapolated to the remaining 80% (respectively 66,67*80% = 53,33% and 33,33*80%= 26,67%.)

- In the case where more than one product from a specific supplier is selected, we attribute them the same weights (hence has the previously determined weight of the supplier divided by two)[59,60].

- Switching rates were fetched on the Retail Markets Monitoring Report by the Council of European Energy Regulators and make the distinction between residential and small professional consumers[61].

---

[59] Example: In case the switching rate amounts to 20%, and the market incumbent of the previous example has two products selected in the mix, each of its products have a weight of 53,33%/2 = 26,66%

[60] An exception is made for the electricity profiles in France, as most clients still have a regulated product. Therefore, the market share of the regulated product is maintained, and the third product is 100% - the switching rate – the market share of the regulated product.

[61] Yet, the Netherlands do not publish separate data for residential and non-residential consumers. For this country, the combined annual switching rate was therefore used as published by the Energy fact sheets from the European Commission. An exception was also made for France, the SR comes from the report “Le fonctionnement des marchés de détail français de l’électricité et du gaz naturel » which is updated every year.

Electricity

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

For all countries under review, this section details:

1. **Commodity costs** for profiles E-RES, E-SSME and E-BSME;
2. **Network costs** for profiles E-RES, E-SSME and E-BSME;
3. **All other costs** for profiles E-RES, E-SSME and E-BSME.
4. **VAT** for profile E-RES

Profile	Consumption (kWh)	Connection capacity (kVA)[62]
E-RES	3.500	9,20
E-SSME	30.000	46,90
E-BSME	160.000	156

Belgium

Contrary to what is observed in other countries, the Belgian Electricity suppliers have quite transparent price sheets. Commonly not only the current price sheets can be found online but also previous ones, meaning that the evolution over the years can easily be seen. The price sheets also give a good overview of all charged components, thereby offering a clear understanding of what the final invoice will be.

Component 1 – the commodity price

In 2018, the HHI of the retail market in Belgium was over 2.000, and according to the methodology, this entails that we consider only three products: the standard product, the cheapest product of the market incumbent, and the cheapest offer on the market. The switching rate for households in Belgium is 18,95% (E-RES) and for non-households 21,6% (E-SSME). The products of the market incumbent for E-RES thus each weigh (100%-18,95%)/2 or 40,53%. For the E-SSME, the two products of the market incumbent each weight 39,20%, (100%-21,6%)/2.

Table 21 : Profile weights depending on the Belgian product

Product	Weight E-RES	Weight E-SSME
Standard product of market incumbent	40,53%	39,20%
Cheapest product on the market	18,95%	21,60%
Cheapest product of the market incumbent	40,53%	39,20%
Total	100%	100%

The table below gives an overview of the selected products, based on the consumption and characteristics of the profile, per region and their annual cost. To choose these products price comparison websites of the respective regional regulators were used: https://vtest.vreg.be/ for Flanders, www.compacwape.be for Wallonia and www.brusim.be for Brussels. All prices reported are VAT excluded.

Table 22 : Annual cost of selected products for profile E-RES in Belgium

Region	Supplier – Product	Fixed component (EUR/year)	Price for peak consumption (EUR/year)	Price for off-peak consumption (EUR/year)
Brussels	ENGIE - Electrabel Easy Indexed	50,00	117,79	86,19
	MEGA – Super variable	0,00	97,94	83,38
	ENGIE – Electrabel Direct	22,60	91,60	89,19

[62] Methodology to assess connection capacity of each profile can be found in section 3.2. Consumer profiles.

Wallonia	ENGIE - Electrabel Easy Indexed	50,00	117,79	86,19
	MEGA - Super Variable 1 an	0	97,93	83,37
	ENGIE - Electrabel Direct	22,60	91,60	89,19
Flanders	ENGIE - Electrabel Easy Indexed	50,00	117,79	86,19
	Vlaamse Energieleverancier - Groen variabel	0,00	80,62	95,74
	ENGIE - Electrabel Direct	22,60	91,60	89,19

Table 23 : Annual cost of selected products for profile E-SSME in Belgium

Region	Supplier – Product	Fixed component (EUR/year)	Price for peak consumption (EUR/year)	Price for off-peak consumption (EUR/year)
Brussels	ENGIE - Electrabel Easy Pro Indexed	48,50	1.336,30	608,21
	LUMINUS - Basic pro	15,00	968,84	527,73
	ENGIE - Electrabel Direct Pro	14,81	1.083,56	591,29
Wallonia	ENGIE - Electrabel Easy Pro Indexed	48,50	1.336,30	608,21
	Luminus - Basic Pro Electricité	15,00	968,84	527,73
	ENGIE - Electrabel Direct Pro	14,81	1.083,56	591,29
Flanders	ENGIE - Electrabel Easy Pro Indexed	48,50	1.336,30	608,21
	Vlaamse Energieleverancier - Groen variabel pro	50,00	907,02	604,68
	ENGIE - Electrabel Direct Pro	14,81	1083,56	591,29

While this methodology provides an objective view of the market situation in Belgium, one must be aware that it does not provide a full overview of market prices as only three products were considered to depict the Belgian commodity prices.

The commodity price for the E-BSME profile was not extracted from a comparison website but calculated according to the following formula, procured by the CREG.[63] Commodity prices computation rests on market prices and describes the cost of electricity for industrial consumers as of January 2021. We used the ICE Endex CAL and the Belpex DAM as national indexes for the computation. For the E-BSME profile, we did not include weekend hours of Belpex DAM.

$$\textit{Commodity price}$$
$$= 36.5\%\ CAL\ Y_{-1} + 27.4\%\ CAL\ Y_{-2} + 21.4\%\ CAL\ Y_{-3} + 8.2\%\ Qi_{-1} + 4.2\%\ Mi_{-1} + 2.3\%\ Belpex\ DAM$$

Where:

[63] The equations are based on an analysis of all Belgian consumers with a yearly usage higher than 10 GWh, which was performed by the Belgian regulator. For 2021, ratios used in the formula were determined as being the average coefficients over three years (2016 to 2018). For the sake of consistency, the coefficients will remain the same for the initial study and the yearly updates until 2023.

	Explanation
CAL Y_{-1}	Average year ahead forward price in 2020
CAL Y_{-2}	Average two years ahead forward price in 2019
CAL Y_{-3}	Average three years ahead forward price in 2018
Qi_{-1}	Average quarter ahead forward price in the fourth quarter of 2020
Mi_{-1}	Average month ahead forward price in December 2020

Component 2 – network costs

Transmission cost

All residential profiles reviewed in this study are subject to transmission tariffs. The table below syntheses the components per region:

Table 24 : Network cost components per Belgian region

Brussels	Flanders	Wallonia
1. Transmission costs	1. Tariffs for the management and the development of the grid infrastructure 2. Tariffs for the management of the electric system 3. Tariffs for the power reserves and black start 4. Tariffs for market integration	1. Fares for the management and the development of the grid infrastructure
2. Tariffs for network losses[64]	-	2. Tariffs for network losses[65]

Concerning transmission tariffs, regional regulators also differ in terms of timing of tariffs adoption. The table below sets out the different adoption dates per region:

Table 25 : Adoption date of new tariffs by regional DSOs in Belgium

Adoption of new tariffs by local regulators	Transmission
VREG	1 March 2021
BRUGEL	1 January 2021
CWaPE	1 March 2021

This study analyses the tariffs in January 2021. Therefore, transmission tariffs for Wallonia are taken at their 2020 level as they remain valid until the end of February 2021.

[64] Network losses on the federal transmission grid (380/220/150 kV) are a separate and additional component of transmission tariffs. Suppliers usually bill these costs as a percentage (fixed every year by the TSO) of the commodity cost. While the costs associated to network losses is not a transmission tariff as such, it is deemed to be a part of the 2nd component in this study. We consider that such tariff only applies to E-BSME as commodity is not computed based on a supplier's product, which would cover network losses through its costs.

[65] See footnote 64.

Distribution costs

When consumers are also connected to the distribution grid, which is the case for all of our residential and small professional profiles, distribution tariffs have to be added to the transmission tariffs mentioned above. Similarly, to transmission costs charged by regional DSOs, each DSO publishes their tariff sheets from which fees were selected based on the tension level. As our profiles have different tension levels, we assume that each profile can be characterised as follows:

Profiles	Brussels	Flanders	Wallonia
E-RES	BT	LS Zonder piekmeting	BT Sans mesure de pointe
E-SSME	BT	LS Zonder piekmeting	BT Sans mesure de pointe
E-BSME	1-26 kV	1-26 kV Hoofdvoeding	MT Avec mesure de pointe

There is a relatively similar component in the distribution sheets of all the DSOs of all regions, namely "Tariff for the use of the distribution grid". This component is composed of three terms:

Table 26 : Distribution cost composition in Belgium

Brussels	Flanders	Wallonia
Capacity term (in EUR/kW)	Capacity term	Capacity term
Fixed term (in EUR/Year)	-	Fixed term
Proportional term (in EUR/kWh)	Proportional term	Proportional term

Whereas Brussels and Flanders both assess their capacity term based on consumers' annual peak, Wallonia considers the yearly and monthly peaks. The yearly peak is considered as the peak over the last 11 months before invoicing month and makes up for 75% of the component. Monthly peak, the remaining 25%, is determined as the peak of the invoicing month. It is to be noted that the capacity term only applies from consumer E-BSME.

Furthermore, all three regions differentiate these distribution charges according to the time of the day. As such, different prices prevail whether electricity is consumed during daytime hours (from 7 am to 10 pm during weekdays) or night-time (from 10 pm to 7 am during weekdays and all hours during weekends). Besides, an exclusive night-time tariff exists (same hours as night-time schedule) for consumers equipped with meters only functioning overnight.

Besides, the following components are part of distribution tariffs:

Table 27 : Other distribution cost component in Belgium

Brussels	Flanders	Wallonia[66]
Metering costs	Tariff of data management[67]	Regulatory balances
-	Tariff for system services	-
	Network losses	

Considering tariffs are region- and DSO-dependent, we compute the weighted average for each component. The weights of elements are attributed based on the number of EAN connections[68] per DSO. For Flanders and

[66] Charges for metering activities in Wallonia are built in tariffs for the use of the distribution grid.

[67] In 2019, the Flemish government conferred Fluvius the role of data manager with a view to the roll-out of the digital meter, among other things. The activities to be performed by the data manager concern data recorded by all types of meter, not only digital meters, but also analogue and electronic meters. The costs of all these activities will be charged as of 2021 via the data management tariff which replaces the metering costs.

[68] EAN (European Article Numbering) is a unique code attributed to meters and which indicates a supply point for electricity or natural gas.

Wallonia, all operating DSOs are taken into account, representing 100% of the EAN connections[69]. In Brussels, Sibelga is the only DSO, representing 100% of EAN connections.

Component 3 – all other costs

In Belgium, several additional fees apply to electricity. Because of the existence of three regions, these costs often have different rates that are only applicable to a specific region. To summarise the above, two aspects must be taken into account when looking at the other costs. Firstly, there are costs on the federal level and the three regional levels. Secondly, there are PSOs on one side and taxes, levies and surcharges on another side. These costs are summarised below with a distinction between average costs to all three Belgian regions and the one's specific per region. It is to be noted that federal charges are levied by the Belgian TSO (Elia), and regional DSOs levy regional charges. Tariff rates are mentioned when they do not vary depending on the consumer profile and/or the DSO; otherwise, units in which they are expressed are detailed:

Table 28 : Other costs for residential and small professional electricity consumers applying in all three Belgian regions[70]

All regions	Profiles
Federal Public Service Obligations (Federal PSOs) on transmission[71]	
a. Financing for the connection of offshore wind turbine parks (0,084 EUR/MWh); b. Financing for green certificates (federal)[72] (11,6852 EUR/MWh); c. Financing for strategic reserves (0,051 EUR/MWh)[73];	All
Regional Public Service Obligations (Regional PSOs)	
Regional PSOs on distribution[74]	
a. A general tariff for regional PSOs (expressed in EUR/MWh)	All
Taxes and levies on the federal level	
a. Federal contribution[75] (3,4700 EUR/MWh); b. Energy contribution[76] (1,9261 EUR/MWh).	a. All b. E-RES and E-SSME

Degressivity exists on the federal contribution and the funding for green certificates PSO for consumers, from a specific consumption threshold, which are part of a sectoral agreement. Below this threshold, the degressivity is automatically applied. The sectoral agreement scheme does not exist in Brussels, which is why the degressivity is automatically applied to all consumers.

[69] The number of EAN connections for Flanders at their 2020 level and for Wallonia at their 2018 level.

[70] The tariffs shown are those as approved for Elia for 2021, but as already stated in the text, for Flanders and Wallonia these were only published from 03/2021, so that for these regions 2020 values are still used in the calculations for this study.

[71] The three categories of costs under the Federal PSOs are grouped as the "ELIA surcharge" for Brussels

[72] This only encompasses activities that are not a competence of the Belgian regions and the "pioneers" of solar energy (Wolters Kluwer, 2013)

[73] The financing of strategic reserve PSO is taken into account starting E2.

[74] For each region of Belgium, we compute the tariff through a weighted average of each component across all DSO active in the region (weights are given in terms of number of EAN connection per DSO).

[75] In all three regions, federal contribution is to be increased by 1,1%. Firstly, to compensate for the administrative and financial costs of the electricity supplier and secondly to compensate for the part of the federal contribution that would not be paid by the end-consumer. There is an additional 0,1% increase for profiles connected to the distribution grid to compensate for the administrative costs of the DSO (Art. 4bis and 4ter Royal Decree 24 March 2003).

[76] Not applicable on E-BSME profile because it has a connection level > 1kV.

Table 29 : Regional other costs for residential and small professional electricity consumers[77]

Brussels	Flanders	Wallonia	Profiles
Regional Public Service Obligations (Regional PSOs)			
Regional PSOs on transmission			
a. Financing of regional energy policies[78] (E-RES and E-SSME: 1,36 - 6,80 EUR/month; E-BSME: 0,95 EUR/kVA)	a. Financing of support measures for renewable energy and cogeneration (0,1609 EUR/MWh)	a. Funding of support measures for renewable energy[79] (12,9606 EUR/MWh)	All
-	b. Financing measures for the promotion of rational energy use (0 EUR/MWh)	-	
Taxes and levies on the regional level			
Regional taxes and levies on distribution			
a. Charges on non-capitalised pensions (0,283 - 1,108 EUR/MWh)	a. Charges on non-capitalised pensions (0,1033 - 0,9231 EUR/MWh)	a. Levy for occupying road network (0,002832 - 2,9379 EUR/MWh)	All
b. Levy for occupying road network (3,541 - 7,081 EUR/MWh)	b. Contribution for the energy fund[80](0,43 – 155,51 EUR/month)	b. Corporate income tax (0,8586 - 4,3922 EUR/MWh)	
c. Corporate income tax and other taxes (0,921 - 4,064 EUR/MWh)	c. Other local, provincial, regional and federal taxes, Charges, Surcharges, Fees and contributions (0,064 - 0,5719 EUR/MWh)	c. Other local, provincial, regional and federal taxes, Charges, Surcharges, Fees and contributions (0,0042 - 0,0047 EUR/MWh)	
Regional taxes and levies on transmission			
-	a. Levy for the taxes pylons and trenches in Flanders (0,0001441 EUR/kWh)	a. Connection fee (0,075 for the first 100 kWh; 0,3 - 0,75 in EUR/MWh)	All
-	-	b. Levy for the use of the public domain (0,3144 EUR/MWh)	

In addition to these previously mentioned taxes and levies, the three Belgian regions also implemented **certificate schemes** that come as another indirect cost. Even though these schemes mechanisms are similar, they present regional differences. Every year, suppliers must reach a certain quota, differing depending on the region, of green certificates, or they are fined. Suppliers charge these additional costs to their customers, and since these fines can vary between suppliers, the costs for the customers also vary. We take into account the extra "Green Certificate costs" surcharge published by each of the selected suppliers on their tariff sheets in each

[77] The tariffs represented in this table vary depending on the DSO and we have thus chosen to only present the minimum and maximum range of the tariff from the largest (or only) DSO of the region. Sibelga for Brussels, Imewo for Flanders and ORES Hainaut for Wallonia.

[78] (Sibelga, 2020)

[79] In Wallonia a partial exemption of 85% applies for holders of a sectoral energy efficiency agreement, meaning that the E-BSME profile can profit from this reduction.

[80] (Vlaamse Overheid, sd)

of the regions. In Wallonia, there is a reduction on the green certificate scheme for holders of a climate change or sector agreement, which we consider applies to profile E1 and above and is therefore not taken into account for residential and small professional consumers[81]. Flanders also has a reduction on the green certificate scheme which is based on the Nace-code and the total consumption.

Besides, while there is a green certificate system for renewable energies in each region, Flanders also has a certification scheme for combined heat/power (WKK).

Component 4 – VAT

There is no reduced VAT electricity for residential consumers in Belgium, and it is thus subjected to an additional 21%. The VAT is presented as a different price component. However, this VAT is not due on the federal contribution, the contribution for the energy fund in Flanders and the connection fee in Wallonia.

Germany

Component 1 – the commodity price

Germany had an HHI-index, not retrieved from CEER, of 2.021 for the retail market in 2014[82]. We thus consider three products for both profiles E-RES and E-SSME: the standard product of the market incumbent, the cheapest product of the market incumbent, and the most competitive offer on the market. However, Germany presents peculiarities leading to separately identifying each mentioned product for each region:

- As detailed in the methodology section of Germany, different areas are taken into account because of the existence of price divergences and all have different standard products called *Grundversorgung*.
- For some regions, the cheapest product was also the most affordable product of the market incumbent. Consequently, the 4th product – the cheapest from the second-largest player - replaces the 3rd product. Yet, the 2nd largest supplier can differ from one region to another, which is why we have taken the assumption that the supplier, from the table below, that offers the cheapest product in that region is probably the 2nd most significant supplier of that region (as long as it is not the market incumbent). When this occurs, products' weights are normalised according to the market shares presented below.

Table 30 : Market share of German energy suppliers

Energy supplier	Market share[83]
RWE AG	21,00%
EnBW AG	13,00%
E.ON AG	15,00%
Vattenfall Europe AG	13,00%
Stadtwerke und andere öffentliche Anbieter[84]	29,00%
Alternative private Stromanbieter	9,00%

The German annual switching rate is of 10,2% for household (profile E-RES) and 12,7% for non-household (profile E-SSME) consumers. In previous countries, we have set out which weights are attributed to the chosen products. The table below illustrates the products' weights in situations following the first methodology. As previously explained, these shares do not hold when the cheapest product of the market is the incumbent's product.

[81] See General assumption (p.78)

[82] (European commission, 2014)

[83] (Stromvergleich, 2015)

[84] In Germany, cities frequently provide their own energy product and they tend to have a large market share. While the 29,0% indicates the market share that all the Stadtwerke have together in Germany. We take the assumption that this is also the % they have in the region when their product is taken into account.

When it is the case, it is assumed that such supplier has a 29% market share in the individual region.

Table 31 : Profile weights depending on the German product

Product	Weight E-RES	Weight E-SSME
Standard product of the market incumbent	44,90%	43,65%
Cheapest product on the market	10,20%	12,70%
Cheapest product of the market incumbent	44,90%	43,65%

The cheapest product was selected by using the German price comparison website, https://www.stromanbietervergleich.net/. The prices presented in the table below still integrate taxes (except VAT) and network costs because German suppliers use “all-in tariffs”. Furthermore, not all the selected products use different prices for peak and off-peak consumption. While this makes the comparison with other countries more complicated, it is deemed more important to choose the products according to the methodology. In Germany, this means that we took the cheapest product, of the market or the market incumbent, regardless of a dual price system or not.

Table 32 : Annual cost of selected products for profile E-RES in German

Region	Supplier - product	Grundpreis (EUR/year)[85]	Arbeitspreis[86] for peak consumption (EUR/year)	Arbeitspreis for off-peak consumption (EUR/year)	Arbeitspreis without dual tariff (EUR/year)	Weight
Bayern-werk	E.ON - Grundversorgung Strom HH Doppeltarif	135,35	427,16	412,25	-	44,90%
	eprimo – PrimaKlima	68,03	-	-	735,59	10,20%
	E.ON – Strom Pur	139,74	-	-	773,53	44,90%
SWM Infrastruktur Stammgebiet	SWM – Grund- und Ersatzversorgung HH NT	123,68	384,27	391,82	-	44,90%
	eprimo - PrimaKlima	20,17	-	-	730,59	10,20%
	SWM – M-Strom flex	109,04	374,18	381,92	-	44,90%
E-DIS	E.ON – Grundversorgung Strom HH Doppeltarif	141,65	434,02	501,34		44,90%
	eprimo - PrimaKlima	53,58	-	-	812,06	10,20%
	E.ON – Strom Pur	138,57	-	-	854,41	44,90%
Stromnetz Berlin	Vattenfall – Berlin Basis Privatstrom mit Zweitarifzähler	106,89	453,11	409,06		44,90%
	eprimo - PrimaKlima	20,17	-	-	774,41	10,20%
	Vattenfall – Easy12 Strom Standard	94,79	358,99	426,30	-	44,90%
Westnetz	EW Aach - Komfort HH NT	119,28	434,82	516,35	-	44,90%
	eprimo - PrimaKlima	20,17	-	-	805,59	10,20%
	EW Aach – AktivPrivat NT	115,92	-	-	937,65	44,90%
RNG-Netz 2- Köln	RheinEnergie – FairRegio Strom Basis	157,30	-	-	843,50	44,90%
	eprimo - PrimaKlima	90,65	-	-	695,59	10,20%
	RHEINENERGIE – FairRegio Strom plus Online-option	150,10	-	-	827,75	44,90%
Netze BW	EnBW – Komfort Haushalt	119,28	-	-	951,30	44,90%
	eprimo - PrimaKlima	20,17	-	-	805,59	10,20%
	EnBW - Online	124,80	-	-	876,40	44,90%
Stuttgart Netze	EnBW – Komfort Haushalt	119,28	-	-	951,30	44,90%
	Montana – Garant 12	19,68	-	-	802,20	10,20%
	Vattenfall – Easy Strom	64,54	-	-	822,65	44,90%

[85] Basic price (fixed)

[86] Labour price (variable)

Table 33 : Annual cost of selected products for profile E-SSME in Germany

Region	Supplier - product	Grundpreis	Arbeitspreis[87] Peak consumption (EUR/year)	Arbeitspreis Off-peak consumption (EUR/year)	Arbeitspreis without dual tariff (EUR/year)	Weight
Bayernwerk	E.ON – Strom Pro Pur Fix	214,53	-	-	6.378,00	46,80%
	MAINGAU StromRegio	30,25	-	-	6.068,07	12,70%
	Vattenfall – Profi12 Standard Strom	166,79	-	-	6.438,66	40,50%
SWM Infrastruktur Stammgebiet	SWM – M-Ökostrom business Vario DT	109,04	3.994,79	2.267,90	-	43,65%
	Maingau – Stromregio	30,25	-	-	6.045,38	12,70%
	SWM – M-Strom business Vario DT	109,04	3.958,49	2.243,70	-	43,65%
E-DIS	E.ON – Strom pro pur fix	209,46	-	-	7.011,00	46,77%
	Maingau – Stromregio	30,25	-	-	6.753,78	12,70%
	Vattenfall – Profil 12 standard	148,84	-	-	7.157,14	40,53%
Stromnetz Berlin	Vattenfall – Profil Strom	105,00	-	-	7.025,40	43,70%
	Maingau – Stromregio	30,25	-	-	6.262,18	12,70%
	Vattenfall – Profi12 Tag-Nacht Strom	141,00	4.245,88	2.230,59	-	43,70%
Westnetz	Ew Aach – AktivProfi ZT	136,44	5.049,08	2.932,44	-	60,28%
	Maingau – Stromregio	30,25	-	-	6.516,81	12,70%
	Vattenfall – Profil 12 standard strom	130,79	-	-	7.099,16	27,02%
RNG-Netz 2-Köln	RHEINENERGIE – TradeRegio Strom basis	174,00	-	-	7.461	43,70%
	Maingau – Stromregio	30,25	-	-	5.669,75	12,70%
	RHEINENERGIE – Gewerbestrom plus	150,10	-	-	7.095,00	43,70%
Netze BW	ENQU – Aurora eco business	138,81	-	-	6.963,00	43,70%
	Maingau - Stromregio	30,25	-	-	6.516,81	12,70%
	ENQU - Online	120,20	-	-	6.963,00	43,70%
Stuttgart Netze	ENQU – Aurora eco business[88]	79,74	-	-	7.167,00	43,70%
	Maingau - Stromregio	30,25	-	-	6.675,63	12,70%
	Vattenfall – Profil 12 standard	94,79	-	-	7.308,40	43,70%

The commodity price could not be extracted through the comparing site for the E-BSME profile, and we have thus used a formula that was provided to us by the CREG[89]. The EEX Futures and EPEX DAM prices are the national indexes employed in the computation. We did not take the weekend hours of the EPEX SPOT DE DAM into account for the E-BSME profile. The CREG provided us with the formula. For 2021, ratios used in the formula were determined as being the average coefficients over three years (2016 to 2018).

$$Commodity\ price$$
$$= 36.5\%\ CAL\ Y_{-1} + 27.4\%\ CAL\ Y_{-2} + 21.4\%\ CAL\ Y_{-3} + 8.2\%\ Qi_{-1} + 4.2\%\ Mi_{-1} + 2.3\%\ EPEX\ Spot\ DE$$

[87] Labour price (variable)

[88] As no market share was found for this energy supplier no normalised market share could be computed. We have thus distributed the weights equally between Enqu en Vattenfall.

[89] The formula is based on an analysis carried by the Belgian regulator of electricity supply contracts of all Belgian consumers with consumption higher than 10 GWh dating back to 2015.

Where:

	Explanation
CAL Y_{-1}	Average year ahead forward price in 2020
CAL Y_{-2}	Average two years ahead forward price in 2019
CAL Y_{-3}	Average three years ahead forward price in 2018
Qi_{-1}	Average quarter ahead forward price in the fourth quarter of 2020
Mi_{-1}	Average month ahead forward price in December 2020

Component 2 – network costs

Integrated transmission and distribution costs

The German electricity market is quite different than the Belgian one. The four TSOs exclusively operate on the (extra-) high voltage grid whereas all lower voltage levels are managed by DSOs (often up to 110 kV).

Furthermore, the German price-setting offers less transparency because they use "all-in tariffs", meaning that the consumer is only presented one tariff without a clear distinction of its components. As described in the dataset, we offer results for four TSO, but since Germany counts more than 800 DSOs[90], a weighted average of 2 DSOs (one rural and one urban) is being presented. This is the case for the E-RES and E-SSME profile. Since the commodity price of E-BSME is computed with a formula, network costs have to be added separately. A more detailed description is provided in "Chapter 5. Component 2 – network costs" (p. 242). E-BSME is subject to the same network costs as the E0 and E1 profiles.

When it comes to the transmission and distribution tariff methodology, German DSOs and TSOs offer a similar structure even though terms are labelled differently. Although every DSO imposes different rates for different ranges of both maximum capacity contracted and electricity consumer, it always involves the same 3 components which are synthesized in the table underneath:

Table 34 : Components of the German network costs

Network costs		
Component	**German label**	**Explanation**
Basic charge	Grundpreis	The basic fee expressed in EUR/year.
Consumption charge	Arbeitspreis	It depends upon the volume of energy consumed in kWh/year, expressed in cEUR/kWh/year.
Metering costs	Messstellenbetrieb	The charges are related to the cost of metering and invoicing; fixed prices expressed in EUR/year.

90 (European Commission, 2019)

Component 3 – all other costs

Regarding German taxes and levies, 7 surcharges apply on electricity price:

1. The "*KWKG-Umlage*" – Kraft-Wärme-Kopplungsgesetz or Combined Heat and Power Act – is a tax contributing to CHP-plant subsidies. The calculation is based on the present forecast data of DSOs and the Federal office for Economic Affairs and Export Control (BAFA). This cost (2,54 EUR/MWh) applies to E-RES, E-SSME and E-BSME[91].
2. The "*StromNEV*" or Electricity Network Charges Ordinance, based on the regulation of charges for access to electricity networks § 19, is a digressive levy to compensate for §19 transmission tariff reductions. This cost (4,32 EUR/MWh) applies to E-RES, E-SSME and E-BSME[92].
3. The "*Offshore-Netzumlage*" or Offshore Network Levy, is a digressive levy. Several rates apply depending on the consumption level and discounts can be granted from above 1 GWh, which does not concern the profiles under review in this section. We thus use the basic rate (3,95 EUR/MWh) for all profiles[93].
4. The "*EEG-Umlage*" – Erneuerbare-Energie-Gesetz or Renewable Energy Act – is a contribution to the renewable energy financing other than offshore wind power generation unit. Since reductions do not apply to any of the profiles under review in this section, the standard rate (65 EUR/MWh) is used[94].
5. The "*Stromsteuer*" or Electricity tax, as its translation shows, is a tax on electricity with a standard rate (20,50 EUR/MWh) that remains unchanged since 2003[95].
6. The "*Konzessionsabgabe*" or Concession fee, is a tax (18,23 EUR/MWh) imposed on all users to fund local governments. The municipality size, as well as the contract type of the consumer[96], constitute the criteria regarding the applied rate. Reductions may be granted from a 30 MWh annual offtake.
7. The "*Abschaltbaren Lasten-Umlage*" or Interruptible loads levy, is a tax (0,09 EUR/MWh) used to offset compensation payments made by transmission system operators to demand-side response (DSR) service providers[97].

Component 4 – VAT

Germany imposes a 19% rate VAT on electricity consumption for residential consumers[98].

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[91] (Netztransparenz.de, 2021).

[92] (Netztransparenz.de, 2021).

[93] (Netztransparenz.de, 2021).

[94] (Netztransparenz.de, 2021).

[95] (Bundesamt für Justiz, 2021).

[96] We distinguish the basic contract, or "*Grundversorgung*", and the other types of contracts.

[97] (Netztransparenz.de, 2021).

[98] VAT or "Mehrwertsteuer" (MwST) in Germany is 19% on electricity. (Smart Rechner, 2019)

France

Component 1 – the commodity price

The HHI of the retail market in France is over 5.000 in 2018[99], meaning that only three products are considered: the standard product, the cheapest offer on the market and the most affordable product of the market incumbent. In 2019, the switching rate for household products in France was 11,9%, and the switching-rate for non-household consumers was 8,9%.[100] The methodology for assigning weights to the products is different for France because most consumers consume the regulated product. The market share for the regulated product is taken as its weight, and the third product has the rest of the weights.

Table 35 : French product weights depending on the profile

Product	Weight E-RES	Weight E- SSME
Standard product of the market incumbent	69,00%	69,00%
Cheapest product on the market	11,90%	8,90%
Cheapest product of the market incumbent/2nd largest supplier	19,10%	22,10%
Total	100%	100%

In France, consumers are presented "all-in tariffs" which toughens the extraction of the commodity component. Using the price comparison website that the CRE puts forward, http://comparateur-offres.energie-info.fr. The commodity cost presented below still includes network and all other costs, but the VAT has already been deducted.

Table 36 : Annual cost of selected products for profile E-RES in France

Region	Supplier – Product	Fixed component (EUR/year)	Price for peak consumption (EUR/year)	Price for off-peak consumption (EUR/year)
France	EDF – Tarif Blue option heures creuses	163,11	239,87	213,12
	Bulb – Offre vert éclair	156,73	205,87	103,71
	EDF – Digiwatt	163,09	230,53	205,52

Table 37 : Annual cost of selected products for profile E-SSME in France

Region	Supplier – Product	Fixed component (EUR/year)	Price for peak consumption (EUR/year)	Price for off-peak consumption (EUR/year)
France	EDF-Tarif Bleu – Réglementé (professionals)	372,48	2.728,80	1.364,40
	Alterna – Idéa élec	389,84	2.238,00	1.304,00
	EDF – Contrat garanti marché public 1 an	369,72	2.635,20	1.339,20

When it comes to E-BSME, consumers in France can benefit from governmental intervention on the commodity costs through the ARENH mechanism. This peculiarity, as well as the formula applied for E-BSME's commodity price, is further explained in section "France Component 1 – the commodity price" (p.172).

[99] (CEER, 2018)

[100] (CRE, 2019)

Component 2 – network costs

Integrated transmission and distribution costs

As in Germany, the transmission and distribution costs are also integrated as one tariff in France. While this might help consumers to better understand their bill, it also makes it less transparent. There are several DSOs in France, but Enedis has a market share of 95% for continental France.[101] Because of this, it is the only DSO that is considered in France in the present study. Distribution prices in France are known as the 'Tarif d'Utilisation du Réseau Public d'Electricité' (TURPE). In january 2021 TURPE 5bis is still in effect but will be replaced by TURPE 6 in august 2021. The French distribution cost consists of 3 components.

Table 38 : Distribution costs in France

Network costs		
Component	**Explanation**	
Management component[102][103]	The management component depends on whether a consumer has a unique contract or not. We assume profiles E-RES and E-SSME opted for exclusive contracts.	
Component for taking off electricity[104]	Multiple prices options exist varying depending on a utilisation length and temporal differentiators capacity and consumption components. The prices options are:	
	Consumers < 36 kVA (E-RES)	**Consumers ≥ 36 kVA (E-SSME)**
	1. Short use (CU)	1. Short use (CU)
	2. Short use with 4 temporal classes (CU4)	2. Long use (LU)
	3. Medium use with a temporal differentiation between peak and off-peak hours (MUDT)	
	4. Medium use with 4 temporal classes (MU4)	
	5. Long use (LU)	
Metering tariff[105]	The metering tariff depends on whether the meter is owned by the consumer or not. The assumption is taken that all three profiles (E-RES, E-SSME and E-BSME) do not own their meters.	

Consumers E-RES and E-SSME face different prices options as depicted in the table above. Concerning E-RES, only two price options out of five presented are considered: CU4 and MU4. The reason behind this lies in the heavy usage of 'Linky' smart meters. The entire French territory is expected to be covered with such meters by 2021 as its implementation started in 2016[106]. As we assume residential consumers to be equipped with 'Linky' smart meters from 2020 onwards, CU4 and MU4 are the only price options available. As for E-SSME, it can either opt for CU or LU prices options. In both cases, both prices options were calculated. As we cannot anticipate which option our potential consumers will prefer, all options are computed and are presented as a price range.

MU4 and CU both rely on 4 temporal classes: peak hours high season (HPH), off-peak hours high season (HCH), peak hours low season (HPB) and off-peak hours low season (HCB). SLP S21 (E-RES) and SLP S11 (E-SSME) for 2020 were used and resulted in the following allocation to determine the proportion of electricity consumed during each temporal class.

[101] (Enedis, 2019)

[102] Since 2018, the level of this component also takes into account the financial compensation paid to suppliers in connection with the management of single-contract customers.

[103] French labelling: Composante annuelle de Gestion

[104] French labelling: Composante annuelle de soutirage

[105] French labelling: Composante annuelle de comptage

[106] (Selectra, 2020)

Table 39 : Allocation of consumption per temporal class in France

Distribution of consumption per temporal class		
Temporal class	**E-RES**	**E-SSME**
HPH	35%	34%
HCH	11%	12%
HPB	38%	40%
HCB	16%	14%

With regards to profile E-BSME, it falls under the category HTA1 for which 4 prices options are available:

- Short use with fixed peak (CU fixed peak);
- Short use with mobile peak (CU mobile peak);
- Long use with fixed peak (LU fixed peak);
- Long use with mobile peak (LU mobile peak);

In a similar fashion to the first two profiles, we computed each prices option that is presented as a price range. Given that these prices options also depend on temporal classes, allocation of hours were also estimated. However, we used RTE's timeframe (see below) to determine hours allocation, taking into account that E-BSME does not operate during weekends.

Table 40 : Hours per temporal classes in France

Hours per temporal classes		
Temporal class	**Weekdays**	**Weekends**
Peak	4h/day for three months (December to February)	/
HPH	12h/day for three months (December to March) + 16h/day for 2 months (March and November)	/
HCH	8h/day for five months (November to March)	24h/day for five months (November to March)
HPB	16h/day for seven months (April to October)	/
HCB	8h/day for seven months (April to October)	24h/day for seven months (April to October)

Component 3 – all other costs

Three extra surcharges, set out below, add up to the price components in France.:

Table 41 : Other costs in France (E-RES, E-SSME, E-BSME)

Title	Definition	Amount
Contribution tarifaire d'acheminement (CTA)	The CTA finances part of the pensions of staff in the energy sector for Electricity and Natural gas Industries.	27,04% for residential and small professional consumers that are connected to the distribution grid and is due on the fixed and power component of the network tariffs.[107] As explained above, network tariffs may vary according to the selected price option. Consequently, the CTA may vary, which is why it is represented as a range.
Consommation finale d'électricité (TCFE) (TCCFE and TDCFE)	The TCFE is a departmental and municipal tax. This tax consists of two parts, namely a default tax and factor defined by the department or municipality.	In 2021, the default tax is set on 0,78 EUR/MWh[108]. Every department can change it with a factor between 2 and 4,25 and by every municipality with a factor between 0 and 8,5[109]. Almost 80% of the municipalities set a coefficient of 8,5, leading to a tax of 6,63 EUR/MWh, while nearly 90% of all departments set a 4,25 factor, leading to a tax of 3,315 EUR/MWh.[110] Therefore, we use these factors since they are the most representative.
Contribution au service public d'électricité (CSPE)	The CSPE is a surcharge that finances expenses related to public service missions in the electricity sector. This surcharge is, for the most part, used for renewables generation subvention schemes.	In 2021, the tax amounts to 22,5 EUR/MWh for residential and small professionals. For small professionals, this tax can reach a minimum of 0,50 EUR/MWh. We present these two tariffs for small professionals as the minimum fare can benefit companies involved in transport activities (freight and passengers), which could be the case of some companies under the small professional profiles.

Component 4 – VAT

Two different VAT rates apply to electricity tariffs, 5,5% and 20%. While the 5,5% rate is imposed on the subscription and the CTA, the 20% VAT is computed on the consumers' actual consumption, the TCFE and CSPE surcharges.[111] As a result of CTA potential variance, a range of possible VAT is also presented in final results.

[107] (CRE, 2019)

[108] (Collectivités locales (gouv.fr), 2021)

[109] The possible factors are limited to 0, 2, 4, 6, 8 et 8,50 for municipalities and to 2, 4 and 4,25 for departments.

[110] (Ministère des Finances (France), 2020)

[111] (Selectra, 2020)

The Netherlands

Component 1 – the commodity price

In the Netherlands, the HHI-index was between 1,500 and 2,000 in 2018.[112] Therefore, we consider four products. These are the standard product, the cheapest product on the market, the most affordable product of the market incumbent and the most competitive product of the second-largest supplier. Since the CEER did not detail the annual switching rate in the Netherlands, the switching rate of the Dutch Energy Union Factsheet (2015) is taken into account[113]. This factsheet gives us a switching rate of 15,1% and is this is thus the weight attributed to the cheapest product for both profiles E-RES and E-SSME[114]. Other products weights are computed based on the normalised market share, which are presented in the table below.

Table 42 : Normalised market shares of the largest two Dutch energy suppliers

Energy supplier	Customers	Normalised market share[115]
Innogy	3.100.000	56,40%
Eneco	2.400.000	43,60%

Weights are allocated according to the following calculations regarding normalised market shares. The weight of the cheapest product equals the annual switching-rate (15,1%). The normalised market share of the market incumbent is 56,4%, estimated as 3.100.000/(3.100.000+2.400.000), and therefore of 43,6% for the second-largest supplier. The market incumbent' product has a weight of (100%-15,156,36%/2 and the product of the second-largest supplier of (100%-15,1%)*43,64, which respectively results in 23,93% and 37,05%. The table below presents the applied weights of profiles E-RES and E-SSME.

Table 43 : Profile weights depending on the Dutch product

Product	Weight
Standard product of the market incumbent	23,90%
Cheapest product on the market	15,10%
Cheapest product of the market incumbent	23,90%
Cheapest product of the second largest player	37,10%

[112] (CEER, 2018)

[113] (European Commission, 2017)

[114] No distinction between household and non-household switching rates could be found. Consequently, we use a unique switching rate for both profiles E-RES and E-SSME.

[115] A more detailed explanation of the need of this normalised market share to compute commodity prices can be found under the section "Residential and small professional consumers' commodity computation methodology - Weight of each product within the product portfolio" (p. 115).

The following price comparison website was used to obtain the cheapest products, https://www.energieleveranciers.nl/. The products are set out in the table below.

Table 44 : Annual cost of selected products for profile E-RES in the Netherlands

Region	Supplier – Product	Fixed component (EUR/year)	Price for peak consumption (EUR/year)	Price for off-peak consumption (EUR/year)
Netherlands	Essent – Modelcontract elektriciteit en natural gas	77,83	111,33	104,61
	Fenor – Vaste Prijs Groene Stroom 1jr	36,30	102,61	108,05
	Essent – Stroom Variabel Groen 1jr.	77,88	110,16	103,23
	Eneco – Hollandse Wind & Zon 1 jaar vast	71,88	114,26	105,80

Table 45 : Annual cost of selected products for profile E-SSME in the Netherlands

Region (CEER, 2018)	Supplier – Product	Fixed component (EUR/year)	Price for peak consumption (EUR/year)	Price for off-peak consumption (EUR/year)
Netherlands	Essent – Modelcontract elektriciteit en natural gas MKB	83,88	1.305,00	721,20
	NLE- Variabele Stroom	70,00	1.117,31	589,66
	Essent – Stroom Variabel Groen 1jr.	77,88	1.239,28	651,95
	Eneco – Europese Wind 1 jaar vast	71,88	1.285,46	668,21

As already mentioned, the previous methodology applied for our profiles E-RES and E-SSME, whereas we use a formula to compute the commodity costs for E-BSME. The computation rests on market prices and describes the cost of electricity for industrial consumers as of January 2020. We used the ICE Endex CAL and the APX NL DAM as national indexes for the computation. The underneath commodity formula is used for each profile. For E-BSME, we did not include weekend hours of APX NL DAM. The CREG provided the formula used for commodities pricing in this investigation.[116]

$$\textit{Commodity price} = 36.5\%\, CAL\, Y_{-1} + 27.4\%\, CAL\, Y_{-2} + 21.4\%\, CAL\, Y_{-3} + 8.2\%\, Qi_{-1} + 4.2\%\, Mi_{-1} + 2.3\%\, APX\, NL\, DAM$$

Where:

	Explanation
CAL Y_{-1}	Average year ahead forward price in 2020
CAL Y_{-2}	Average two years ahead forward price in 2019
CAL Y_{-3}	Average three years ahead forward price in 2018
Qi_{-1}	Average quarter ahead forward price in the fourth quarter of 2020
Mi_{-1}	Average month ahead forward price in December 2020

[116] The equations are based on an analysis of all Belgian consumers with a yearly usage higher than 10 GWh performed by the Belgian regulator of the electricity supply.

Component 2 – network costs

Network prices in the Netherlands are integrated as one tariff and are built on the four components presented in the table below[117]. We take the weighted average of all 7 distribution zones' prices.

Table 46 : Network cost for electricity in the Netherlands (E-RES, E-SSME, E-BSME)

Network costs		
Component	**Dutch labelling**	**Explanation**
Standing charge	Vastrecht	Fixed basic fee (expressed in EUR/year).
Capacity charge	Capaciteitstarieven	The fixed fee is covering the costs associated with the transmission of electricity. Its height depends on the capacity of the connection (expressed in EUR/year).
Periodical connection tariff	Periodieke aansluitvergoeding	The fixed fee is covering the costs for managing the connection (expressed in EUR/year).
Metering charge	Meettarief	The fixed charges are covering for the use and management of energy meters (expressed in EUR/year).

The capacity charge is composed differently for the E-BSME profile:

- Fixed charge depending on the contracted capacity, expressed in EUR/year;
- Variable charge depending on the monthly peak expressed in EUR/kW/month;
- Variable charge depending on the consumption level, expressed in EUR/kWh.

Component 3 – all other costs

For the profiles discussed in this part of the study, two surcharges apply, namely:

- The Energy Tax, *Regulerende Energie Belasting* (REB), which varies, in a digressive trend, according to the amount of consumed electricity. Besides, a reduction of 461,62 EUR/year on the Energy tax is granted to every electricity connection with residential purposes. This reduction ("*Belastingvermindering*") changes every year and is financed by the Dutch government as they consider electricity as a basic need of the population.
- The ODE Levy, *Opslag Duurzame Energie* (ODE), is digressive levy, with reductions starting from 10 MWh.

The rates of the Energy Tax and ODE Levy for electricity in 2021 are displayed in the table below:

Table 47 : Electricity Energy Tax and ODE bands (Netherlands)[118]

Band	Consumption	Energy Tax (EUR/MWh)	ODE (EUR/MWh)
A	Up to 10.000 kWh	94,28	30,00
B	10.000-50.000 kWh	51,64	41,10
C	50.000-10.000.000 kWh	13,75	22,50
D	> 10.000.000 kWh (residential)	1,13	0,40
E	> 10.000.000 kWh (professional)	0, 56	0,40

Given the consumption level of our profiles understudy, they fall into the following bands: A for E-RES, B for E-SSME and C for E-BSME.

[117] (ACM, 2020)

[118] (Belastingdienst Nederland, 2021)

Component 4 – VAT

The VAT on electricity is 21% for residential consumers[119].

The United Kingdom

Component 1 – the commodity price

In the UK suppliers often combine electricity and natural gas in one product, the so-called dual tariff, which is supposed to result in lower prices. Since this is not the case in all the other countries and to have a consistent methodology across the study, we only consider products where electricity is offered by itself. Furthermore, suppliers in the UK generally present all-in tariffs that are not entirely transparent. These tariffs consist of:

- The Standing Charge (fixed element), which is expressed in p/day and that covers the fixed costs of the DSO and;
- Unit Rate Charge (variable element), which is expressed in p/kWh and that varies according to the energy consumption.

Since we only want the commodity price in this section, network charges, taxes and VAT from these 'all-in tariffs' were extracted. Commodity prices of a supplier are not very different between regions, and for the sake of simplicity, we only look at the commodity price in one region, which is then used for all 14 DSO regions. An Ofgem study from 2015[120] analysed the prices throughout the different regions, and out of this study, Yorkshire appeared to be the median zone in term of commodity price. For this reason, the selected products come from the Yorkshire region. The network cost, VAT and taxes are deducted from the all-in prices of the Yorkshire region. Like other countries in review, the weighted average of network tariffs for all DSOs are used to determine the network cost. Since different payment options are proposed, we have taken the monthly direct debit option into account, as it seems to be the most used option. Suppliers generally do not publish different tariffs for domestic and small professional consumers. Suppliers and small professional tend to negotiate directly, and prices are thus not publicly available. Therefore, we assume that small professional consumers pay the same 'all-in' tariffs as domestic consumers.

In 2018, the HHI of the retail market was between 1.000 and 2.000 in the United Kingdom.[121] Therefore, four products are considered: the standard product of the market incumbent, the cheapest product on the market, the most affordable product of the market incumbent and the most affordable product of the second-largest supplier. The table below presents the market shares of the two largest electricity suppliers, British Gas and OVO energy[122], in the United Kingdom, for which we have normalised their market shares.

Table 48 : Normalised market share of energy supplier in the UK

Electricity supplier	Market shares[123]	Normalised market shares
British Gas	18,23%	54,30%
OVO energy	15,34%	45,70%

The weights are distributed as the methodology has set out. The cheapest product is assigned the switching rate as weight, which is 19,1% for household consumers and 19,30% for non-household consumers in 2018[124]. The normalised market shares of British Gas set out above is the result of the following calculation: 18,23%/(18,23%+15,34%)=54,30%. Similarly, OVO's market shares normalisation results in 45,70%.

For E-RES, the products of the market incumbent thus weight (100%-19,1%)*54,30%/2 = 21,96%. About E-SSME, the results is as follows: (100%-19,3%)*54,3%/2= 21,91%. The cheapest product of the 2nd largest energy supplier is thus (100%-19,1%)*45,70%=36,97% for E-RES and (100%-19,3%)*45,70%=36,88% for E-SSME. The weights are set out in the table below.

[119] (Energie Leveranciers, 2021)

[120] (OFGEM, 2015)

[121] (CEER, 2018)

[122] Previously this was SSE but they have been bought by OVO energy

[123] (OFGEM, 2020)

[124] (CEER, 2018)

Table 49 : Profile weights depending on the products in the UK

Product	Weight E-RES	Weight E-SSME
Standard product of the market incumbent	21,96%	21,91%
Cheapest product on the market	19,10%	19,30%
Cheapest product of the market incumbent	21,96%	21,91%
Cheapest product of the second largest player	36,97%	36,88%

An overview of the products we have selected per region and their respective price components are presented in the following table. The cheapest product has been selected through the price comparison website of www.uswitch.co.uk. The prices displayed in the table below are VAT exclusive but still encompasses the network costs and taxes.

Table 50 : Annual cost of selected products for profile E-RES in the UK

Region	Supplier – Product	Fixed component (EUR/year)	Price for peak consumption (EUR/year)	Price for off-peak consumption (EUR/year)
United Kingdom	British Gas – Standard	104,00	344,91	178,73
	EON – Fix online exclusive v57	28,62	335,22	210,87
	British Gas – HomeEnergy Fix Feb22	104,00	358,37	189,40
	OVO energy – 2 year fixed energy	91,72	282,85	216,48

Table 51 : Annual cost of selected products for profile E-SSME in the UK

Region	Supplier – Product	Fixed component (EUR/year)	Price for peak consumption (EUR/year)	Price for off-peak consumption (EUR/year)
United Kingdom [125]	British Gas – Standard	104,00	3.880,23	1.128,86
	GNE - Family green 12 month fixed	147,29	2.899,78	1.420,99
	British Gas – HomeEnergy Fix April 2021	104,00	4.031,67	1.196,21
	OVO energy – 2 year fixed energy	91,72	3.181,65	1.367,21

The commodity price of the E-BSME profile could not be extracted from the comparison website and is therefore computed on the market prices and describes the cost of electricity for industrial consumers as of January 2021. We used the APX UK DAM as the national index for the calculation. The CREG provided us with the formula used for commodity pricing and is based on an analysis carried by the Belgian regulator of electricity supply contracts of all Belgian consumers with consumption higher than 10 GWh[126]. We do not use the weekend hours of APX UK DAM for the E-BSME profile.

[125] (OFGEM, 2020)

[126] As the UK power market work in a different way, based on seasons rather than on a calendar year, we replaced the annual computation with the aggregation of seasonal products on the ICE futures market. BBSx quotes the baseload electricity price on the ICE index for x seasons ahead. We, therefore, used two seasons of BBS2 (a year ahead) to replace CAL Y-1 , two seasons of BBS4 (two years ahead) to replace CAL Y-2 and again, two seasons of BBS6 to replace CAL Y-3.

$$\text{Commodity price} = 36.5\%\ CAL\ Y_{-1} + 27.4\%\ CAL\ Y_{-2} + 21.4\%\ CAL\ Y_{-3} + 8.2\%\ Qi_{-1} + 4.2\%\ Mi_{-1} + 2.3\%\ APX\ UK\ DAM$$

Where:

	Explanation
CAL Y_{-1}	Average year ahead forward price in 2020
CAL Y_{-2}	Average two years ahead forward price in 2019
CAL Y_{-3}	Average three years ahead forward price in 2018
Qi_{-1}	Average quarter ahead forward price in the fourth quarter of 2020
Mi_{-1}	Average month ahead forward price in December 2020

Component 2 – network costs

Transmission cost

The transmission costs in the UK are covered by the Transmission Network Use of System (TNUoS) charges and have two possible options: Non-Half-Hourly (NHH) and Half-Hourly (HH). The E-RES and E-SSME profiles are subject to NHH and E-BSME to the HH rate.

Table 52 : Transmission costs options

United Kingdom		
Tariff option	**Explanation**	**Profile**
Not Half-Hourly (NHH)	Monthly metered customers are paying a demand rate in function of their electricity consumption, expressed in p/kWh.	E-RES and E-SSME
Half-Hourly (HH)	Metering system, which utilises AMR (automatic meter reading) technology to provide electricity consumption reading. The system sends updated meter reads to the energy supplier every half hour. Customers pay a capacity tariff depending on their connection capacity, expressed in p/kVA/day.	E-BSME

The NHH tariff is zonal, meaning that the rates differ between all fourteen zones of the UK. We use a weighted average value of these fourteen zonal tariffs as transmission cost for our E-RES and E-SSME profiles.

Distribution costs

Our residential and small professional profiles are subject to these costs but follow a different methodology because it depends on the connection voltage. The distributions costs, called Distribution Use of System (DUoS) tariffs, follow two possible charging methods. Since all of our residential and small professional profiles are connected to the LV-grid, the "Common Distribution Charging Methodology" (CDCM) is applicable.[127] This methodology encompasses the following components:

[127] (ENA, 2020)

Table 53 : Distribution costs in the United Kingdom

United Kingdom	
Component	**Explanation**
Total consumption	A unit charge in p/kWh
Fixed charge	Fixed charge per offtake point in p/MPAN[128]/day
Metering costs[129]	Cost for use and management of your energy meter in p/day or GBP/year

To estimate British prices, we took the weighted average (based on the number of connection of DSOs) of the fourteen zonal tariffs to calculate the distribution costs.

Component 3 – all other costs

Three different additional costs are identified for the UK: two levies and the indirect cost of one renewable subsidies scheme.

1. Energy suppliers need to account for the cost of the Energy Company Obligation (ECO) scheme, which helps to reduce carbon emissions and tackle energy poverty. The cost of the ECO scheme represents, according to Ofgem, around 22,92% of the electricity bill.[130]
2. The Climate Change Levy (CCL) is a levy payable on electricity, natural gas, fuel, etc. The basic rate (8,11 GBP/MWh or 9,09 EUR/MWh[131]) of the Climate Change Levy is always determined for a year starting on 1 April, in this study in April 2020. Residential consumers are exempted from it.[132]
3. The Renewables Obligation (RO) is the cost taken into account by energy suppliers for the large-scale renewable subsidy scheme. Similar to the Climate Change Levy, the quota and buyout price is determined for a year starting in April. From April 2020 to April 2021, the renewable quota is 0,471 Renewable Obligation Certificates (ROC's) per MWh. To compute the cost of RO, the quota has to be multiplied with buyout price per ROC, which is 50,05 GBP (56,07 EUR). This amounts to 23,57 GBP/MWh (26,41 EUR/MWh) for the residential and small professional profiles[133]
4. The Assistance for Areas with High electricity distribution Costs[134] (AAHEDC) the levy compensates for high distribution costs in the zone of Northern Scotland (1 of the 14 zones) corresponding to 0,30446 GBP/MWh (0,34 EUR/MWh).

Component 4 – VAT

Electricity used for residential and domestic purposes is subject to a 5% VAT in the UK.[135]

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[128] Meter Point Administration Number

[129] Electricity metering charges in the UK are not easily accessible. A proxy was used to account for these charges based on a methodology disclosed by National Grid, the British TSO delivering electricity and natural gas. As electricity and natural gas are frequently offered as one product with a dual tariff, natural gas metering methodology was used as a proxy. Charges are billed as a fixed yearly charge for installation costs recovered via a rental given that we make the assumption our profiles do not own the meters.

[130] As no exact price could be identified for this cost, a proxy derived from OFGEM's website is used. We consider ECO to account for the full weight of Environmental and Social Costs component as estimated by OFGEM. https://www.ofgem.gov.uk/consumers/household-gas-and-electricity-guide/understand-your-gas-and-electricity-bills (OFGEM, 2020)

[131] With a GBP/EUR exchange rate of 1,1035.

[132] (GOV.UK, 2020)

[133] (OFGEM, 2020)

[134] (National Grid ESO, 2020)

[135] (GOV.UK, 2020)

Natural gas

Natural gas: Detailed description of the prices, price components and assumptions

For all countries under review, this section details:

1. **Commodity costs** for profiles G-RES and G-PRO;
2. **Network costs** for profiles G-RES and G-PRO;
3. **All other costs** for profiles G-RES and G-PRO.
4. **VAT** for profile G-RES

Profile	Consumption (kWh)
G-RES	23.260
G-PRO	300.000

Belgium

Contrary to what you see in other countries, the Belgian natural gas suppliers have quite transparent price sheets. Commonly, not only the current tariff sheets can be found online but also previous ones so evolution can easily be seen over the years. The price sheets also give a good overview of all charged components, thereby offering a clear understanding of what becomes the end cost.

Component 1 – the commodity price

In 2018 the HHI of the retail market in Belgium was over 2.000. According to the methodology, this entails that only three products are considered: the standard product of the market incumbent, the cheapest product of the market incumbent, and the cheapest offer on the market. The switching rate for households in Belgium is 22,00% (G-RES). The products of the market incumbent for G-RES thus each weight (100%-22,00%)/2 or 39%.

Table 54 : Profile weights depending on the products in Belgium

Product	Weight G-RES
Standard product of the market incumbent	39,00%
Cheapest product on the market	22,00%
Cheapest product of the market incumbent	39,00%
Total	**100%**

The table below gives an overview of the selected products per region and their annual cost, which is based on the profile's characteristics. To choose these products, price comparison websites of the respective regional regulators were used[136]. All prices reported are VAT excluded.

[136] Flanders : https://vtest.vreg.be; Brussels : www.brusim.be; Wallonia : www.compacwape.be

Table 55 : Annual cost of selected products for profile G-RES in Belgium

Region	Supplier – Product	Fixed component (EUR/year)	Variable component (EUR/year)
Brussels	ENGIE – Electrabel Easy Indexed	35,00	561,04
	MEGA - Super variable	0,00	433,74
	ENGIE – Electrabel Direct	15,00	442,66
Wallonia	ENGIE – Electrabel Easy Indexed	35,00	561,04
	Lampiris - Online	28,93	408,18
	ENGIE – Electrabel Direct	15,00	442,66
Flanders	ENGIE – Electrabel Easy Indexed	35,00	561,04
	Vlaamse energieleverancier – Gas variabel	0,00	404,15
	ENGIE – Electrabel Direct	15,00	442,66

While this methodology provides an objective view of the market situation in Belgium, one must be aware that it does not provide a full overview of market prices as only three products were considered to depict the Belgian commodity prices.

The commodity component for the G-Pro profile was not extracted from a comparison site but is based on the prices observed in January 2021 at the Zeebrugge Trading Point (ZTP). The formula that was used to compute the commodity cost for this profile is the same as the large industrial profiles and is set out in the corresponding segment. However, it is known that the majority of Belgian industrial consumers' contracts are TTF indexed[137], which represents their most significant component of natural gas bills.[138] The CREG provided all necessary commodity data.

Component 2 – network costs

Transport costs

As discussed in the consumer profiles, we assume that G-RES profile is connected on the T2 level and G-Pro on the T3 level. Contrary to the transmission costs for electricity, transport costs are not transparent and easy to calculate for natural gas. Therefore, this cost is based on an estimate disclosed by Fluxys[139].

Table 56 : Transmission cost of Belgian TSO

TSO	Transport cost (EUR/kWh)
Fluxys	0,00146

The transport cost for residential and small professional consumers takes the entry and exit tariffs into account while also taking a weighted average of low (L) and high (H) caloric natural gas.

Distribution costs

Since both G-RES and G-PRO profiles are connected to the distribution grid, distribution tariffs have to be taken into account and therefore added to the transport costs. Similar to the transport tariffs, the T2 and T3 levels were chosen for respectively G-RES (T2) and G-PRO (T3). Typically, each Belgian region splits distribution tariffs into a different number of components but has at least one common component: *tariff for the use of the network*, which is always composed of*:*

a. Fixed term (expressed in EUR/Year);

[137] https://www.creg.be/fr/publications/etude-f2097, (CREG, 2020).

[138] This method tackles down the non-intuitive results that were obtained with the previous methodology as a commodity price can undergo heavy variations month to month and therefore lessen significant differences regarding commodity prices between countries considering their distinct situation within a period.

[139] (Fluxys, 2021)

b. Proportional term (expressed in EUR/kWh).

Besides, other components are part of the distribution costs, although they vary depending on the region. Brussels includes a tariff for the measuring activities and Flanders includes a tariff of data management and the system management. In contrast, Wallonia only adds a tariff for regulatory balances.

Since tariffs vary between regions and DSOs, a weighted average is computed across all DSOs that are active in the region. The weight is distributed according to the number of EAN connections the DSO owns in the region. In Flanders, all DSOs operated by Fluvius were considered. For Wallonia, all DSOs operated by ORES, as well as RESA, were taken into account. Both regions' market shares can be found in chapter 3. Belgium (p. 106). In Brussels, Sibelga is the unique DSO to be running and therefore selected.

Component 3 – all other costs

There are additional costs in Belgium that can be charged to our natural gas consumers under review. While two additional costs are at the federal level and apply to all profiles, regional costs exist in Brussels and Wallonia. These costs are summarised below with a distinction between common costs to all three Belgian regions and the one's specific per region. It is to be noted that federal charges are levied by the Belgian TSO (Fluxys) and regional charges are levied by regional DSOs Tariff rates are mentioned when they do not vary depending on the consumer profile and/or the DSO; otherwise, units in which they are expressed are detailed:

Table 57 : Other costs for residential and small professional natural gas consumers applying to all Belgian regions

All regions	Profiles
Regional Public Service Obligations (Regional PSOs) on distribution	
a. A general tariff for regional PSOs (expressed in EUR/MWh)	All
Taxes and levies on the federal level	
I. Federal taxes and levies	
a. Federal contribution[140] (0,6482 EUR/MWh); b. Energy contribution[141] (0,9978 EUR/MWh).	All

[140] In all three regions, federal contribution is to be increased by 1,1%. Firstly, to compensate for the administrative and financial costs of the electricity supplier and secondly to compensate for the part of the federal contribution that would not be paid by the end consumer. There is an additional 0,1% increase for profiles connected to the distribution grid to compensate for the administrative costs of the DSO (Art. 4bis and 4ter Royal Decree 24 March 2003).

[141] Not applicable on E-BSME profile because it has a connection level > 1kV.

Table 58 : Other regional costs for residential and small professional natural gas consumers[142]

Brussels	Flanders	Wallonia	Profiles
Regional Public Service Obligations (Regional PSOs) on transport			
a. Brussels regional public service obligation[143] (0,80 or 4,79 EUR/month)	-	-	All
Taxes and levies on the regional level			
Regional taxes and levies on distribution			
a. Charges on non-capitalised pensions (0,13 - 0,217 EUR/MWh)	a. Charges on non-capitalised pensions (0,3066 EUR/MWh)	a. Levy for occupying road network (1,676 - 1,910 EUR/MWh)	All
b. Levy for occupying road network (1,275 EUR/MWh)	b. Other local, provincial, regional and federal taxes, Charges, Surcharges, Fees and contributions (0,0509 EUR/MWh)	b. Corporate income tax (0,7845 - 1,2385 EUR/MWh)	
c. Corporate income tax and other taxes [144] (0,544 - 0,907 EUR/MWh)	-	c. Other local, provincial, regional and federal taxes, Charges, Surcharges, Fees and contributions (0,0012 - 0,0018 EUR/MWh)	
Regional taxes and levies on transport			
-	-	a. Connection fee (0,075 for the first 100 kWh; 0,75 in EUR/MWh)	All

Component 4 – VAT

VAT cost is presented as a different price component and amounts to 21%. No VAT is due on the federal contribution and the connection fee in Wallonia.

Germany

German natural gas suppliers generally present only two tariffs on their tariff sheets, a fixed tariff per month (in EUR/month), the "Grundpreis", and a variable prices named "Arbeitspreis" per kWh of natural gas consumed (in cEUR/kWh). Since Germany uses "all-in tariffs", which is less transparent, we deducted the network costs, taxes and VAT to retrieve the commodity component.

Component 1 – the commodity price

The CEER does not set out the German HHI for natural gas suppliers, and we have thus taken the EU Energy market study from 2014. This study tells us that the HHI-index was 300 in 2014 for our natural gas profiles, meaning that five products should be taken into account. Since Germany counts plenty of small suppliers that offer low prices, no supplier can be considered consistently as the largest one across the whole of Germany. Therefore, we adapted the methodology for this country, and only three products are found: the standard product of the market incumbent, the cheapest offer on the market and the most affordable product of the market

[142] The tariffs represented in this table vary depending on the DSO and we have thus chosen to only present the minimum and maximum range of the tariff from the largest (or only) DSO of the region. Sibelga for Brussels, Fluvius Antwerpen for Flanders and ORES Hainaut for Wallonia.

[143] Depends on the calibre of the meter being installed.

[144] Brussels groups the last two regional taxes as one labelled "Financing of Corporate income tax & other taxes".

incumbent. While this approach might pose a limitation, we expect it to have a limited impact on representativeness, given the robustness offered by the regional approach, as three products are selected for every DSO region under study (8 times 3 products). The standard product ("*Grundversorgung*") is offered by a standard supplier, which varies in every DSO region.

Since for a DSO region, Stuttgart Netze, we did not find a second product of the market incumbent with the comparison tool which is why we took a product of the second largest energy supplier. The second largest energy supplier in Germany are the Stadtwerke so we took the cheapest product of the cheapest stadtwerke. The table below lists the maket shares of the German energy suppliers.

Table 59 : Market shares of German natural gas suppliers

Energy supplier	Market share
RWE AG	30,00%
EnBW AG	13,00%
E.ON AG	7,00%
Vattenfall Europe AG	7,00%
Stadtwerke und andere öffentliche Anbieter	26,00%
LEAG	17,00%

The switching rate is of 9,3% for household suppliers (G-RES), which is the assigned weight to the cheapest product of the market. The weights of the 1st and 3rd product are thus (100%-9,3%)/2 = 45,4%. The market shares of the energy suppliers will be used to calculate the weight of the first and third product of Stuttgart Netze

Table 60 : Profile weights depending on the products in Germany

Product	Weight G-RES	Weight G-RES (Stuttgart Netze)
Standard product of the market incumbent	45,30%	30,23%
Cheapest product on the market	9,40%	9,30%
Cheapest product of the market incumbent or the 2nd largest supplier	45,30%	60,47%

The cheapest product was found by using a German price comparison website https://www.stromanbietervergleich.net/. The price comparison website only represented the "all-in prices", and we thus had to deduct the network costs, taxes and VAT to get the commodity components presented below.

Table 61 : Annual cost of selected products for profile G-RES in Germany

DSO	Supplier - product	Grundpreis[145] (EUR/year)	Arbeitspreis[146] (EUR/year)
Bayernwerk	E.ON – Grundversorgung Erdgas	192,00	1.139,74
	Stadtwerke Haltern – permanent gas 24	120,00	900,32
	E.ON – Erdgas Pur	146,24	1.069,18
SWM Infrastruktur Stammgebiet	Stadtwerke München – Grundversorgung	111,60	1.107,18
	Emil energie – Emilgas online	90,76	664,53
	Stadtwerke München – M-Erdgas Flex	78,29	946,68
E-DIS	EWE Vertrieb – Erdgas comfort	168,30	1.383,87
	Stadtwerke Achim – online ardgas	114,68	799,45
	EWE Vertrieb – Erdgas Solo	159,56	1.146,95
Stromnetz Berlin	GASAG – ERDGAS Komfort	156,00	1.304,88
	Emil energie – Emilgas online	110,92	664,53
	GASAG – ERDGAS Smart	160,84	934,31
Westnetz	Thüga Energie – Thüga ClassicGas	120,00	1.365,36
	Stadwerke Haltern – permanent gas 24	102,72	848,18
	Thüga Energie – Thüga OnlineGas	120,00	1.018,79
RNG-Netz 2-Köln	RheinEnergie – FairRegio Erdgas basis	145,00	1.186,26
	Roth – Rothgas 12	69,00	837,36
	RheinEnergie – FairRegio Erdgas plus Konstant 2021 Online	140,00	1.081,59
Netze BW	EW Schönau – EWS Gas Option 1	99,83	2.081,68
	WEP GmbH – LandGas 2021	77,31	1.086,24
	EW Schönau – EWS Gas	99,83	1.260,74
Stuttgart Netze	EnBW Energie – ErdgasPlus	91,08	1.274,65
	Grünwelt energie – Grüngas classic	85,71	762,23
	Stadtwerke Haltern – Permanentgas 24	81,31	932,40

The commodity price for the G-PRO profile could not be extracted following the previous method but was provided to us by the CREG. The commodity price exhibited in this document is the average of prices collected in each market areas in January 2021.

Component 2 – network costs

Integrated transport and distribution costs

Similarly to the methodology employed for electricity, four rural (1/zone) and four urban DSOs (1/zone), for a grand total of eight DSOs, are selected. As both of our profiles, G-RES and G-PRO are connected to the distribution network; they are thus subject to transport and distribution costs, which are integrated into one single tariff. Besides, we assume these profiles to fall under the category "*Netzentgelte für Entnahmestellen ohne Leistungsmessung*" (or network charges for offtake points without power metering) as their consumption is yearly metered.

[145] Basic price (fixed)

[146] Labour price (variable)

The annual charge is comprised of four components as listed below, even if DSOs might use different bands or rates:

Table 62 : Distribution costs in Germany

Network costs		
Component	**German label**	**Explanation**
Basic charge	Grundpreis	A fixed basic fee expressed in EUR/year.
Consumption charge	Arbeitspreis	A variable element which depends upon the volume of energy consumed in cEUR/kWh/year.
Metering costs	Messung	Fixed charges related to the cost of metering and invoicing, for which we assume our residential and small professional consumers to have been metered annually.
Metering point operation per counting point charges	Messstellenbetrieb	

German annual charge for natural gas is computed as follows:

$$Annual\ charge = Arbeitspreis * (Annual\ Consumption - \ Durch\ Grundpreis\ abgegoltene\ Arbeit) + Grundpreis$$

Where, "*Durch Grundpreis abgegoltene Arbeit*" is the price band bottom level, expressed in kWh.

Depending on the consumers' consumption volumes, they fall under certain categories (the number of categories depends on the local DSO). These categories determine the amount of consumption volume that has to be set at a standard rate, while the rest fall under the network cost fares as determined by local DSOs. These volumes are said to be compensated to limit network costs and ultimately, DSOs' remuneration.

Component 3 – all other costs

We flagged two supplementary costs for natural gas consumers in Germany: the "*Erdgassteuer*", or Gas tax, and the "*Konzessionsabgabe*", or Concession fee:

- The "*Erdgassteuer*" or Gas tax, is an energy tax that applies at several rates depending on the consumer. This price of 5,50 EUR/MWh is the standard rate when using natural gas for heating purposes[147], which is applied for our G-RES profile. Regarding our small professional profile, G-PRO, a reduced rate is ranging from 4,12 EUR/MWh to 2,07 EUR/MWh as companies fall under other regimes specified by the law when not using natural gas for heating purposes[148].
- The "*Konzessionsabgabe*, or Concession fee, exists for electricity and natural gas depending on the municipality size and the contract type of the consumer. As it is impossible to compute a weighted average of the fee, we calculated a non-weighted mean for the four categories of municipalities. Since the natural gas usage has different associated prices, we computed two rates respectively for our two studied profiles:
    - Natural gas only for cooking and for hot water in municipalities (7,05 EUR/MWh): we attribute this usage to strictly residential consumers (G-RES)[149].
    - Natural gas for other purposes (3,05 EUR/MWh): we attribute this usage to SME consumers (G-PRO)[150]. As small professionals fall under reduced rates as the law implemented special rates for companies.

[147] (Bundesamt für Justiz, 2021)

[148] § 54 and § 55 Energiesteuergesetz

[149] (Bundesamt für Justiz, 2021)

[150] (Bundesamt für Justiz, 2020)

Component 4 – VAT

Germany imposes a 19% rate VAT on natural gas consumption for residential consumers (G-RES), which is presented as a separate price component[151].

France

Component 1 – the commodity price

Only three products are considered for the French market since the HHI of the retail market in France is over 5.000 in 2018. These products are the standard product of the market incumbent, the cheapest product on the market and the most affordable product of the market incumbent. As defined by the methodology, the weight of the most inexpensive option equals the annual switching rate and is 15,80% for household consumers.[152] The weights of the products for the G-RES profile is set out in the table below.

Table 63 : Profile G-RES weight for each product

Product	Weight G-RES
Standard product of the market incumbent	42,10%
Cheapest product on the market	15,80%
Cheapest product of the market incumbent	42,10%

To extract the commodity price, we have used the price comparison website that the CRE puts forward, http://comparateur-offres.energie-info.fr. In France, consumers are presented "all-in tariffs" which toughens the extraction of the commodity component. Therefore we present the total cost without VAT but with other taxes and network costs.

Table 64 : Annual cost of selected products for profile G-RES in France

Region	Supplier – Product	Fixed component (EUR/year)	Variable price based on consumption (EUR/year)
France	Engie – Tarif réglementé	235,79	1.005,19
	dyneff – MON CONTRAT SEREIN ONLINE	249,18	833,48
	Engie – GAZ tranquillité	235,66	982,74

As mentioned before, six prices zones exist in France. Given that our consumers' profiles could be randomly dispersed on the territory, the price zone with the most significant number of cities, reflecting, therefore, the majority prices, were used.

In France, residential consumers and consumers with an annual consumption up to 300 MWh can benefit from regulated tariffs ("*tariffs réglementés*"). The table below lists consumers categories that can benefit from it:

[151] VAT or "Mehrwertsteuer" (MwST) in German is 19% on natural gas. (Toptarif, 2021)

[152] (CRE, 2018)

Table 65 : Categories depending on the yearly consumption in France

Annual consumption (MWh/year)	Network	Type of consumers	Usage	Category
< 1 MWh	Distribution network	Residential and Industrial consumers	Cooking	Base
1 < x < 6 MWh			Hot water	B0
6 < x < 300 MWh			Individual heating	B1
			Small boiler	B2i

However, in November 2019, French public authorities decided to terminate the commercialisation of such tariffs even if existing contracts remain in force until December 2020 for professional consumers and June 2023 for residential consumers.

Component 2 – network costs

Transport costs

Transmission tariffs[153] have the following components:

1. Transport costs (expressed in EUR/MWh);
2. Storage costs (expressed in EUR/MWh) are charged on final residential consumers to finance the cost of storing natural gas in order to smoothen the seasonal demand effect.

Distribution costs

As stated before, 96% of all distributed natural gas in France is delivered by GrDF (Gaz Réseau Distribution France)[154], which is why GrDF is considered as sole DSO for this study. Given their annual consumption levels, both G-RES and G-PRO are subject to the tariffs T2. The fare has three components:

1. Subscription (expressed in EUR/year);
2. A daily capacity charge (expressed in EUR/MWh/day);
3. A proportional component (expressed in EUR/MWh).

Component 3 – all extra costs

In France, two surcharges have to be taken into account for natural gas consumers:

1. The “Contribution tarifaire d’acheminement” (CTA) is a surcharge for energy sector pensions (for Electricity and Gas Industries). It amounts to 20,80% for clients connected to the distribution grid. The CTA is only due on the fixed part of the distribution cost (i.e. subscription).
2. The “Taxe intérieure sur la consommation de gaz naturel” (TICGN) is a tax on natural gas consumption, that amounts to 0,843 cEUR/kWh in 2021.

Component 4 – VAT

A reduced VAT of 5,5% applies to the amount of the subscription as well as on the CTA. A 20% VAT applies to the amount of consumption as well as on the TICGN.

[153] The CREG provided PwC with the data for these two components.

[154] (CRE, 2019)

The Netherlands

Component 1 – the commodity price

The HHI-index of the retail market in the Netherlands is between 1.500 and 2.000 in 2018.[155] Therefore, four products are considered: the standard product of the market incumbent, the cheapest product on the market, the cheapest product of the market incumbent and the cheapest product of the second-largest supplier. According to the methodology, normalised market shares of the two biggest suppliers have to be taken into account when distributing the weights of the products. The underneath table displays the normalised market shares used in this study:

Table 66 : Normalised market shares of the largest two Dutch energy suppliers

Energy supplier	Customers	Normalised market share[156]
Innogy (Essent)	3.100.000	56,40%
Eneco	2.400.000	43,60%

When considering the normalised market shares, the weights are distributed according to the following calculations. The weight of the cheapest product equalled the annual switching rate and was 15,1%[157]. The normalised market share of the market incumbent is 56,36%, namely 3.100.000/(3.100.000+2.400.000), and that of the second-largest supplier is 43,64% which is the result of the calculation above but while switching the numerator with the number of clients of the second-largest supplier. The product of the market incumbent thus has a weight of (100%-15,1%)*56,36%/2 and the product of the second-largest supplier (100%-15,1%)*43,64 which respectively results in 23,93% and 37,05%. The weights are set out in tables below.

Table 67 : Profile weight for each product in the Netherlands

Product	Weight G-RES
Standard product of the market incumbent	23,90%
Cheapest product on the market	15,10%
Cheapest product of the market incumbent	23,90%
Cheapest product of the second largest player	37,10%

The cheapest product was obtained by consulting a Dutch price comparison website https://www.energieleveranciers.nl/. The weight of the products for profiles G-RES is presented in the table above. The products selected for profiles G-RES and their prices are stated in the next tables. These prices exclude charges and taxes.

[155] (CEER, 2018)

[156] A more detailed explanation of the need of this normalised market share to compute commodity prices can be found under the section "Residential and small professional consumers' commodity computation methodology - Weight of each product within the product portfolio" (p. 115).

[157] No distinction between household and non-household switching rates could be found. Consequently, we use a unique switching rate for both profiles E-RES and E-SSME.

Table 68 : Annual cost of selected products for profile G-RES in the Netherlands

Region	Supplier – Product	Fixed component (EUR/year)	Variable price based on consumption (EUR/year)
The Netherlands	Essent - Modelcontract elektriciteit en gas Welkom energie - CO2-gecompenseerd gas Vast Essent - ZekerheidsGarantie Gas 1jr. Eneco Gas 1 jaar vast	83,88 48,00 64,36 59,40	544,06 500,01 535,73 483,06

As described in the section "Natural gas: Countries/Zone(s) identified" (p. 109), suppliers have the option to apply a regional surcharge, based on how far the region is situated from Groningen. Yet, the selected suppliers did not do this and offered the same prices for each region. Besides, the Dutch network is primarily supplied with the so-called "Groningen-gas". This natural gas has a lower calorific value (L-gas) than the natural gas used in most of Western Europe (H-gas). As prices in the Netherlands are reported by m³ instead of by kWh, a conversion factor is used. The latter is of 9,77 kWh/m³ as all residential and small users, use low caloric natural gas[158].

The commodity price for the G-PRO profile is the January 2021 observed prices for TTF, and the CREG provided all commodity prices data.

Component 2 – network costs

Integrated transport and distribution costs

As it is the case for electricity, the Netherlands use a combined tariff including four components:

Table 69 : Components of network costs in the Netherlands

Network costs		
Component	**Dutch labelling**	**Explanation**
Standing charge	Vastrecht	Fixed basic fee (expressed in EUR/year).
Capacity charge	Capaciteitstarieven	Fixed fee covering the costs associated with the transport of natural gas. Its height depends on the capacity of the connection (expressed in EUR/Year/m³/h).
Periodical connection tariff	Periodieke aansluitvergoeding	Fixed fee covering the costs for managing the connection (expressed in EUR/year).
Metering charge	Meettarief	Fixed charges are covering for the use and management of energy meters (expressed in EUR/year).

As the Dutch distribution tariffs are notably dependant on a capacity charge, which is based on the m³ volume consumption, the same conversion factor, as mentioned above, is used.

Component 3 – all other costs

Two surcharges apply to the natural gas invoice for the profiles understudy in the Netherlands:

1. Energy Tax, *Regulerende Energiebelasting*, (REB) is a digressive tax on all energy carriers which depends on the consumption;
2. The ODE levy, *Opslag duurzame energie*, is also a digressive levy that varies depending on the use and the revenues are used to finance renewable energy.

[158] (Gasunie Transport Services, 2020), 1 m³ under normal conditions (zero degrees Celsius, 1 atm) is considered to have a calorific value of 35.17 MJ (Groningen-gas equivalent) with a conversion factor of 1 MJ= 0.278 kWh.

The tables below show the 2021 rates for each band of natural gas consumption.

Table 70 : Energy tax and ODE 2021 rates in the Netherlands

Band	Consumption	Energy Tax (EUR/m³)	ODE (EUR/m³)
A	Consumption up to 170.000 m3	0,34856	0,0851
B	Consumption between 170.000- 1.000.000 m³	0,06547	0,0235
C	Consumption between 1.000.000- 10.000.000 m³	0,02386	0,0232
D	Consumption above 10.000.000 m³	0,01281	0,0232

As the Energy Tax and ODE Levy are fixed in EUR per volume units (EUR/m³) and not in EUR per energy unit, the calorific value of the used natural gas has an impact on the total amount paid. As stated under "Component 1 – the commodity price" of the Netherlands, low caloric natural gas is used, except in around 80 industrial companies, the assumption is made that the profiles G-RES and G-PRO use low caloric natural gas. To determine our profiles' tax categories, we use the same conversion factor of 9,77 kWh/m³ mentioned previously.

Given the consumption level of our profiles understudy, all profiles for G-RES and G-PRO fall in the A band.

Component 4 – VAT

In the Netherlands, VAT on natural gas equals 21% and is due on the full energy invoice.

The United Kingdom

Component 1 – the commodity price

In the UK suppliers often combine electricity and natural gas in one product, the so-called dual tariff, which would result in lower prices. Since duel tariffs are not available in all other countries under review and to have a consistent methodology across the study, we only consider products where natural gas is offered by itself. Furthermore, suppliers in the UK generally present all-in prices that are not transparent. These prices consist of:

- The Standing Charge (fixed element), which is expressed in p/day and that covers the fixed costs of the energy supplier and;
- Unit Rate Charge (variable element), which is expressed in p/kWh and that varies according to the energy consumption

Since we only want the commodity price in this section, we had to deduct network charges, taxes and VAT from these 'all-in prices'. Commodity prices of a supplier are not very different between regions, and for the sake of simplicity, the commodity price of only one region is used for all 8 DSO regions. An Ofgem study from 2015[159] analysed the costs throughout the different areas, and out of this study, Yorkshire appeared to be the median zone in term of commodity price. For this reason, the selected products come from the Yorkshire region. The network cost, VAT and taxes are deducted from the all-in prices of the Yorkshire region. Similar to other countries in review, the weighted average of network prices for all DSOs are used to determine the network cost.

The HHI of the retail market in the United Kingdom is between 1.000 and 2.000 in 2018, meaning that only four products are considered: the standard product of the market incumbent, the cheapest product on the market, the cheapest product of the market incumbent and the cheapest product of the second-largest supplier. The table below presents the normalised market shares of the two largest natural gas suppliers in the United Kingdom (British Gas and E.ON).

Table 71 : Market share of energy supplier in the United Kingdom

[159] (OFGEM, 2015)

Natural gas supplier	Market shares[160]	Normalised market shares
British Gas	27,03%	68,00%
OVO energy	12,72%	32,00%

The weights are distributed as the methodology has set out. The cheapest product is assigned the switching rate as weight which is 19,4% for household consumers in 2018[161]. The normalised market share of British Gas set out above is the result of the following calculation 27,03%/(27,03%+12,72%)= 68,00%. OVO energy thus has a normalised market share of 32,00%. For G-RES the products of the market incumbent thus have a weight of (100%-19,40%)*68,00%/2 = 27,40%. The cheapest product of the 2nd largest energy supplier is (100%-19,40%)*32,00%=25,79%.

Table 72 : Weight for each product in the United Kingdom

Product	Weight G-RES
Standard product of the market incumbent	27,40%
Cheapest product on the market	19,40%
Cheapest product of the market incumbent	27,40%
Cheapest product of the second largest player	25,79%

An overview of the products we have selected per region and their respective pricing elements are presented in the table below. The cheapest product has been selected through a British price comparison website, https://www.uswitch.com/gas-electricity/. Since different payment options are proposed by the website, we take the monthly direct debit option into account, as it seems to be the most used option. Suppliers generally do not publish different tariffs for domestic and small professional consumers.

In the table below, we present the prices extracted from the comparison website, but these still include the network costs and taxes.

Table 73 : Annual cost of selected products for profile G-RES in the UK

Region	Supplier – Product	Fixed component (EUR/year)	Variable price based on consumption (EUR/year)
The United Kingdom	British Gas - Standard E.ON - Fix online exclusive v57 British Gas - HomeEnergy Fix February 2021 E.ON - E.ON Energy Plan	101,54 28,62 101,54 88,73	719,98 762,98 774,71 709,56

The commodity price of the G-PRO profile could not be extracted throughout the comparison website, and the CREG has thus provided all the commodity price data. The national commodity price is the result of January 2021 prices for NBP.

Component 2 – network costs

Transport costs

Only one TSO, excluding the Northern Islands, operates in the UK: National Grid Gas. The Gas Transmission Transportation Charges are comprised of the following components:

[160] (OFGEM, 2020)

[161] (CEER, 2018)

Table 74 : Transport costs components in the UK

United Kingdom	
Component	**Explanation**
Entry Commodity Charge	A charge per unit of natural gas transported payable for flow entering the system in p/kWh/day
Exit Commodity Charge	A charge per unit of natural gas transported payable for flow exiting the system in p/kWh/day
Commodity charge	A charge per unit of natural gas transported payable for flows entering and exiting the system in p/kWh

National Grid Gas provides a weighted average of the entry and exit capacity tariffs in their Statement of Gas Transmission Transportation Charges[162].

Distribution costs

Both of our residential and small professional profiles (G-RES and G-PRO) have to pay distribution tariffs since they are connected to the distribution grid. There are eight natural gas DSOs in the UK, out of which 4 are run by Cadent Gas. The distribution tariff for natural gas is composed of the following components:

Table 75 : Distribution costs for residential users and small professionals in the United Kingdom

United Kingdom		
Component	**Explanation**	**Profile**
LDZ System Capacity Charge	With charge band for consumption up to 73.200 kWh, calculated using the supply point End User Category (EUC) and the appropriate load factor in p/kWh.	G-RES
	With charge band between 73.200 and 732.000 kWh, calculated using the supply point End User Category (EUC) and the appropriate load factor in p/kWh.	G-PRO
LDZ System Commodity Charge	With charge band for consumption up to 73.200 kWh, calculated using the supply point End User Category (EUC) and the appropriate load factor in p/kWh.	G-RES
	With charge band between 73.200 and 732.000 kWh, calculated using the supply point End User Category (EUC) and the appropriate load factor in p/kWh.	G-PRO
LDZ Customer Capacity Charge	With charge band for consumption up to 73.200 kWh, it is a capacity charge in p/Peak day kWh/day.	G-RES
	With charge band between 73.200 and 732.000 kWh, a fixed charge which depends on the frequency of meter reading, plus a capacity charge based on the registered SOQ.	G-PRO
LDZ Customer Fixed Charges	Only due for supply points with annual consumption between 73.200 and 732.000 kWh/year	G-PRO
Exit Capacity Charges	Capacity charge applied to the supply point in the similarly to LDZ System Capacity Charge. These charges are applied per exit zone on an administered on peak day basis in GBP/year.	G-RES and G-PRO
Metering charges	Cost for use and management of your energy meter in GBP/year.	G-RES and G-PRO

The capacity terms are based on the estimated maximum daily offtake. This is calculated by dividing the total consumption in a year by the number of days of consumption multiplied by the load factor. This load factor is related to the EUC (End User Category) bands. Each local distribution zone has 33 individual EUC bands that define 9 different consumption profiles based on annual consumption. The load factors, therefore, differ depending on the annual consumption of a profile and the local distribution zone. Each DSO has its own load factor percentages, but only Northern Gas Networks discloses its load factors, which we used as a proxy for all other DSOs. The table below depicts the load factors used for profiles G-RES and G-PRO:

162 We have used the weighted averages published in the Gas Transmission Transportation Charges of the NGG valid as from the 1st of April 2020, (Nationalgrid, 2020).

Table 76 : Load factors for profiles G-RES and G-PRO

Profile	Bands	Threshold (kWh)	Average load factor
G-RES	1	1 – 73.200	34,00%
G-PRO	2	293.001 – 732.000	38,4%

Based on this, the capacity term is computed as follows:

$$annual\ charge = (SOQ * 365\ days) * unit\ rate$$

Where,

$$SOQ = annual\ consumption/(365\ days * Load\ Factor)$$

We considered a weighted average of these components across four active DSOs for natural gas in the UK.

Component 3 – all other costs

In the United Kingdom, the following taxes and levies are due to the consumers under review:

1. **Energy Company Obligation** (ECO) scheme helps to reduce carbon emissions and tackle fuel poverty. The cost of the ECO scheme amounts to roughly 1,86% of the total natural gas invoice.[163]
2. **Climate Change Levy** (CCL) is payable for small professional consumers of natural gas with a standard rate of 4,06 GBP/MWh (4,55 EUR/MWh[164]).[165]

Component 4 – VAT

VAT on the consumption of natural gas in the UK amounts to 5% for residential consumers

[163] (OFGEM, 2020)

[164] We use the following exchange rate: 1,1035 GBP/EUR (see General assumptions, p. 77)

[165] (GOV.UK, 2020)

5. Large industrial consumers

Electricity

5. Large industrial consumers

This chapter aims at providing an extensive introduction to the prices, price components and the assumptions taken for each country and region with a particular focus on industrial consumers of electricity (E0 to E4) and natural gas (G0 to G2).

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

For all countries under review, this section details:

1. **Commodity costs** for profiles E0, E1, E2, E3 and E4;
2. **Network costs** for profiles E0, E1, E2, E3 and E4;
3. **All other costs** for profiles E0, E1, E2, E3 and E4

Profile	Consumption (MWh)	Connection capacity (kVA)
E0	2.000	781
E1	10.000	3.125
E2	25.000	6.944
E3	100.000	18.056
E4	500.000	86.806

Belgium

Component 1 – the commodity price

Commodity prices computation rests on market prices and describes the cost of electricity for industrial consumers as of January 2021. We used the ICE Endex CAL and the Belpex DAM as national indexes for the computation.

The underneath commodity formula is used for each profile. For E0, E1 and E2, we did not include weekend hours of Belpex DAM, while for E3 and E4 we included weekdays and weekend hours.

The CREG provided the formulas used for commodities pricing in this investigation. The equations are based on an analysis of all Belgian consumers with a yearly usage higher than 10 GWh, which is performed by the Belgian regulator of the electricity supply. For 2021, ratios used in the formula were determined as being the average coefficients over three years (2016 to 2018).

$$Commodity\ price$$

$$= 36.5\%\ CAL\ Y_{-1} + 27.4\%\ CAL\ Y_{-2} + 21.4\%\ CAL\ Y_{-3} + 8.2\%\ Qi_{-1} + 4.2\%\ Mi_{-1} + 2.3\%\ Belpex\ DAM$$

Where:

	Explanation
CAL Y_{-1}	Average year ahead forward price in 2020
CAL Y_{-2}	Average two years ahead forward price in 2019
CAL Y_{-3}	Average three years ahead forward price in 2018
Qi_{-1}	Average quarter ahead forward price in the fourth quarter of 2020
Mi_{-1}	Average month ahead forward price in December 2020

Component 2 – network costs

Transmission cost

Whether connected to the transmission grid 30-70 kV (Local Transmission System) – profile E2 - or to the transmission network itself – profiles E3 and E4 -, the same transmission tariff structure applies to all our industrial profiles under review in this study. However, in the function of the voltage connection, different rates apply.

The transmission costs in Belgium are fixed by Elia Transmission Belgium and consists of five components:

1. **Connection tariffs**: charges to operate and maintain the user connection for consumers directly connected to Elia's grid (from E2);[166]
2. **Tariffs for the operation and the development of the grid infrastructure**: including (i) the tariff for the monthly peak for the offtake, (ii) the tariff for the yearly peak for the offtake and (iii) the power put at disposal;
3. **Tariffs for the operation of the electric system**: including (i) the tariff for the management of the electric system and (ii) tariffs for the offtake of additional reactive energy (not taken into account);
4. **Tariffs for the compensation of imbalances**: including (i) the tariff for the power reserves and black-start and (ii) the tariff for the maintenance and restoring of the residual balance of the individual access responsible parties. The latter includes (a) imbalance tariffs, which are not taken into account as they are (generally) not explicitly billed by the TSO or by suppliers to end consumers and (b) network losses. Network losses on the federal transmission grid (380/220/150 kV) are a separate and additional component of transmission tariffs. Suppliers usually bill these costs as a percentage (fixed every year by the TSO) of the commodity cost. While the costs associated with network losses is not a transmission tariff as such, it is deemed a part of the 2nd component in this study. Yet, for consumers connected to the distribution grid, Flanders integrates network costs as a distribution component as we later detail.
5. **Tariffs for market integration**: Elia Transmission Belgium provides services such as the development and integration of an effective and efficient electricity market, the operation of interconnections, coordination with neighbouring countries and the European authorities and publication of data as required by transparency obligations. The costs that come from these services is covered by the market integration tariff.

As profiles E0 and E1 remain connected to the distribution grid, transmission costs are charged based on DSOs' transmission price sheets. Further explanation on the latter can be retrieved in the Transmission cost (p.120) of the residential profiles.

As the below-table sets out, regional regulators adopt tariffs transmission tariffs on different dates, with Wallonia being deferred compared to the other two regions.

[166] This cost depends on the distance between the connection bay and the consumer. We have taken the assumption that this is 500 meters.

Table 77 : Date of adoption of new transmission tariffs in Belgium

Adoption of new tariffs by regional regulators	Transmission
VREG	1 March 2021
BRUGEL	1 January 2021
CWaPE	1 March 2021

This study analyses the tariffs in January 2021. Therefore, transmission tariffs for Flanders and Wallonia are taken at their 2020 level as they remain valid, until the end of February 2021. Since the VREG publishes an additional transmission sheet for the period 1/01/2021 - 28/02/2021 we take this sheet into account.

Distribution costs

As part of our industrial consumers, 2 profiles (namely E0 and E1) are connected to the distribution grid. Consequently, they are also subject to distribution tariffs, which have to be added to the transmission tariffs. Voltage level networks have been determined to both industrial profiles connected to the distribution grid as illustrated below.

Table 78 : Voltage level for industrial profiles in Belgium

Profiles	Brussels	Flanders	Wallonia
E0	1-26 kV	1-26 kV Hoofdvoeding	MT Avec mesure de pointe
E1	Trans MT	Trans-HS Hoofdvoeding	T-MT Avec mesure de pointe

Distribution tariffs from all regions have one similar component: tariff for the use of the distribution grid. For both E0 and E1, such component is decomposed as follows.

Table 79 : Tariff for the usage of the distribution grid in Belgium

Brussels	Flanders	Wallonia
Capacity term (EUR/kW)	Capacity term (EUR/kW)	Capacity term (EUR/kW)
Proportional term (EUR/kWh)	Proportional term (EUR/kWh)	Proportional term (EUR/kWh)
Fixed term (EUR/Year)	-	Fixed term (EUR/Year)

Whereas Brussels and Flanders both assess their capacity term based on consumers' annual peak, Wallonia takes into account the annual and monthly peaks. The former is considered as the peak over the last 11 months before the invoicing month and make up for 75% of the component while monthly peak, the remaining 25%, is determined as the peak of the invoicing month.

Additional components are part of distribution tariffs, as described in the following table.

Table 80 : Additional components for Belgian industrial consumers

Brussels	Flanders	Wallonia[167]
Metering costs	Tariff of data management[168]	Regulatory balances
-	Tariff for system services	-
	Network losses	

As tariffs differ from region to region and from DSO to DSO, a weighted average is computed. Each DSO's weights are determined according to the number of EAN connections[169] owned by each DSO. While we consider all DSOs operated by Fluvius in Flanders, accounting to 100% of EAN connections, we also take into account all DSOs from Wallonia (100% of EAN connections).

Component 3 – all other costs

In Belgium, three different kinds of extra costs apply to electricity: tariffs for Public Service Obligations (PSO), taxes and levies, certificate schemes and other indirect costs. These costs are summarised below with a distinction between common costs to all three Belgian regions and the one's specific per region. It is to be noted that federal charges are levied by the Belgian TSO (Elia), and regional charges are levied by regional DSOs. Tariff rates are mentioned when they do not vary depending on the consumer profile and/or the DSO; otherwise, units in which they are expressed are detailed:

Table 81 : Other costs for industrial electricity consumers applying in all three Belgian regions

All regions	Profiles
Federal Public Service Obligations (Federal PSOs) on transmission[170]	
a. Financing for the connection of offshore wind turbine parks (0,084EUR/MWh); b. Financing of green federal certificates (federal)[171] (11,6852EUR/MWh); c. Financing for strategic reserves (0,051 EUR/MWh);	All
Regional Public Service Obligations (Regional PSOs)	
Regional PSOs on distribution[172]	
a. A general tariff for regional PSOs (expressed in EUR/MWh)	E0 and E1
Taxes and levies on the federal level	
a. Federal contribution[173] (3,4735 EUR/MWh)	All

[167] Charges for metering activities in Wallonia are built in tariffs for the use of the distribution grid.

[168] In 2019, the Flemish regulator conferred Fluvius the role of data manager with a view to the roll-out of the digital meter, among other things. The activities to be performed by the data manager concern data recorded by all types of meter, not only digital meters, but also analogue and electronic meters. The costs of all these activities will be charged as of 2021 via the data management tariff which replace the metering costs.

[169] EAN (European Article Numbering) is a unique code attributed to meters and which indicates a supply point for electricity or natural gas.

[170] The three categories of costs under the Federal PSOs are grouped as the "ELIA surcharge" for Brussels

[171] This only encompasses activities that are not a competence of the Belgian regions and the "pioneers" of solar energy (Wolters Kluwer, 2013)

[172] For each region of Belgium, we compute the tariff through a weighted average of each component across all DSO active in the region (weights are given in terms of number of EAN connection per DSO).

[173] In all three regions, federal contribution is to be increased by 1,1%. Firstly, to compensate for the administrative and financial costs of the electricity supplier and secondly to compensate for the part of the federal contribution that would not be

Degressivity exists on the federal contribution and the funding for green certificates PSO for consumers, from a specific consumption threshold, which are part of a sectoral agreement. Below this threshold, the degressivity is automatically applied. The sectoral agreement scheme does not exist in Brussels, which is why the degressivity is automatically in force for all consumers.

Table 82 : Regional other costs for industrial electricity consumers[174]

Brussels	Flanders	Wallonia	Profiles
Regional Public Service Obligations (Regional PSOs)			
Regional PSOs on transmission			
a. Financing of regional energy policies[175] (6,80 EUR/month or 0,95 EUR/kVA) (E0 to E2)	a. Financing of support measures for renewable energy and cogeneration (0,553 EUR/MWh) (only E2)	a. Funding of support measures for renewable energy[176] (2,072385 EUR/MWh)	E0, E1 and E2
b. Levy compensating for the use of public highways[177] (3,5248 EUR/MWh) (from E1)	b. Financing measures for the promotion of rational energy use (0 EUR/MWh) (only E2)	-	
Taxes and levies on the regional level			
Regional taxes and levies on distribution			
a. Charges on non-capitalised pensions (0,163 - 0,283 EUR/MWh)	a. Charges on non-capitalised pensions (0,0052 - 0,1033 EUR/MWh)	a. Levy for occupying road network (2,832 - 0,0029391 EUR/MWh)	E0 and E1
b. Levy for occupying road network (3,541 EUR/MWh)	b. Contribution for the energy fund[178](155,51 - 907,18 EUR/month)	b. Corporate income tax (0,2647 - 0,8586 EUR/MWh)	
c. Corporate income tax and other taxes (0,417 - 0,921 EUR/MWh)	c. Other local, provincial, regional and federal taxes, Charges, Surcharges, Fees and contributions (0,0033 - 0,064 EUR/MWh)	c. Other local, provincial, regional and federal taxes, Charges, Surcharges, Fees and contributions (0,0041 - 0,0042 EUR/MWh)	
Regional taxes and levies on transmission			
-	a. Levy for the taxes pylons and trenches in Flanders (0,1441 in EUR/MWh)	a. Connection fee (0,075 EUR for the first 100 kWh; 0,3 - 0,75 in EUR/MWh)	All
-	-	b. Levy for the use of the public domain (0,3144 EUR/MWh) (E0 and E1)	

paid by the end-consumer. There is an additional 0,1% increase for profiles connected to the distribution grid to compensate for the administrative costs of the DSO (Art. 4bis and 4ter Royal Decree 24 March 2003).

[174] The tariffs represented in this table vary depending on the DSO and we have thus chosen to only present the minimum and maximum range of the tariff from the largest (or only) DSO of the region. Sibelga for Brussels, Imewo for Flanders and ORES Hainaut for Wallonia.

[175] (Sibelga, 2020)

[176] In Wallonia a partial exemption of 85% applies for holders of a sectoral energy efficiency agreement, meaning that to the E-BSME profile can profit from this reduction.

[177] (Sibelga, 2020)

[178] (Vlaamse Overheid, sd)

Because of the regional quota for green certificates (all regions) and combined heat/power-certificates (only Flanders), there are some indirect costs that are added on the commodity price. The average market price of the certificates over the last 12 months, which means for 2021 from 1st of January 2020 until 31st of December 2020, is considered to estimate the cost of this mechanism. The average values for each region taken into account are presented in the table below and are based on figures retrieved from the respective regional regulators. To estimate the cost of this mechanism, we also take into account the quotas and some associated reductions.

Table 83 : Certificate schemes in each Belgian region

<table>
<tr><th>Region</th><th colspan="2"></th></tr>
<tr><td colspan="3">Average price of certificate schemes</td></tr>
<tr><td>Flanders (GC)</td><td colspan="2">93,24 EUR/GC</td></tr>
<tr><td>Wallonia (GC)</td><td colspan="2">66,84 EUR/GC</td></tr>
<tr><td>Brussels (GC)</td><td colspan="2">94,85 EUR/GC</td></tr>
<tr><td>Flanders (CHPC)</td><td colspan="2">26,06 EUR/CHPC</td></tr>
<tr><td colspan="3">Certificate schemes</td></tr>
<tr><td>Brussels</td><td>Green certificates</td><td>The quota increases every year. As opposed to Flanders and Wallonia, no reduction applies for large industrial consumers in Brussels.</td></tr>
<tr><td rowspan="3">Flanders</td><td>Green certificates</td><td>Since the introduction of the green certificates, the quota has increased yearly (except in 2018). Yet, as of 2019, there will be no quota change in the upcoming years.[179] Flanders also applies progressive quota reductions for large consumers. Part of these reductions are only applicable to large consumers active in certain electro-intensive sectors.</td></tr>
<tr><td>Combined heat/power certificates</td><td>Flanders is the only region that also has these certificates. As seen with the green certificates, the quota also increased every year from introduction to 2016 but remain steady ever since and for the coming years.[180] Similar to the GC there are also progressive quota reductions for large consumers, partly limited to large consumers active in certain electro-intensive sectors. [181]</td></tr>
<tr><td>Cap on GC and CHPC</td><td>As of 2019 two caps on green certificates were introduced for certain industrial consumers. However, starting 2021 these have been replaced by a cap combining GC and CHPC: [182]
i. The amount due for the costs related to the financing of renewable energy and qualitative combined heat and power is capped at 0,5% of gross value added (average last 3 years) for all consumers with an electro-intensity over 20% for consumers belonging to sectors that are listed in annexes 3 and 5 of the EEAG ;
ii. The amount due for the costs related to the financing of renewable energy and qualitative combined heat and power is capped at 4% of gross value added (average last 3 years) for all consumers belonging to sectors that are listed in annexe 3 of the EEAG;</td></tr>
<tr><td>Wallonia</td><td>Green certificates</td><td>The quota has increased every year. Progressive quota reductions apply to large consumers, reinforced by the new regional decree that entered into force on July 1st, 2014. These reductions apply for consumers that have contracted a sectoral agreement. Following the reasoning detailed for the federal contribution, notably, we consider that these reductions only apply from consumer profile BSME.</td></tr>
<tr><td colspan="3">Computation</td></tr>
<tr><td colspan="3">The cost of the GC and CHPC scheme is easily computed by multiplying the average yearly consumption by the average market price of the certificates weighted by the quota. The quota and GC (and CHPC) cost depend on the region. Wallonia and Flanders also have a reduction on quota that has to be taken into account for GC (and CHPC).</td></tr>
</table>

[179] Art. 7.1.10 § 2 Energiedecreet

[180] Art. 7.1.11 § 2 Energiedecreet

[181] (Elia, 2018)

[182] Art. 7.1.11/1 Energiedecreet; The companies listed in Annexe 3 and 5 of EEAG correspond to the companies listed in the Energiedecreet with the exception of Nace 3832 (Recycling of waste) which is listed in Annexe 3 EEAG but not in the Energiedecreet.

Germany

Component 1 – the commodity price

In Germany, commodity prices describe the cost of electricity used by industrial consumers in January 2021, as computed based on market prices. The EEX Futures and EPEX DAM prices are the national indexes employed in the computation.

The commodity formula applies to all our industrial profiles. For profiles E0, E1 and E2, we use all hours apart from weekends of EPEX SPOT DE DAM, while for profile E3 and E4, we utilise all hours of EPEX SPOT DE DAM.

The CREG provided us with the formula used for commodity pricing, and commodities are based on an analysis carried by the Belgian regulator of electricity supply contracts of all Belgian consumers with consumption higher than 10 GWh dating back to 2015. For 2021, ratios used in the formula were determined as being the average coefficients over three years (2016 to 2018).

$$\textit{Commodity price}$$
$$= 36.5\%\ CAL\ Y_{-1} + 27.4\%\ CAL\ Y_{-2} + 21.4\%\ CAL\ Y_{-3} + 8.2\%\ Qi_{-1} + 4.2\%\ Mi_{-1} + 2.3\%\ EPEX\ Spot\ DE$$

Where:

	Explanation
CAL Y_{-1}	Average year ahead forward price in 2020
CAL Y_{-2}	Average two year ahead forward price in 2019
CAL Y_{-3}	Average three year ahead forward price in 2018
Qi_{-1}	Average quarter ahead forward price in the fourth quarter of 2020
Mi_{-1}	Average month ahead forward price in December 2020

Component 2 – network costs

The German electricity market differs from the Belgian one. The four TSOs exclusively operate on the (extra-) high voltage grid and all lower voltage levels are operated by DSOs (often up to 110 kV).

Our profiles are connected to different voltage levels, and different tariffs thus apply. The profiles are associated with the appropriate voltage level in the following table:

Table 84 : Connection voltage for each consumer profile

Connection voltage (U_n)	Voltage profile	Consumer profile	Grid operator
1 kV ≤ Un ≤ 50 kV	Medium voltage	E0	DSO
		E1	
		E2	
Un = 110 kV	High voltage	E3	
220 kV < Un ≤ 350 kV	Extra-High voltage	E4	TSO

German prices are disclosed as integrated tariffs both for transmission and distribution, thereby offering less view on the bill components. As described in the dataset, all four transmission zones are represented, but since Germany counts more than 800 DSOs[183], a weighted average of two DSOs (one rural and one urban) per zone is presented.

183 (European Commission, 2010)

Transmission cost

Like Belgium, the German integrated transmission fees involve three main components:

Table 85 : Components of German transmission costs

Transmission costs		
Component	**German label**	**Explanation**
Capacity charge	Leistungspreis	Depends upon the maximum capacity in kW contracted, expressed in EUR/year.
Consumption charge	Arbeitspreis	Depends upon the volume of energy consumed in kWh per year, expressed in cEUR/kWh/year.
Metering costs	Messstellenbetrieb	Charges related to the cost of metering and invoicing; fixed prices expressed in EUR/year.

Since it is assumed that load profiles do not exceed their contracted capacity, no other fees such as capacity excess fees are taken into account

When annual consumption exceeds 10 GWh, important transmission network costs reductions can apply on large industrial consumers. Users with a very abnormal load profile (case by case)[184] get a reduction of max. 90%. Moreover, users who exceed 7.000 consumption hours[185] a year, benefit from reductions, as shown in the table below:

Table 86 : Grid fee reduction conditions

Annual consumption	Annual offtake hours	Grid fee reduction
>10 GWh	≥ 7.000 hours	- 80%
> 10 GWh	≥ 7.500 hours	- 85%
> 10 GWh	≥ 8.000 hours	- 90%

These reductions apply to profiles E3 and E4. We assumed that Profile E3 has a profile of 7.692 hours and pays consequently, only 15% of the grid fee, while this is only 10% for profile E4 (8.000 consumption hours). The costs can be allocated pro-rata to final consumers as a surcharge on network charges. Other profiles do not qualify for the following reasons:

- Profile E-BSME and E0 do not consume 10 GWh in addition to reaching fewer offtake hours, respectively 1.600 hours and 4.000 hours.
- Profile E1 and E2 do consume 10 GWh or more, but their offtake hours are lower (5.000 hours).

Distribution costs

Distribution costs follow an identical pricing methodology as for the transmission grid with similar terminology. Tariffs are also composed of three elements: capacity charge (i.e. “Leistungspreis”), consumption charge (i.e. “Arbeitspreis”) and the metering costs (“Messstellenbetrieb”). The tariffs may differ on price or range of maximum capacity contracted and electricity consumed.

Component 3 – all other costs

When it comes to German taxes and levies, the case is somewhat more complicated with many exemptions, progressive reductions and various rates. As stated in the section “3.1 General assumptions”, we expect the consumer to behave in an economically rational manner aiming at the lowest tax rate. Whenever the application of reductions or exemptions depends on economic criteria, not under the full control of the user (energy cost/turnover, energy cost/gross value added, pension payments etc.), we present a range of possible options.

We counted seven taxes or surcharges that apply on electricity in Germany:

[184] (Bundesamt für Justiz, 2021)

[185] See definition in section 0. Consumer profiles.

1. The "*KWKG-Umlage*" – Kraft-Wärme-Kopplungsgesetz or Combined Heat and Power Act – is a tax contributing to CHP-plant subsidies. The present forecast data of DSOs and the Federal office for Economic Affairs and Export - Bundesamt für Wirtschaft und Ausfuhrkontrolle shorten by BAFA – represent the backbone of the computations. There is a specific rate for consumers under certain conditions, below detailed. This applies to all profiles from E0 to E4.

Table 87 : KWKG-Umlage tax in Germany

Category	Consumer group	Rates
Category A	All other consumers	**2,54EUR/MWh**[186]
Category B	If consumption > 1 GWh / year and electricity cost is: • For an extensive list of industrial sectors (annexe 3 of EEAG)[187]: >17% of gross value added [188]	**0,38 EUR/MWh** (85% reduction) but capped[189] at 0,5% of gross value added (average last three years) for all consumers with electricity cost >20% of gross value added
	If consumption > 1 GWh / year and electricity cost is: • For a less extensive list of industrial sectors (annexe 5 of EEAG): >20% of gross value added	**0,38 EUR/MWh** (85% reduction) but capped at 4,0% of gross value added (average last three years) for all consumers with electricity cost
Category C	If consumption > 1 GWh / year and electricity cost is: For an extensive list of industrial sectors (annexe 3 of EEAG)[190]: between 14 and 17% of gross value added (avg. last three years)	**0,51 EUR/MWh** (80% reduction) but capped[191] at 0,5% of gross value added (average last three years) for all consumers with electricity cost >20% of gross value added
		0,51 EUR/MWh (80% reduction) but capped[192] at 4,0% of gross value added (average last three years) for all consumers with electricity cost

A **bottom rate of 0,30 EUR/MWh** exists that can benefit some consumers from category B and C. While the bottom rate applied for taxes might differ (see further with EEG-Umlage, p.) depending on whether a consumer is, on the one hand, active in the aluminium, lead, zinc or copper production or, on the other hand, active in another sector but the ones mentioned previously, it is not the case for the KWKG.

Regarding our reviewed profiles (E0 to E4), we display a range from the bottom rate to the category C rate for electro-intensive consumers. As for non-electro-intensive consumers, we consider a maximum price based on category A rates.

2. The "*StromNEV*", or Electricity Network Charges Ordinance, based on the regulation of charges for access to electricity networks § 19, is a digressive levy to compensate for §19 transmission tariff reductions. Again, different rates apply to the respective following categories:

[186] This tax rate hasn't changed in the past years.

[187] (European Commission, 2014-2021)

[188] The notion of gross value added is defined in Annexe 4 of the Environmental and Energy State Aide Guidelines, Communication C200/50 of the European Commission. (European Commission, 2014-2021)

[189] However, these caps are only applicable if the consumer is part of an energy efficiency system improvement program.

[190] (European Commission, 2014-2021).

[191] However, these caps are only applicable if the consumer is part of an energy efficiency system improvement program.

[192] However, these caps are only applicable if the consumer is part of an energy efficiency system improvement program.

Table 88 : StromNEV tax in Germany

Band	Electricity offtake	Rates
Band A	Offtake ≤ 1 GWh/year	**4,32 EUR/MWh**
Band B	Offtake > 1 GWh /year	**0,50 EUR/MWh**
Band C	Offtake > 1 GWh/year and manufacturing industry with electricity cost > 4% of turnover	**0,25 EUR/MWh**

For all profiles understudy, we display two possibilities: the consumer can benefit from the Band C rate for his offtake above 1 GWh with the bottom range, or he does not qualify for the given conditions, in which case Band B rate applies for his offtake above 1 GWh and with top range on offtakes up to 1 GWh.

3. The "*Offshore-Netzumlage*", or Offshore Network Levy, is a levy to pay for offshore wind power generation units. Several rates apply depending on the band they fall into which depends on the total electricity offtake in a similar way we have seen for the KWKG/CHP surcharge.

Table 89 : Offshore-Netzumlage tax in Germany

Category	Consumer group	Rates
Category A	All consumers that do not belong to category B or C	**3,95 EUR/MWh**
Category B	If consumption > 1 GWh / year and electricity cost is: • For an extensive list of industrial sectors (annexe 3 of EEAG)[193]: >17% of gross value added [194]	**0,593 EUR/MWh** (85% reduction) but capped[195] **at 0,5% of gross value added** (average last three years) for all consumers with electricity cost > 20% of gross value added
	If consumption > 1 GWh / year and electricity cost is: • For a less extensive list of industrial sectors (annexe 5 of EEAG): >20% of gross value added	**0,593 EUR/MWh** (85% reduction) but capped[196] **at 4,0% of gross value added** (average last three years) for all consumers with electricity cost < 20% of gross value added
Category C	If consumption > 1 GWh / year and electricity cost is: For an extensive list of industrial sectors (annexe 3 of EEAG)[197]: between 14 and 17% of gross value added (avg. last three years)	**0,790 EUR/MWh** (80% reduction) but capped[198] at 0,5% of gross value added (average last three years) for all consumers with electricity cost > 20% of gross value added
		0,790 EUR/MWh (80% reduction) but capped[199] at 4,0% of gross value added (average last three years) for all consumers with electricity cost < 20% of gross value added

[193] (European Commission, 2014-2021).

[194] The notion of gross value added is defined in Annexe 4 of the Environmental and Energy State Aide Guidelines, Communication C200/50 of the European Commission. (European Commission, 2014-2021)

[195] However, these caps are only applicable if the consumer is part of an energy efficiency system improvement program.

[196] However, these caps are only applicable if the consumer is part of an energy efficiency system improvement program.

[197] (European Commission, 2014-2021).

[198] However, these caps are only applicable if the consumer is part of an energy efficiency system improvement program.

[199] However, these caps are only applicable if the consumer is part of an energy efficiency system improvement program.

A **bottom rate of 0,30 EUR/MWh** exists that can benefit some consumers of the EEG for the Offshore-Netzumlage (Offshore Network Levy).

Regarding our reviewed profiles (E0 to E4), we display a scope from the bottom rate to the category C rate for electro-intensive consumers. As for non-electro-intensive consumers, we consider a maximum price based on category A rates.

4. The "*EEG-Umlage*" – Erneuerbare-Energie-Gesetz or Renewable Energy Act – is a contribution to the renewable energy financing other than offshore wind power generation unit. There are two different consumer categories: category A that pays a single 'top rate' for their total consumption and category B that only pays this top rate for the first GWh consumed. For the exceeding use (more than 1 GWh/year), the latter category benefits from an 85% reduction on the EEG-Umlage tax[200] while category C benefits from an 80% reduction on the EEG-Umlage fee. The following table gathers the information.

Table 90 : EEG-Umlage tax in Germany

Category	Consumer group	Rates
Category A	All consumers that do not belong to category B	**65,0 EUR/MWh**
Category B	If consumption > 1 GWh / year and electricity cost is: • For an extensive list of industrial sectors (annexe 3 of EEAG)[201]: >17% of gross value added [202]	**9,75 EUR/MWh** (85% reduction) but capped[203] at 0,5% of gross value added (average last three years) for all consumers with electricity cost >20% of gross value added
	If consumption > 1 GWh / year and electricity cost is: • For a less extensive list of industrial sectors (annexe 5 of EEAG): >20% of gross value added	**9,75 EUR/MWh** (85% reduction) but capped[204] at 4,0% of gross value added (average last three years) for all consumers with electricity cost < 20% of gross value added
Category C	If consumption > 1 GWh / year and electricity cost is: • For an extensive list of industrial sectors (annexe 3 of EEAG)[205]: between 14 and 17% of gross value added (avg. last three years)	**13,0 EUR/MWh** (80% reduction) but capped[206] at 0,5% of gross value added (average previous three years) for all consumers with electricity cost >20% of gross value added
		13,0 EUR/MWh (80% reduction) but capped[207] at 4,0% of gross value added (average last three years) for all consumers with electricity cost

[200] Reductions such as the EEG-Umlage that are destined to fund renewable energy are allowed according to the Environmental and Energy State Aid Guidelines or so-called EEAG framework (European Commission, 2014-2020).

[201] (European Commission, 2014-2020).

[202] The notion of gross value added is defined in Annexe 4 of the Environmental and Energy State Aide Guidelines, Communication C200/50 of the European Commission. (European Commission, 2014-2020).

[203] However, these caps are only applicable if the consumer is part of an energy efficiency system improvement program.

[204] However, these caps are only applicable if the consumer is part of an energy efficiency system improvement program.

[205] (European Commission, 2014-2020).

[206] However, these caps are only applicable if the consumer is part of an energy efficiency system improvement program.

[207] However, these caps are only applicable if the consumer is part of an energy efficiency system improvement program.

For both categories B and C, there is a 1 EUR/MWh rate that applies to the industrial sectors, except for three particular industries - aluminium, zinc, lead and copper production – that benefit from a **0,50 EUR/MWh bottom rate**.

The EEG-Umlage partially covers self-generated electricity consumption, depending on nature and amount of generated electricity (called '*Eigenversorgung'* in German). Anew, we presume the five studied profiles are not producing electricity, therefore not concerned by the EEG-Umlage regulations regarding self-generation.

Hereabout, we present a range of potentialities reflecting the impossibility to determine whether the consumer profiles meet the economic criteria to qualify as category B or C. The category A – paying the full price of 65 EUR/MWh is shown as an outlier even though it represents a significant group of non-electro-intensive consumers. As in 2017, in Germany, solely 2.058 companies among over 45.000 industrial companies are entitled to category B tariff. Notwithstanding, these companies designate around 42% of the overall German industrial energy consumption, as of 2018[208].

Regarding our profiles (E0 to E4) under review, we display a scope from the bottom rate to the category C rate for electro-intensive consumers. As for non-electro-intensive consumers, we consider a maximum price based on category A rates.

5. The "*Stromsteuer*", or Electricity tax, as its translation shows, is a tax on electricity. The standard rate is 20,50 EUR/MWh, remaining unchanged since 2003 (Bundesamt für Justiz, 2021). All applying industrial consumers benefit from a 15,37 EUR/MWh rate, which represents a 25% reduction. Initially implemented to fund employees' pensions, companies may be granted important reductions whether they do not contribute much as a result of a low number of employees.

   The maximum reduction rate that can be reached is 1,537 EUR/MWh with a 90% reduction. Since 2015, the implementation of this reduction, also called '*Spitzenausgleich*' depends on the countrywide effort regarding energy efficiency goals[209]. In 2019, 5488, companies benefit from a reduction through this system[210].

   Apart from these cutbacks, electricity as a raw material for electro-intensive industrial processes is entirely exempted from electricity tax (Stromsteuer). Furthermore, for all profiles, we exhibit a scope from 0 EUR/MWh (exemptions) to 15,37 EUR/MWh. The lowest considered tariff for the non-exempted consumers is included in this range as it amounts to 1,537 EUR/MWh.

6. The "*Konzessionsabgabe*", or Concession fee, is a tax imposed on all users to fund local governments. The basic rate for industrial consumers is 1,10 EUR/MWh[211]. Yet, consumers whose final electricity price (all taxes and grid fees included) remains below a fixed threshold (in 2018: 139,20 EUR/MWh, published in December 2019[212]), are exempted from the concession fee. For our profiles, this means that the concession fee is only due when no substantial reductions are applicable for the EEG-Umlage. We hence only apply the concession fee in the (outlier) case where the full rate (64,05 EUR/MWh) of the EEG-Umlage is due.

7. The "*Abschaltbaren Lasten-Umlage*", or Interruptible loads levy, is a tax used to offset compensation payments made by transmission system operators to providers of so-called "switch-off" services.Providers of disconnection capacity are, for example, industrial companies that can refrain from supplying electricity for an agreed period of time or even at short notice if there is not enough electricity available in the electricity grid at the time. The TSOs balance their payments among themselves and allocate the amount to all final consumers. The aim is to improve grid stability and thus increase supply security.[213] The 2021-rate amounts to 0,09 EUR/MWh with a significant increase compared to the 2019-rate, which amounted to 0,05 EUR/MWh.

[208] (Bundesamtes für Wirtschaft und Ausfuhrko-trolle, 2017); (BDEW, 2018)

[209] (Bundesamt für Justiz, 2019)

[210] Bericht der Bundesregierung über die Entwicklung der Finanzhilfen des Bundes und der Steuervergünstigungen für die Jahre 2015 bis 2018, pg. 98

[211] (Acteno, 2019)

[212] (RGC Manager, 2019)

[213] (Netztransparenz.de, 2020)

France

Component 1 – the commodity price

In France, there is a specific scheme that enables alternative suppliers – apart from the historical one EDF – to obtain electricity from EDF under conditions set by the public authorities. The maximum aggregated amount is capped at 100 TWh/year, with a current price of 42 EUR/MWh[214]. The access to this regulated rate "ARENH" ("Accès Régulé à l'Electricité Nucléaire Historique")[215] depends on the consumer profile. This fixed-rate and the electricity market price compose the overall commodity price. In this document, we presume that consumers, behaving as rational actors, can choose between the following:

1. A combination of market price-based electricity and regulated price-based electricity (ARENH)
2. Market price only

The commodity formula to compute the market price is applied to each profile. For E-BSME to E2, we did not include weekend hours of Epex Spot FR DAM, while for E3 and E4 we included weekdays and weekend hours of Epex Spot FR DAM. The equations are based on an analysis of all Belgian consumers with a yearly usage higher than 10 GWh performed by the Belgian regulator of the electricity supply.

The amount of nuclear power at regulated prices (ARENH) attributed to a supplier depends on its consumer portfolio and the usage of that portfolio during a 'reference period' (low national consumption), which is highlighted in the following table.

Table 91 : Reference period for the ARENH

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Weekdays only	1 am < x < 7 am												
	All hours												
Weekends and bank holidays	All hours												

The Energie regulatory commission stated the regulated tariffs could be allocated only if two conditions were met:

- ARENH volumes must be representative of the share of historical nuclear production in total electricity consumption in France (approximately 70% in 2019[216])
- The distribution of the ARENH among suppliers must be made according to their customers' consumption during the hours of low national consumption.

In other words, for each supplier, the amount of electricity supplied by ARENH represents 70%, and the rest is bought in the electricity market (30%).

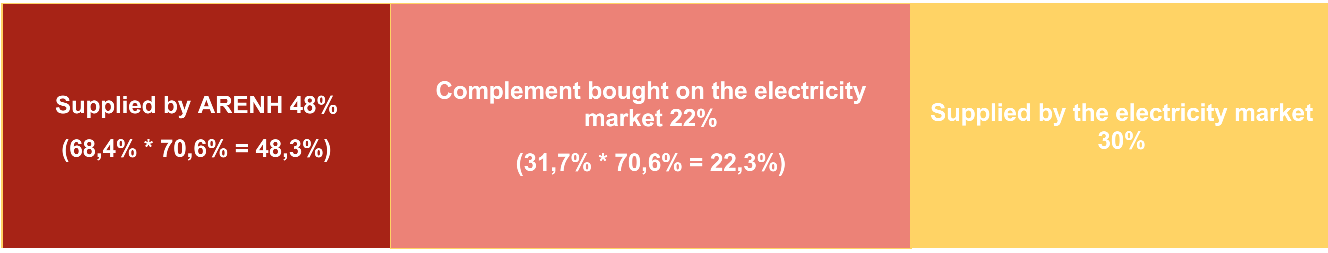
In 2021, as in 2020, the commodity price is thus a combination of the market price (including capacity certificates) and the regulated price. For the year 2021, the demand was 146,2 TWh which is above what EDF provides (100 TWh). To reach the capped level, only 68% of the demand for each supplier is fulfilled ('écrêtement' or capping).

[214] The price has not changed since 2012 (Selectra, n.d.)

[215] ARENH started in 2011, its termination process will start in 2021 to be definitely stopped in 2025. (CRE, 2019)

[216] (Connaissance des Energies, 2020)

Figure 26 : Capping in 2021 for the ARENH



Under the ARENH conditions, defined in the French law[217], the electricity is sold by EDF to authorized suppliers in the form of products delivered over a one-year period, characterised by a quantity and a profile. This quantity is the average power of electricity delivered during the delivery period.

Given the consumption profiles and the capping we have determined, this means that 11,2% of the consumption of profile E-BSME, 28,0% of the consumption of profile E0, 35,0% of the consumption of profiles E1 and E2 is taken into account to allocate nuclear power at regulated prices to its supplier, 60,1% for E3 and 62,5% for E4. In 2020, commodity prices are a combination of the market price (including capacity certificates) and the regulated rate.

Table 92 : Percentage of ARENH hours compared to their overall consumption hours

Days included	Weekdays	Weekends and Public holidays	Percentage of total consumption hours under ARENH (capping excl.)	Percentage of total consumption hours under ARENH (capping incl.)
Profile E-BSME	✓	✖	16,4%	11,2%
Profile E0	✓	✖	40,9%	28,0%
Profile E1	✓	✖	51,2%	35,0%
Profile E2	✓	✖	51,2%	35,0%
Profile E3	✓	✓	87,8%	60,1%
Profile E4	✓	✓	91,3%	62,5%

For 2021, ratios used in the formula were determined as being the average coefficients over three years (2016 to 2018). The commodity price equations are exhibited below:

$$\text{Commodity price E-BSME} = 11{,}2\%\ ARENH + 88{,}9\%\ (36.5\%\ CAL\ Y_{-1} + 27.4\%\ CAL\ Y_{-2} + 21.4\%\ CAL\ Y_{-3} + 8.2\%\ Qi_{-1} + 4.2\%\ Mi_{-1} + 2.3\%\ EPEX\ Spot\ FR)$$

$$\text{Commodity price E0} = 28{,}0\%\ ARENH + 72{,}2\%\ (36.5\%\ CAL\ Y_{-1} + 27.4\%\ CAL\ Y_{-2} + 21.4\%\ CAL\ Y_{-3} + 8.2\%\ Qi_{-1} + 4.2\%\ Mi_{-1} + 2.3\%\ EPEX\ Spot\ FR)$$

$$\text{Commodity price E1, E2} = 35{,}0\%\ ARENH + 65{,}2\%\ (36.5\%\ CAL\ Y_{-1} + 27.4\%\ CAL\ Y_{-2} + 21.4\%\ CAL\ Y_{-3} + 8.2\%\ Qi_{-1} + 4.2\%\ Mi_{-1} + 2.3\%\ EPEX\ Spot\ FR)$$

$$\text{Commodity price E3} = 60{,}1\%\ ARENH + 40{,}3\%\ (36.5\%\ CAL\ Y_{-1} + 27.4\%\ CAL\ Y_{-2} + 21.4\%\ CAL\ Y_{-3} + 8.2\%\ Qi_{-1} + 4.2\%\ Mi_{-1} + 2.3\%\ EPEX\ Spot\ FR)$$

[217] (Legifrance, 2020)

$$\text{Commodity price E4} = 62{,}5\%\ ARENH + 37{,}9\%\ (36.5\%\ CAL\ Y_{-1} + 27.4\%\ CAL\ Y_{-2} + 21.4\%\ CAL\ Y_{-3} + 8.2\%\ Q_{-1} + 4.2\%\ Mi_{-1} + 2.3\%\ EPEX\ Spot\ FR)$$

Where:

	Explanation
ARENH	Nuclear power at the regulated price of 42 EUR/MWh (since 2012)
CAL Y_{-1}	Average year ahead forward price in 2020
CAL Y_{-2}	Average two year ahead forward price in 2019
CAL Y_{-3}	Average three year ahead forward price in 2018
Qi_{-1}	Average quarter ahead forward price in the fourth quarter of 2020
Mi_{-1}	Average month ahead forward price in December 2020

Component 2 – network costs

Integrated transmission and distribution costs

The RTE ("Réseau de Transport d'Electricité") is the Transmission System Operator (TSO) who is in charge of the transmission network. The French high voltage network starts at 1 kV, as shown in the table below and RTE operates the HTB (> 50 kV) networks.

Table 93 : Tension connection level and tension domain in France

Tension connection level (Un)	Tension domain	
$U_n \leq 1$ kV	BT	Low Tension domain
1 kV < $U_n \leq 40$ kV	HTA1 (E0, E1)	High Tension domain
40 kV < $U_n \leq 50$ kV	HTA2	High Tension domain
50 kV < $U_n \leq 130$ kV	HTB1 (E2)	High Tension domain
130 kV < $U_n \leq 150$ kV	HTB2 (E3, E4)	High Tension domain
350 kV < $U_n \leq 500$ kV	HTB3	High Tension domain

The French transmission tariffs are composed of 3 components which are presented in this table:

Table 94 : French transmission tariffs

<table>
<tr><th colspan="4">Network costs</th></tr>
<tr><th>Component</th><th>French label</th><th colspan="2">Explanation</th></tr>
<tr><td>Management component[218]</td><td>Composante annuelle de gestion</td><td colspan="2">The management component depends on whether a consumer has a unique contract or not. We assume profile E-BSME opted for individual contracts.</td></tr>
<tr><td rowspan="6">Component for taking off electricity</td><td rowspan="6">Composante annuelle de soutirage</td><td colspan="2">Multiple prices options exist varying depending on utilisation length and temporal differentiators with both capacity and consumption components. The prices options are:</td></tr>
<tr><td>HTA</td><td>HTB</td></tr>
<tr><td>1. Short use (CU) with a fixed peak</td><td>1. Short use (CU)</td></tr>
<tr><td>2. Short use (CU) with a mobile peak</td><td>2. Medium use (MU)</td></tr>
<tr><td>3. Long use (LU) with a fixed peak</td><td>3. Long use (LU)</td></tr>
<tr><td>4. Long use (LU) with a mobile peak</td><td></td></tr>
<tr><td>Metering tariff</td><td>Composante annuelle de comptage</td><td colspan="2">The metering tariff depends on whether the meter is owned by the consumer or not. The assumption is taken that concerned industrial profiles (E0 and E1) own their own meters.</td></tr>
</table>

For the consumers that fall under the HTA1 (E0 and E1), there is a similar offering, namely four contract options (see Table 94) based on the offtake in 5 different time slots. The number of hours per time slot was determined based on RTE's timeframe (see Table 95), taking into account that all these profiles do not operate during weekends. Again, all options were computed and are presented as a price range given that we cannot anticipate what option is preferred by our potential consumers.

Table 95 : Hours per temporal classes in France

Hours per temporal classes – RTE Timeframe		
Temporal class	**Weekdays**	**Weekends**
Peak	4h/day for three months (December to February)	n/a
HPH	12h/day for three months (December to March) + 16h/day for two months (March and November)	n/a
HCH	8h/day for five months (November to March)	24h/day for five months (November to March)
HPB	16h/day for seven months (April to October)	n/a
HCB	8h/day for seven months (April to October)	24h/day for seven months (April to October)

The offtake tariffs are a bit more complicated than the other components for profiles falling under HTB (HTB1 for E2 and HTB2 for E3/E4) tariffs. There are additional fees that could have been taken into account, but we chose not to in this study. Firstly, there are fees for planned and unplanned exceeding of power capacity, a cost for the regrouping of connection, a complimentary fee and emergency power supplies, a fee for reactive energy and a transformation fee. Secondly, there are injection fees, which need to be paid for the injection in the grid. As we

[218] Since 2018, the level of this component also takes into account the financial compensation paid to suppliers in connection with the management of single-contract customers.

assume that the load capacity is constant throughout the year and do not exceed their contracted capacity, the latter components are not taken into consideration.

Since February 2016, a new and relatively complex transmission tariff reduction was introduced to replace the more straightforward transmission tariff reductions that were in place between mid-2014 and late 2015. An increase in transmission tariffs finances those reductions billed to the network users who are not eligible for those reductions. Discounts are granted to baseload, 'anti-cyclical' and very large consumers according to the principles laid out in the table below.

Table 96 : Transmission reductions eligibility criteria and rates

Origin of eligibility						
Stable profiles	**Anti-cyclical**	**Large consumers**	**Hyper electro-intensive cons. sites (art. D. 351-3)**	**Electro-intensive cons. sites (art. D. 351-2 or art D. 351-1)**	**Power storage sites connected to the grid**	**Other sites**
Annual offtake >10GWh and ≥ 7000 hours	Annual offtake >20 GWh and off-peak grid utilisation ≥44%	Annual offtake >500 GWh and off-peak grid utilisation ≥40% and ≤44%	80 %	45 %	30 %	5 %
Annual offtake >10 GWh and ≥ 7500 hours	Annual offtake >20 GWh and off-peak grid utilisation ≥48%	/	85 %	50 %	40 %	10 %
Annual offtake >10 GWh and ≥ 8000 hours	Annual offtake >20 GWh and off-peak grid utilisation ≥53%		90 %	60 %	50 %	20 %

With Electro-intensive and hyper-electro-intensive consumers defined as follows:

Table 97 : Definitions of electro- and hyper-electro-intensive consumers

	Power consumed/Value added	Trade-intensity	Annual power consumption
Electro-intensive	>2,5 kWh/EUR	>4%	>50 GWh
Hyper-electro-intensive	>6 kWh/EUR	>25%	Not applicable

Given this framework, we can make the following assumptions for the four consumer profiles under review:

- Profile E0 and E1 are **not eligible** for any reduction, as it does not meet the criteria for stable, anti-cyclical or large consumers.
- Profile E2 is **not eligible** for any reduction, as it does not meet the criteria for stable, anti-cyclical or large consumers - with an off-peak utilisation rate of 41%.
- Profile E3 **is eligible** for a reduction, as a stable consumer profile. With 7.692 consumption hours per year, depending on the industrial activity and hence the electro-intensity of the consumer, the discount can vary from 10% to 85%.
- Profile E4 **is eligible** for a reduction, as a stable consumer profile. With 8.000 consumption hours per year, depending on the industrial activity and hence the electro-intensity of the consumer, the discount can vary from 20% to 90%.

Component 3 – all other costs

There are two different surcharges that have to be taken into account for electricity in France, and two different surcharges apply to electricity. Furthermore, users have to pay for capacity certificates covering their demand. The surcharges for the large industrial profiles have remained the same between 2020 and 2021 with the exception of capacity certificates. The surcharges are detailed as follow:

1. The "Contribution tarifaire d'acheminement" (CTA) is a surcharge for energy sector pensions (for Electricity and Natural gas Industries). There are two tariffs of the CTA depending on the grid to which the user is connected. For consumers directly connected to the transmission grid (profiles E2, E3 and E4 in France), the CTA amounts to 10,14%. For all other consumers connected to the distribution grid, the CTA amounts to 27,04% (profile E0 and E1 in France). The CTA is due on the fixed and capacity component of the transmission tariff. As the latter tariffs may vary according to the selected price option, CTA variance is represented as a range.
2. The "Contribution au service public d'électricité" (CSPE) is a surcharge which feeds a special budgetary program "Public service of energy" that pays (amongst other things) for the cost of support for the production of electricity from natural gas-fired cogeneration plants, the péréquation tarifaire (including a small part of the cost of renewables) and social tariffs. The standard tariff of the CSPE is 22,50 EUR/MWh, but three reductions are applicable:
    a. For electro-intensive consumers where the CSPE would have been (without reductions and exemptions) at least equal to 0,5% of value added, the CSPE is equal to:
        i. 2 EUR/MWh for consumers consuming above 3 kWh per euro of value added;
        ii. 5 EUR/MWh for consumers consuming between 1,50 and 3 kWh per euro of value added;
        iii. 7,50 EUR/MWh for consumers consuming below 1,50 kWh per euro of value added.
    b. For hyper-electro-intensive consumers, the tariff amounts to 0,50 EUR/MWh. To be very electro-intensive, consumers must satisfy both conditions:
        i. their energy consumption represents more than 6 kWh per euro of value added;
        ii. their activity belongs to a sector with a high trade intensity with third countries (> 25%).
    c. Sectors with a high risk of carbon leakage are metallurgy, electrolysis, non-metal minerals or chemical sectors. For electro-intensive consumers described under (i) above with a high risk of carbon leakage linked to indirect carbon emissions, the CSPE amounts to:
        i. 1 EUR/MWh for consumers consuming above 3 kWh per euro of value added;
        ii. 2,50 EUR/MWh for consumers consuming between 1,50 and 3 kWh per euro of value added;
        iii. 5,50 EUR/MWh for consumers consuming below 1,50 kWh per euro of value added.

Lacking more detailed economic and financial data on the consumer profiles, we cannot exclude that the maximum rate of 22,5 EUR/MWh applies to one or more of our consumer profiles. More specifically, the economic conditions needed for the maximum rate to be applicable are the following (cumulative):

1. The annual value added of the industrial company exceeds:

	Value added
Profile E1 (10 GWh)	45 MEUR
Profile E2 (25 GWh)	112,50 MEUR
Profile E3 (100 GWh)	450 MEUR
Profile E4 (500 GWh)	2.250 MEUR

2. The industrial company does not meet the criteria for very-electro-intensity specified under (ii).
3. The industrial company does not meet the criteria for carbon leakage risk defined under (iii).

We, therefore, present the maximum rate of 22,50 EUR/euros per MWh as a possible outlier for all consumer profiles (non-electro-intensive consumers). In addition, we also present a range from 0,50 EUR/MWh to 7,50 EUR/MWh for electro-intensive consumers.

There are also exonerations on the CSPE, namely for 5 types of consumption/activities:

i. Electricity is used for metallurgical processes, chemical reduction and electrolysis
ii. Companies for which electricity accounts for more than half of the cost of a product
iii. Manufacture of non-metallic mineral products
iv. Production of energy products, electricity generation
v. Compensation for losses on the public electricity transmission and distribution network.

This exemption may be total or partial, depending on the use of the site's electricity.

3. Since 2017, every supplier needs to hold capacity certificates to cover for the demand of its users during peak times. Final consumers also need to hold capacity certificates to cover their demand during peak times. The final demand to be covered is subject to a reduction factor, which was 0,99 in 2020. The price per certificate is of 31.241,77 EUR/MW in 2020.[219] Capacity certificates only need to be bought for the electricity which is not bought at regulated rates since the electricity bought at regulated prices contains capacity certificates. For the industrial profiles understudy, the assumption is made that their electricity usage during peak moments is the same as during other moments.

The Netherlands

Component 1 – the commodity price

Commodity prices computation rests on market prices and describes the cost of electricity for industrial consumers as of January 2021. We used the ICE Endex CAL and the APX NL DAM as national indexes for the computation. The underneath commodity formula is used for each profile. For E-BSME to E4, we did not include weekend hours of APX NL DAM, while for E3 and E4 we included weekdays and weekend hours of APX NL DAM. The CREG provided the formulas used for commodities pricing in this investigation. The equations are based on an analysis of all Belgian consumers with a yearly usage higher than 10 GWh, performed by the Belgian regulator of the electricity supply.

$$\text{Commodity price}$$
$$= 36.5\%\ CAL\ Y_{-1} + 27.4\%\ CAL\ Y_{-2} + 21.4\%\ CAL\ Y_{-3} + 8.2\%\ Qi_{-1} + 4.2\%\ Mi_{-1} + 2.3\%\ APX\ NL\ DAM$$

Where:

	Explanation
CAL Y-1	Average year ahead forward price in 2020
CAL Y-2	Average two year ahead forward price in 2019
CAL Y-3	Average three year ahead forward price in 2018
Qi-1	Average quarter ahead forward price in the fourth quarter of 2020
Mi-1	Average month ahead forward price in December 2020

[219] Data was made available by the French regulator, CRE

Component 2 – network costs

Integrated transmission and distribution costs

In the Netherlands, the network costs integrate both transmission and distribution costs. As Dutch TSO, Tennet operates the transmission grid and is responsible for the infrastructure above 110 kV. Hence, profiles E3 and E4 are assumed to be directly connected to the transmission grid, respectively to the high voltage (110-150 kV) and the extra high voltage grid (220-380 kV). Consequently, they are subject to Tennet's prices. Concerning the other industrial profiles (E0, E1 and E2) and E-BSME, connected to lower voltages and thus to the distribution grid, they are subject to DSOs 'prices. Similar to the residential profiles in the Netherlands, we use a weighted average of the seven distribution zones because the Netherlands uses an integrated tariff[220].

For all profiles above-mentioned, they involve the same four main components[221]:

Table 98 : Network cost component in the Netherlands

Network costs		
Component	**Dutch labelling**	**Explanation**
Standing charge	Vastrecht	Fixed basic fee (expressed in EUR/year).
Capacity charge	Capaciteitstarieven	Fees are covering the costs associated with the transmission of electricity. They are subdivided into three terms: - Fixed charge depending on the contracted capacity (expressed in EUR/year); - Variable charge depending on the monthly peak (expressed in EUR/kW/month); - Variable charge depending on the consumption level (expressed in EUR/kWh).
Periodical connection tariff	Periodieke aansluitvergoeding	Fixed fee is covering the costs for managing the connection (expressed in EUR/year).
Metering charge	Meettarief	Fixed charges are covering for the use and management of energy meters (expressed in EUR/year).

However, a reduction ("*Volumecorrectie*") in transmission prices has to be taken into consideration. This correction targets energy-intensive consumers who jointly fulfil the following two conditions[222]:

1. The customer exceeds 50 GWh/year in terms of offtake;
2. The operating time exceeds 5.700 hours per year (or 65%) during off-peak hours[223].

The possible reduction is calculated according to the following formula, with a 90% reduction limit:

$$Volume\ correction\ (in\ \%) = \frac{(Company\ operating\ time - 65\%)}{(85\% - 65\%)} * \frac{(offtake - 50\ GWh)}{(250\ GWh - 50\ GWh)} * 100$$

Where

$$Company\ operating\ time\ (in\ \%) = \frac{(Total\ offtake\ during\ offpeak\ hours\ /\ maximum\ capacity)}{(hours\ per\ annum)} * 100$$

[220] All industrial profiles are not served by all DSOs. COTEQ and RENDO do not serve consumers similar to our E1 and E2 profiles (from HS tension level) while Westland does not provide profiles similar to E2 (from TS)

[221] (TenneT, 2020)

[222] (Overheid, 2014)

[223] In the Netherlands, offpeak hours are between 11pm-7am in addition to weekends and bank holidays.

Component 3 – all other costs

In general, two surcharges apply to the electricity bill for industrial consumers:

1. The Energy Tax, *Regulerende Energie Belasting* (REB), is a digressive tax on all energy carriers;
2. The ODE levy is a digressive levy, *Opslag Duurzame Energie* (ODE), except for the first 10 MWh, on electricity that the revenues are used to finance renewable energy.

Both taxes rates for 2021 are as follows:

Table 99 : Energy tax and ODE levy according to the consumption level for electricity (industrial consumers)

Band	Consumption level	Energy Tax (EUR/MWh)	ODE (EUR/MWh)
Band A	0 – 10 MWh	94,28	30,00
Band B	10 – 50 MWh	51,64	41,10
Band C	50- 10.000 MWh	13,75	22,50
Band D	> 10.000 MWh (professional)	0,56	0,40

There are several reductions and exemptions for these above-mentioned taxes:

1. Tax refund scheme ("teruggaafregeling"): This is applicable for industrial consumers who are classified as being energy-intensive and which concluded a multiple-year agreement with the Dutch government to save energy by improving their energy efficiency. These consumers can apply for a refund of any tax paid above their consumption of 10.000 MWh after each financial year. Given the latter threshold, only consumer profiles from E2 to E4 are considered for this refund. Concretely, the payback potentially granted is computed as the positive difference between[224]:
    a. The tax due on electricity consumption and;
    b. The highest amount between the tax normally due on the first 10 GWh consumption and the tax that would be due if all consumption was taxed at a rate equal to the European minimum level of taxation (0,5 EUR/MWh).

This refund is to be computed on joined taxes amounts for the Energy tax and the ODE[225].

2. Industrial consumers are exempted if they use electricity for chemical reduction or electrolytic and metallurgical processes.
3. Tax discounts are also possible for cooperatives. However, the profiles under study are assumed not to fall under this category.

Several of the criteria that give access to these tax refunds are based upon economic and accounting data, which are not defined for the industrial profiles of this study. Therefore, we present a range of results with an outlier option (maximum rate only applies if the industrial consumer is not energy-intensive and cannot qualify for the full exemption) and a range spanning from the minimal option (totally exempted) to the refund rate (0,50 EUR/MWh).

[224] (Belastingdienst, 2019)

[225] At 2021 level, for profile E2 (consumption of 25 GWh), the tax normally due for both the Energy tax and the ODE amounts to 380.039,90 EUR whereas the tax due on the first 10 GWh equals 365.639,90 EUR and the total consumption taxed at European minimum level reaches 12.500 EUR. Therefore, this profile is paid back 14.400 EUR (= 380.039,90 - 365.639,90).

The United Kingdom

Component 1 – the commodity price

Commodity prices computation rests on market prices and describes the cost of electricity for industrial consumers as of January 2021. We used the APX UK DAM as the national index for the calculation. The CREG provided us with the formula used for commodity pricing, which is based on an analysis carried by the Belgian regulator of electricity supply contracts of all Belgian consumers with consumption higher than 10 GWh.

As the UK power market work in a different way, based on seasons[226] rather than on a calendar year, we replaced the annual computation with the aggregation of seasonal products on the ICE futures market. BBS_x quotes the baseload electricity price on the ICE index for x seasons ahead. We, therefore, used two seasons of BBS_2 (a year ahead) to replace CAL Y_{-1}[227], two seasons of BBS_4 (two years ahead) to replace CAL Y_{-2} and again, two seasons of BBS_6 to replace CAL Y_{-3}.

The commodity formula applies to each profile. For profiles E0, E1 and E2, we use all hours apart from weekends of APX UK DAM, while for profile E3 and E4, we utilise all hours of APX UK DAM.

$$Commodity\ price$$
$$= 36.5\%\ CAL\ Y_{-1} + 27.4\%\ CAL\ Y_{-2} + 21.4\%\ CAL\ Y_{-3} + 8.2\%\ Qi_{-1} + 4.2\%\ Mi_{-1} + 2.3\%\ APX\ UK\ DAM$$

Where:

	Explanation
CAL Y_{-1}	Average year ahead forward price in 2020
CAL Y_{-2}	Average two year ahead forward price in 2019
CAL Y_{-3}	Average three year ahead forward price in 2018
Qi_{-1}	Average quarter ahead forward price in the fourth quarter of 2020
Mi_{-1}	Average month ahead forward price in December 2020

We computed the commodity price based on the formula mentioned above, entirely in Pound Sterling which has been converted to Euro at the January 2021 rate[228] (also see section "General assumptions", p.77)

Component 2 – network costs

Transmission cost

As we have described above, the UK's network structure is divided between three TSOs, six DSOs and fourteen identified tariff zones. On a technical level, the grid is organized as follows:

[226] In the UK power market, a year is equal to two seasons. A season correspond to a six-month period either summer (April-September) or winter (October-March)

[227] For instance, to estimate CAL Y_{-1} price for January 2020, we selected the average price quotation over the course of 12 months (from October 2018 to September 2019) of the 'two seasons ahead' seasonal forward. This is the equivalence to the year-ahead price quotations applied to the other countries, with the difference of the UK year within which the electricity is consumed lasts from October 2018 to September 2019 while for the other countries it runs from January 2019 to December 2019.

[228] Conversion factor of 1,1035 EUR/GBP, the average conversion factor over the month of January, according to the Eucopean Eentral Bank is considered.

Table 100 : Tariff scheme regarding transmission cost in the United Kingdom

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

The voltage of the transmission grid is particularly high, which is why we assume that E-BSME, E0, E1 and E2 are still connected to the distribution grid, but the bigger industrial profiles (E3 and E4) are directly connected to the transmission grid. In the UK is transmission charges are known as the Transmission Network Use of System (TNUoS) charges and has two different rates: Half-Hourly (HH) and Non-Half-Hourly (NHH). As only the former applies to our industrial profiles, we only detail this one below:

Table 101 : Half-hourly (HH) tariff option in the United Kingdom

United Kingdom		
Tariff option	**Explanation**	**Profile**
Half-Hourly (HH)	Metering system, which utilises AMR (automatic meter reading) technology to provide electricity consumption reading. The system sends updated meter reads to the energy supplier every half hour. Customers pay a capacity tariff depending on their connection capacity, expressed in p/kVA/day.	E0 to E4

Since the HH tariffs differ between all fourteen zones of the UK, a weighted average of the transmission costs is presented for all of our industrial profiles.

There are also rates applied to cover for network losses, and the UK uses a system similar to the Belgian one (but more dynamic) to apply these costs. The Balancing and Settlement Code Administrator, each half-hour, defines the Transmission losses multiplier (TLM) applicable for offtake and delivery. This cost is added to the bill as a percentage of the commodity cost for offtake and should thus not be part of this component. Yet, even though it is not part of the tariff structure as such, we include it as a network component.

Distribution costs

Distribution costs, which are due for profiles E0, E1 and E2, have a more complex methodology.

Profiles E0 and E1 pay according to the Common Distribution Charging Methodology (CDCM). They are billed for total offtake across all demand time periods and with important differences between peak and off-peak offtake. This methodology encompasses the following components:

Table 102 : Distribution costs (CDCM) in the United Kingdom

United Kingdom	
Component	**Explanation**
Total consumption	A unit charge in p/kWh
Fixed charge	Fixed charge per offtake point in p/MPAN[229]/day
Metering costs[230]	Cost for use and management of your energy meter in p/day or GBP/year

[229] Meter Point Administration Number

[230] Electricity metering charges in the UK are not easily accessible. A proxy was used to account for these charges based on a methodology disclosed by National Grid, British TSO delivering electricity and natural gas. As electricity and natural gas are frequently offered as one product with a dual tariff, natural gas metering methodology was used as a proxy. Charges are billed as a fixed yearly charge for installation costs recovered via a rental given that we make the assumption our profiles do not own the meters.

As for profile E2, it is charged through the EHV Distribution Charging Methodology (EDCM), which are largely based on capacity with a small element for offtake in the high demand time-period in addition to a fixed charge. The EDCM provides for individual tariffs for each customer depending upon location, demand, generation (type) and capacity. The individual EDCM-rates are made public, which is why we calculated the average individualized EDCM-rates compared to CDCM-tariffs in each of the fourteen zones. We present the average EDCM-rates on CDCM-tariffs in the fourteen zones as the distribution cost value for profile E2. The following components compose EDCM charges:

Table 103 : Distribution costs (EDCM) in the United Kingdom

United Kingdom	
Component	**Explanation**
Total consumption	A unit charge for high demand periods, expressed in p/kWh.
Fixed charge	Fixed charge per offtake point in p/day
Capacity charge	Daily Fixed charge function of the contracted capacity, expressed in p/kVA/day
Metering costs[231]	Cost for use and management of your energy meter in p/day or GBP/year

Component 3 – all other costs

Three different extra costs exist in the UK: two levies and the indirect cost of one renewable subsidies scheme.

1. The Climate Change Levy[232] (CCL) is applicable to electricity. The standard rate for electricity offtake is 0,0081 GBP/KWh, but there is a possible reduction of 93% if the energy-intensive consumer has a Climate Change Agreement (CCA). We assume that all industrial profiles (E0 to E4) under this study concluded a CCA. Given that 7.814 facilities were covered by a CCA in 2017[233] for about 7.700 large businesses (>250 employees)[234], we consider that all industrial profiles from this study are part of a sectoral agreement. Besides, a large spectrum of industrial processes[235] is accepted to be eligible to apply for a CCA, which widens the number of companies that can be considered.

   There are multiple exemptions regarding the CCL, among others when electricity is a supply[236]:

   - For domestic use or used by a charity for its non-business activities;
   - Used in some forms of transmission;
   - To combined heat and power stations;
   - For small generating stations (other than combined heat and power) used to generate any electricity that's not self-supplied;
   - Not used as fuel;
   - For use in metallurgical and mineralogical processes.

231 Electricity metering charges in the UK are not easily accessible. A proxy was used to account for these charges based on a methodology disclosed by National Grid, British TSO delivering electricity and natural gas. As electricity and natural gas are frequently offered as one product with a dual tariff, natural gas metering methodology was used as a proxy. Charges are billed as a fixed yearly charge for installation costs recovered via a rental given that we make the assumption our profiles do not own the meters.

232 (GOV.UK, 2021)

233 (Ecofys and adelphi, 2018)

234 (Department for Business, Energy & Industrial Strategy, 2020)

235 Defined in the Appendix A of the Climate Change Agreements Operations Manual.

236 (GOV.UK, 2020)

2. The Assistance for Areas with High electricity distribution Costs[237] (AAHEDC) the levy compensates for high distribution costs in the zone of Northern Scotland (1 of the 14 zones) corresponding to 0,030446 p/kWh.
3. The Renewables Obligation (RO) is the cost taken into account for the large-scale renewable subsidy scheme. The renewable quota is 0,471 Renewable Obligation Certificates (ROC's) per MWh for the period between 1st of April 2020 and 31st March of 2021. To encourage companies to meet the renewables obligation, a fee per missing ROC of 50,05 GBP/ROC (or 56,07 EUR/ROC). Since the renewable quota is 0,471 ROC/MWh, this ends up in a potential fee of 23,57 GBP/MWh (or 26,41 EUR/MWh). The obligation period lasts from the 1st of April until the 31st of March, and we thus take the ROC buy-out price and quota from the year 2020.[238]
4. An additional cost identified in the United Kingdom is that of the capacity market. However, it was decided to not take this cost into consideration. Firstly, because it is paid for by the suppliers, who integrate it in their offerings and do not disclose the exact amount of the costs and secondly because the United Kingdom is an outlier in most electricity profiles under review (E1 to E4). Therefore, the prices in this study can be seen as a slight underestimation of the real electricity cost in the United Kingdom.

[237] (National Grid ESO, 2020)

[238] (OFGEM, 2020)

Natural gas

Natural gas: Detailed description of the prices, price components and assumptions

For all countries under review, this section details:

1. **Commodity costs** for profiles G0, G1 and G2;
2. **Network costs** for profiles G0, G1 and G2;
3. **All other costs** for profiles G0, G1 and G2.

Profile	Consumption (in MWh)
G0	1.250
G1	100.000
G2	2.500.000

Belgium

Component 1 – the commodity price

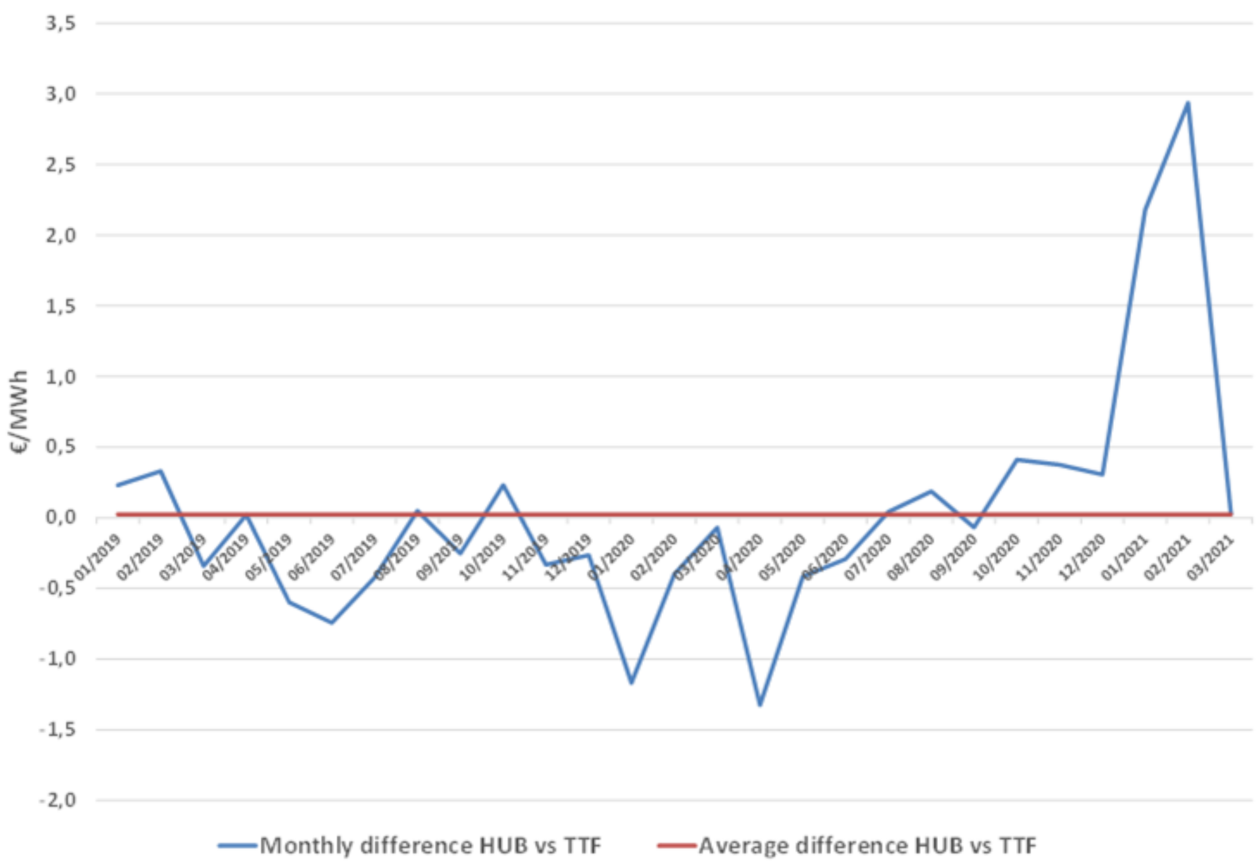
Commodity prices, in this document, rest on market prices. The given prices for profiles G0 to G2, are the result of prices observed in January 2021 at the Zeebrugge Trading Point (ZTP). However, it is known that the majority of Belgian industrial consumers' contracts are indexed on TTF[239], which represents their largest component of natural gas bills.[240]

The current methodology to compute the gas commodity price will be adapted for the next update that is foreseen in 2022. The objective of this adaptation will be to promote the robustness of our conclusions by better reflecting the evolution towards a convergence of the prices of the different hubs in North West Europe and by avoiding that a local congestion observed during a specific month potentially skews the conclusions of our study. Indeed, concerning the quotations during December 2020 for a delivery in January 2021 that have been used for this study, a difference of 2,18 €/MWh has been observed between Belgium and the Netherlands while this difference is negligible on a yearly basis. Therefore, it seems better to consider the 12 months average of these prices for future reports, which would have led a difference of less than 0.1€/MWh in January 2021 between the two countries. The table hereafter shows this discrepancy.

[239] https://www.creg.be/fr/publications/etude-f2097, (CREG, 2020).

[240] The CREG provided all commodity data.

Table 104 : Evolution of the delta between Belgian Hub Zeebrugge and Dutch TTF



Component 2 – network costs

Transport costs

According to the consumer profiles set out above, G0 and G1 are still connected to the distribution grid. We assume that they are respectively connected at T4 and T6 levels. Concerning G2, as the majority of industrial consumers in Belgium are connected at high-pressure level, we assume that this also the case for our G2 profile.

Natural gas transport costs have 3 main components for clients directly connected to the transport grid:[241]

1. Entry capacity fee (border point entry fee);
2. Exit capacity fee (HP-service fee or RPS[242])[243]
3. Commodity fee ("energy in cash").

The optional odorization tariff is not taken into account in the scope of this study. The reasoning is that the majority of industrial consumers in Belgium on the TSO-grid does not need odorization services from Fluxys.

[241] Since 2020, the "fix/flex" tariff option does no longer exist and therefore cannot be chosen by directly connected consumers (CREG, 2020).

[242] RPS stands for Reduced Pressure Service which, since 2020, encompasses both former Medium Pressure (MP) and Pressure-reducing stations (DPRS) services.

[243] For exit capacity fee at end-user domestic exit points, HP (High Pressure) tariff option or RPS can be chosen. As 99% of Belgian industrial consumers need to pay HP capacity fees, while the MP capacity fee is due for 31% of the Belgian industrial consumers, the exit capacity was therefore calculated as follows: 0,99* HP-tariff + 0,31*RPS-tariff.

Part of the network in Belgium is supplied with “L-gas”. This natural gas has a lower calorific value than the “H-gas” that is used in most of Western Europe. The following table illustrates the repartition of industrial consumers supplied with H- or L-gas depending on their connection to the Distribution (DG) or Transport grid (TG).

Table 105 : Natural gas type by grid type for each Belgian region (in%)

	Brussels		Flanders		Wallonia	
Natural gas Type	**DG**	**TG**	**DG**	**TG**	**DG**	**TG**
H-gas	7,50%	-	57,10%	95,30%	86,90%	99,20%
L-gas	92,50%	-	42,90%	4,70%	13,10%	0,8%

Source: CREG (2021)

The transport tariffs for natural gas in Belgium are largely capacity-based and expressed in EUR/kWh/year. Transport costs vary depending on the type of natural gas consumed, which is why a weighted average of H- and L-tariffs for the G2 profile are computed.

Finally, the commodity fee depends on the annual consumption of the end-user (in MWh/year). It accounts for 0,08% of a theoretical commodity cost per year, based on the Gas Price Reference[244], which is the ZTP average of day-ahead commodity prices, as published by Powernext.

Distribution costs

As previously stated, profile G0 and G1 are connected to the distribution grid. Users of the distribution grid are also subject to additional tariffs. The T4 category was selected for our G0 profile and T6 for G1. Since the highest category on the Brussels' distribution grid is T5, this one was selected for the G1 profile.[245] The distribution tariffs are typically divided over 3 components:

1. Fixed component;
2. Proportional component;
3. Capacity component (only Flanders and Wallonia).

Besides, other components are part of the distribution costs, although they vary depending on the region. As such Brussels includes a tariff for the measuring activities and Flanders a tariff of data management, whereas Wallonia adds a tariff for regulatory balances.

The weighted average of each component across all DSOs active in the region is taken into account since the tariffs differ across regions and DSOs. The weights are based on the number of EAN connection of each DSO. For Flanders, all DSOs under FLUVIUS were taken into account (100% of EAN connections) and in Wallonia all the DSOs under ORES and RESA (100% of EAN connections). With only one DSO, Sibelga is the DSO used for Brussels.

Component 3 – all other costs

In Belgium, two extra costs are charged to natural gas consumers directly connected to the transport grid; three regional taxes also apply to all profiles studied whereas local taxes and levies can be charged to profiles G0 and G1 given their connection to the distribution grid. These costs can be grouped into two categories, as presented below, where federal charges are levied by the Belgian TSO (Fluxys) and regional charges are levied by regional DSOs: Tariff rates are mentioned when they do not vary depending on the consumer profile and/or the DSO; otherwise, units in which they are expressed are detailed:

[244] For more information on the Gas Price Reference, please see (Fluxys, 2020)

[245] T5 (and not T6) is the highest category for Sibelga network active in Brussels which we use in the scope of this study.

Table 106 : Other costs for industrial natural gas consumers applying to all Belgian regions

All regions	Profiles
Regional Public Service Obligations (Regional PSOs) on distribution	
a. A general tariff for regional PSOs (expressed in EUR/MWh)	G0 and G1
Taxes and levies on the federal level	
II. Federal taxes and levies	
a. Federal contribution[246] (0,6482 EUR/MWh)[247]; b. Energy contribution[248] (0,9978 EUR/MWh).	All

[246] In all three regions, federal contribution is to be increased by 1,1%. Firstly, to compensate for the administrative and financial costs of the natural gas supplier and secondly to compensate for the part of the federal contribution that would not be paid by the end-consumer. There is an additional 0,1% increase for profiles connected to the distribution grid to compensate for the administrative costs of the DSO (Art. 4bis and 4ter Royal Decree 24 March 2003).

[247] Degressivity applies on the federal contribution for consumers which are part of a sectoral agreement as stated by the 2nd of April Royal Decree establishing the terms and conditions of the federal contribution intended to finance certain public service obligations and the costs related to the regulation and control of the natural gas market, Art. 13.

[248] The tariff is reduced to 0,54 €MWh for holders of an EBO or sector agreement. We assume that the reduction applies starting G0.

Table 107 : Other regional costs for industrial natural gas consumers[249]

Brussels	Flanders	Wallonia	Profiles
Regional Public Service Obligations (Regional PSOs) on transport			
a. Brussels regional public service obligation[250] (expressed in EUR/MWh)	-	-	G0 and G1
Taxes and levies on the regional level			
Regional taxes and levies on distribution			
a. Charges on non-capitalised pensions (0,005 - 0,054 EUR/MWh)	a. Charges on non-capitalised pensions (0,0072 - 0,0559 EUR/MWh)	a. Levy for occupying road network (0,067 - 0,492 EUR/MWh)	G0 and G1
b. Levy for occupying road network (1,275 EUR/MWh)	b. Other local, provincial, regional and federal taxes, Charges, Surcharges, Fees and contributions (0,0012 - 0,0093 EUR/MWh)	b. Corporate income tax (0,0355 - 0,2655 EUR/MWh)	
c. Corporate income tax and other taxes (0,022 - 0,218 EUR/MWh)	-	c. Other local, provincial, regional and federal taxes, Charges, Surcharges, Fees and contributions (0,0002 - 0,0022 EUR/MWh)	
Regional taxes and levies on transport			
-	-	a. Connection fee (0,075 EUR for the first 100 kWh; 0,3 - 0,75 in EUR/MWh)	All

Germany

Component 1 – the commodity price

In this study, natural gas commodity prices are estimated based on market prices. As previously mentioned, two market areas coexist in Germany, namely Gaspool and NetConnect Germany (NCG).

For all industrial profiles (G0 to G2) as well as G-PRO, the commodity price exhibited in this document is the average of prices collected in each market areas in January 2021. The CREG provided all commodity date.

Component 2 – network costs

Transport costs

There are 11 TSOs for natural gas in Germany, which all have directly connected clients. While their tariff methodology might be similar, they use different rates. As we consider that profile G2 is directly connected to the

[249] The tariffs represented in this table vary depending on the DSO and we have thus chosen to only present the minimum and maximum range of the tariff from the largest (or only) DSO of the region. Sibelga for Brussels, Fluvius Antwerpen for Flanders and ORES Hainaut for Wallonia.

[250] Depends on the calibre of the meter being installed. For G-Pro, G0 and G1 we respectively chose the meters process between 16-25 m^3, 40-65 m^3 and > 160 m^3. Which respectively coincides with 57,48€, 287,64€ and 742,32€, on which VAT is due.

transport grid, entry and exit capacity tariffs for all TSOs have been taken into account in addition to the costs related to metering and invoicing. The transport tariffs comprise in general, the same three components:

Table 108 : Components of German transport costs

Transport costs	
Component	**Explanation**
Entry point capacity rate (Einspeisung)	Depends on the contracted entry point and the capacity contracted (in kW)
Exit point capacity rate (Ausspeisung)	Depends on the exit point chosen and the capacity contracted (in kW)
Metering costs (Messung)	Both of these charges related to the cost of metering, fixed prices (in EUR/year)
Metering point operation per counting point charges (Messstellenbetrieb)	

Distribution costs

Since two of our profiles (G0 and G1) are connected to the distribution grid, they are subject to distribution costs. Since these differ between DSOs, prices from 8 different DSOs (4 rural, 4 urban) are considered. However, the tariffs from the DSOs also integrates the transport tariffs. While we assume profile G0 falls under the category “Netzentgelte für Entnahmestellen ohne Leistungsmessung” (or Network charges for offtake points without power metering) as their consumption is yearly metered, G1 is considered as being in the category “Netzentgelte für Entnahmestellen mit Leistungsmessung” due to its daily metered consumption (or Network charges for offtake points with power metering).

These distribution tariffs are generally composed of 5 components:

Table 109 : Components of German distribution costs

Transport costs	
Component	**Explanation**
Basic charge (Sockelbetrag arbeit/leistung)	Fixed basic fee, expressed in EUR/year.
Capacity charge (Leistungspreis)	Depends upon the maximum capacity in kW contracted, expressed in EUR/year.
Labour charge (Arbeitspreis)	Depends upon the volume of energy consumed in kWh per year, expressed in cEUR/kWh/year.
Metering costs (Messung)	Charges related to the cost of metering and invoicing, fixed prices (in EUR/year)
Metering point operation per counting point charges (Messstellenbetrieb)	

German annual charge for natural gas is computed as follows:

$$\begin{aligned} Annual\ charge = {} & [Arbeitspreis * (Annual\ Consumption - \ Durch\ Sockelbetrag\ abgegoltene\ Arbeit) \\ & + Sockelbetrag\ Arbeit] + [Leistungspreis \\ & * (Annual\ Consumption - \ Durch\ Sockelbetrag\ abgegoltene\ Leistung) \\ & + Sockelbetrag\ Leistung \end{aligned}$$

Where, *Durch Sockelbetrag abgegoltene Arbeit/Leistung* is the price band bottom levels, expressed in kWh or in kW respectively.

Depending on the consumers' consumption volumes and capacity, they fall under certain categories (the number of categories depend on the local DSO). These categories determine the amount of consumption volume and capacity that have to be set at a standard rate, while the rest fall under the network cost fares as determined by local DSOs. These volumes and capacity are said to be compensated in order to limit network costs and ultimately, DSOs' remuneration.

Component 3 – all other costs

Four further costs were found for industrial consumers in Germany: the "*Biogaskostenwälzung*" or Biogas levy, the "*Marktraumumstellungsumlage*" or Market Area Conversion Levy, the "*Erdgassteuer*", or Gas tax and the "*Konzessionsabgabe*", or concession fee, which are detailed in the table below.

Table 110 : Other costs for large industrial natural gas consumers

All other costs			
Component	**German label**	**Explanation**	**Profiles**
Biogas levy	Biogaskosten wälzung	A Nationwide standard levy implemented in January 2014. This levy amounts to 0,625 EUR/kWh/year in 2021.	All
Market Area Conversion Levy	Marktraumum stellungs-umlage	A burden to balance the conversion costs from L-gas to H-gas, implemented in January 2015. The 2021 levy amounts to 0,72910 EUR/kWh/y.	All
Energy tax	Energiesteuer	This tax has various rates depending on the energy source (e.g. coal, biodiesel, natural gas, bioethanol…), valid since January 1989. For natural gas for industrial consumers, **the standard tax rate is 5,50 EUR/MWh**. A reduction of 1,38 EUR/MWh can apply, bringing the price down to **4,12 EUR/MWh** (= 5,50 EUR/MWh -1,38 EUR/MWh)[251] As mentioned for the electricity in Germany, based on the amount of pension contributions paid by the company, more reductions can be granted. Initially implemented to fund employees' pensions, companies may be granted important reductions whether they do not contribute much as a result of a low number of employees. Another cut of 2,28 EUR/MWh can be used for natural gas, lowering the rate to 1,84 EUR/MWh (= 4,12 EUR/MWh - 2,28 EUR/MWh); however, it is an 'incompressible' rate. **The minimum tariff** is computed as follows: A 90% reduction on 2,28 EUR/MWh represents the maximum cut ((100%-90%) * 2,28 EUR/MWh = 0,228 EUR/MWh) to which we add the previous lowest rate (1,84 EUR/MWh) reaching **2,068 EUR/MWh** (=0,228 EUR/MWh + 1,84 EUR/MWh)[252][253]. These reductions apply depending on the sectorial affiliation of companies. No energy tax applies when the natural gas purpose is not fuel or heating, but as raw material, feedstock part of an industrial process[254]. As the pension payment reduction system is based on economic criteria that are not precise for profile G0 and G1, we exhibit a range from 2,068 EUR/MWh (minimum rate) to 4,12 EUR/MWh (standard reduction). As we assume that G2 might consume electricity as feedstock in its industrial processes, we display a scope from 0 EUR/MWh (exemption – only the biogas levy has to be paid) to 4,12 EUR/MWh (standard reduction)	All
Concession fee	Konzessions-abgabe	A tax that also exists for electricity consumption. However, clients with a high-level use (higher than 5 GWh/year) benefit from a total exemption, meaning this tax is not relevant as we study profiles with greater use (i.e., not relevant for G1 and G2) except for G0.[255]	G-PRO and G0

[251] This tax rate hasn't changed in the past years.

[252] Energiesteuergesetz § 54, Energiesteuergesetz § 55

[253] In very specific cases, further reductions are possible. We have not included these in our report.

[254] Energiesteuergesetz § 27

[255] This tax rate hasn't changed in the past years.

France

Component 1 – the commodity price

France used to work with two market areas (PEG Nord and TRS) regarding natural gas. In 2018, the merger of these areas resulted in the creation of a single zone, TRF (PEG), which we present accordingly as a unique price zone[256]. The commodity price exhibited in this document is the prices collected in January 2021 prices for PEG. The CREG provided all commodity data.

Unlike electricity supply for industrial consumers with a yearly consumption higher than 300 MWh (ARENH), France does not provide a regulated tariff for natural gas supply[257].

Component 2 – network costs

Transport costs

As previously stated, there are two Transmission System Operators (TSOs) in charge of the natural gas transport network: GRTgaz and Teréga. Transport costs are computed based on a weighted average of TSOs' annual natural gas offtakes, as set out below:

Table 111 : TSOs natural gas offtake in France

TSO	Annual consumption (2019) in GWh	Percentage of annual consumption (%)
GRTgaz	451.728	94,20%
Terega	27.758	5,80%

Transport tariffs are built along with the same methodology, and made of three main components for end-users on the transport grid:

Table 112 : Transport cost component in France

Transport		
Component	**French labelling**	**Explanation**
Fixed charge	Terme fixe de livraison	Applicable per year per delivery station (expressed in EUR/year)
Entry capacity fee	Terme de capacité d'entrée sur le réseau principal	Applicable to daily delivery capacity subscriptions (expressed in EUR/year/MWh/day)
Delivery charge	Terme de capacité de livraison	Applicable to daily delivery capacity subscriptions for industrial consumers (expressed in EUR/year/MWh/day)

[256] On 1 April 2015, a common market area in Southern France, "Trading Region South" (TRS), replaced the former PEG TIGF and PEG SUD. On 1 November 2018, TRS and PEG-Nord merged into a single market area (TRF) with a unique trading hub (PEG or Point d'échange de gaz).

[257] France used to provide regulated selling rates regarding natural gas based on categories for professionals (B2S, TEL S2S/STS) with a higher yearly consumption than 300 MWh. However, this disappeared in December 2015 for industrial consumers.

Distribution costs

Profiles G-Pro, G0, and G1 are located on the distribution grid, respectively subject to T3 and T4 tariff option (determined by their annual consumption level). Given that distribution costs integrate transport costs, only these tariffs apply to our G0 and G1 profiles. Only tariffs from GrDF (Gaz Réseau Distribution France) are taken into account as it delivers 96% of all distributed natural gas in France. The tariff has three components:

Table 113 : Distribution cost components in France

Transport		
Component	**French labelling**	**Explanation**
Fixed charge	Abonnement	Applicable per year per subscription (expressed in EUR/year)
Proportional component	Prix proportionnel	Variable component based on consumption (expressed in EUR/MWh)
Delivery charge	Terme de souscription capacitaire journalière	Applicable to daily delivery capacity subscriptions for industrial consumers with annual consumption from 5.000 MWh (expressed in EUR/MWh/day)

Component 3 – all other costs

In France, two surcharges apply on natural gas:

Table 114 : Surcharges on natural gas in France

Surcharges	Definition	Amount in 2021	Profile
Contribution tarifaire d'acheminement (CTA)	The CTA is a surcharge for energy sector pensions - for Electricity and Gas Industries.	20,80% on the fixed part of distribution cost	Profiles G0 and G1
		4,70% on the fixed part of the transport cost	Profile G2 (Not on G0 and G1 as distribution tariffs include transport costs)
Taxe intérieure sur la consommation de gaz naturel (TICGN)	The TICGN is a tax on natural gas consumption	8,45 EUR/MWh	
		Reductions: • 1,52 EUR/MWh for companies that participate in the carbon market and that are energy-intensive • 1,60 EUR/MWh for companies that belong to a sector with a high risk of carbon leakage and that are energy-intensive	
		Exemptions: • Companies that do not use natural gas as a fuel (for example as raw materials); • Natural gas is used for dual purposes in a certain metallurgical, chemical reduction or electrolysis processes; • For the manufacture of non-metallic mineral products; • For the manufacture of energy products; • For the production of electricity; • For the purposes of its extraction and production.	

As we include the option that the profile G2 could use natural gas as raw material, we present a range from 0 EUR/MWh (totally exempted from the TICGN) to 8,45 EUR/MWh. As we do not consider that option for profiles G0 and G1, a range from 1,52 EUR/MWh (reduced rate) to 8,45 EUR/MWh is displayed for those consumers G0 and G1.

The Netherlands

Component 1 – the commodity price

For investigated profiles, the commodity price in the Netherlands given in this study is the January 2021 observed prices for TTF. The CREG provided all commodity prices data.

Component 2 – network costs

Transport costs

The Dutch natural gas transport network is operated by the TSO Gasunie Transport Services and serves distribution networks and direct exit points. According to the Gas Act (Article 10, paragraph 6b), it is the duty of the Dutch TSO, Gasunie Transport Services to provide an applicant with a connection point if the connection has a flow rate greater than 40 m^3 per hour. Consequently, we consider that profiles G0, G1 and G2 profile are directly connected to the transmission network.

Since 2020, transport tariffs have changed of structure. Following the principles of the 'Network code on harmonized transport tariff structures for gas' (NC-TAR), decided by the European Commission, the Netherlands has simplified its tariffs structure. They are therefore only composed of 2 components, which can vary depending on the contracted capacity:

Table 115 : Network cost component in the Netherlands

France	
Component	**Explanation**
Entry capacity fee	Fee depending on the entry point and function of the contracted capacity (expressed in EUR/kWh/year).
Exit capacity fee	Fee depending on the exit point and function of the contracted capacity (expressed in EUR/kWh/year).

The Dutch network is essentially supplied with the so-called "Groningen-gas". This natural gas has a lower calorific value (L-gas) than the natural gas used in most of Western Europe (H-gas). Yet, as the Dutch transport tariffs are fixed in terms of capacity and expressed in EUR/kWh/year, this evens out this calorific value effect. While Gasunie Transport Services used to offer individualized rates for the entry and exit capacity fees, it is no longer the case. One single exit capacity fee as well as one entry capacity fee is used for the 328 directly connected industrial consumers.

Component 3 – all other costs

In general, two surcharges apply to the natural gas bill for industrial consumers:

1. The Energy Tax, *Regulerende Energie Belasting* (REB), is a digressive tax on all energy carriers;
2. The ODE levy is a digressive levy, *Opslag Duurzame Energie* (ODE), that finances renewable capacity.

Both tax rates for 2021 are as follows:

Table 116 : Energy tax and ODE 2021 rates in the Netherlands

Band	Consumption level	Energy Tax (EUR/m³)	ODE (EUR/m³)
Band A	0 – 170.000 m^3	0,34856	0,0851
Band B	170.000 – 1.000.000 m^3	0,06547	0,0235
Band C	1.000.000 – 10.000.000 m^3	0,02386	0,0232
Band D	> 10.000.000 m^3	0,01281	0,0232

A lowered tariff also exists for both surcharges, but only for agricultural heating installations.[258] We assume our profiles do not benefit from the lowered tariffs.

As the Energy tax and ODE Levy are fixed in euros per volume units (EUR/m³) and not in euros per energy units, the calorific value of the used natural gas has an impact on the total amount paid. We thus use a weighted average in function of the calorific value distribution of all natural gas industrial users directly connected to the transport grid in the Netherlands. Out of the 328 industrial consumers directly connected to the grid, the following table depicts the allocation of companies using which type of natural gas (H, G or G+)[259] :

Table 117 : Companies directly connected to the transport grid in the Netherlands

Natural gas type	Number of companies directly connected to the transport grid	Percentage of companies directly connected to the transport grid (%)
H-Gas	99	30,20%
G-Gas	26	7,90%
G+ Gas	203	61,90%

Similar to the surcharges on electricity there are also some exemptions and reductions for natural gas. Since the conditions are slightly different from those for electricity, they are set out below:

a. **Exemptions** if natural gas is:
   i. Used to generate electricity in an installation with an electrical efficiency of at least 30%;
   ii. Not used as fuel as an additive or filler substance;
   iii. Used for metallurgical and mineralogical processes;
   iv. Used as fuel for commercial shipping.
b. **Tax refund scheme** ('teruggaafregeling'), which applies to public and religious institutions such as clinics, schools, sports centres, churches, etc. We assume that our profiles are not part of these specific categories and thus do not take this specific scheme into account.

As we do not consider profiles G0 and G1 as consumers using natural gas as a fuel or natural gas that has been used as an additive or filler substance, we present the maximum option (no refund applicable) for both profiles. Considering that G2 can represent a large consumer using natural gas as a feedstock for its industrial processes, we assume that it can be granted an exemption of taxes and we, therefore, present a range between the minimal option (totally exempted from taxes) to the maximum option (no refund applicable) for this consumer profile.

[258] (Belastingsdienst Nederland, 2020)

[259] G- and G+ Gases are both considered as L-Gas. In this study, they are considered as having the same calorific value and the same conversion factor to kWh, namely 9,77 kWh/m³.

The United Kingdom

Component 1 – the commodity price

The National Balancing Point is the referent market index regarding the United Kingdom. For both investigated profiles, the national commodity price is the result of January 2021 prices for NBP. The CREG provided all commodity price data.

Component 2 – network costs

Transport costs

As already mentioned for our residential and small professional profiles, there is only one TSO in the UK (except for Northern Ireland): National Grid Gas. The Gas Transmission Transportation Charges are comprised of the following components:

Table 118 : Transport costs components in the UK

United Kingdom	
Component	**Explanation**
Entry Commodity Charge	A charge per unit of natural gas transported payable for flow entering the system, expressed in p/kWh/day.
Exit Commodity Charge	A charge per unit of natural gas transported payable for flow exiting the system, expressed in p/kWh/day.
Commodity charge	A charge per unit of natural gas transported payable for flows entering and exiting the system expressed in p/kWh.
Compression charge	Additional charge payable where natural gas is delivered into the National Grid NTS system at a lower pressure than that required, expressed in p/kWh.

National Grid Gas provides a weighted average of the entry and exit capacity tariffs in their Statement of Gas Transmission Transportation Charges.[260]

Distribution costs

Industrial consumers that are still connected to the distribution grid are also subjected to their tariffs, and this is the case for the G0 and G1 profiles. The UK has eight DSOs for natural gas, amongst which four are owned by Cadent Gas. The distribution tariff for natural gas is composed of four components:

Table 119 : Distribution cost components in the UK

The United Kingdom		
Component	**Explanation**	**Profile**
LDZ System Capacity Charge	With charge band with 732.000 kWh and above LDZ charges are based on functions, these functions use Supply Point Offtake Quantity (SOQ) in the determination of the charges. The LDZ System capacity charge is expressed in p/Peak day kWh/day and the LDZ System commodity charge in p/kWh.	G0 and G1
LDZ System commodity Charge		
LDZ Customer Capacity Charge	With charge band with 732.000 kWh and above customer, the capacity charge is based on a function related to the registered SOQ. Expressed in p/peak day kWh/day.	
Exit Capacity Charges	A capacity charge applied to the supply point in the similarly to LDZ System Capacity Charge. These charges are applied per exit zone on an administered peak day basis and are expressed in GBP/year.	

260 We have used the weighted averages published in the Gas Transmission Transportation Charges of the NGG valid as from the 1st of April 2020, (Nationalgrid, 2020).

Metering charges	A cost for use and management of your energy meter, which is expressed in GBP/year.	

An average of these components is presented across all active DSOs for natural gas in the UK.

The capacity terms are based on the estimated maximum daily offtake. This is calculated by dividing the total consumption in a year by the number of days of consumption multiplied by the load factor. This load factor is related to the EUC (End User Category) bands. Each local distribution zone has 33 individual EUC bands that define 9 different consumption profiles based on annual consumption. The load factors, therefore, differ depending on the annual consumption of a profile and the local distribution zone[261]. Each DSO has its own load factor percentages, but only Northern Gas Networks discloses its load factors, which we used as a proxy for all other DSOs. The table below depicts load factors used for profiles G0, G1 and G2:

Table 120 : Load factors for profiles G0, G1 and G2

Profile	Bands	Threshold (kWh)	Average load factor
G0	4	732.001 - 2.196.000	38,20%
G1/G2	9	58.600.000 – 99.999.999.999	66,30%

Based on this, the capacity term is computed as follows:

$$Annual\ charge = (SOQ * 365\ days) * unit\ rate$$

Where,

$$SOQ = annual\ consumption/(365\ days * Load\ Factor)$$

Component 3 – all other costs

Only the **Climate Change Levy** (CCL) is applicable to the consumption of natural gas. Holders of climate change agreement, for which all industrial consumers are considered to be part of[262], can benefit from a reduction of 22%. Furthermore, the consumption of natural gas for non-fuel use is exempted from this levy. As in other countries, we included the option that profile G2 can be such a consumer, and hence we present a range from 0 EUR/MWh (exempted from the Climate Change Levy) to +/- 1,49 EUR/MWh (reduction when being part of Climate Change Agreement).

[261] Load factors for bands 3 to 9 (from 293 MWh to 58,600 MWh/year) are determined based on a Winter Annual Ratio (consumption between December to March over annual consumption).

[262] See General assumption (p77)

6. Presentation and interpretation of results

6. Presentation of results

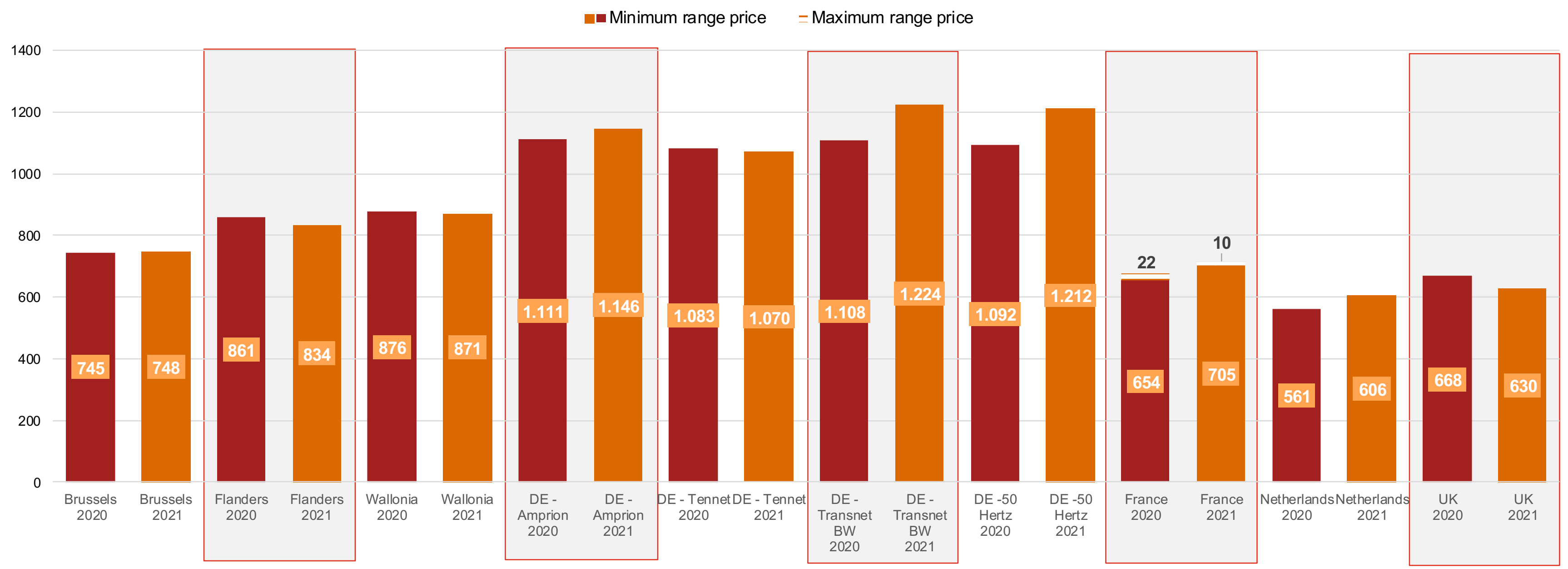
Presentation of figures (Electricity)

Profile E-RES (Electricity)

Total invoice analysis

The figure below provides a comparison of the total yearly invoice paid by a residential consumer (E-RES) in the different studied countries and regions. The results are expressed in EUR/year.

Figure 27 : Total yearly invoice in EUR/year for residential consumers (profile E-RES)



Similar to last year Belgium is split into three regions and Germany into four regions because of regional differences. The other countries under review – France, the Netherlands and the UK – are represented as one single result. The reasoning behind the distinction between regions was already set out above with an additional explanation of how the countries organize themselves regarding energy regulation. Furthermore, we show the results of the computations of 2020 (bordeaux) and 2021 (orange) and have added frames to easily identify different regions/countries.

Germany is still the most expensive country in all its regions and with the exception of Tennet the price increased in all German regions. Compared to 2020 the total invoice has increased in 6 of the 10 regions/countries under review. Even though this is the smallest electricity profile under review, we already see that there's a price range in France. The price range is the consequence of the possibility to opt for the CU4 or MU4 network cost option which also has an impact on the CTA. The figure below thus shows a range for the network and all other costs component. We do see that the range is smaller than last year even though the total invoice has increased meaning that the difference between the CU4 and MU4 price options has decreased.

The Netherlands is still the cheapest country with the UK as a close second. The gap between the two countries has lessened because of the increase in the Netherlands and the decrease in the UK. Important to note is that the invoice in the Netherlands and UK are (almost) half the invoice of the most expensive region, Transnet, in Germany.

Belgium is not very competitive regarding the E-RES profile and is only more competitive than the German region. The positioning of the Belgian regions has remained the same as 2020, Brussels is still the most competitive Belgian region, followed by Flanders.

Breakdown per component

The previous results are further detailed for profile E-RES by the figure underneath, which provides a closer look at the breakdown of the different price components.

Figure 28 : Electricity price by component in EUR/MWh (profile E-RES)

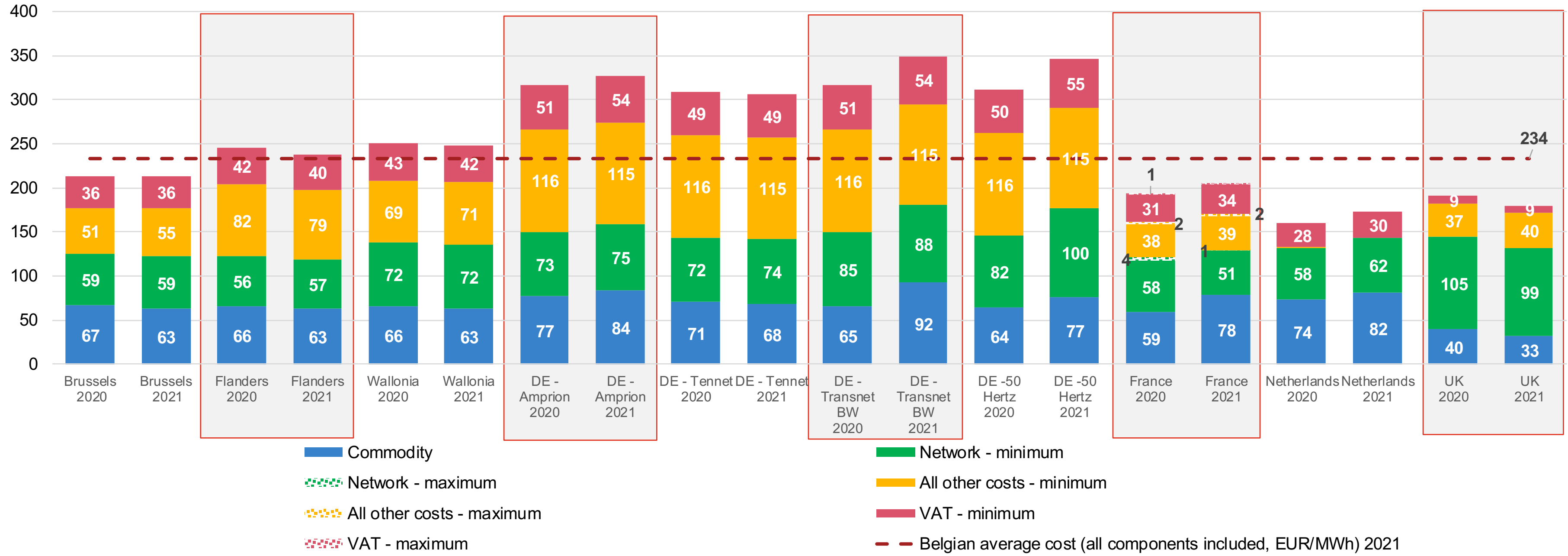
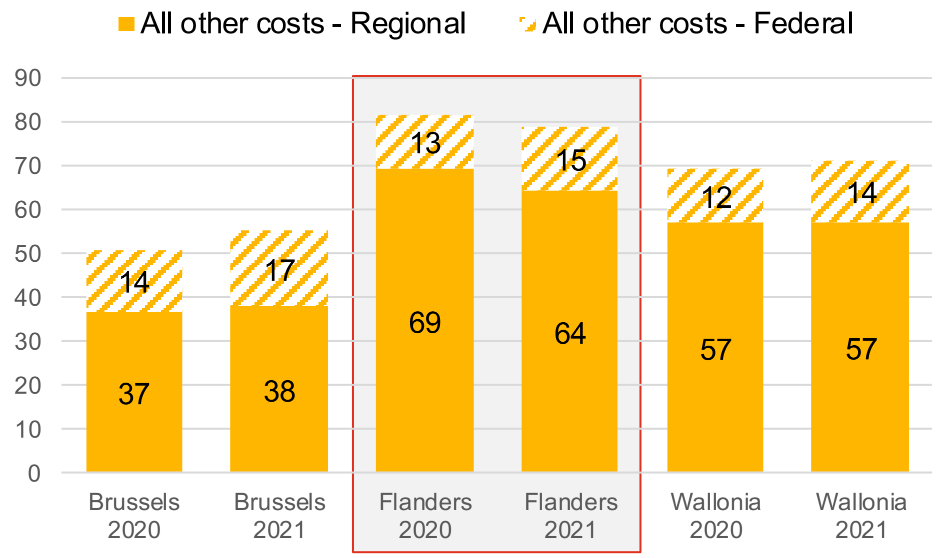


Figure 29 : Regional and Federal all other costs in Belgium in EUR/MWh (profile E-RES)



The ***commodity component***[263] is by far the lowest in the UK (33 EUR/MWh) followed by Brussels, Flanders and Wallonia. The largest increase in this component is observed in the German Transnet region, namely an increase of 27 EUR/MWh. We also observe a large increase of the commodity component in France, namely 19 EUR/MWh. This results in a yearly increase of ca. 95 and 67 EUR purely for the commodity component in respectively the German Transnet region and France. In Belgium the commodity component sees a small decrease of 3 to 4 EUR/MWh in all regions. When looking in more detail Flanders presents the smallest commodity cost, but this is not discernible at this level.

The ***network cost*** component has increased in most regions/countries (8 out of 10) under review, but the increase in Brussels and Wallonia is so small that we can not discern it. The German 50 Hertz region has the highest network cost, followed by the UK. While important network cost reductions are in place for the large industrial profiles in Germany this is not the case for the residential consumers. In the UK the high network cost is mainly because of Transmission costs (TNUos) which is computed based on the consumption of the consumer (p/kWh) and compensates for the very low commodity component. The breakdown per component figure also clearly shows the smaller range in France, 4 EUR/MWh in 2020 versus only 1 EUR/MWh in 2021. This indicates that the gap between CU4 and MU4 has decreased as stated above. On the Belgian front we see that the network costs are still the highest in Wallonia. The network cost component is stable in Brussels and we see a small increase in Flanders, but it is still the Belgian region with the lowest network cost with 57 EUR/MWh.

The ***all other costs component***[264] has remained quite stable across all the reviewed regions/countries. This component was negligible last year and is actually non-existent in the Netherlands in 2021, because residential consumers can be refunded (*Belastingvermindering*) by a fixed amount of 461,62 EUR/year in 2021 which is more than last year (435,68 EUR/year) and even surpassed the taxation in the Netherlands which is why we assume the all other costs component to be nil this year. This component clearly has a big impact on the overall position of Belgium compared to the other regions/countries. Belgium was relatively close to the 3 cheapest countries (Netherlands, UK and France) before considering the all other costs component which is much larger than the 3 cheapest countries under review. In Belgium we have made a distinction between the regional and federal all other costs and we observe that the regional costs are the biggest part of the all other costs component. This is especially the case in Flanders where the PSO tariff (tarief openbare dienstverplichting) and the green certificates make out the largest cost.

Finally, we also have to take the ***VAT*** into account since this is a residential profile and we do not assume that this is deductible for them. The VAT rate is similar across all regions and countries, except the UK with a rate of

[263] While this methodology to estimate commodity costs provides a fair view of the market situation in the respective countries and regions, one must be aware that it does not provide a full overview of the market prices as only three to five products were considered.

[264] This cost includes taxes, levies and certificate schemes.

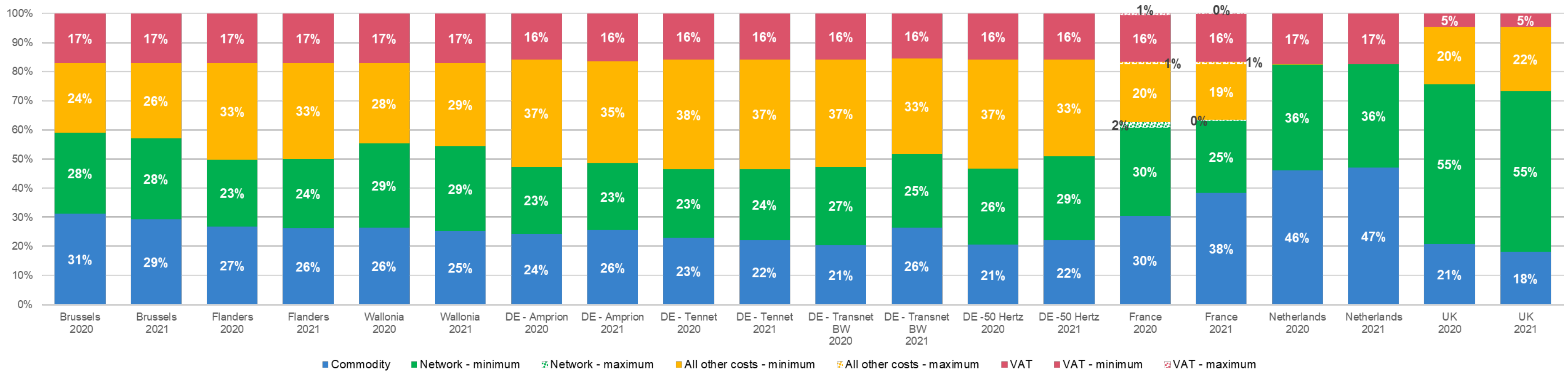
5%, and thus mainly depends on the total invoice of the region/country.[265] The UK has the lowest VAT because of the low rate they apply on energy, followed by the Netherlands that has the lowest total invoice.

[265] The VAT rate is not always applied on the whole total invoice since some tariffs are exempted.

Proportional component analysis

The percentages of the costs for each component can be found in the figure below.

Figure 30 : Proportional component analysis for electricity (profile E-RES)



The graph above represents the weights of each component in the total invoice and while it is a bit misleading for the Netherlands it is interesting to see how the countries/regions are similar or differ when not looking at the absolute values. The Netherlands is not representative, because the all other costs component is (almost) non-existent which has an impact on all the other components.

A few things stand out when observing the graph. Firstly, we observe that the network costs component in the UK is very large, more than 50% of the total invoice. Leaving the Netherlands aside the region/country with the second highest network cost is Wallonia, 29% of the total invoice, which is a remarkable difference. Secondly, we see that even though the total invoice of Germany is much higher than the other countries the proportional repartition across the different components is quite similar to the other countries/regions. Only the all other costs component is higher than the average of the other countries. Lastly, when looking at Belgium, we see that Flanders has the highest all other costs component. However Flanders also has the lowest network cost component, so these components compensate each other overall. Again, when comparing the components from the Belgian regions with the 3 cheapest countries/regions we see that there is a significant difference regarding the importance of the all other costs component, namely it is higher in the Belgian regions.

KEY FINDINGS

The profile of residential consumers (E-RES) suggests the following findings:

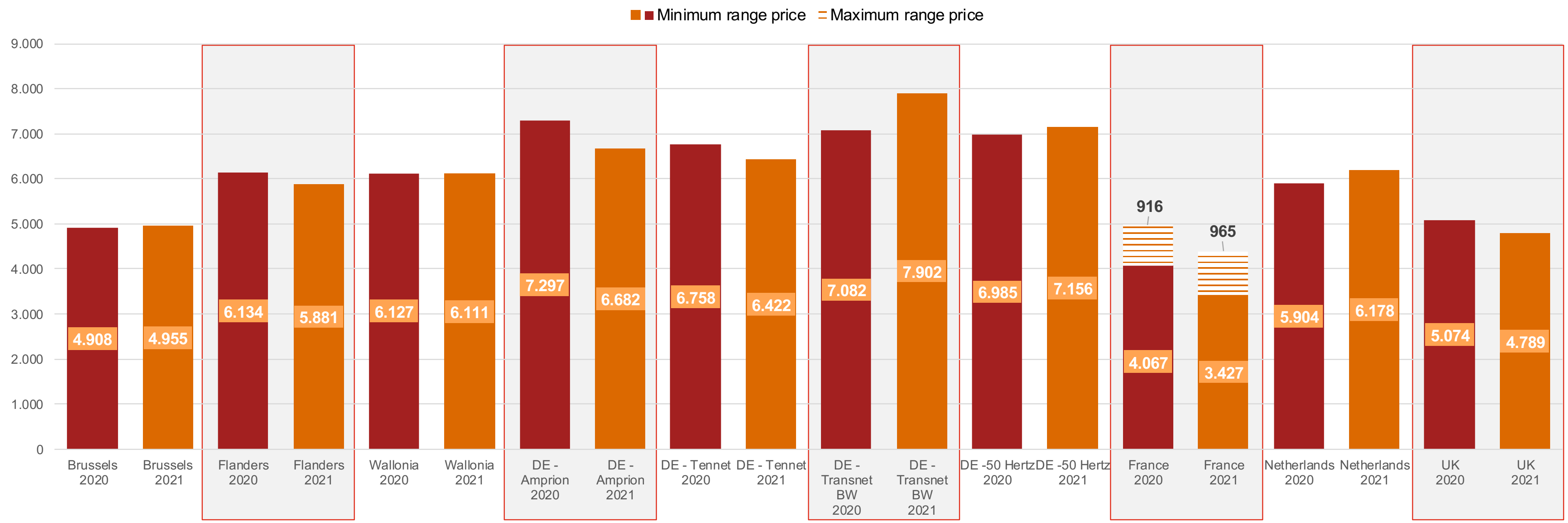
- The total invoices for the different regions/countries under review show quite some variation. Similar to last year the Netherlands is still the least expensive region and the German regions are the most expensive. The total invoice in the Netherlands (606 EUR/year) is less than half the total invoice of the most expensive German region (1.224 EUR/year). The low cost in the Netherlands can be explained by the tax refund from the government (*Belastingsvermindering*) which nullifies the all other costs component in 2021. We also note that the UK and France are respectively the 2nd and 3rd cheapest country.
- Flanders and Wallonia have seen a small decrease of their total invoice, but the position of Belgium as a whole has not changed since last year. While the Belgian total invoice is closer to the top 3 cheapest countries than to the more expensive German regions there is still a clear and significant difference.
- The **commodity component** is not the most important component to determine the competitivity of a region/country even though it takes up a significant proportion of the total invoice in France (38%). The proportion of the commodity in the Netherlands is 47%, but this is mainly because of the absence of the all other costs component. The UK shows the lowest commodity cost component (33 EUR/MWh), while the German Transnet region has the highest cost (92 EUR/MWh).
- **Network costs** show quite some variation with Germany and the UK as clear outliers. Compared to 2020 this component has increased in all regions/countries with the exception of France and the UK. From a Belgian perspective, we observe that Flanders has the smallest network cost, followed by Brussels. The relative importance of this component is similar across all regions/countries, with the exception of the UK and the Netherlands, namely between 23 and 29% of the total invoice.
- The **all other costs component** plays a big role in the competitive position of the region/country, in particular the absence of it in the Netherlands and the very high cost in the German regions. However, it is important to note that this component is very similar in the UK and France and that the commodity component and network costs have a bigger impact here. In Belgium we have made a distinction between the regional and federal all other costs and we observe that the regional costs play a significant role. Brussels is the cheapest Belgian region, and this is mainly thanks to the lower regional all other costs. As a whole the Belgian all other costs component is very high compared to the three most competitive regions for E-RES.

Profile E-SSME (Electricity)

Total invoice analysis

The figure below provides a comparison of the total yearly invoice paid by a small professional consumer (E-SSME) in the different studied countries and regions. The results are expressed in EUR/year.

Figure 31 : Total yearly invoice in EUR/year (profile E-SSME)



Similar to the annual invoice of the E-RES profile Germany is clearly the most expensive country, certainly the Transnet region. While the Netherlands was the cheapest country for the smaller E-RES profile it is now France that is the cheapest country, even when taking the maximum invoice into account, and the UK and Brussels are in 2nd and 3rd place.

The total invoice has decreased in most observed regions/countries (6 out of 10) compared to 2020. The biggest decrease (640 EUR) is observed in France and the biggest increase in German Transnet region (820 EUR). In Belgium the cost has decreased in Flanders and Wallonia, while there is a small increase in Brussels. The breakdown per component below will detail which components have the most influence on the total invoice.

Breakdown per component

The previous results are further detailed for profile E-SSME in the figure below, which provides a closer look at the breakdown of the different price components.

Figure 32 : Electricity price by component in EUR/MWh (profile E-SSME)

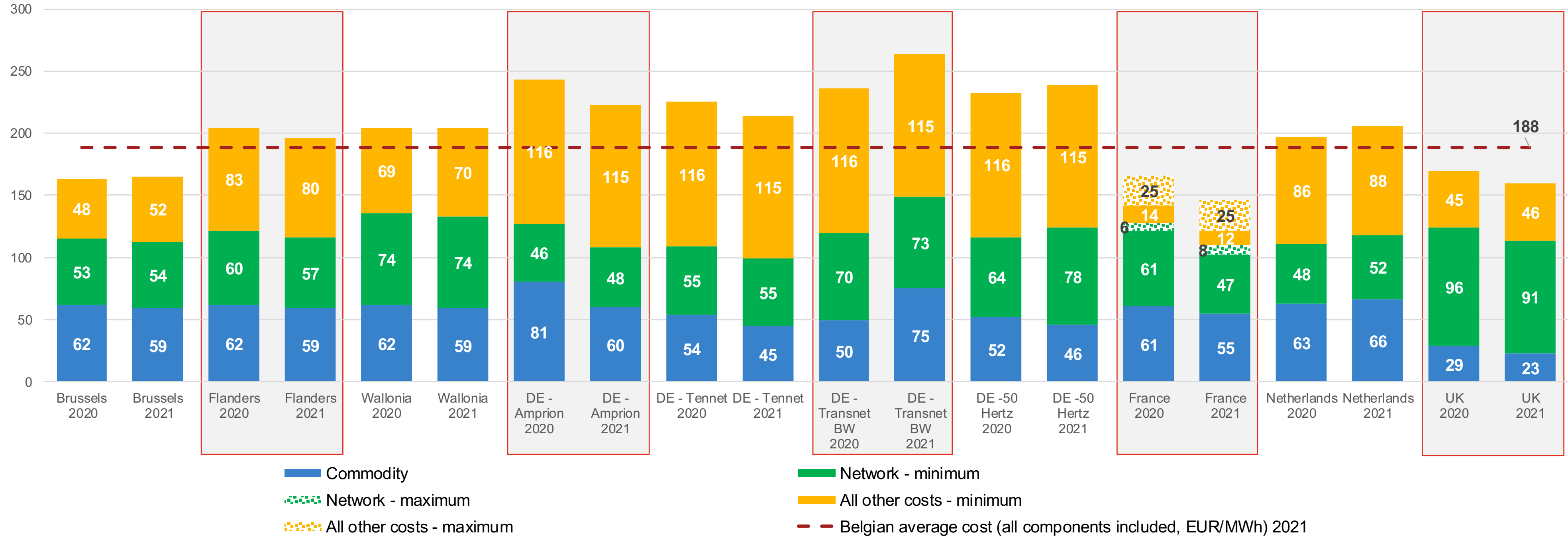
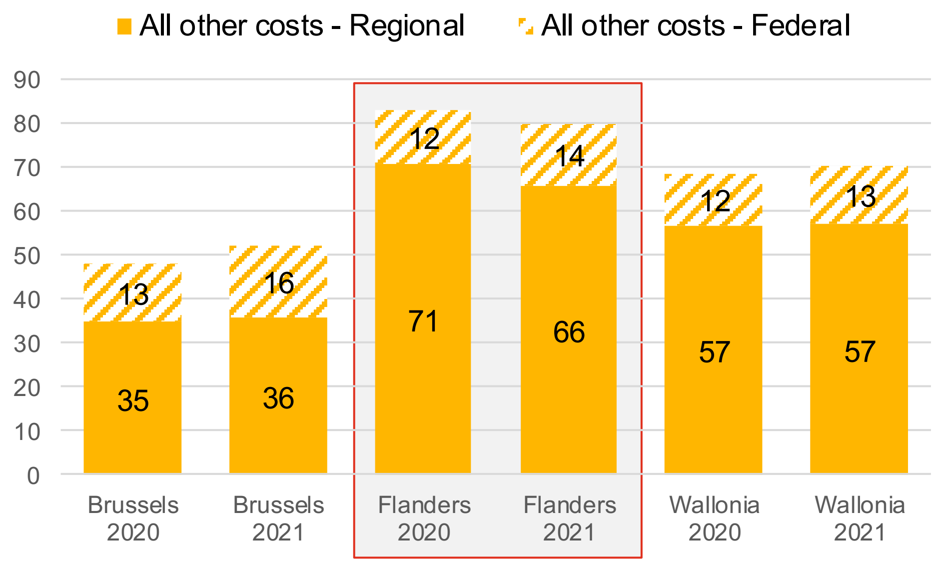


Figure 33 : Regional and Federal all other costs in Belgium in EUR/MWh (profile E-SSME)



The **commodity component**[266] has decreased in all regions/countries under review, except the German Transnet region and in the Netherlands. Overall, the commodity component seems quite similar in all the regions/countries under review, except for the UK where the commodity cost is really low. The highest commodity component is observed in the German Transnet BW region (75 EUR/MWh) followed by the Netherlands with a cost of 66 EUR/MWh. Interesting to note is that the commodity component in EUR/MWh has decreased in every country compared to E-RES.[267]

For the **network component** we can differentiate two groups, namely the group with a network cost between 47 and 57 EUR/MWh which are quite close together and a second group above 70 EUR/MWh where we observe bigger variations. The UK and the German 50 Hertz region have the highest network cost, while France shows the cheapest network cost of the regions/countries under review. Even though the UK is the second cheapest country it is also the country with the highest network cost. The network cost per MWh is also very similar to the cost of the E-RES profile. Lastly, we see that the ranges of the network costs in France are starting to increase compared to E-RES.

The **all other costs component**[268] is the lowest in France and highest in Germany. Similar to the network costs we observe that the range in France is growing compared to E-RES. When taking the maximum range of France into account we see that the difference with the second cheapest region (UK) is not that big. In Belgium we see that the regional component of the all other costs is still very important. This component is almost twice as big in Flanders (66 EUR/MWh) than in Brussels (36 EUR/MWh). When looking at the Belgian all other costs component we observe that this component is higher than in the two cheapest countries (the UK and the Netherlands) and has a big impact on the competitivity of Belgium, certainly in Flanders and Wallonia.

[266] While this methodology to estimate commodity costs provides a fair view of the market situation in the respective countries and regions, one must be aware that it does not provide a full overview of the market prices as only three to five products were considered.

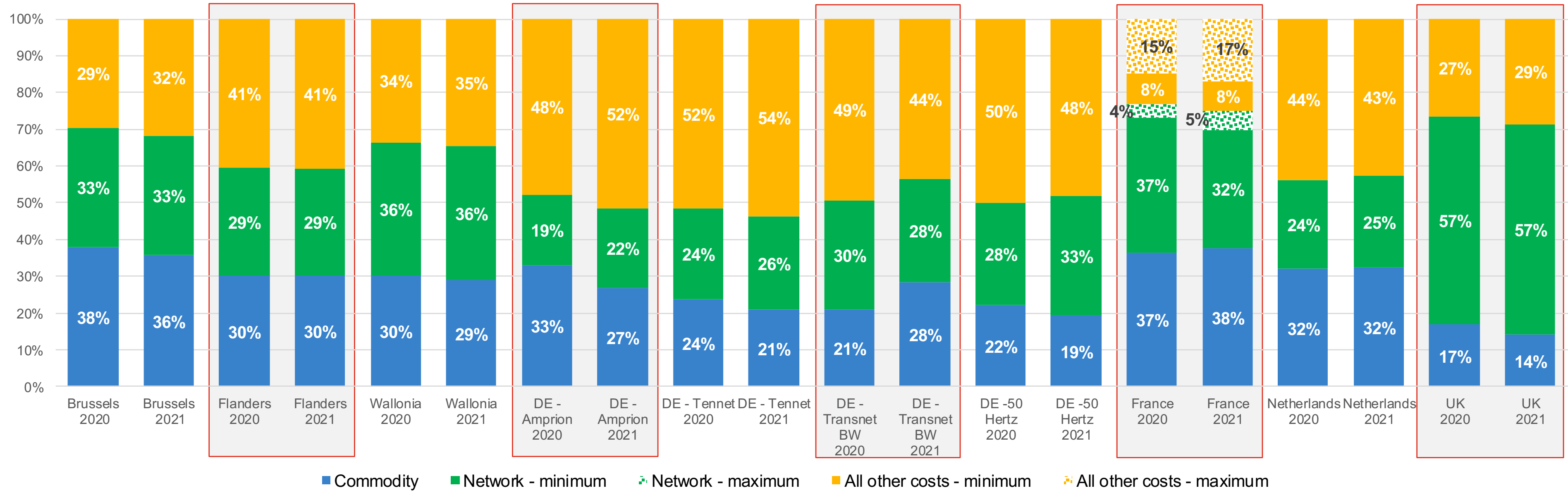
[267] The fixed cost of the energy bill and the different consumption pattern impact the commodity cost per MWh.

[268] This cost includes taxes, levies and certificate schemes.

Proportional component analysis

The percentages of the costs for each component can be found in the underneath figure.

Figure 34 : Proportional component analysis (profile E-SSME)



The relative importance of the **commodity component** has decreased in most regions/countries under review. This component is the most important in France (38%) and this would be even higher if we do not take the maximum ranges into account. In contrast, this component is not very important in the UK where the **network cost** component makes up 57% of the total invoice. Lastly, we observe quite some variation in the importance of the **all other costs component** across all regions/countries. In Germany, the Netherlands and Flanders this is an important component that constitutes more than 40% of the yearly bill. The percentual analysis also clearly shows the difference in all other costs in the different Belgian regions, highlighting again the regional differences.

KEY FINDINGS

The results reported above suggest the ensuing key findings regarding profile E-SSME:

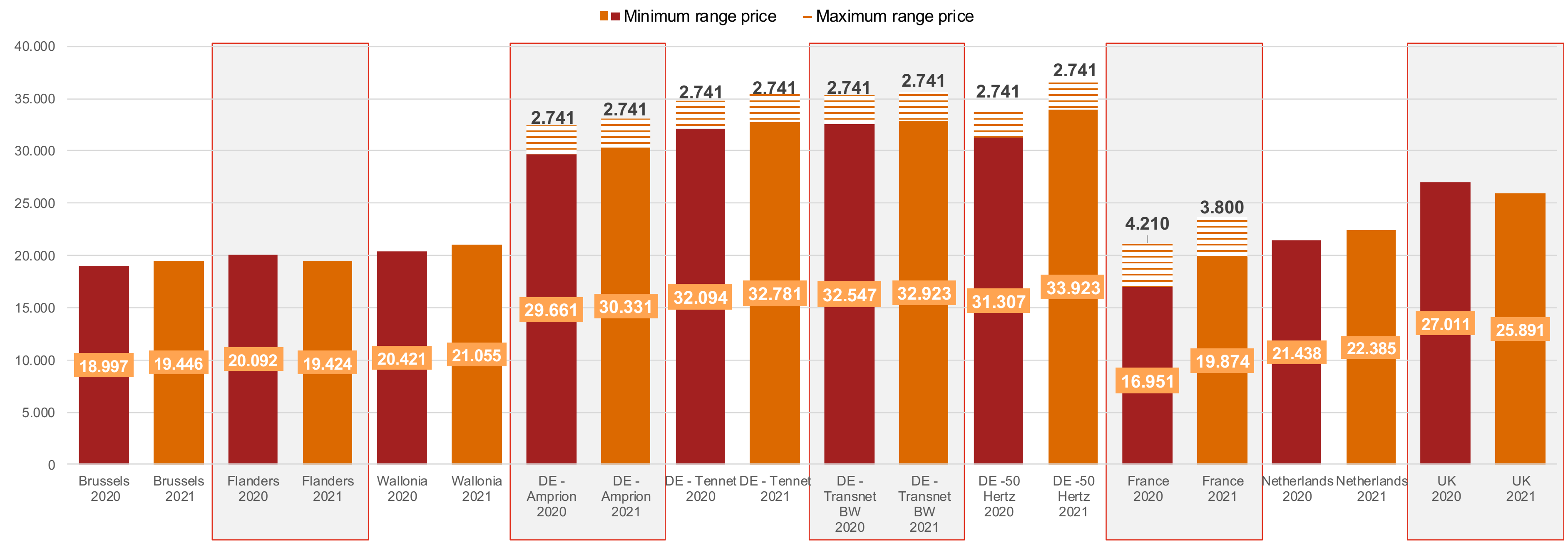
- The total invoice varies greatly between regions/countries with France being the cheapest country, whether we take the maximum range into account or not. There is a big difference between the minimum range in France (3.427 EUR/year) and the most expensive Germany region Transnet (7.902 EUR/year). The second cheapest region is the UK (4.789 EUR/year), but the gap between France and the UK is still significant.
- Brussels is the most competitive Belgian region, but while it was still more competitive than the UK last year this is no longer the case. Again, the more competitive position of Brussels is mainly thanks to a lower (regional) all other costs component.
- The UK has the lowest **commodity component,** but overall this component does not really play an important role in determining the competitivity of a region/country. If we do not take the UK into consideration the German Tennet region has the lowest commodity cost (45 EUR/MWh) while the German Transnet region has the highest commodity cost (75 EUR/MWh).
- We observe quite some variation regarding the **network component**. The UK is an outlier, but we see that the component is quite similar between the cheaper regions, Brussels, France and the Netherlands. The regional aspect has quite a big impact in Germany with the network cost being between 48 and 78 EUR/MWh.
- The **all other costs component** is higher in Flanders, Wallonia, Germany and the Netherlands which are also the less competitive regions/countries regarding this profile. The range of this component in France is significant even though they are still the most competitive country, even if the maximum range is taken into account. While the regional all other costs component is 9 EUR/MWh higher in Flanders than Wallonia, Flanders is still more competitive. The regional component still has a big impact on the competitivity of the Belgian regions.
- In Belgium there is a significant difference between E-SSME and E-BSME, bigger than between E-RES and E-SSME. This is because E-BSME is connected to a different voltage level that implies lower costs.

Profile E-BSME (Electricity)

Total invoice analysis

The figure below provides a comparison of the total yearly invoice paid by a big professional consumer (E-BSME) in the different studied regions and countries. The results are expressed in EUR/year.

Figure 35 : Total yearly invoice in EUR/year (profile E-BSME)



First off, we observe that for the E-BSME profile (and larger profiles) we also have to take a range into account in Germany, because of a possible reduction of the *Konzessionsabgabe*. While this does not change their competitive position compared to other regions/countries for this profile it will have an impact for the bigger consumers as detailed below.

Secondly the total yearly invoice has increased in 8 out of the 10 regions/countries under review. The biggest change is an increase in France (2.923 EUR/year) and in the German 50 Hertz region (2.616 EUR/year). Because of the increase in France it is no longer the cheapest country and has been overtaken by

Flanders (19.424 EUR/year) and Brussels (19.446 EUR/year). Depending on the situation in France, the Netherlands and Wallonia might be less expensive than France.

The competitive position of all the Belgian regions have improved compared to the E-SSME profile. While Wallonia is still the most expensive Belgian region, it has the possibility to be the third most competitive region (after Flanders and Brussels) if the reduction does not apply in France.

Breakdown per component

The previous results are further detailed for profile E-BSME in the following figure, which provides a closer look at the breakdown of the different price components.

Figure 36 : Electricity price by component in EUR/MWh (profile E-BSME)

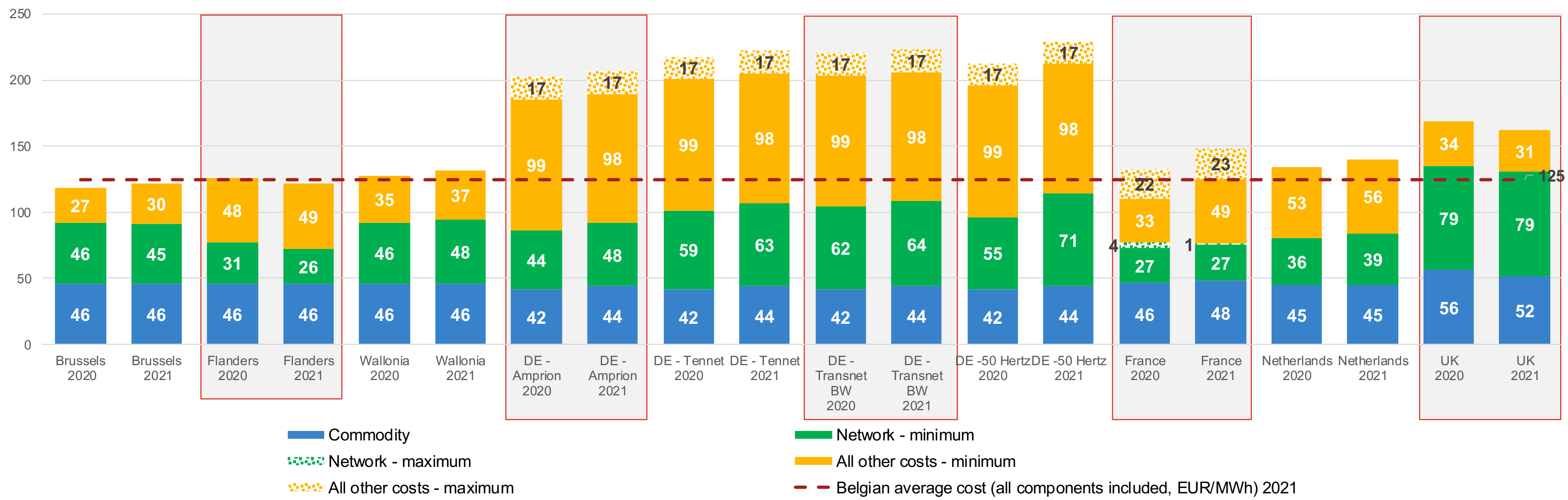
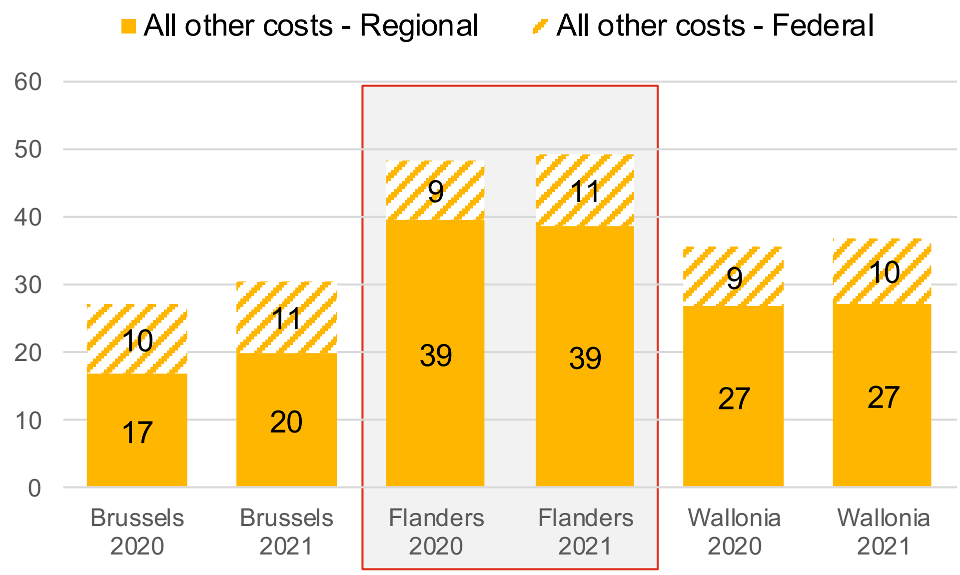


Figure 37 : Regional and Federal all other costs in Belgium in EUR/MWh (profile E-BSME)



The **commodity component** is stable compared to last year and also across regions/countries. Germany has the lowest commodity cost (44 EUR/MWh) while the UK has the highest (52 EUR/MWh). This component does not determine the overall competitivity of the regions/countries. Since the price is now computed according to a formula and no longer by using comparison websites it remains the same between regions and will remain the same for all bigger industrial profiles in EUR/MWh.

The **network cost** show more variation, namely between 26 (Flanders) and 79 (UK) EUR/MWh. The UK still has the biggest network cost similar to the former E-SSME profile. The network cost has an impact on the competitivity of Brussels, Wallonia and the UK, but not when comparing Flanders and France that show very similar network costs. This component has a big impact on the less competitive position of the UK now that it is no longer compensated by a low commodity cost.

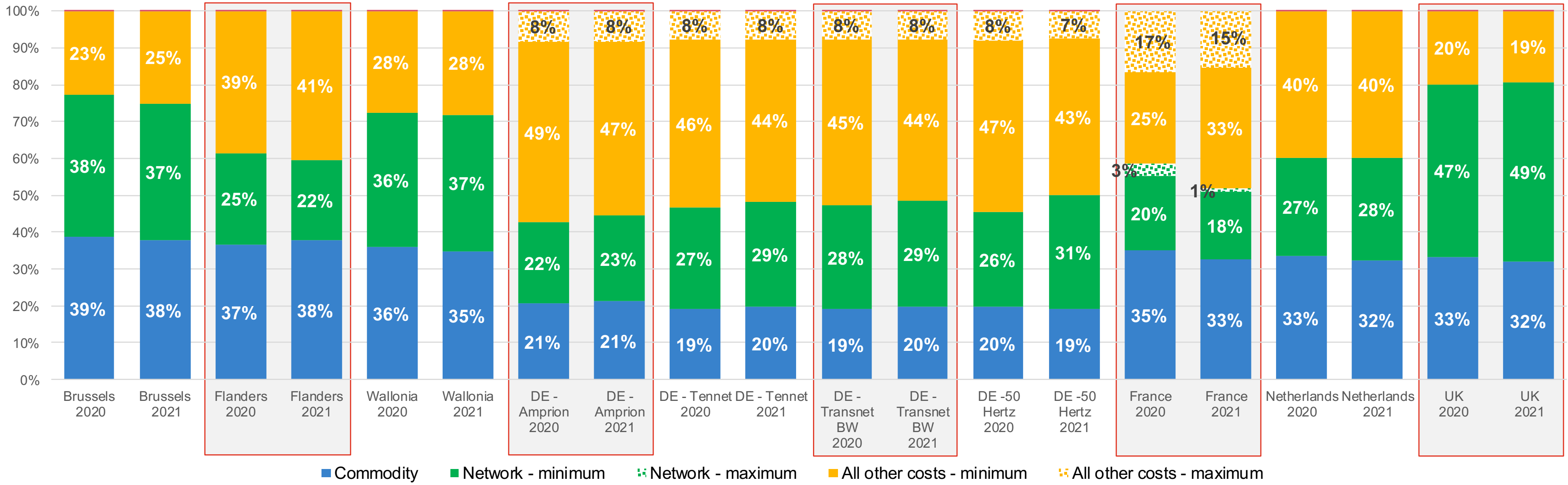
The **all other costs component**[269] is very large in Germany and the German reduction possibility will not impact their overall competitive position. This is not the case in France where the reduction will have a big impact. Depending on the reduction France will be the 3rd or 5th most competitive country under review. The Belgian regions and the UK have the lowest all other costs component even though there are no reduction to take into account. While Flanders has the highest all other costs component in Belgium, this is compensated by the lower network costs that have also decreased compared to last year. The all other costs price per MWh decreased compared to the small professional profile (E-SSME) with the exception of Germany where it is the same cost, but with a potential reduction of 17 EUR/MWh.

[269] This cost includes taxes, levies and certificate schemes.

Proportional component analysis

The percentages of the costs for each component can be found in the figure below.

Figure 38 : Proportional component analysis (profile E-BSME)



As the network costs and all other costs components decrease in Flanders and Wallonia we see that the **commodity component** becomes a more important part of the total invoice. While the proportion was respectively 30 and 29% for E-SSME it is now 38 and 35%. On the Belgian level we observe that Flanders has a higher all other costs, but they remain competitive because of the lower **network costs** in Flanders compared to the other two Belgian regions. When it comes to the network costs Brussels, Wallonia and in particular the UK are the outliers. The **all other costs component** is still very important in Flanders, Wallonia, and the Netherlands, in particular Germany where it constitutes 43 to 47% of the total invoice.

KEY FINDINGS

As for the E-BSME profile, the results demonstrate the ensuing key findings:

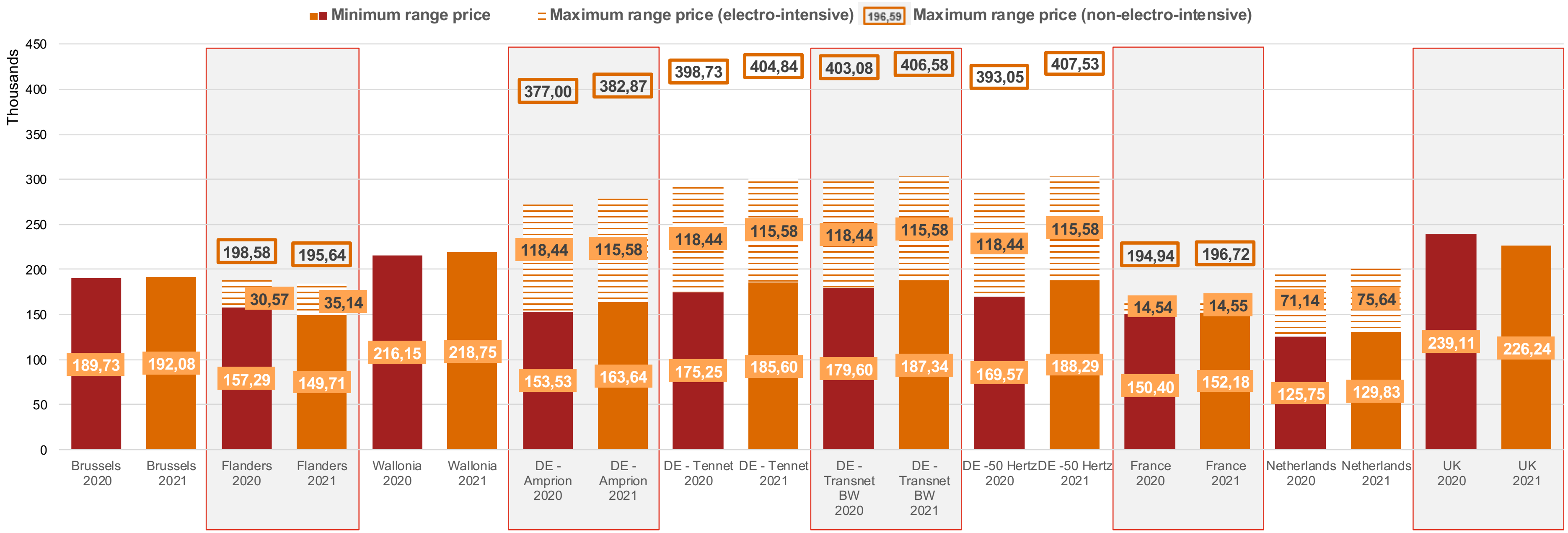
- The total invoice has increased in 8 out of 10 regions/countries under review and ranges from 19.424 (Flanders) to 36.664 EUR/year (Maximum range Germany, 50 Hertz). Flanders and Brussels are the cheapest regions followed by France's minimum range. On the other hand, the German regions are still far behind the other countries regarding the E-BSME profile.
- In Belgium, Flanders is the least expensive region thanks to the low network costs component that compensates the higher all other costs component in this region. Previous year this was Brussels, but there has been an increase of 448 EUR/year compared to 2020 while we see a decrease of 668 EUR/year for Flanders over the same period. This is, respectively, because of an increase and decrease of the (regional) all other costs component.
- The **commodity component** is not a major factor for the overall competitivity, but can already make up 38% of the total invoice (Flanders and Brussels).
- The **network costs component** varies across the reviewed regions/countries and goes from 26 (Flanders) to 79 EUR/MWh (UK). Flanders has a much lower network cost than the other two Belgian regions, but is comparable to the French minimum range network cost (27 EUR/MWh).
- The **all other costs component** and the reductions that can be applied are the most important factor when determining the competitivity of a region/country. Germany's competitive position will not change whether we take the minimum or maximum range into account. However, in France the potential reduction will either make France the 3rd or 5th most competitive region/country under review.

Profile E0 (Electricity)

Total invoice analysis

The figure below provides a comparison of the total yearly invoice paid by an industrial profile E0 in the different studied regions and countries. The results are expressed in kEUR/year.

Figure 39 : Total yearly invoice in kEUR/year (profile E0)



Because of regional differences, Belgium is split into three regions and Germany into four regions. The other countries under review – France, the Netherlands and the UK – are represented as one single result. Below, we compare each region and country's yearly bill with the average Belgian price, which is set at 100. The Belgian average is computed as the mean between Brussels' and Wallonia's single price as well as Flanders' minimum and maximum prices. We have also added a box with the total maximum price range for non-electro-intensive consumers since some reductions/exemptions will start applying on electro-intensive consumers from this profile onward.

Figure 40 : Total yearly invoice comparison in % (profile E0; Belgium Average = 100)

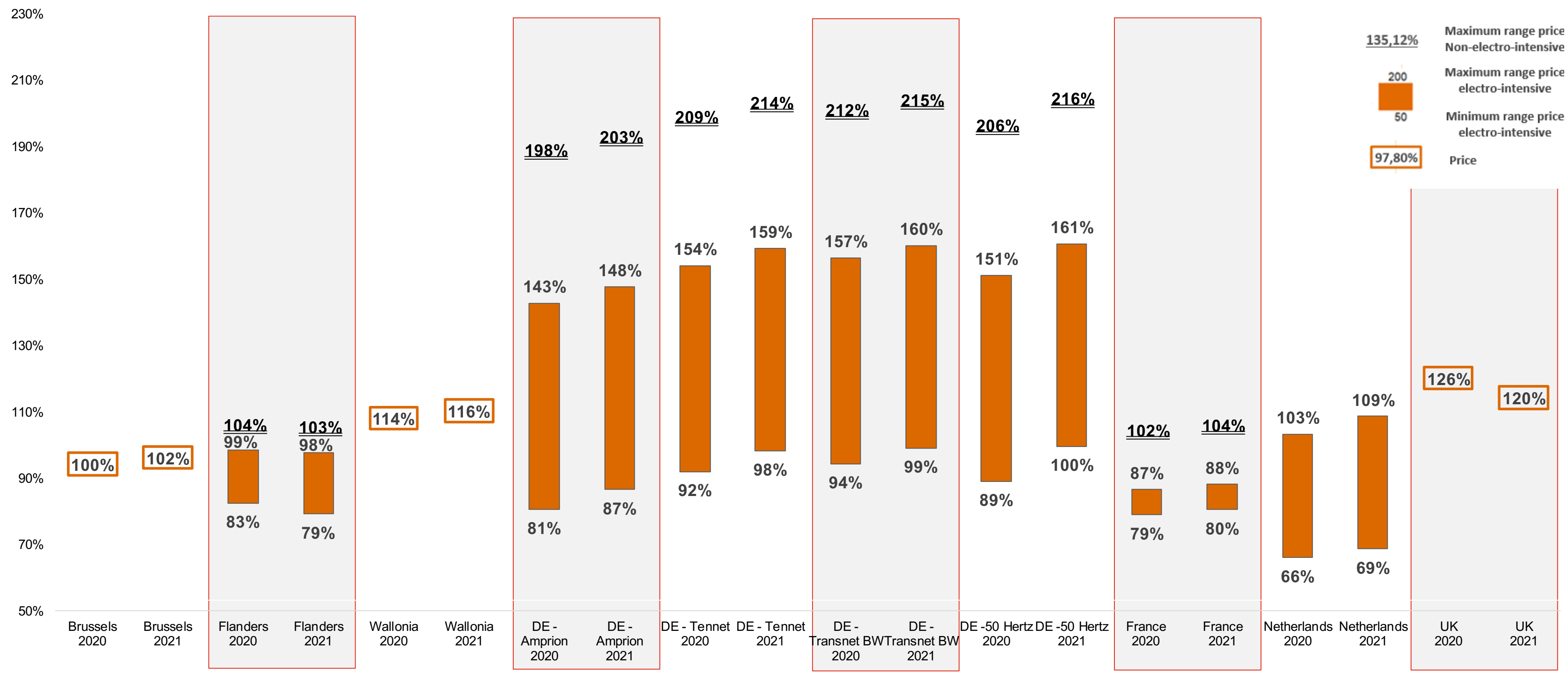


Figure 39 and

Figure 40 above give us a lot of information about the total invoice and the competitivity of the different regions/countries depending on which reductions and/or exemptions are taken into account. Because of the large amount of ranges different regions/countries have the possibility to be the most competitive. What is sure is that the UK, Wallonia and Brussel will never be the cheapest region.

The competitive position of Germany has completely changed with the introduction of reductions for electro-intensive consumers. Depending on the region it has the possibility to be cheaper than all regions/countries under review. The total invoice for non-electro-intensive consumers in Germany is still way above the other regions/countries.

France has the smallest range for consumers that qualify as electro-intensive while the Netherlands has the ability to have the lowest price of all regions/countries for the E0 profile (129,83 kEUR/year) with France following (152,18 kEUR/year). Overall, all the countries, except the UK, have the possibility to be under the Belgian average.

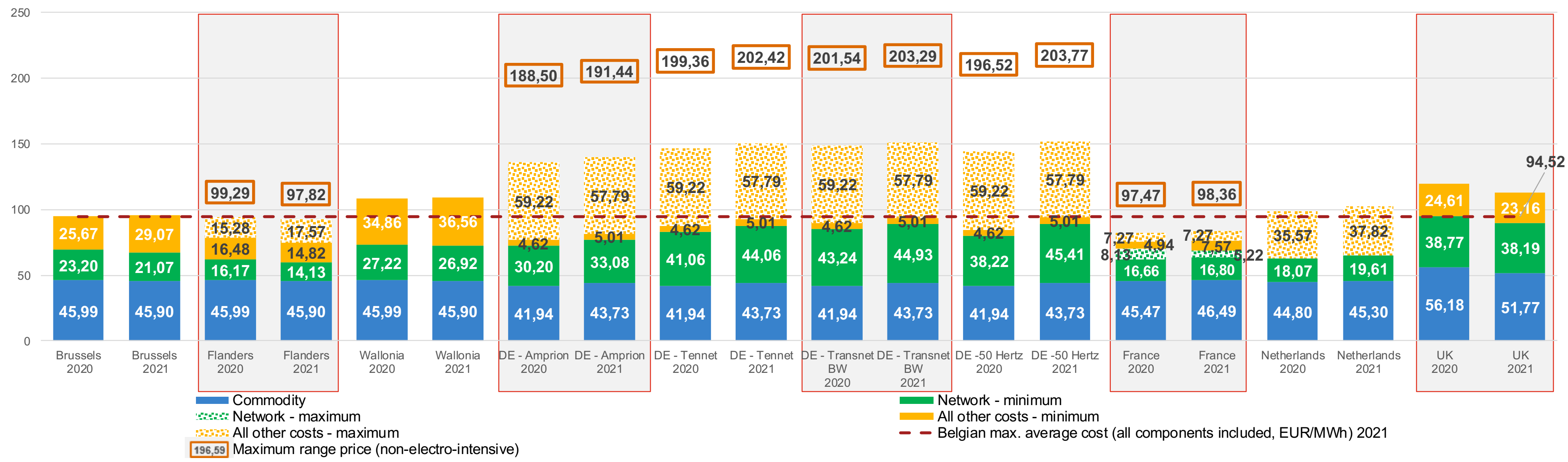
The competitivity of Belgium is quite average and on the better side for Flanders, that offers reductions for GC and CHPC. Flanders has the possibility to be the most competitive region if the reduction applies and if there is no reduction in France and the Netherlands. The competitive position of Flanders and Belgium as a whole has thus become much less clear compared to the E-BSME profile.

If we only consider the maximum ranges of the electro-intensive consumers, Flanders would still be less competitive than France, but more than the other regions/countries. In this case however, the Belgian region's competitivity would increase because Brussels and Wallonia do not offer specific electro-intensive reductions.

Breakdown per component

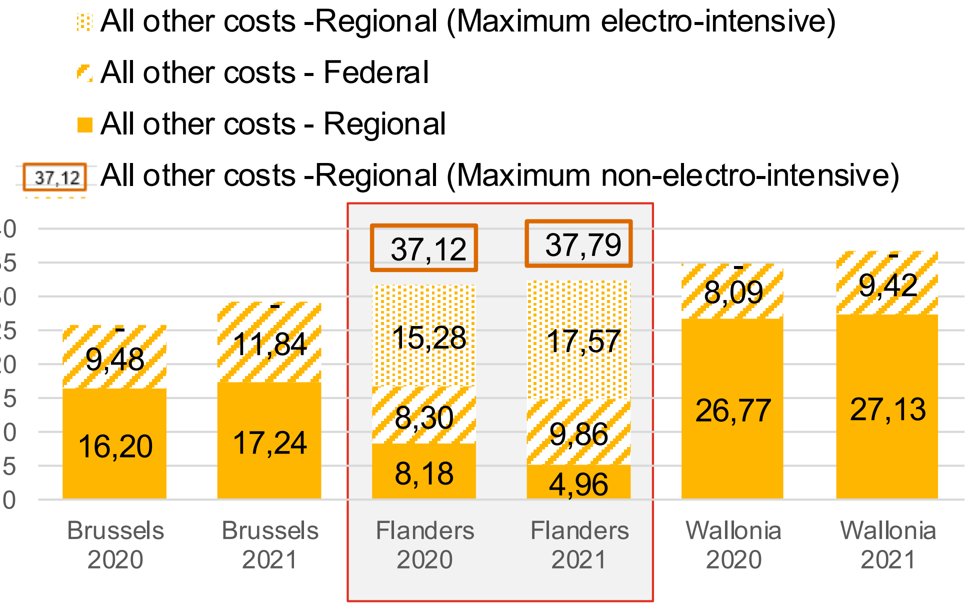
The previous results are further detailed for profile E0 in the figure underneath, which provides a closer look at the breakdown of the different price components.

Figure 41 : Electricity price by component in EUR/MWh (profile E0)



250
200
150
100
50
0
99,29
97,82
188,50
191,44
199,36
202,42
201,54
203,29
196,52
203,77
97,47
98,36
94,52
Brussels 2020
Brussels 2021
Flanders 2020
Flanders 2021
Wallonia 2020
Wallonia 2021
DE - Amprion 2020
DE - Amprion 2021
DE - Tennet 2020
DE - Tennet 2021
DE - Transnet BW 2020
DE - Transnet BW 2021
DE -50 Hertz 2020
DE -50 Hertz 2021
France 2020
France 2021
Netherlands 2020
Netherlands 2021
UK 2020
UK 2021
Commodity
Network - maximum
All other costs - maximum
196,59 Maximum range price (non-electro-intensive)
Network - minimum
All other costs - minimum
Belgian max. average cost (all components included, EUR/MWh) 2021

Figure 42 : Regional and Federal all other costs in Belgium in EUR/MWh (profile E0)



The **commodity costs component** is relatively well aligned across all the regions/countries with the UK being a bit more expensive (51,77 EUR/MWh). However, this component is now more important because of the lower network costs and/or all other costs components. This is especially the case if further exemptions/reductions are applied. Looking at the Netherlands and France in particular it would even make up more than 50% of the total invoice if the minimum range is taken into account.

The **networks costs component** varies across the regions/countries and we see a clear distinction within Belgium as well. The difference between Flanders and France is small, but Flanders has the lowest network cost (14,13 EUR/MWh) of all regions/countries under review. The German 50 Hertz region has the highest network cost (45,41 EUR/MWh) and the other German regions are in the same vicinity even though Amprion's network cost is still a bit of an outlier within Germany (33,08 EUR/MWh). In France the network cost depends on the price option (i.e. CU fixed peak, CU mobile peak, LU fixed peak or LU mobile peak), but it seems that the distinction between the options has decreased from 8,13 to 5,22 EUR/MWh between 2020 and 2021.

Lastly, the **all other costs component**[270] shows the most variation across regions/countries and even in their respective region/country since there are multiple reduction/exemption schemes that affect this component. With the exception of Brussels, Wallonia and the UK all the regions/countries present a range and this range is the largest in Germany, namely of 57,79 EUR/MWh. The different pricing schemes for electro- end non-electro-intensive consumers are also abundantly clear in Germany. We also note that the height of the all other costs component and the ranges has remained quite similar to last year. The variations in this component makes the competitive position of the countries less clear and much will depend on which consumers will be entitled to a reduction/exemption.

[270] This cost includes taxes, levies and certificate schemes.

Impact of Flanders' combined cap on profile E0

The cost of green certificates can have a big impact on the energy price of large industrial consumers. To limit these costs, Flanders introduced two caps, in 2018, on the cost of financing of renewable energies. These caps are proportional to the Gross Value Added (GVA) of the company and thus vary from company to company. Previously this cap was only applicably on GC but since 2021 it is a combined cap that is applicable on GC and CHPC. In the following example, we attempt to illustrate the potential impact of these caps on industrial consumers.

There are two different caps according to the undertaking type of the industrial consumer:[271]

- **Case 1:** Undertakings belonging to sectors listed in annexe 3 or 5 of the EEAG[272] with an electro-intensity above 20%, the amount due for the costs related to the financing of renewable energy and qualitative combined heat and power is capped at 0,50% of the average gross value added (GVA) over the last 3 years;
- **Case 2**: Undertakings belonging to sectors listed in annexe 3 of the EEAG, the amount due for the costs related to the financing of renewable energy and qualitative combined heat and power is capped at 4% of the average gross value added (GVA) over the last 3 years.

Since the cap's financial impact differs according to the last 3 years' average gross value added, it also differs between companies. Therefore, this analysis focuses on identifying the maximum GVA from which each profile (E0 to E4) does no longer benefit from the caps (i.e. a reduction in the total cost of GC and CHPC). The computation of GC and CHPC is explained in CH 5 p. 165.

The results for E0[273] are synthesized in the following table:

Table 121 : Flanders' cap on profile E0

	Case 1	Case 2
NACE codes[274]	Annexe 3 or 5 EEAG	Annexe 3 EEAG
Electro-intensity	> 20%	No threshold
Cap (% of GVA)	0,50%	4%
Average yearly consumption (E0)	2 GWh	
Scheme cost (without cap)	35.136,94 EUR	
Maximum gross value added to benefit from the cap	7,03 MEUR	878,42 kEUR

Considering only Profile E0 companies with NACE codes from Annexe 3 or 5 from the EEAG and with an electro-intensity above 20% (case 1), a company benefits from the application of the cap as long as its gross value added is less than 7.027.388 EUR.

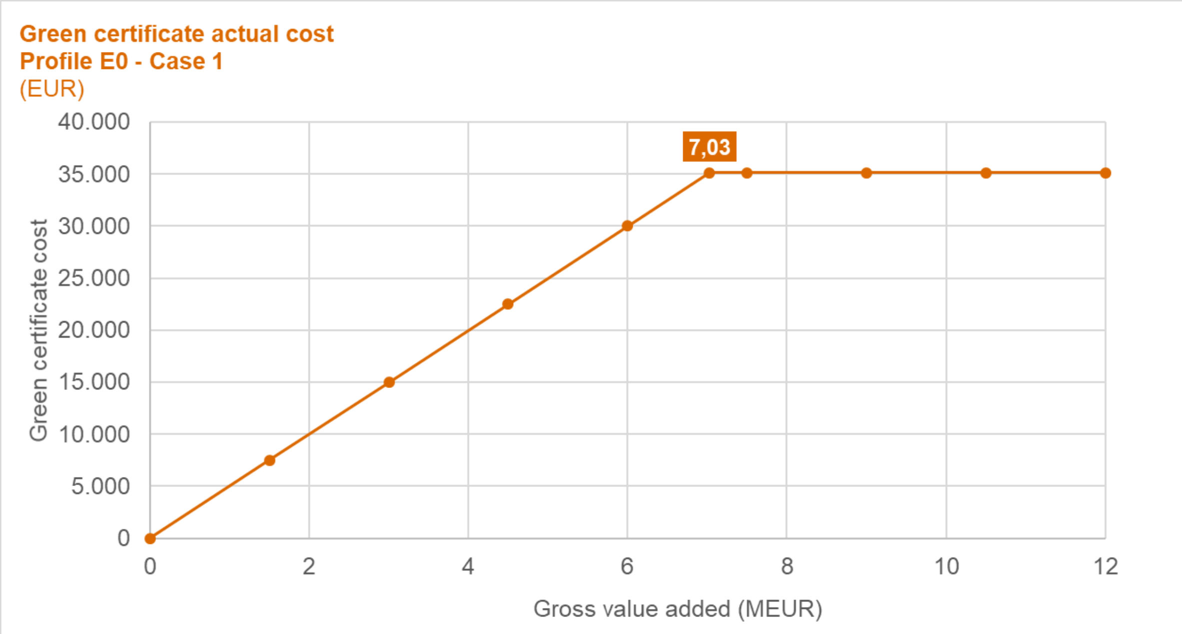
[271] The companies listed in Annexe 3 and 5 of EEAG correspond to the companies listed in the Energiedecreet with the exception of Nace 3832 (Recycling of waste) which is listed in Annexe 3 EEAG but not in the Energiedecreet.

[272] (European Commission, 2014-2020)

[273] One must be aware that it is less likely that E0-like consumers would fall under the cap application scheme. However, for the sake of the report consistency and the latter analyses, we reflect potential impacts it would have on this consumer.

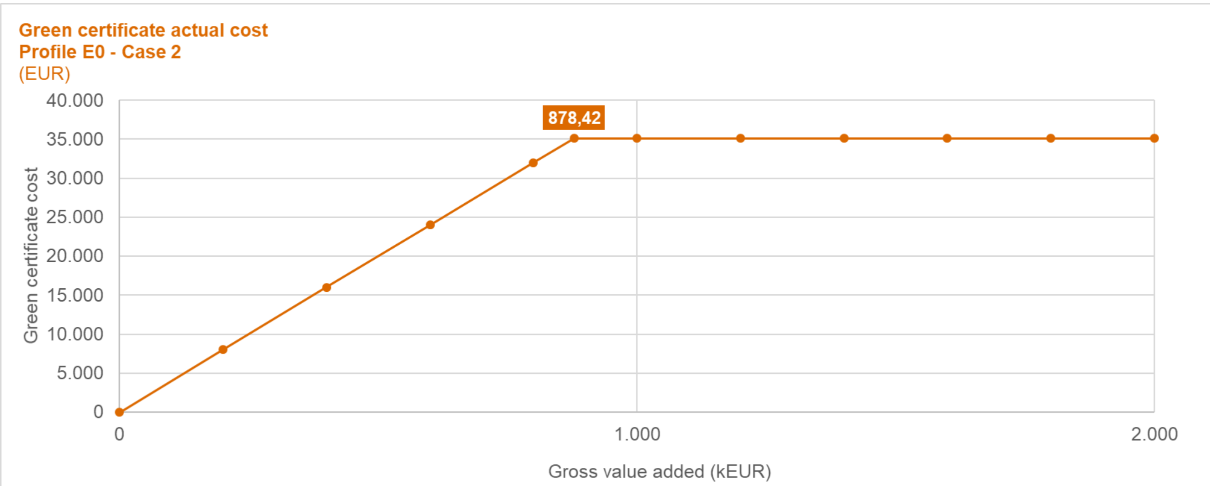
[274] The companies listed in Annexe 3 and 5 of EEAG correspond to the companies listed in the Energiedecreet with the exception of Nace 3832 (Recycling of waste) which is listed in Annexe 3 EEAG but not in the Energiedecreet.

Figure 43 : CHPC and GC actual cost for E0 profile (Case 1)



Considering only Profile E0 companies with NACE codes from Annexe 3 from the EEAG (case 2), a company benefits from the application of the cap as long as its gross value added is less than 878.423 EUR.

Figure 44 : Green certificate actual cost for E0 profile (Case 2)



KEY FINDINGS

The analysis of the E0 profile leads us to the following findings:

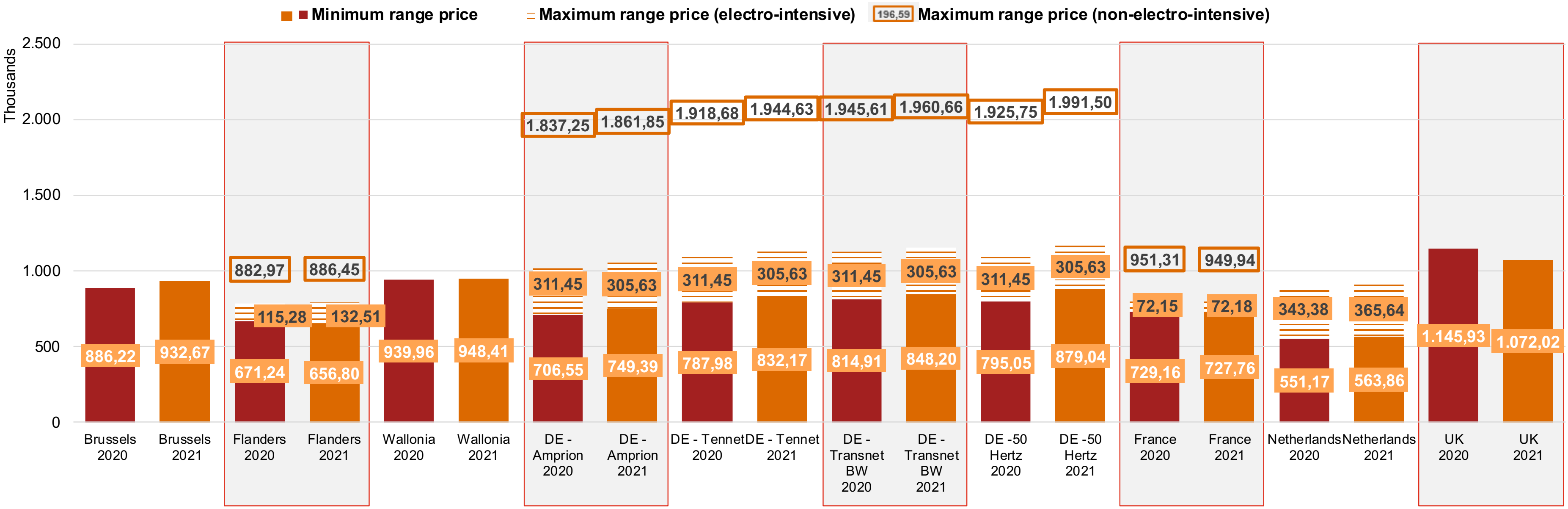
- The competitivity of the regions/countries is no longer as clear cut as it was for the smaller profiles. There a major price differences depending on which reductions are in force or not. And with the exception of the UK, Wallonia and Brussel all regions/countries can be the cheapest under the right circumstances. The biggest change compared to the E-BSME profile and before is that Germany has the potential to be more competitive than the other regions/countries.
- Flanders is still in a good competitive position thanks to the GC and CHPC reduction schemes, but Wallonia's and Brussels' position has deteriorated. Overall, the Netherlands has the possibility to have the lowest total invoice of all regions/countries.
- The **commodity component** plays a bigger role than before and even makes up more than 50% of the total invoice in some cases. This component is very similar between regions, with the UK being a bit more expensive.
- The most expensive **network cost** is still found in the German 50 Hertz region (45,41 EUR/MWh) and the cheapest in Flanders (14,13 EUR/MWh). The network cost in Flanders has always been the lowest and this has often put them in a good position compared to the other regions/countries, but we see that this is no longer enough to clearly make them the most competitive.
- In Belgium, Flanders always had the highest **all other costs component,** but this is no longer necessarily the case because of the potential GC and CHPC reduction for smaller consumers. This component has the biggest impact on the competitivity and the positioning of all the regions/countries. In Germany in particular the reductions make a big change, up to 57,79 EUR/MWh less for electro-intensive consumers.

Profile E1 (Electricity)

Total invoice analysis

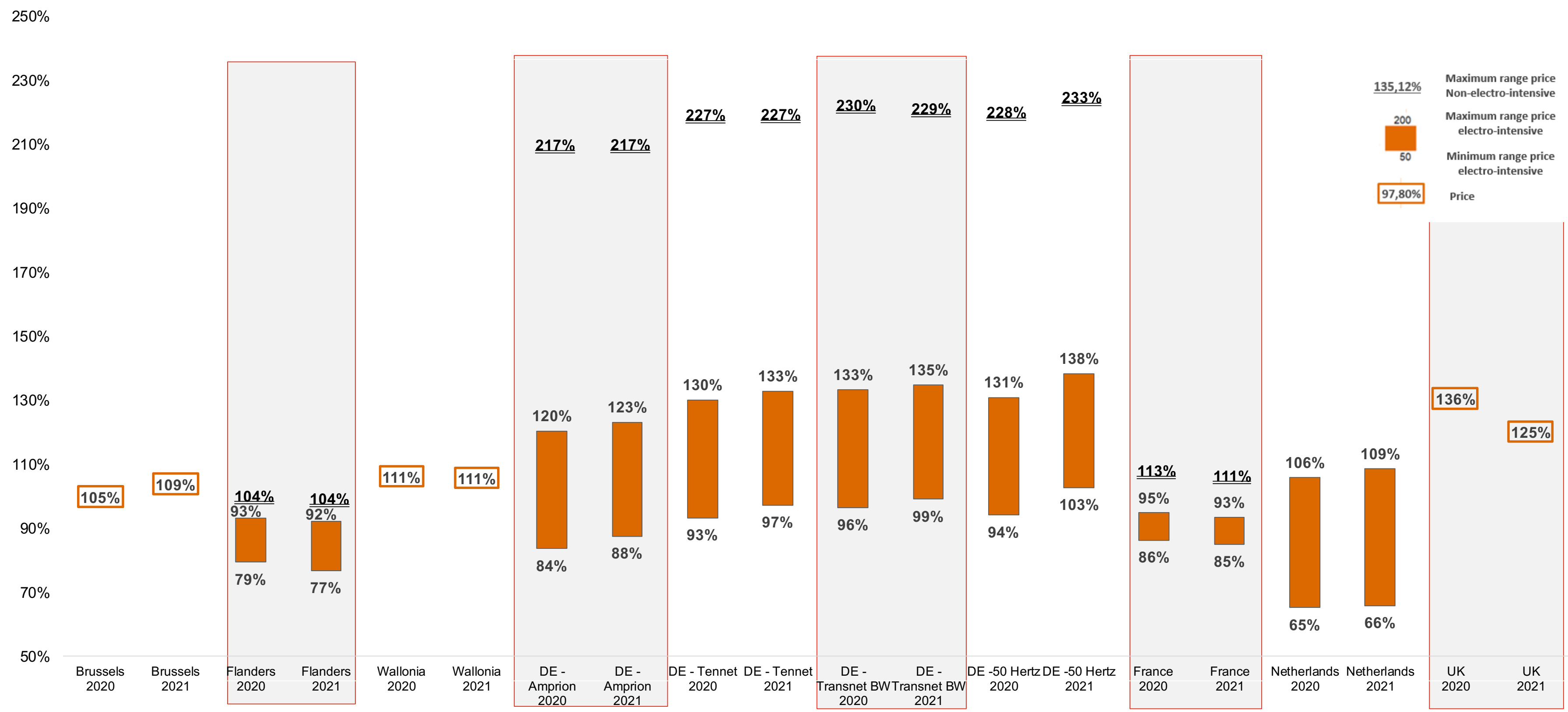
The first figure below provides a comparison of the total yearly invoice paid by an industrial profile E1 in the different studied regions and countries. The results are expressed in kEUR/year. The second figure gives the Belgian average of 100% to easily compare the percentual price differences with other countries.

Figure 45 : Total yearly invoice in kEUR/year (profile E1)



Below, we compare each region and country's yearly bill with the average Belgian price, which is set at 100. The Belgian average is computed as the mean between Brussels' and Wallonia's single price as well as Flanders' minimum and maximum prices.

Figure 46 : Total yearly invoice comparison in % (profile E1; Belgium Average = 100)



As depicted in Figure 45 the total invoice has increased in 8 out of the 10 regions/countries under review. We have once again big ranges to take into account, but similar to E0 Brussels, Wallonia and the UK can not be the cheapest country except if the consumer is not seen as electro-intensive in France. Nevertheless, the Netherlands has the potential to have the lowest price 563,86 kEUR/year followed by Flanders (656,80 kEUR/year).

Compared to Belgium the competitive position of Germany is still improving while the range for E0 electro-intensive consumers went up to 50,47% above the Belgian average this is now 28,56% meaning that even if the reduction is not applied Germany will be more competitive than before. Regarding the same situation France and the Netherlands' position declined a bit compared to E0. Furthermore, the Netherlands now has the biggest range for electro-intensive consumers 365,64 kEUR/year.

The difference between electro- and non-electro intensive consumers is also important to note. While the distinction is particularly important in Germany it also has a significant effect on the competitivity of France. When the maximum range of electro-intensive consumers is considered, the difference in Flanders is 97,14 kEUR it is 150,00 kEUR in France.

When not taking the reductions for electro-intensive consumers into consideration the position of Belgium and the UK would be better even though they would still not be cheaper than France and the Netherlands. Regarding electro-intensive consumers the UK is the most expensive country even though the total invoice has decreased compared to 2020.

Breakdown per component

The previous results are further detailed for profile E1 in the figure underneath, which provides a closer look at the breakdown of the different price components.

Figure 47 : Electricity price by component in EUR/MWh (profile E1)

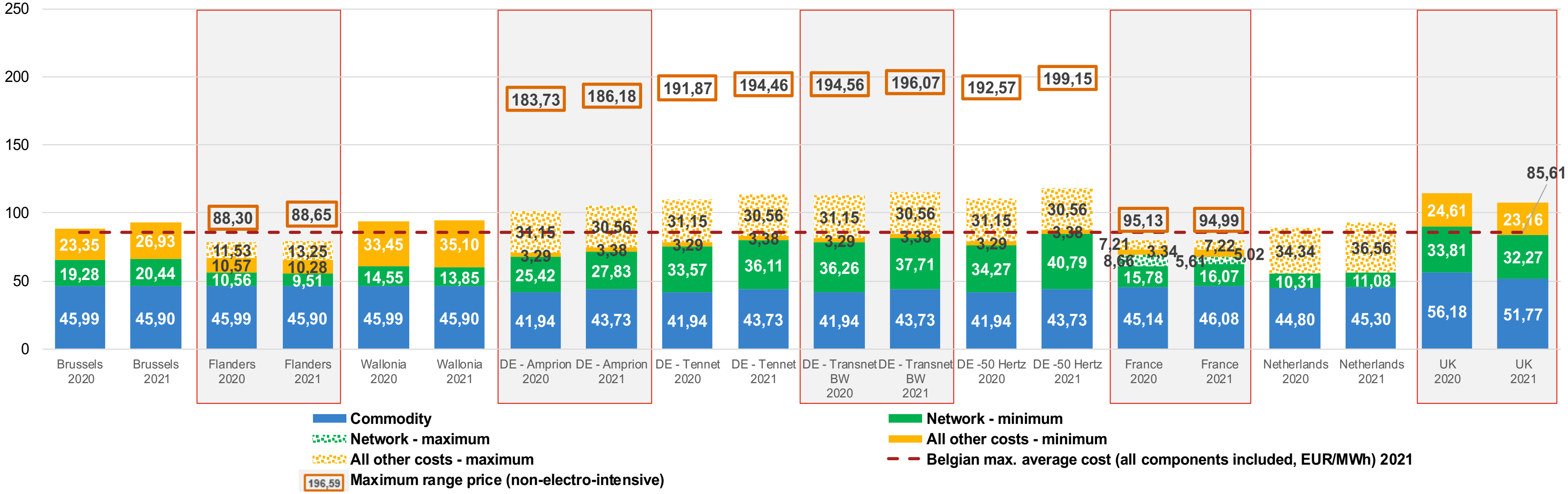
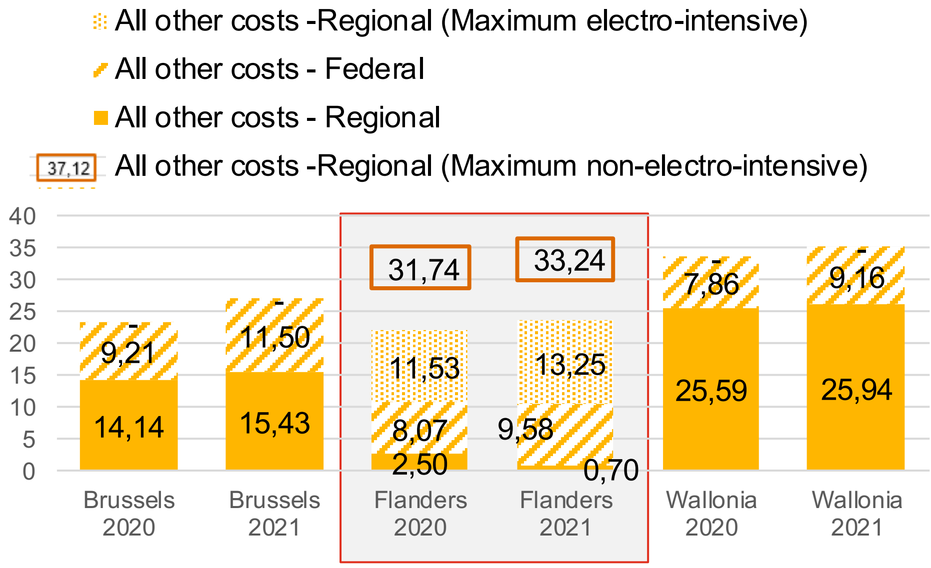


Figure 48 : Regional and Federal all other costs in Belgium in EUR/MWh (profile E1)



Similar to E-BSME and E0, the **commodity component** stays the same per MWh and does not vary much across regions/countries and the UK is the only country that is a bit more expensive (51,77 EUR/MWh).

The importance of the **network cost** is steadily decreasing as the profiles become larger and larger, but is still significant in Germany and the UK. Flanders has the lowest network cost (9,51 EUR/MWh) followed by the Netherlands (11,08 EUR/MWh) which is the opposite of what we observed last year. The network costs in Wallonia are similar to that of the more competitive countries (France and the Netherlands) and is now less expensive than Brussels as it was for the smaller profiles.

The **all other costs component**[275] shows a lot of variation across regions/countries. The range in Germany has significantly decreased in Germany. While the minimum all other costs in the countries that offer reduction/exemptions is still significant in Flanders (10,28 EUR/MWh), there is a potential exemption in the Netherlands. Furthermore, this component has also almost disappeared in Germany (3,38 EUR/MWh) and France (5,02 EUR/MWh). The qualification as electro-intensive consumer is still very important in Germany and France. Brussels, Wallonia, and the UK still do not offer any reductions.

[275] This cost includes taxes, levies and certificate schemes.

Impact of Flanders' combined cap on profile E1

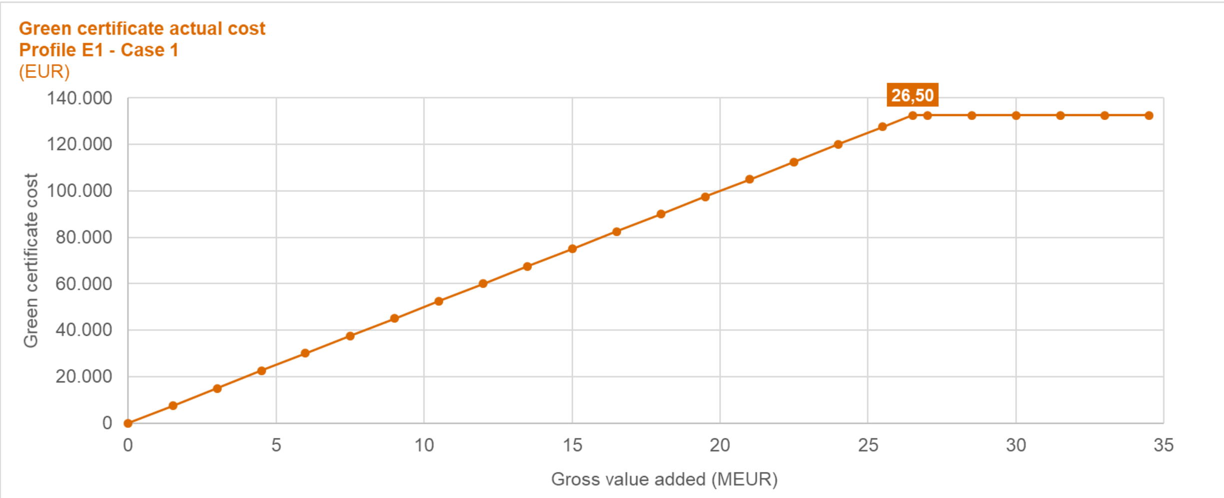
The cost of green certificates can have a big impact on the energy price of large industrial consumers. To limit these costs, Flanders introduced two caps, in 2018, on the cost of financing of renewable energies. These caps are proportional to the Gross Value Added (GVA) of the company and thus vary from company to company. In the following example, we attempt to illustrate the potential impact of these caps on industrial consumers. Previously this cap was only applicably on GC but since 2021 it is a combined cap that is applicable on GC and CHPC.

Table 122 : Flanders' cap on profile E1

	Case 1	Case 2
NACE codes[276]	Annexe 3 or 5 EEAG[277]	Annexe 3 EEAG
Electro-intensity	> 20%	No threshold
Cap (% of GVA)	0,50%	4%
Average yearly consumption (E1)	10 GWh	
Scheme cost (without cap)	132.509,90	
Maximum gross value added to benefit from the cap	26,50 MEUR	3,31 MEUR

Considering only Profile E1 companies with NACE codes from Annexe 3 or 5 from the EEAG and with an electro-intensity above 20% (case 1), a company benefits from the application of the cap as long as its gross value added is less than 26.501.979 EUR.

Figure 49 : CHPC and GC actual cost for E1 profile (Case 1)

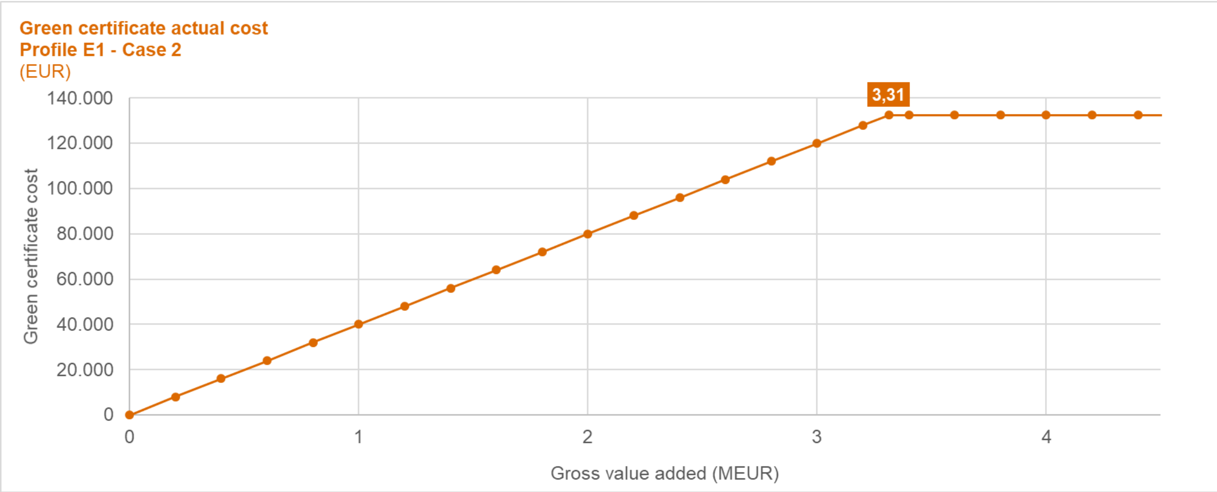


Considering only Profile E1 companies with NACE codes from Annexe 3 from the EEAG (case 2), a company benefits from the application of the cap as long as its gross value added is less than 3.312.747 EUR.

Figure 50 : CHPC and GC actual cost for E1 profile (Case 2)

[276] The companies listed in Annexe 3 and 5 of EEAG correspond to the companies listed in the Energiedecreet with the exception of Nace 3832 (Recycling of waste) which is listed in Annexe 3 EEAG but not in the Energiedecreet.

[277] (European Commission, 2014-2020)



KEY FINDINGS

The analysis of the E1 profile leads us to the following findings:

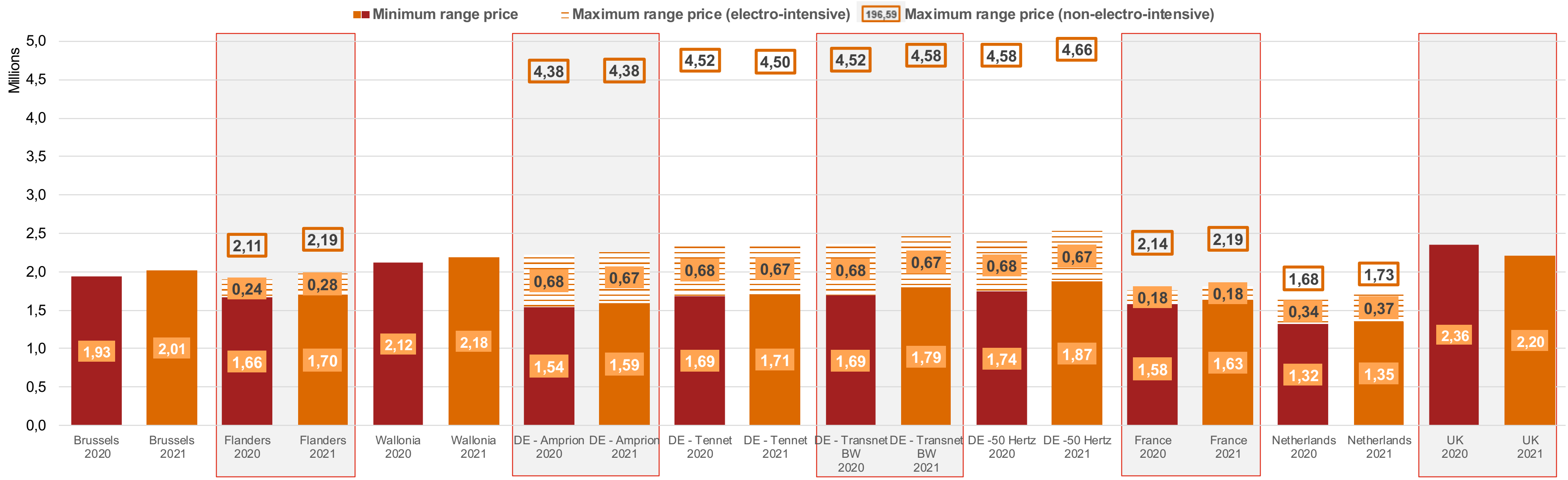
- Not taking the costs for non-electro-intensive consumers into account we still have a big range between the cheapest and most expensive region/country under review, namely between 563,86 (Netherlands) and 1.184,67 kEUR (Germany – 50 Hertz). The maximum range, taking non-electro-intensive consumers into account is almost 2 MEUR in the German 50 Hertz region.
- In Belgium, Flanders is undoubtedly the most competitive region even when not taking any reductions into consideration. This is no longer just the case because of the lower network cost, but also the lower all other costs component.
- The **commodity component** does not change between profiles anymore and is quite similar across the reviewed regions/countries with the UK being the most expensive with 51,77 EUR/MWh.
- Flanders has the most competitive **network cost** (9,51 EUR/MWh) which is similar to the cost in the Netherlands. Brussels, Wallonia and France are in the middle group regarding the competitivity of this component while Germany and the UK are clearly the most expensive countries regarding this component. France has a range (5,61 EUR/MWh) for the network costs, but remains in the middle group either way.
- Lastly the component that varies the most, the **all other costs**, and has a big impact on the competitivity of the regions/countries. For the E1 profile the Netherlands displays the biggest range for electro-intensive consumers (36,56 EUR/MWh). Since the all other costs in France are very small to begin with, even if the reduction for electro-intensive consumers does not apply, they are in a very competitive position.

Profile E2 (Electricity)

Total invoice analysis

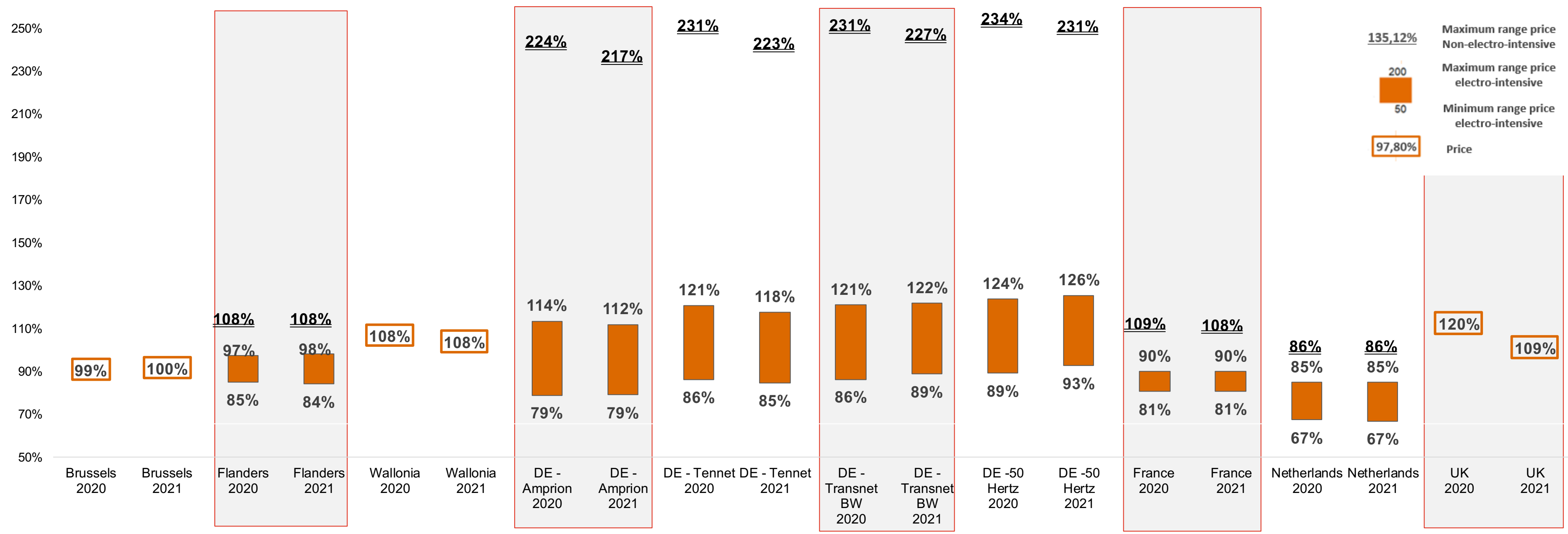
The figure below provides a comparison of the total yearly invoice paid by an industrial profile E2 in the different studied countries and regions. The results are expressed in MEUR/year. The second figure gives the Belgian average of 100% to easily compare the percentual price differences with other countries.

Figure 51 : Total yearly invoice in MEUR/year (profile E2)



Below, we compare each region and country's yearly bill with the average Belgian price, which is set at 100. The Belgian average is computed as the mean between Brussels' and Wallonia's single price as well as Flanders' minimum and maximum prices.

Figure 52 : Total yearly invoice comparison in % (profile E2; Belgium Average = 100)



Before starting the analysis, we note that the price has increased in 9 out of 10 reviewed countries, all regions/countries except the UK. This is often because of a higher commodity component in 2021.

The situation in Belgium has changed once again and we have two observations to make. Firstly, while Flanders was always more competitive than Brussels and Wallonia this is no longer the case for the E2 profile. Wallonia and Brussels can be more competitive than Flanders for non-electro intensive consumers

The Netherlands still has the potential to offer the cheapest total invoice, namely of 1,35 MEUR, while the German 50 Hertz region might have the most expensive total invoice regarding electro-intensive consumers, namely 2,54 MEUR. The only 4 regions/countries that have the possibility to be cheaper than the Netherlands are Flanders, France and the German Amprion and Tennet regions.

Contrary to E1 the total invoice of the Netherlands will always be under the Belgian average, with a maximum 86%. As for Germany, their competitive position is still bettering as it was the case between E0 and E1. While the German regions could be up to 38% higher for E1 this is maximum 26% above the Belgian average in the German 50 Hertz region. As always, the total invoice for non-electro-intensive consumers in Germany is an outlier and can go up to 4,66 MEUR.

Breakdown per component

The previous results are further detailed for profile E2 in the underneath figure, which provides a closer look at the breakdown of the different price components.

Figure 53 : Electricity price by component in EUR/MWh (profile E2)

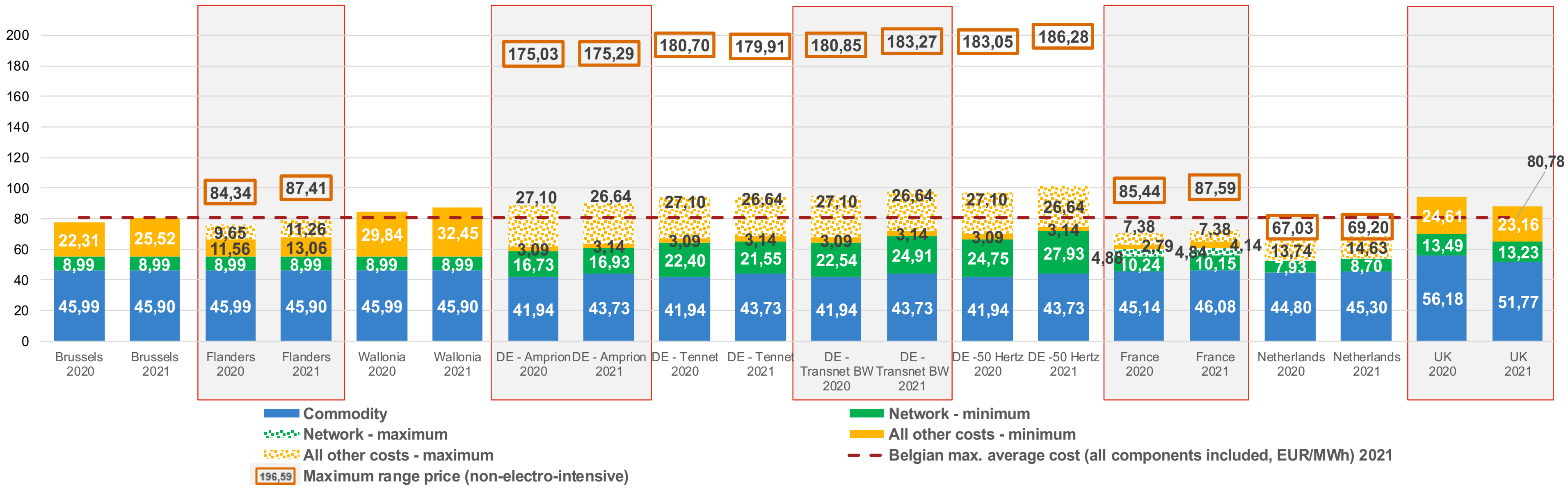
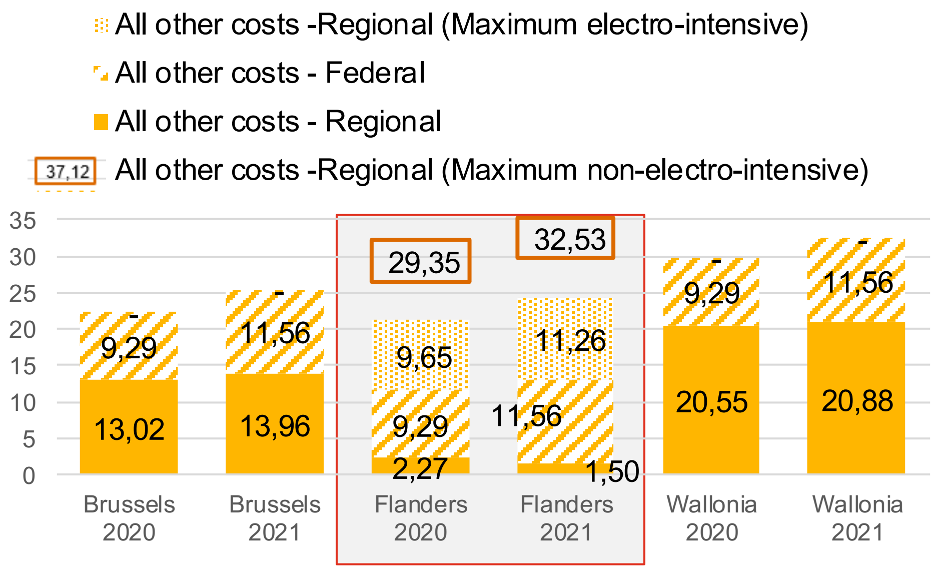


Figure 54 : Regional and Federal all other costs in Belgium in EUR/MWh (profile E2)



The **commodity component** does not change since it is computed with a formula, so as always it is quite similar across regions and more expensive in the UK. The importance of the commodity component keeps increasing because the network costs keep decreasing and/or potential reductions/exemptions on the all other costs component.

The **network costs component** shows some more variation compared to the E1 profile since Flanders is no longer the most competitive regarding this component and it is now the Netherlands (8,70 EUR/MWh). Since the E2 profile is no longer connected to the distribution grid starting E2 this cost is no longer present in the network cost and the cost is also the same in all the Belgian regions (8,99 EUR/MWh). With the exception of the German regions, the network costs are quite even across the regions/countries, between 8,70 and 13,23 EUR/MWh. In Germany we still see some regional differences, in particular the relatively cheap cost in the Amprion region compared to the other German regions.

Finally, the **all other costs component**[278] varies greatly depending on the region/country and on the consumer profile (electro-intensive or not). Depending on the consumer they might be entitled to a reduction or even an exemption, as is the case in the Netherlands. In the Netherlands we do see that there is now a maximum for non-electro-intensive consumers to take into account, that is different from the maximum range from the electro-intensive consumers even though it is not yet very clear at this point. The all other costs stand out in Brussels, Wallonia and the UK where there are still no reductions/exemptions to be applied for electro-intensive consumers. Depending on the reduction in France they might be more competitive than the Netherlands. While France will in any case at least bill 4,14 EUR/MWh to their consumers this is not the case in the Netherlands which puts France at a disadvantage regarding this component.[279]

Impact of Flanders' combined cap on profile E2

The cost of green certificates can have a big impact on the energy price of large industrial consumers. To limit these costs, Flanders introduced two caps, in 2018, on the cost of financing of renewable energies. These caps are proportional to the Gross Value Added (GVA) of the company and thus vary from company to company. In the following example, we attempt to illustrate the potential impact of these caps on industrial consumers. Previously this cap was only applicably on GC but since 2021 it is a combined cap that is applicable on GC and CHPC.

[278] This cost includes taxes, levies and certificate schemes.

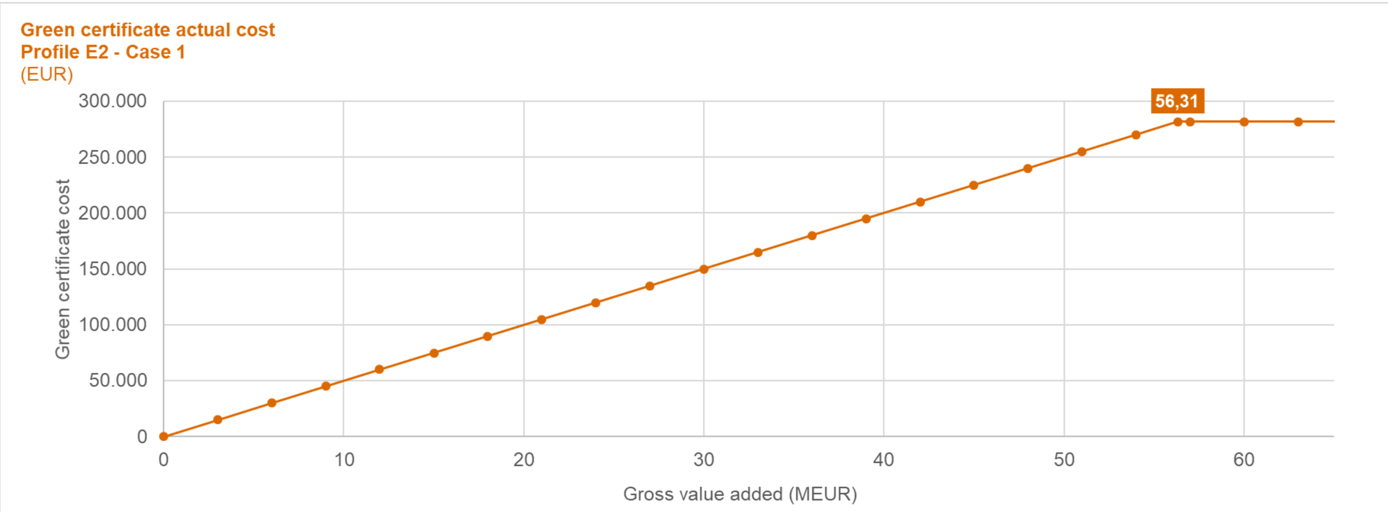
[279] In addition to the degressivity rules and limits that apply the larger profiles (E2 and higher) do not pay a part of the all other costs, namely the part billed through the DSO, which the smaller profiles do pay.

Table 123 : Flanders' cap on profile E2

	Case 1	Case 2
NACE codes[280]	Annexe 3 or 5 EEAG[281]	Annexe 3 EEAG
Electro-intensity	> 20%	No threshold
Cap (% of GVA)	0,50%	4%
Average yearly consumption (E2)	25 GWh	
Scheme cost (without cap)	281.569,49	
Maximum gross value added to benefit from the cap	56,31 MEUR	7,04 MEUR

Considering only Profile E2 companies with NACE codes from Annexe 3 or 5 from the EEAG and with an electro-intensity above 20% (case 1), a company benefits from the application of the cap as long as its gross value added is less than 56.313.898 EUR.

Figure 55 : CHPC and GC actual cost for E2 profile (Case 1)

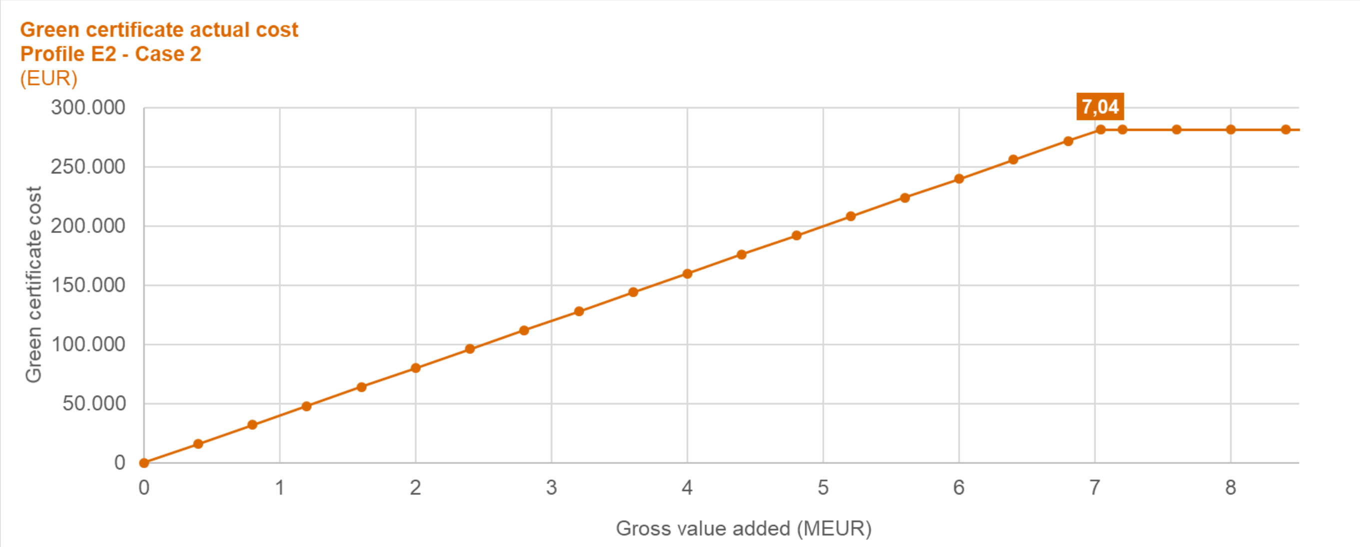


Considering only Profile E2 companies with NACE codes from Annexe 3 from the EEAG (case 2), a company benefits from the application of the cap as long as its gross value added is less than 7.039.237 EUR.

[280] The companies listed in Annexe 3 and 5 of EEAG correspond to the companies listed in the Energiedecreet with the exception of Nace 3832 (Recycling of waste) which is listed in Annexe 3 EEAG but not in the Energiedecreet.

[281] (European Commission, 2014-2020)

Figure 56 : CHPC and GC actual cost for E2 profile (Case 2)



KEY FINDINGS

The analysis of the E2 profile leads us to the following findings:

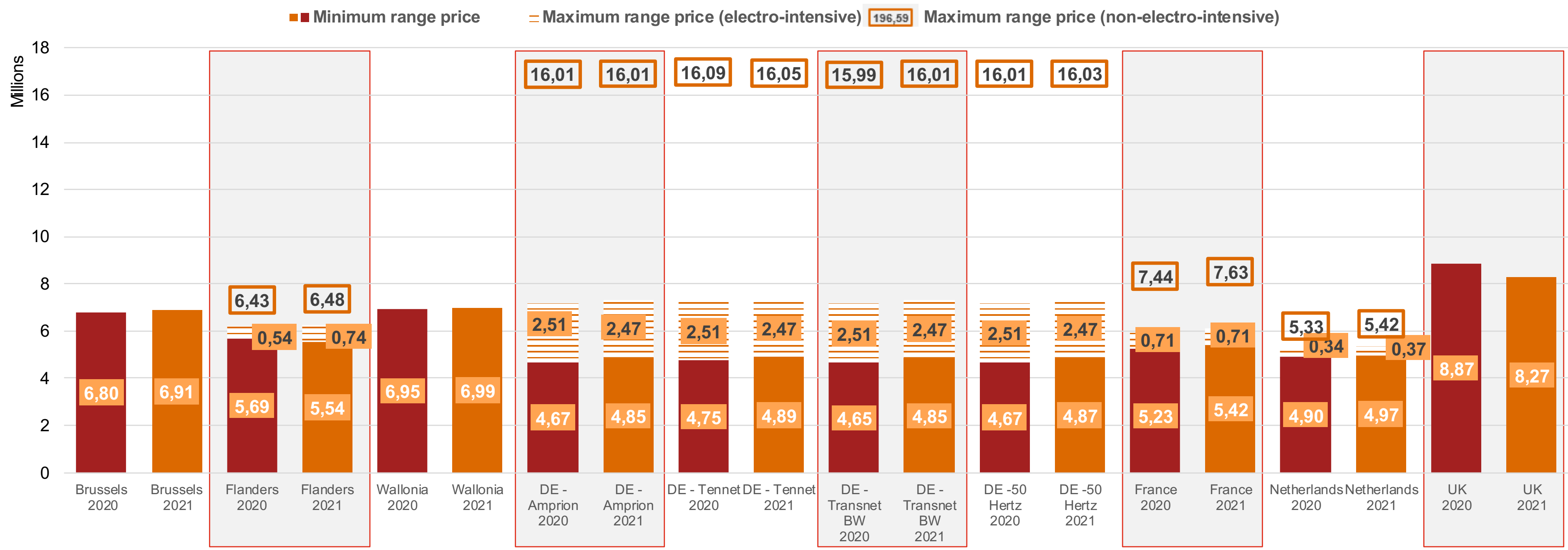
- The total invoices increased in all regions/countries under review, except the UK and varies between 1,35 MEUR (minimum range the Netherlands) and 2,54 MEUR (maximum range German 50 Hertz region) when we do not take the non-electro-intensive consumers into account. The German 50 Hertz region also has the highest possible bill for the non-electro-intensive consumers, 4,66 MEUR.
- In Belgium, Flanders remains the most competitive region thanks to the reductions on the all other costs. Since the E2 profile is no longer connected to the distribution grid the network cost has decreased and is now the same across all Belgian regions. However, Brussels and Wallonia are more competitive regarding non-electro-intensive consumers.
- The **commodity component** stays the same as the smaller profiles (until E-BSME), but plays a more important role as network costs and all other costs components become smaller or are susceptible to reductions/exemptions.
- Because of the decrease and uniformization of the **network cost** in Belgium this country is now in a competitive position regarding this component. Flanders was already the most competitive region regarding this component for the E1 profile. The network cost is not as important anymore regarding the overall competitivity of the regions/countries, but is still significant in Germany. The Amprion region in Germany still shows lower network costs than the other German regions.
- The **all other cost component** still plays an important role in determining the competitivity of the regions. Several regions/countries such as France, the Netherlands, Germany and Flanders support electro-intensive consumers by offering fares reductions. Not falling under these reductions will significantly increase the costs, certainly if you are not qualified as an electro-intensive consumer in Germany.

Profile E3 (Electricity)

Total invoice analysis

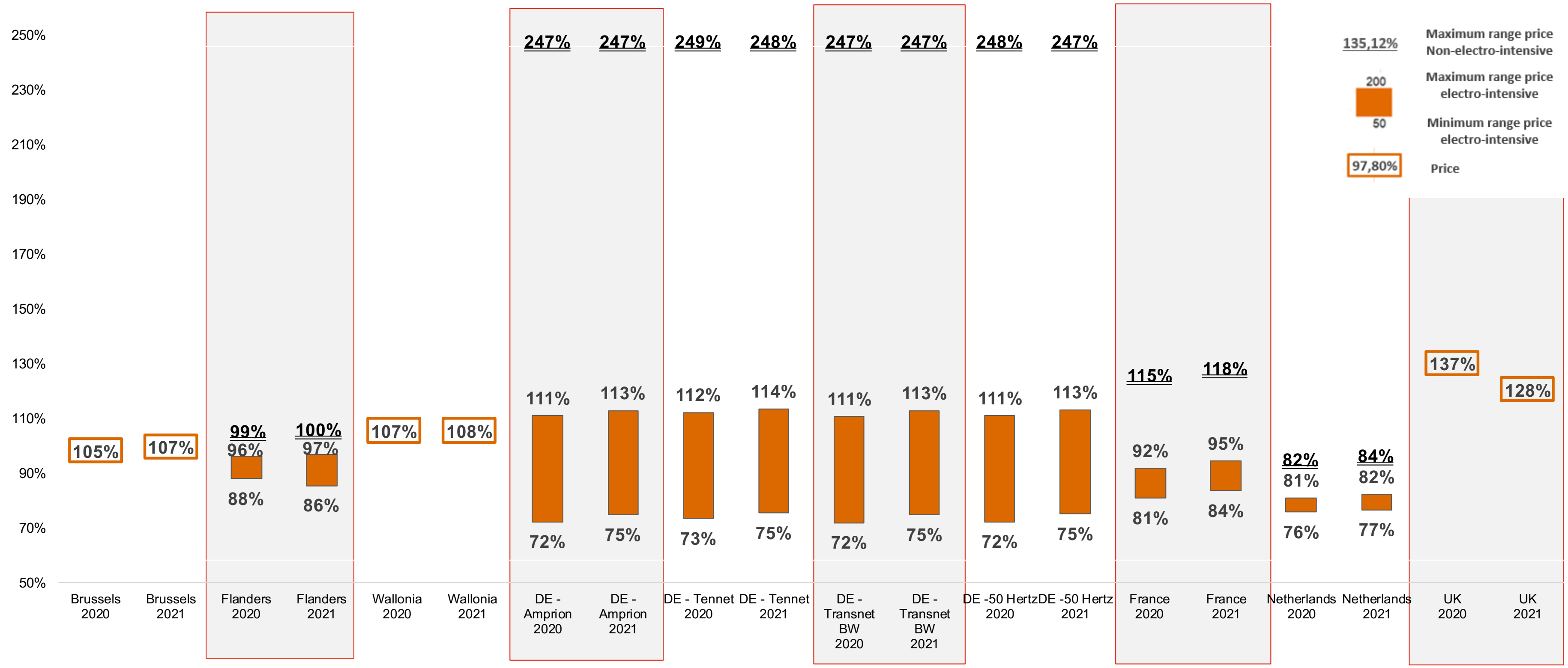
The figure below provides a comparison of the total yearly invoice paid by an industrial profile E3 in the different studied regions and countries. The results are expressed in MEUR/year. The second figure gives the Belgian average of 100% to easily compare the percentual price differences with other countries.

Figure 57 : Total yearly invoice in MEUR/year (profile E3)



Below, we compare each region and country's yearly bill with the average Belgian price, which is set at 100. The Belgian average is computed as the mean between Brussels' and Wallonia's single price as well as Flanders' minimum and maximum prices.

Figure 58 : Total yearly invoice comparison in % (profile E3; Belgium Average = 100)



The total invoice has increased in all regions/countries under review except the UK. The position of the UK has worsened again, compared to profiles E1 and E2, even though their total invoice has decreased and they will always be the most expensive country if we leave out the non-electro-intensive consumers. Furthermore, it is important to note that the positioning of the Belgian countries has changed once again. Flanders is undoubtedly the most competitive Belgian region even without taking reductions into account and Brussels is less expensive than Wallonia regarding the E3 profile. Interesting to note is that the potential total invoice of Flanders has increased, but the minimum range is lower in 2021 (5,54 vs 5,69 EUR/MWh). This is the result of the combined cap on GC and CHPC in Flanders that is applicable starting 2021. Looking at all the regions/countries only Germany, France and the Netherlands have the possibility to be the cheapest region under the right circumstances.

While the Netherlands had the potential to be the cheapest country overall for profile E2, this is no longer the case since the German regions, in particular Transnet and Amprion, now have the potential lowest total invoice (4,85 MEUR/year). Even the other two German regions are less expensive than the Netherlands. The Netherlands still has the potential to be more competitive than Germany in certain situations. The larger the consumers become the more the competitive position of the German regions improves, even though it is still the country with the highest total invoice when also taking the non-electro-intensive consumers into account (up to 16,05 MEUR). While it was not yet very clear for E2, we do see that the Netherlands' different taxation schemes for electro- and non-electro-intensive consumers has an impact.

Lastly, we observe that whatever happens only the Netherlands is always under the Belgian average, while this might still differ in other regions/countries. The German maximum electro-intensive range keeps growing closer and closer to the Belgian average. While the maximum range was still 26% above the Belgian average for E2 this is now up to maximum 14%.

Breakdown per component

The previous results are further detailed for profile E3 in the figure underneath, which provides a closer look at the breakdown of the different price components.

Figure 59 : Electricity price by component in EUR/MWh (profile E3)

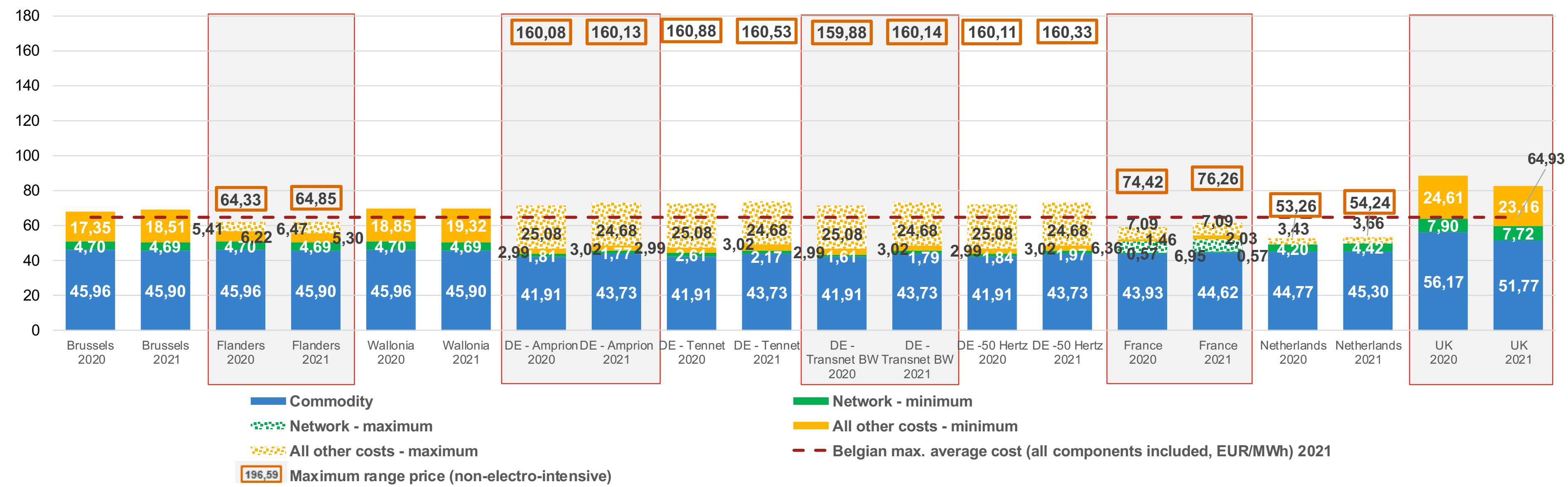
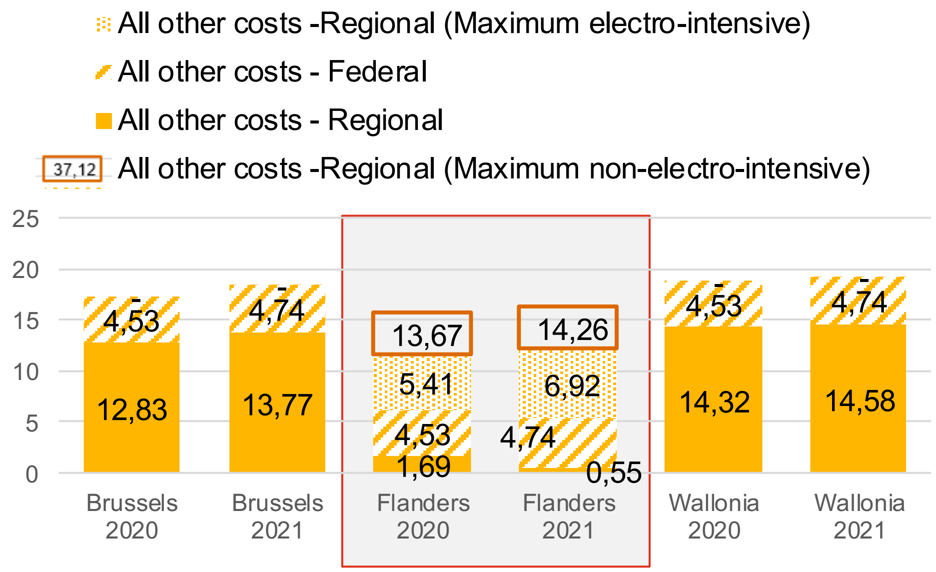


Figure 60 : Regional and Federal all other costs in Belgium in EUR/MWh (profile E3)



In comparison to previous consumer profiles, the **commodity component** of consumer E3 differs as we assume that it constantly operates (24/24, 7/7). Consequently, commodity costs slightly differ compared to previous consumption profiles but not wide enough to be depicted on the figure above, except in France (previously 46,08 EUR/MWh), but it does have an impact on consumers' final bill. Globally, a similar situation is encountered across regions/countries with the lowest cost in Germany closely followed by France. In opposite, the UK has the most expensive commodity cost (51,77 EUR/MWh).

The **network cost component** does not have a big impact on the total invoice and, as said for profile E2, these are now lower and harmonised in Belgium since they are directly connected to the transmission grid and no regional differences have to be taken into account for this profile. The UK still has the highest network cost, 7,72 EUR/MWh. The low cost of this component is due to varying reductions on transmission costs in several of the regions/countries under review, which greatly affects the countries' competitiveness. Among such countries are Germany (85% reduction), France (from 10 to 85% reduction) and the Netherlands (36% reduction).

The minimum rate of the **all other costs component**[282] becomes smaller and smaller and is only still significant in Brussels (18,51 EUR/MWh), Wallonia (19,32 EUR/MWh) and the UK (23,16 EUR/MWh). When no exemptions apply, important reductions are granted on taxes paid for consumption above 10 GWh which makes the Netherlands the country with the potentially lowest possible tax level together with France. Nonetheless, electro-intensive consumers do not see the European minimum tax level (0,50 EUR/MWh) yet applied at their consumption level since the reduction through the "Teruggaaf over energiebelasting en ODE" in the Netherlands is higher.[283]

Impact of Flanders' combined cap on profile E3

The cost of green certificates can have a big impact on the energy price of large industrial consumers. To limit these costs, Flanders introduced two caps, in 2018, on the cost of financing of renewable energies. These caps are proportional to the Gross Value Added (GVA) of the company and thus vary from company to company. In the following example, we attempt to illustrate the potential impact of these caps on industrial consumers. Previously this cap was only applicably on GC but since 2021 it is a combined cap that is applicable on GC and CHPC.

[282] This cost includes taxes, levies and certificate schemes.

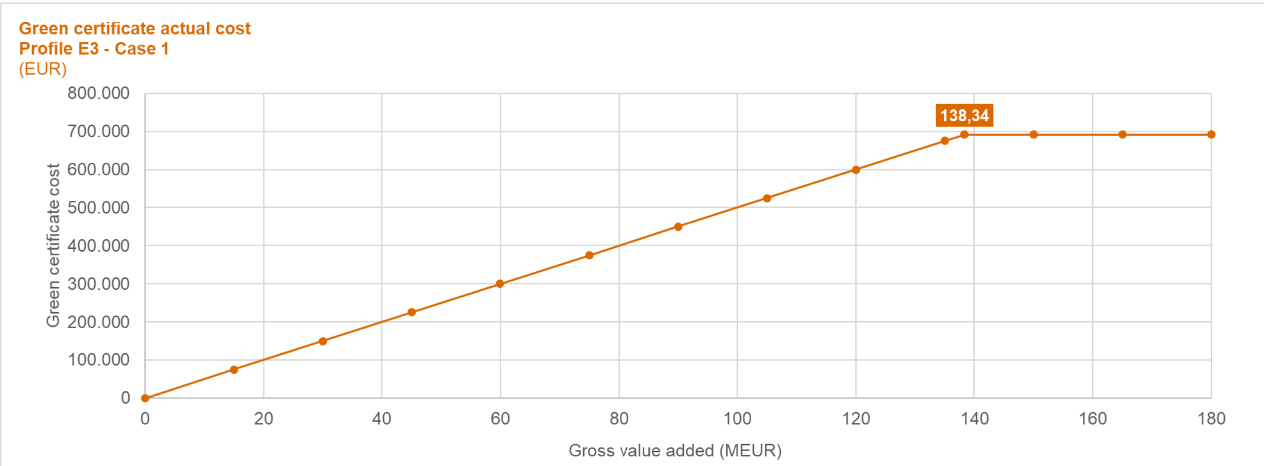
[283] In addition to the degressivity rules and limits that apply the larger profiles (E2 and higher) do not pay a part of the all other costs, namely the part billed through the DSO, which the smaller profiles do pay.

Table 124 : Flanders' cap on profile E3

	Case 1	Case 2
NACE codes[284]	Annexe 3 or 5 EEAG[285]	Annexe 3 EEAG
Electro-intensity	> 20%	No threshold
Cap (% of GVA)	0,50%	4%
Average yearly consumption (E3)	100 GWh	
Scheme cost (without cap)	691.720,49	
Maximum gross value added to benefit from the cap	138,34 MEUR	17,29 MEUR

Considering only Profile E3 companies with NACE codes from Annexe 3 or 5 from the EEAG and with an electro-intensity above 20% (case 1), a company benefits from the application of the cap as long as its gross value added is less than 138.344.098 EUR.

Figure 61 : CHPC and GC actual cost for profile E3 (Case 1)

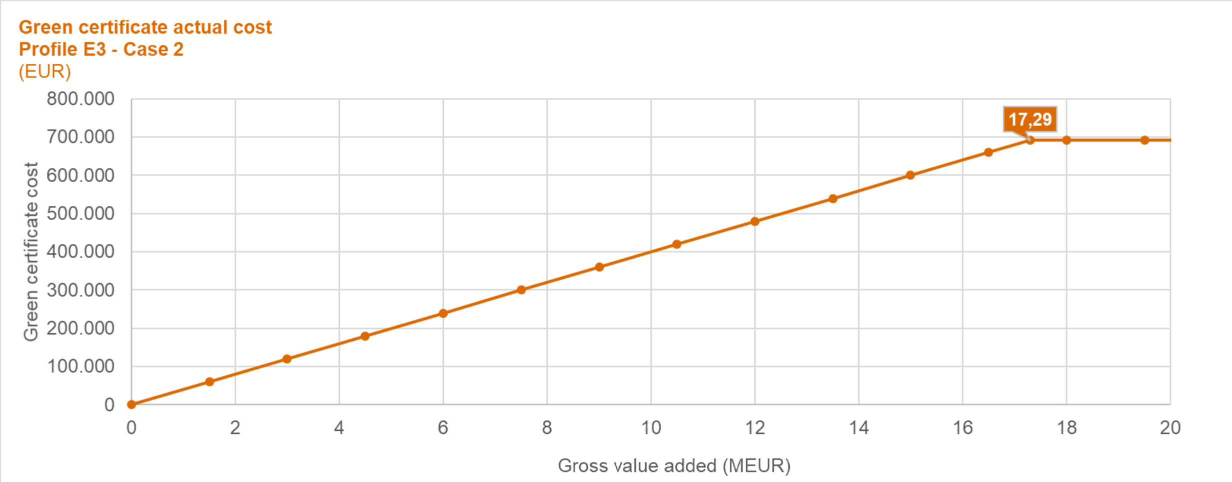


Considering only Profile E3 companies with NACE codes from Annexe 3 from the EEAG (case 2), a company benefits from the application of the cap as long as its gross value added is less than 17.293.012 EUR.

[284] The companies listed in Annexe 3 and 5 of EEAG correspond to the companies listed in the Energiedecreet with the exception of Nace 3832 (Recycling of waste) which is listed in Annexe 3 EEAG but not in the Energiedecreet.

[285] (European Commission, 2014-2020)

Figure 62 : CHPC and GC actual cost for profile E3 (Case 2)



KEY FINDINGS

The analysis of the E3 profile leads us to the following findings:

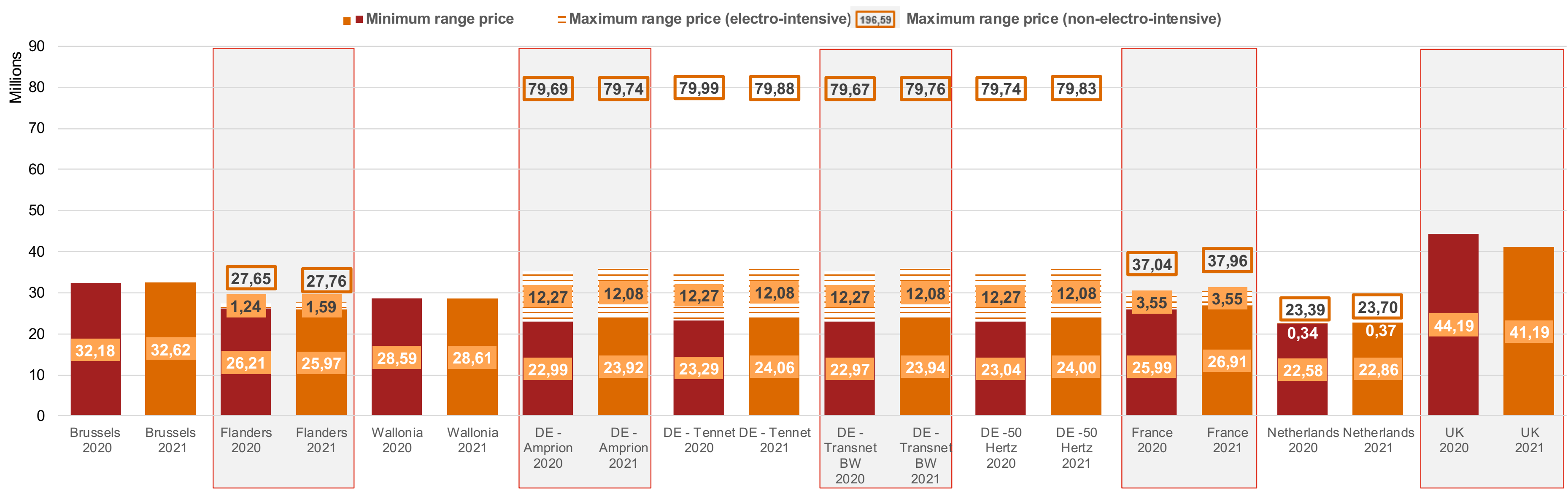
- The total invoice ranges from 4,85 (min. range Amprion and Transnet) to 8,27 MEUR/year (UK) when comparing electro-intensive consumers, while it can go up twice as high, to 16,05 MEUR/year for non-electro-intensive consumers.
- In Belgium, we observe that Flanders will always be the most competitive region even for non-electro intensive consumers which is different from last year where this was more nuanced. While the total invoice has increased the minimum total invoice has decreased compared to 2020 because of the combined cap on GC and CHPC. The difference between Brussels and Wallonia is small (0,08 MEUR/year), but in favour of Brussels.
- The **commodity cost** is different for this profile than E2 because we estimate the consumer to consume 24/7, but we still see the lowest cost in Germany. This component makes up the majority of the invoice with the exception of the total invoice of the non-electro-intensive consumers in Germany.
- The **network cost** is a small component in the total invoice which is even more true since countries such as Germany, France and the Netherlands. The reductions on transmission costs are based either on electro-intensity or consumption criteria. Consecutively, the comparison of network costs within countries is seriously impacted, given the high range of possible reductions. Ultimately, France (considering minimum price option) turns out to be the most competitive country as a result of these reductions (0,57 EUR/MWh)
- Lastly the **all other costs component** is the highest in the UK (23,16 EUR/MWh), followed by Wallonia and Brussels. The other regions/countries consider reduction and even exemption schemes for certain types of consumers. Falling under one of these reduction schemes can have a big impact, namely a reduction up to 24,68 EUR/MWh (Germany).

Profile E4 (Electricity)

Total invoice analysis

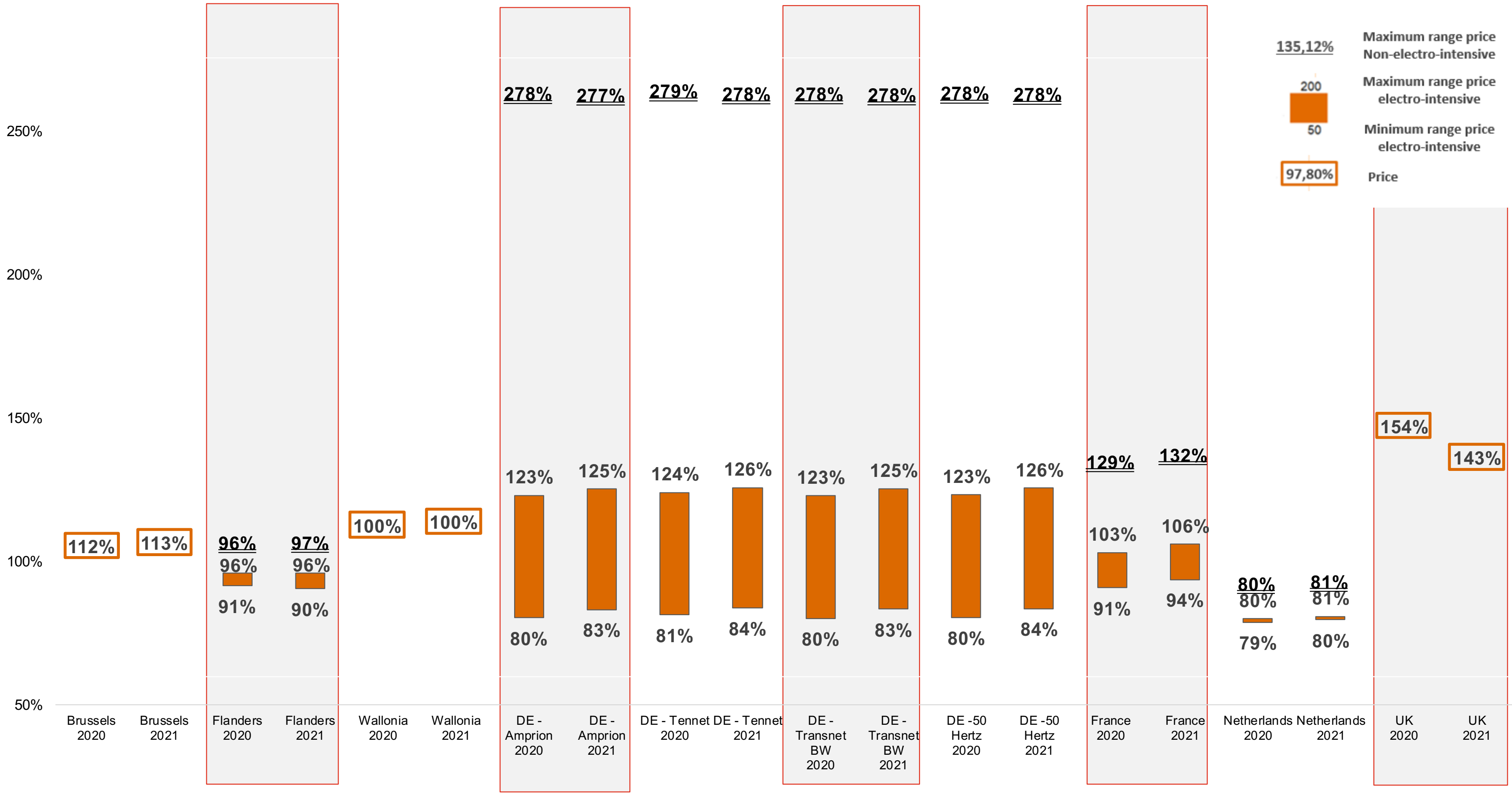
The figure below provides a comparison of the total yearly invoice paid by an industrial profile E4 in the different studied regions/countries. The results are expressed in MEUR/year. The second figure gives the Belgian average of 100% to easily compare the percentual price differences with other countries.

Figure 63 : Total yearly invoice in MEUR/year (profile E4)



Below, we compare each region and country's yearly bill with the average Belgian price, which is set at 100. The Belgian average is computed as the mean between Brussels' and Wallonia's single price as well as Flanders' minimum and maximum prices.

Figure 64 : Total yearly invoice comparison in % (profile E4; Belgium Average 2021 = 100)



The total invoice has increased in 9 out of the 10 reviewed regions/countries and the total invoice ranges from 22,86 (minimum range the Netherlands) to 41,19 MEUR (UK) for electro-intensive consumers. For non-electro-intensive consumers, the price can be up to 79,88 EUR/MWh which is almost twice as high as the electro-intensive consumers' maximum. While the Netherlands position had deteriorated for the E3 profile, compared to E1 and E2, they are now again the country that can offer the lowest possible total invoice. Similar to E3 Flanders potential maximum has increased, while the potential minimum has decreased because of the combined cap for GC and CHPC.

While there are a lot of ranges to take into account it is quite clear that Flanders is the most competitive Belgian region even if we take the maximum range for non-electro-intensive consumers into account (27,76 MEUR/year), followed by Wallonia (28,61 MEUR) and Brussels (32,62 MEUR).

While there is some competition regarding which region/country will be the 2nd most competitive region it is clear that the Netherlands is the most competitive country for the E4 profile, since no other region/country can go under their maximum range of 23,70 MEUR. With the exception of the UK, Brussels and Wallonia all regions/countries can be the 2nd most competitive region depending on the requirements of the reductions in each region/country.

With regards to the presumably lower competitiveness of Germany, for electricity costs, one should evaluate the situation carefully. The existing variance comes as a result of the relative size of power costs in the consumer's gross value added. When the average annual electricity cost over the last three years represents less than 14% of the gross value added of an industrial consumer, the consumer inevitably pays the maximum rate, thereby lowering its competitiveness. While we expect only a limited number of consumers under this profile to qualify as non-electro-intensive, it is worthwhile to mention that Belgium is the second most competitive country (after the Netherlands) for these consumers. We also note that the German competitive position (compared to Belgium average) has deteriorated for E4. The minimum and maximum rate where respectively around 75% and 113% for E3 while this is more around 83% and 126% for E4. This is surprising since the position of Germany had been increasing since E1.

Breakdown per component

The previous results are further detailed for profile E4 in the figure below, which provides a closer look at the breakdown of the different price components.

Figure 65 : Electricity price by component in EUR/MWh (profile E4)

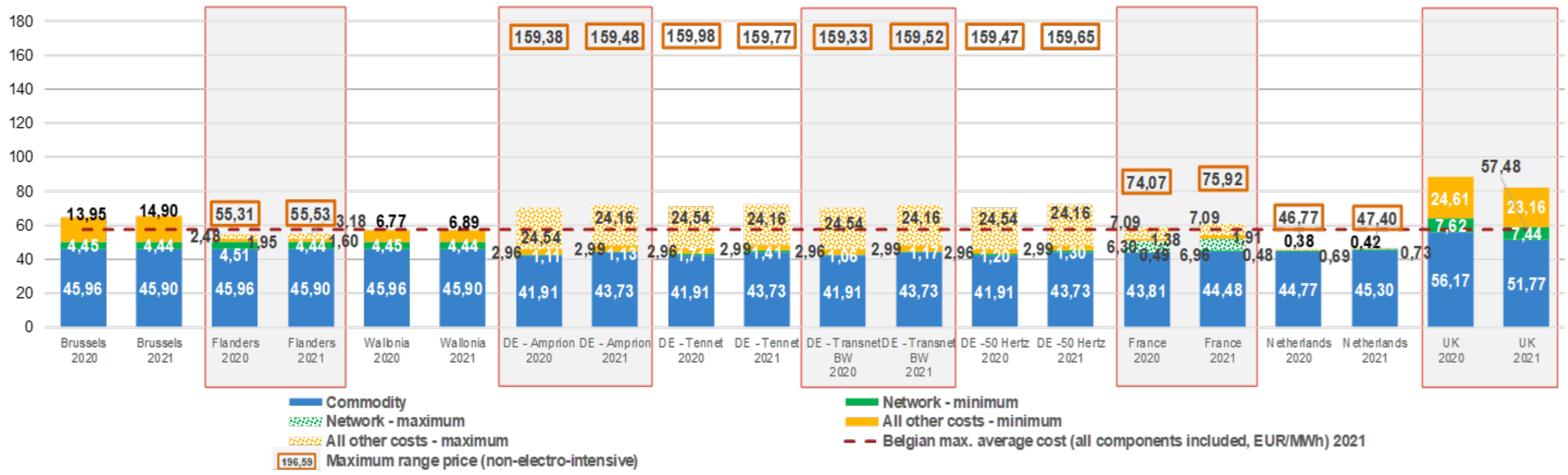
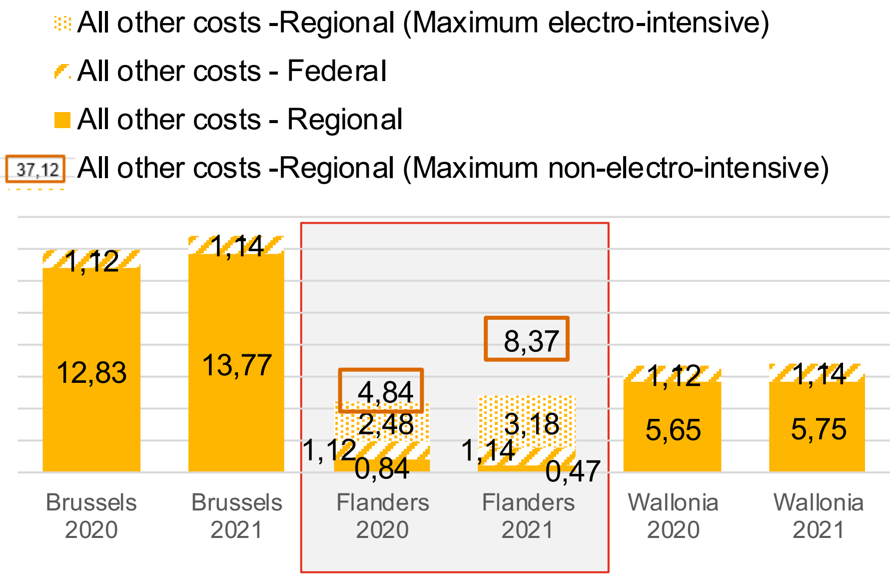


Figure 66 : Regional and Federal all other costs in Belgium in EUR/MWh (profile E4)



Again, **commodity costs** are identical to costs displayed for E3. Therefore, an identical situation is observed across all the regions/countries. The lowest cost is found in Germany closely followed by France. Conversely, the UK comes as an outlier with 51,77 EUR/MWh. The commodity cost is the biggest component in the total invoice, except for the non-electro-intensive consumers in Germany.

Network costs only represent a limited proportion of the final bill. However, countries such as Germany, France (minimum price option) and the Netherlands display lower transmission costs given the fact that reductions are granted to large consumers depending on electro-intensity or consumption criteria. Germany and the Netherlands opt for a direct 90% reduction fee whereas France's reductions vary from 20% to 90%. These reductions profoundly alter the comparison of network costs in between countries, and especially in the case of Germany, which would have the highest network costs otherwise. The UK and France have the highest network cost (ca. 7,44 EUR/MWh).

While the **all other costs component**[286] can have varying importance among countries, it is again mainly dependent on the (non-)electro-intensive nature of consumers. Significant reductions are potentially granted on taxes through a refund scheme which makes the Netherlands the country with the lowest possible tax level. However, electro-intensive consumers do not see the European minimum tax level (0,50 EUR/MWh) yet applied at their consumption level since the reduction through the "Teruggaaf over energiebelasting en ODE" in the Netherlands is higher. As observed previously, Flanders, Germany and France have all three implemented policies that enable electro-intensive consumers to benefit from significant reductions, with France being potentially the most competitive amongst these three regions/countries when it comes to this component. Furthermore, we observe different policies regarding the price differences for electro- and non-electro-intensive consumers. While Germany heavily taxes their non-electro-intensive consumers, this distinction is rather moderate in France (compared to Germany) and rather small in Flanders and the Netherlands. This observation is also the case for profile E2 and E3. Lastly it is interesting to note that Wallonia has a lower tax level than Brussels, which is certainly due to quota reductions on green certificates that do not exist in Brussels. Besides, Wallonia's taxes level is similar to Flanders' in the case of non-electro-intensive consumers.[287]

Impact of Flanders' combined cap on profile E4

The cost of green certificates can have a big impact on the energy price of large industrial consumers. To limit these costs, Flanders introduced two caps, in 2018, on the cost of financing of renewable energies. These caps are in proportion to the Gross Value Added (GVA) of the company and thus vary from company to company. As

[286] This cost includes taxes, levies and certificate schemes.

[287] In addition to the degressivity rules and limits that apply the larger profiles (E2 and higher) do not pay a part of the all other costs, namely the part billed through the DSO, which the smaller profiles do pay.

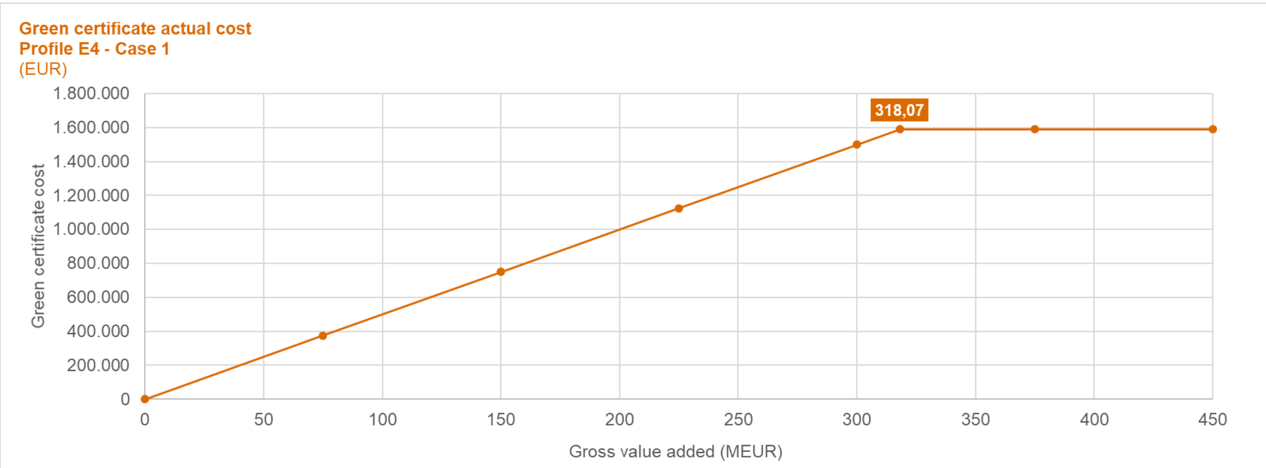
depicted more extensively in section “Impact of Flanders’ cap on profile E0”, the following exercise attempts to illustrate the potential impact of these caps on the industrial consumers.

Table 125 : Flanders’ cap on profile E4

	Case 1	Case 2
NACE codes[288]	Annexe 3 or 5 EEAG	Annexe 3 EEAG
Electro-intensity	> 20%	No threshold
Cap (% of GVA)	0,50%	4%
Average yearly consumption (E4)	500 GWh	
Scheme cost (without cap)	1.590.365,09	
Maximum gross value added to benefit from the cap	318,07 MEUR	39,76 MEUR

Considering only Profile E4 companies with NACE codes from Annexe 3 or 5 from the EEAG and with an electro-intensity above 20% (case 1), a company benefits from the application of the cap as long as its gross value added is less than 318.073.018 EUR.

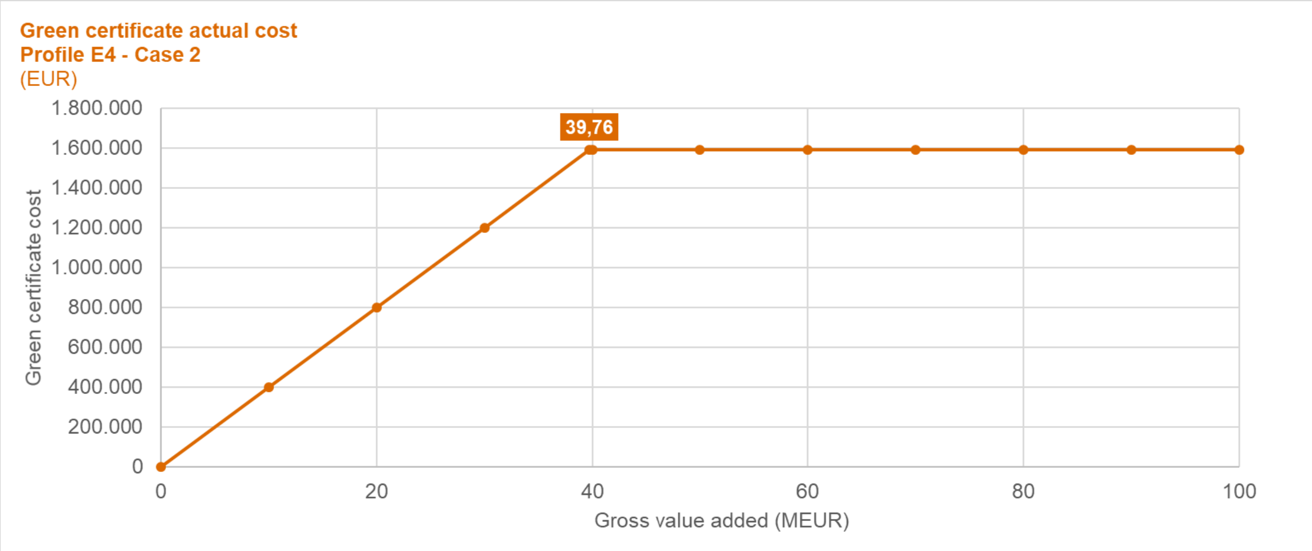
Figure 67 : CHPC and GC actual cost for profile E4 (Case 1)



Considering only Profile E4 companies with NACE codes from Annexe 3 from the EEAG (case 2), a company benefits from the application of the cap as long as its gross value added is less than 39.759.127 EUR.

288 The companies listed in Annexe 3 and 5 of EEAG correspond to the companies listed in the Energiedecreet with the exception of Nace 3832 (Recycling of waste) which is listed in Annexe 3 EEAG but not in the Energiedecreet.

Figure 68 : CHPC and GC actual cost for profile E4 (Case 2)



KEY FINDINGS

The analysis of the E4 profile leads us to the following findings:

- The total invoice ranges from 22,86 (the Netherlands) to 41,19 MEUR/year (UK) for electro-intensive consumers and up to 79,83 MEUR/year for non-electro-intensive consumers. The total invoice has increased in 9 out of the 10 regions/countries compared to 2020.
- In Belgium, Flanders is clearly the most competitive region and because of the introduction of the combined cap in 2021 they now present an even lower potential minimum total invoice.
- **Commodity costs** represent the most significant component in E4 consumers' final bill, except for non-electro-intensive consumers in Germany. While Germany has the lowest fares for the commodity component, the UK constitutes the most expensive country.
- **Network costs** are a reduced constituent of the electricity invoice. Further reductions granted on large consumers by countries such as Germany, France and the Netherlands lead to competitive disadvantages for other countries. The UK and France have the most expensive network costs (ca. 7,44 EUR/MWh).
- **All other costs** span a vast range of potential levels all very different across regions/countries. However, specific attention is brought to Flanders, Germany, France and the Netherlands where electro-intensive consumers may benefit from substantial reductions. While the latter is certainly financed by non-electro-intensive consumers who are charged higher taxes rates, countries such as the Netherlands pay attention to limited tax level variations between those different types of consumers.

Presentation of figures (Natural gas)

Profile G-RES (Natural gas)

Total invoice analysis

The figure below provides a comparison of the total yearly invoice paid by a residential profile G-RES in the different studied regions and countries. The results are expressed in EUR/year.

Figure 69 : Total annual invoice in EUR/year (profile G-RES)

Again, Belgium is split into three regions due to the existence of regional differences, but contrary to the electricity analysis we present Germany as one zone. Nevertheless, we have also taken regional differences into account for the other countries, but only one weighted average cost is presented in the table.

The figure above clearly shows that the Netherlands is still the most expensive country regarding natural gas consumption which is the opposite as the observations we made for electricity, where they were the cheapest or one of the cheaper countries. Furthermore, we observe that the residential natural gas consumers in Belgium are more competitive than the residential electricity consumers. Now Belgium is the 2^{nd} most competitive country while France and the Netherlands were more competitive for the E-RES profile.

Unlike 2020 Flanders' is no longer the most competitive region since the UK is cheaper in 2021. Overall, the prices have remained quite stable between 2020 and 2021 and the biggest change is seen in France where there is a decrease of 94 EUR/year.

Breakdown per component

The previous results are further detailed for profile G-RES in the figure underneath, which provides a closer look at the breakdown of the different price components in EUR/MWh.

Figure 70 : Natural gas price per component in EUR/MWh (profile G-RES)

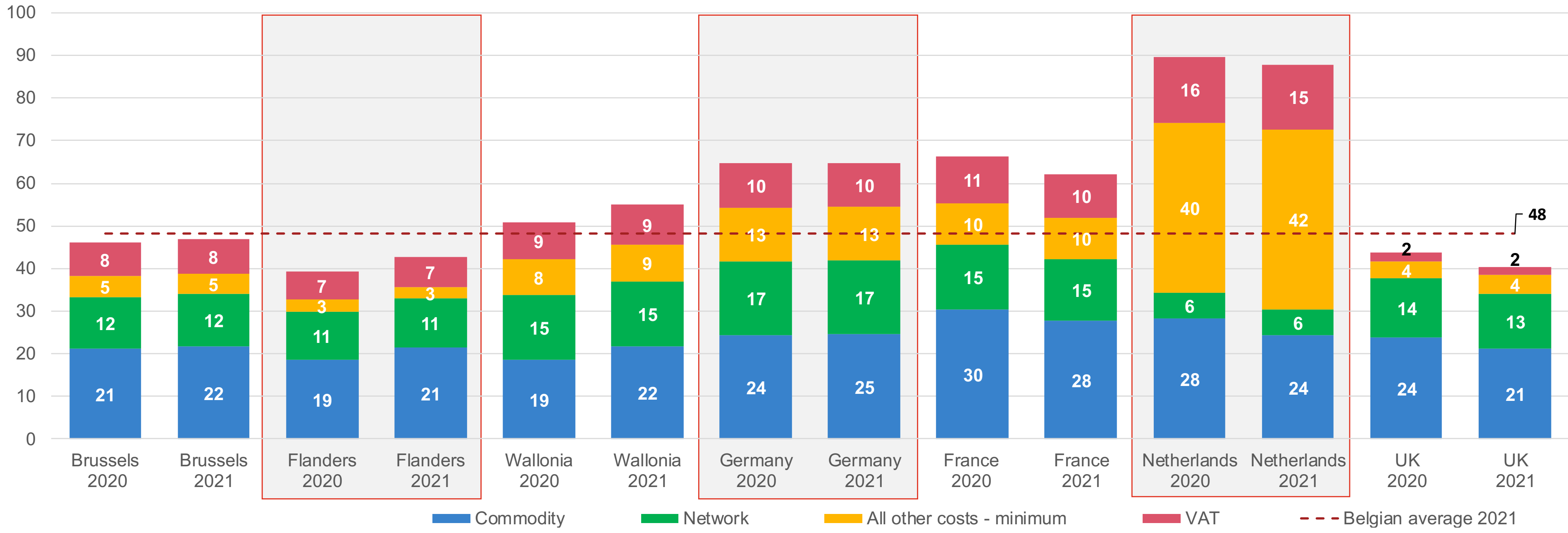
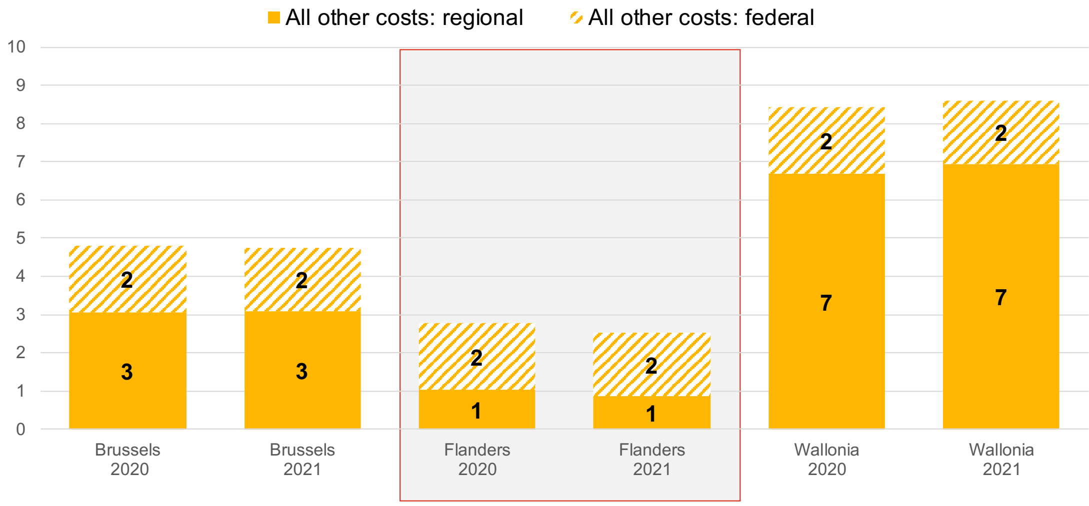


Figure 71 : Regional and Federal all other costs in Belgium in EUR/MWh (profile G-RES)



The lowest **commodity component**[289] is observed in Flanders and the UK. The commodity component has increased in Belgium and Germany, but decreased in the other countries under review.. Even though the commodity cost has decreased in France it is still the most expensive commodity cost of the regions/countries under review.

With the exception of the Netherlands the **network component** is the second most important component after commodity and Flanders is the second most competitive, after the Netherlands, regarding this component. The network cost has remained very stable between 2020 and 2021. While the Netherlands is the most expensive country for the G-RES profile it has the lowest network cost. Germany still has the biggest network cost of all the regions/countries under review. In Belgium the difference between the regions regarding this component is quite impressive. Brussels is the second cheapest region overall (12 EUR/MWh) and Wallonia is one of the average or even more expensive countries (15 EUR/MWh) regarding this specific component.

The component where we see the most fluctuation between countries is the **all other costs component**[290] and this is also the component that has the biggest impact on the competitiveness of a region/country. While the Netherlands was quite competitive regarding the 2 previous components the height of their all other costs component, in particular the energy tax, easily makes them the most expensive country under review. Furthermore, we see that the regions/countries with the lowest all other costs are also the least expensive regions/country overall, namely Flanders, UK and Brussels. This component has remained quite stable compared to 2020 and the biggest change we have observed is an increase in the Netherlands of 2 EUR/MWh. In Belgium we made the distinction between regional and federal all other costs and it is clear that the regional component makes a big difference in the competitiveness between the Belgian regions. The regional all other costs component in Wallonia (6,95 EUR/MWh) is twice as high as Brussels (3,09 EUR/MWh) which is 3 times higher than the regional all other cost of Flanders (0,87 EUR/MWh).

Lastly, we have the **VAT component** which primarily depends on the total invoice. The VAT rate lies between 19 and 21% for most regions/countries with the exception of the UK that applies a rate of 5% on natural gas. It is thus no surprise that the VAT is the lowest in the UK, because of the rate, and the highest in the Netherland, because of the high total invoice. Furthermore, we note that France also uses a 5% VAT-rate but only on the consumer's subscription and CTA[291].

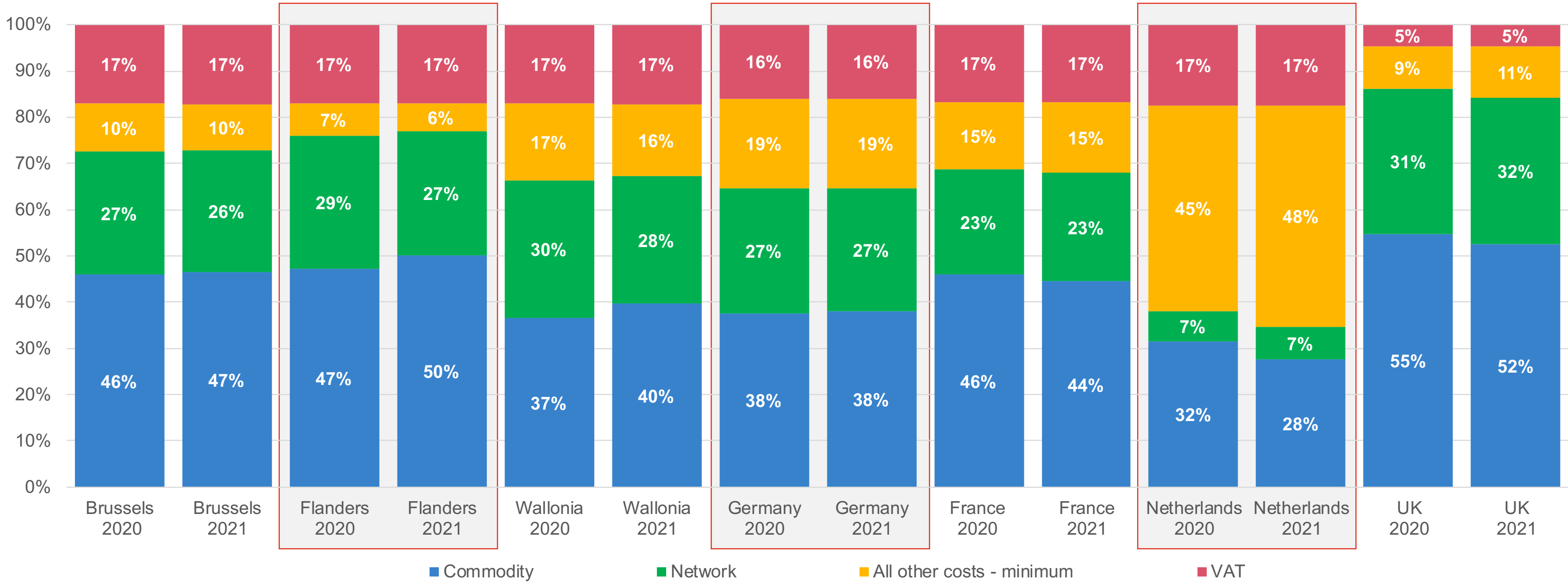
[289] While this methodology to estimate commodity costs provides a fair view of the market situation in the respective countries and regions, one must be aware that it does not provide a full overview of the market prices as only three to five products were considered.

[290] This cost includes taxes, levies and certificate schemes.

[291] Contribution tarifaire d'acheminement

Proportional component analysis

Figure 72 : Proportional component analysis (profile G-RES)



With the exception of the Netherlands the **commodity component** is the most important component in all the regions/countries. The weight of the commodity component lies between 28 and 52% in 2021.

Furthermore, we see that the **network cost component** is equally important across all regions/countries with the exception of the Netherlands, namely between 23 and 32%. We also observe that the importance of the network cost is quite similar to 2020 and that there are no noteworthy changes.

We do see that the importance of the **all other costs component** differs between regions/countries, but the weight of this component is quite even between the three cheapest regions/countries, namely between 6 and 11%. The Netherlands is clearly an outlier regarding this component since it makes out almost half of the total invoice.

The weight of the **VAT** component is very similar through all the countries with the exception of the UK because they use a reduced rate of 5%.

KEY FINDINGS

The results reported above suggest the ensuing key findings regarding profile G-RES:

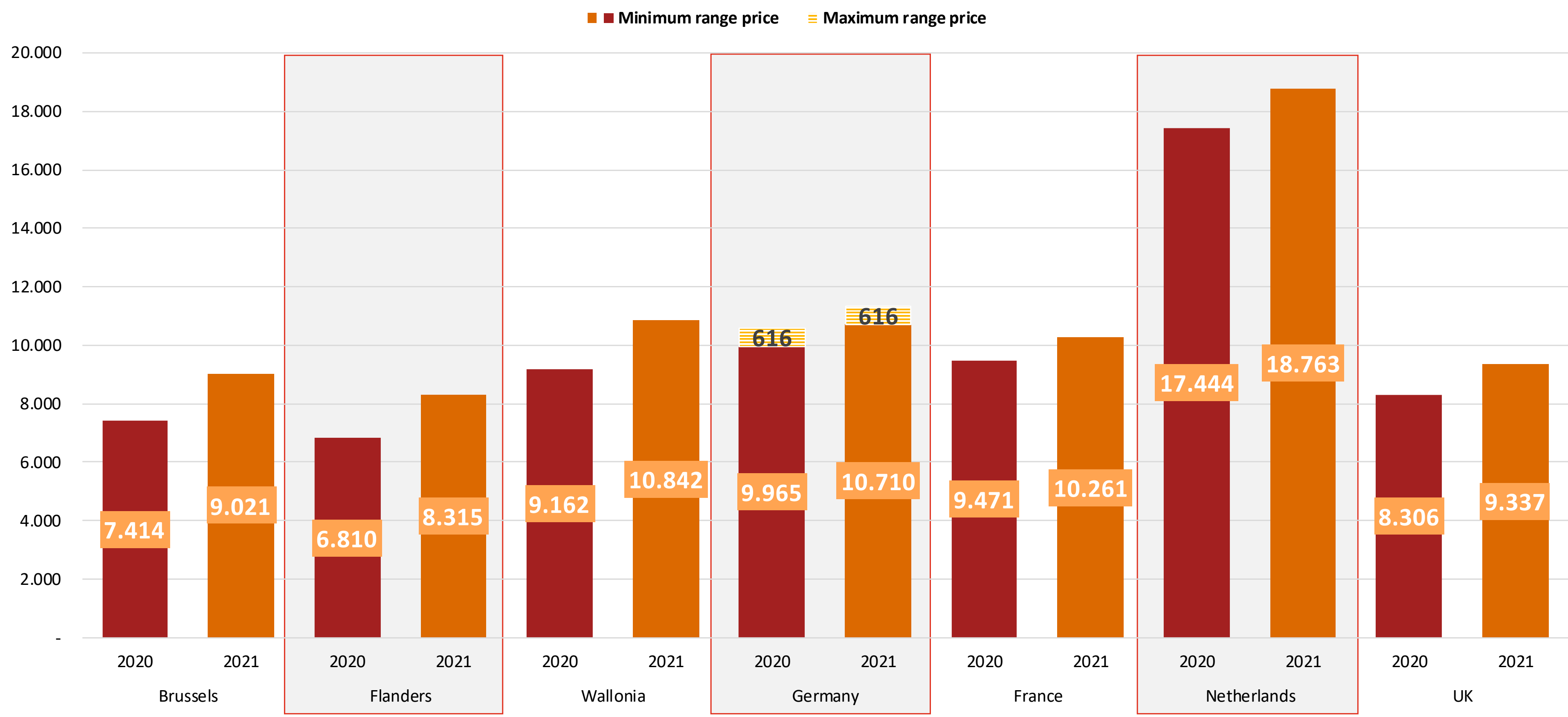
- The UK has taken the podium as the cheapest country for the G-RES profile and this is mainly due to the increase of the commodity cost in Flanders and decrease in the UK. Brussels, Flanders and the UK differentiate themselves from the other regions/countries regarding all other costs and VAT.
- Flanders is the cheapest Belgian region, because the regional all other costs component is (much) higher in the other two Belgian regions.
- The **commodity component** makes up the biggest part of the total invoice of all countries except the Netherlands. In the cheapest region (Flanders) or country (UK) it even makes up 50% or more of the total invoice. Overall, France has the highest commodity component.
- The **network cost component** is equally important in most regions/countries, with the exception of the Netherlands, and makes up between 23 and 32% of the total invoice of the regions/countries under review. However, this component is almost negligible in the Netherlands
- Lastly, the **all other cost component** plays a key role in determining the competitivity of a region/country regarding the G-RES profile. The low network cost in the Netherlands is largely compensated by a high all other costs component. Furthermore, the cheapest region (Flanders) and cheapest country (UK) also have the lowest all other costs component.
- Looking at Belgium, we see that the regional all other costs component greatly impacts the position of the regions.
- Comparing 2020 and 2021 we see that the total invoice has remained quite stable with the biggest change being a decrease of 94 EUR/year in France.

Profile G-PRO (Natural gas)

Total invoice analysis

The figure below provides a comparison of the total yearly invoice paid by a professional profile G-PRO in the different studied regions/countries.

Figure 73 : Total annual invoice in EUR/year (profile G-PRO)



The annual invoice has increased for all regions/countries under review and the overall ranking has thus not changed compared to 2020 and is similar to the G-RES profile. For the G-PRO profile Flanders is still the cheapest region, followed by Brussels and the UK. The annual invoice has increased by 745 (Germany) to 1.680 (Wallonia) EUR/year compared to 2020.

We also observe that Germany now has a price range which is the result of a possible reduction on the *Energiesteuer*. Depending on the application of the reduction Germany is more or less expensive than Wallonia while its position compared to the other regions/countries stays the same.

As it was the case for the G-RES profile the Netherlands is still an outlier because of the all other costs component, in particular the energy tax, which will also become more apparent in the figure below detailing the different components. Furthermore, we also see that there are clearly some regional differences in Belgium, with Wallonia being the most expensive region in Belgium, but also the second-most expensive (or third depending on the reduction in Germany) region overall.

Breakdown per component

The previous results are further detailed for profile G-PRO in the figure underneath, which provides a closer look at the breakdown of the different price components.

Figure 74 : Natural gas price per component in EUR/MWh (profile G-PRO)

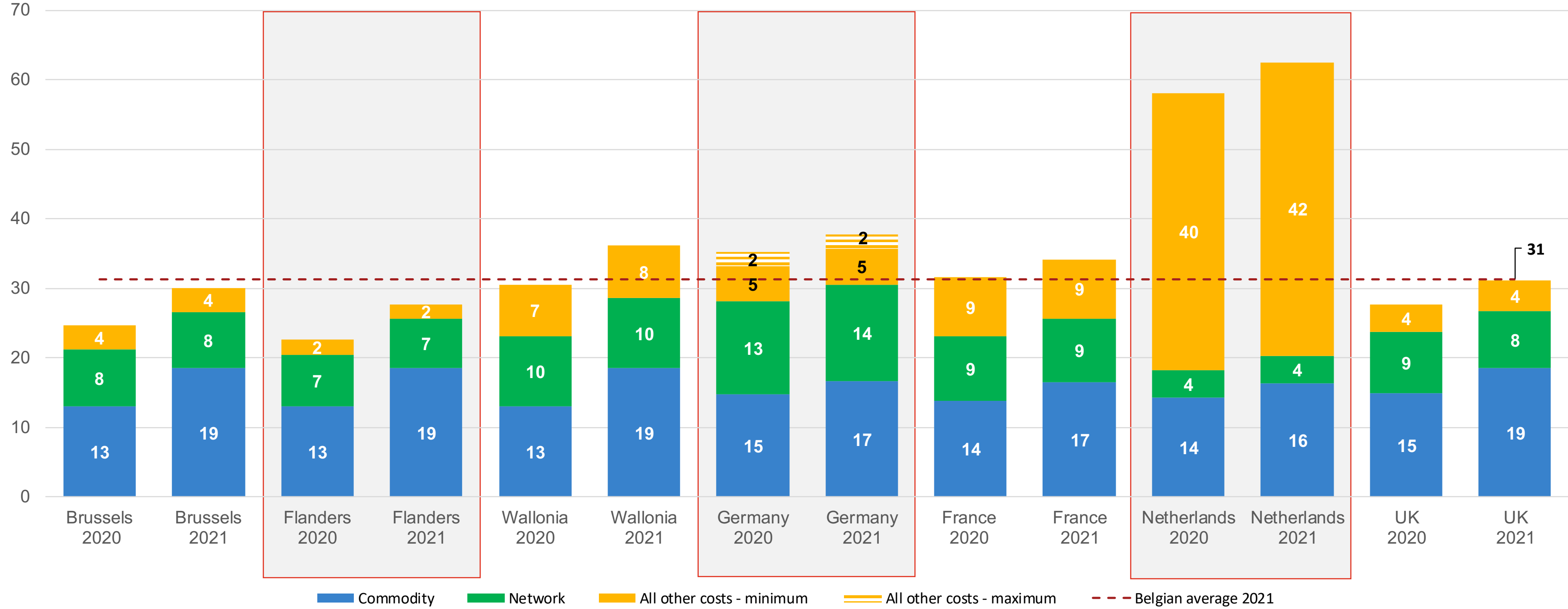
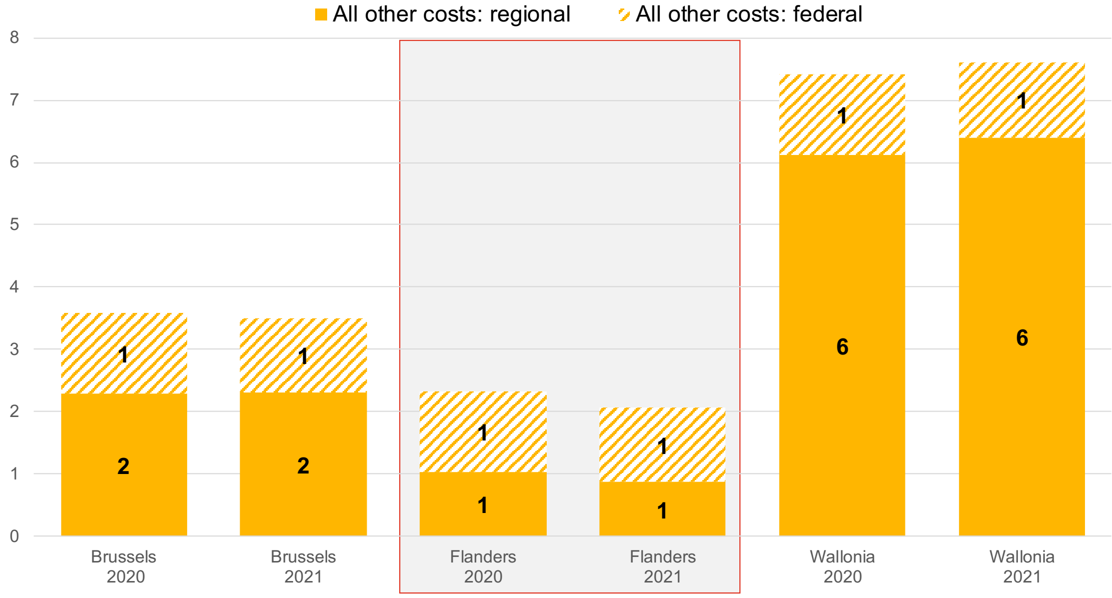


Figure 75 : Regional and Federal all other costs in Belgium in EUR/MWh (profile G-PRO)



The first component we will analyse is the **commodity component**[292] which has been computed according to the market price and not through comparison websites which is why the commodity cost does not alter between the Belgian regions for the G-PRO profile and onwards. Previous year the Belgian regions had the lowest commodity component, but there has been a large increase (6 EUR/MWh) and now the Netherlands has the lowest commodity cost even though it has the highest total invoice. Germany and France are a close second and third regarding the commodity component. The UK has the highest commodity cost, but the difference with the Belgian regions is so small that it is not distinguishable in the figure above.

There are a few observations that can be made regarding the **network cost component**. Firstly, this component is the smallest in the Netherlands and is also Netherlands' smallest component overall. Secondly, there is a noticeable difference between the network cost of the Belgian regions. The most expensive network cost (Wallonia) is 3 EUR/MWh higher than the cheapest network cost (Flanders). Lastly, Germany's network cost is the highest of all regions/countries under review and plays a major role in Germany being one of the less competitive regions/countries.

Lastly, we have the **all other costs component**[293] which is one of the components that has the most effect on the overall position of the region/country with the exception of Germany where the network cost plays a big role. The regions/countries, in order, that have the lowest all other costs are Flanders, Brussels and the UK. Since the difference between Wallonia and the UK is less than 1 EUR/MWh it is not apparent in the figure above. This component is high in the Netherlands and average across Wallonia, Germany and France. We do not see any big increases for this component compared to last year. Two additional observations have to be made regarding the Belgian regions and Germany. First Germany, the range on the *Energiesteur* has not changed between 2020 and 2021 because the taxes and the reductions have stayed the same. Even taking the reduction into account it is one of the more expensive regions for G-PRO profiles. Secondly Belgium, we have made a distinction between the regional and federal all other costs and we see that the regional cost in Wallonia is much higher (6,40 €/MWh) than in Flanders (0,87 EUR/MWh) and Brussels (2,31 EUR/MWh) which is mainly because of the regional PSO.

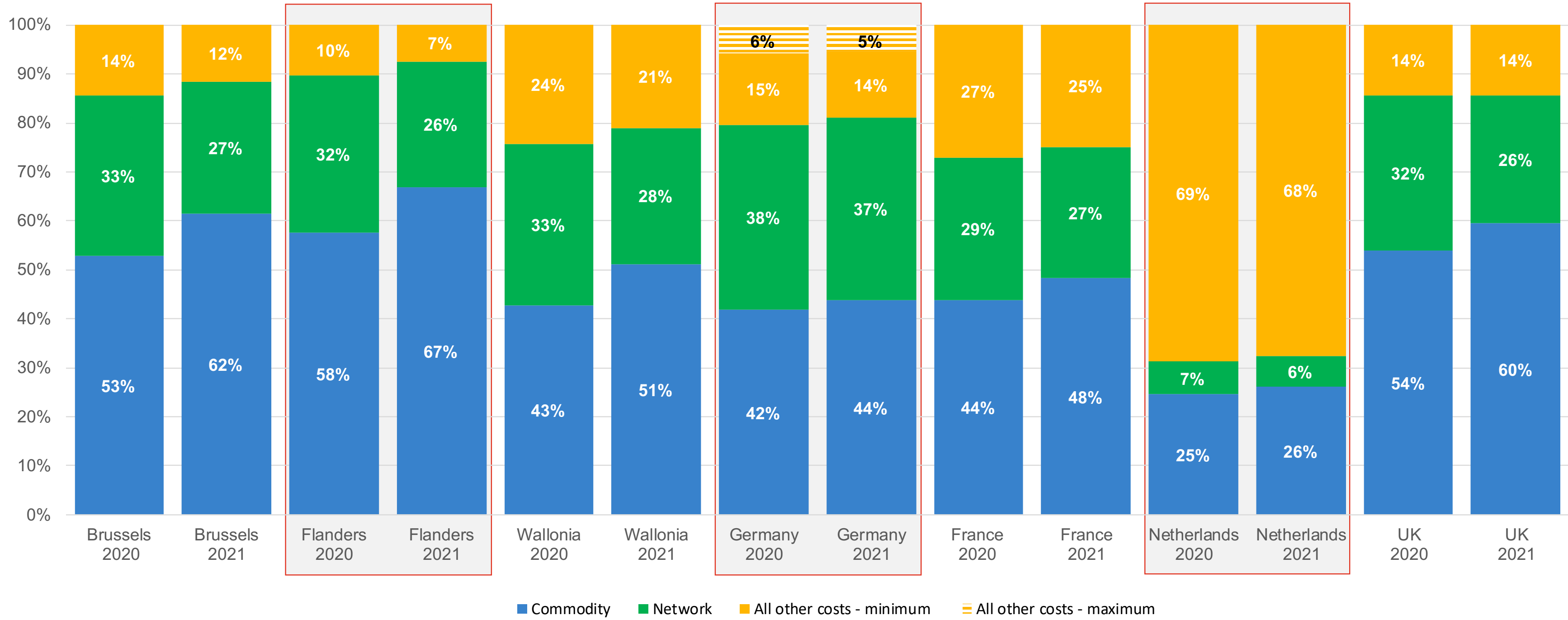
[292] The large increase of the commodity component in Belgium compared to 2020 is the result of the adapted methodology that takes the natural gas price of January which is inconsistent with the yearly average. The methodology behind the natural gas commodity price will be updated next year as detailed in Chapter 5: Large industrial consumers (p.190).

[293] This cost includes taxes, levies and certificate schemes.

Proportional component analysis

The percentages of the costs for each component can be found in the underneath figure.

Figure 76 : Proportional component analysis (profile G-PRO)



The figure above clearly shows that the commodity is the dominant component in all regions/countries except the Netherlands. It makes up more than 50% of the total invoice in 4 of the 7 observed regions/countries and even up to 67% in Flanders. Because of an overall increase of the commodity component compared to last year it further solidifies its position as the prime component of the total invoice.

The weight of the network cost and all other costs component have both decreased as a result of the increase of the commodity component. The network costs are more important in Germany than in any other region/country while the all other costs component makes up 68% of the total invoice in the Netherlands. In Belgium we see that the weight of the all other costs makes up 1/5 of the invoice in Wallonia while this is more around 10% or less in Brussels and Flanders, highlighting again the regional differences.

KEY FINDINGS

The results reported above suggest the ensuing key findings regarding profile G-PRO:

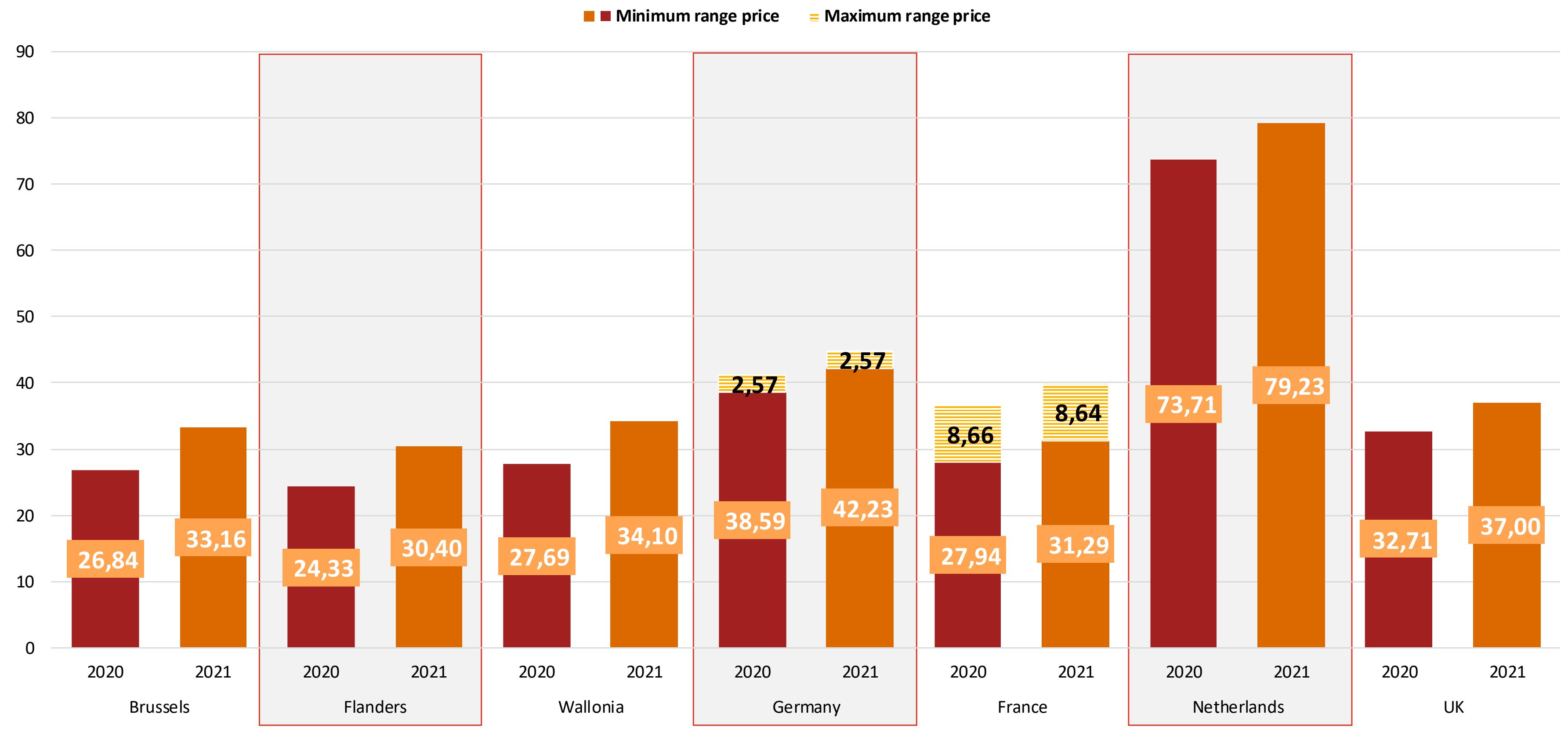
- The Netherlands is the most expensive country under review and is thus the least competitive regarding the G-PRO profile. This is mainly due to the very high all other costs component. On the other hand, Flanders is the least expensive region and they have thus reclaimed the position that they lost to the UK for the G-RES profile.
- The **commodity component** is clearly the most important component, except in the Netherlands, regarding the total invoice. It makes up more than 50% of the total invoice in Brussels, Flanders, Wallonia and the UK.
- The **network cost component** is quite similar across all the regions/countries, with the exception of the Netherlands, and the importance of this component also is quite similar to the G-RES profile. They make up 26 to 37% of the total invoice.
- Lastly, we have the **all other costs component** which has a big impact on the positioning of the regions/countries, whether we look at all regions/countries or in Belgium. From an overall perspective we see that this is the main component due to which Flanders is the most competitive and not the UK regarding this profile. Furthermore, we also see that whether a reduction on this component applies in Germany or not will also have an impact on the competitive position of the country.
- Similar to the G-RES profile we see that the regional all other costs are the major factor that determines the competitivity between Belgian regions. While Wallonia and Brussels would still be more expensive than Flanders if they had the same all other costs the difference would be smaller, certainly for Wallonia.
- The total invoice has seen a significant increase in all regions/countries compared to last year and it seems that the commodity component plays a major role in the increase.

Profile G0 (Natural gas)

Total invoice analysis

The figure below provides a comparison of the total yearly invoice paid by an industrial G0 profile in the different studied regions and countries. The results are expressed in kEUR/year.

Figure 77 : Total yearly invoice in kEUR/year for industrial consumers (profile G0)



The prices in the Belgian regions have increased more than in the other countries when comparing 2020 and 2021 and this is mainly due to the higher commodity cost as the below figure with the breakdown by component will clearly show. We do see that the total invoice has increased in all the regions/countries under review. Furthermore, Germany is not the only region/country with a price range anymore since we take the possibility of a reduction of the TICGN in France starting the G0 profile.

The overall positioning of the regions/countries is quite stable when comparing G-RES and G-PRO, but we are starting to see an evolution. Similar to G-PRO, Flanders is still the cheapest country for the G0 profile, but the second cheapest is no longer Wallonia and the UK but France if the reduction applies. If the reduction does not apply, Belgium is the cheapest country, even on the regional level. Wallonia used to be one of the more expensive regions, but is now in third or fourth place depending on France. The Netherlands is still largely behind the other regions/countries.

Figure 78 : Total yearly invoice comparison in % (profile G0; Belgium average = 100)

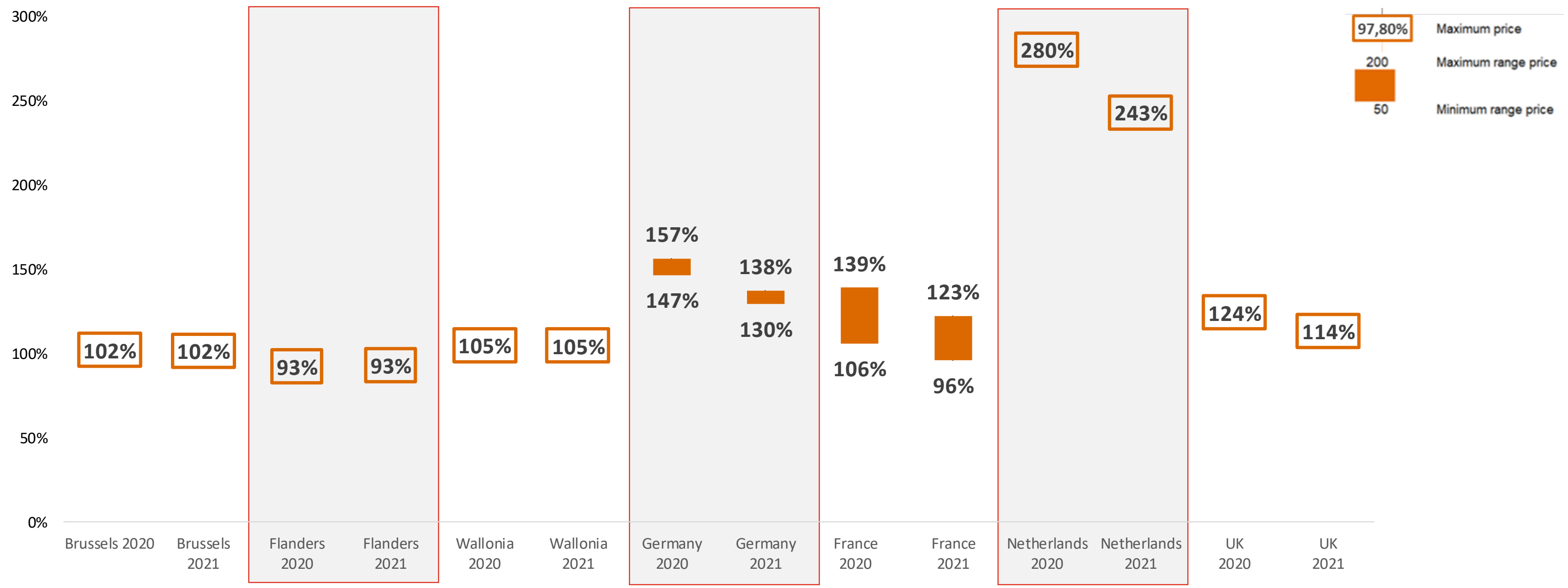


Figure 78 takes the Belgian average and positions the other regions/countries against this average to see if they are above or below or both if there is a range to consider. The figure shows the result from 2020 and 2021 and we have thus taken the Belgian average of their respective year into account. This figure gives a good idea of the competitivity of a region/country compared to Belgium. Overall, we see that the competitiveness of our neighbouring regions/countries has increased compared to Belgium since the percentual difference between the total invoice of the neighbouring country has dropped compared to last year. While France was still more expensive than Belgium as a whole in 2020 this is no longer the case in 2021. Even though the Netherlands is by far the least competitive country under review their total invoice is went from 180% to 143% above the Belgian average. Most countries are still above the Belgian average by 14 to 38% if we do not take the Netherlands into account.

Breakdown by component

The previous results are further detailed for profile G0 in the figure underneath, which provides a closer look at the breakdown of the different price components.

Figure 79 : Natural gas price by component in EUR/MWh (profile G0)

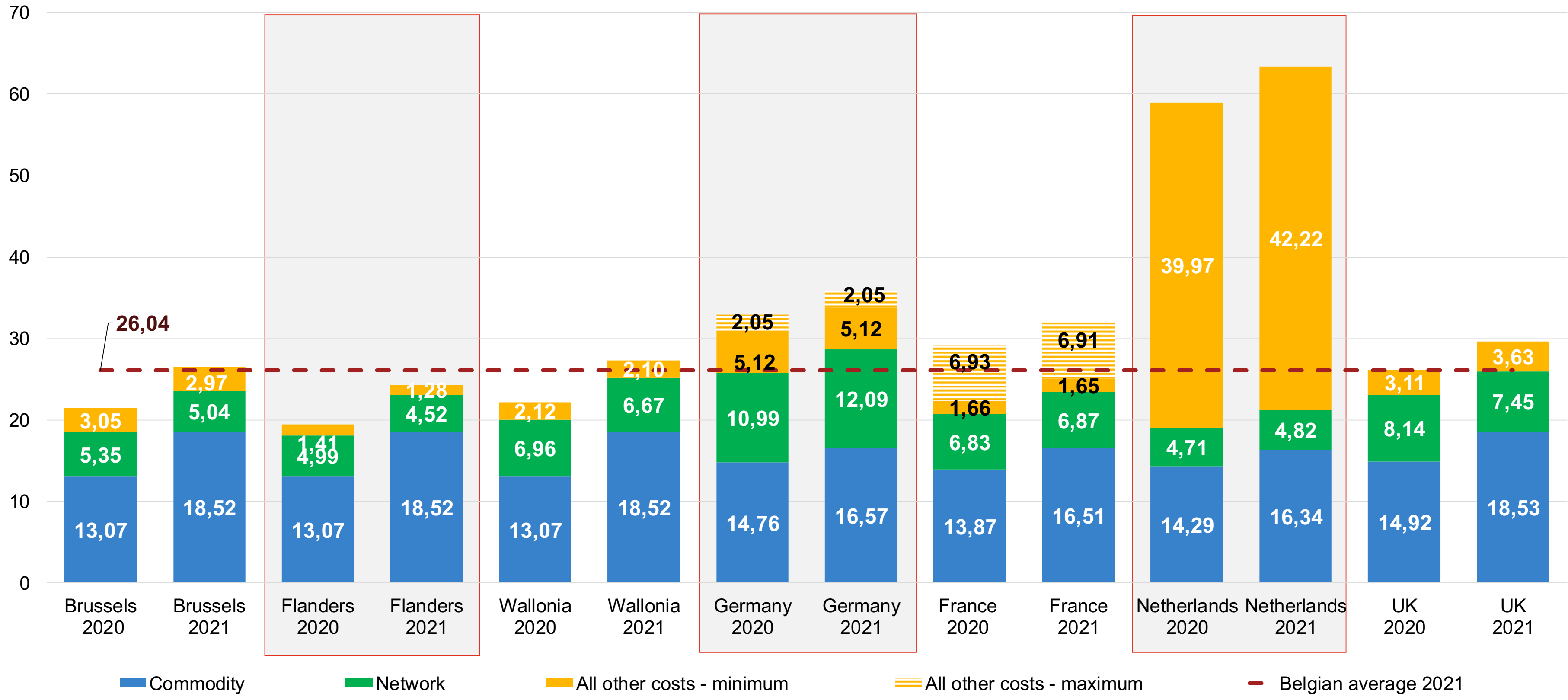
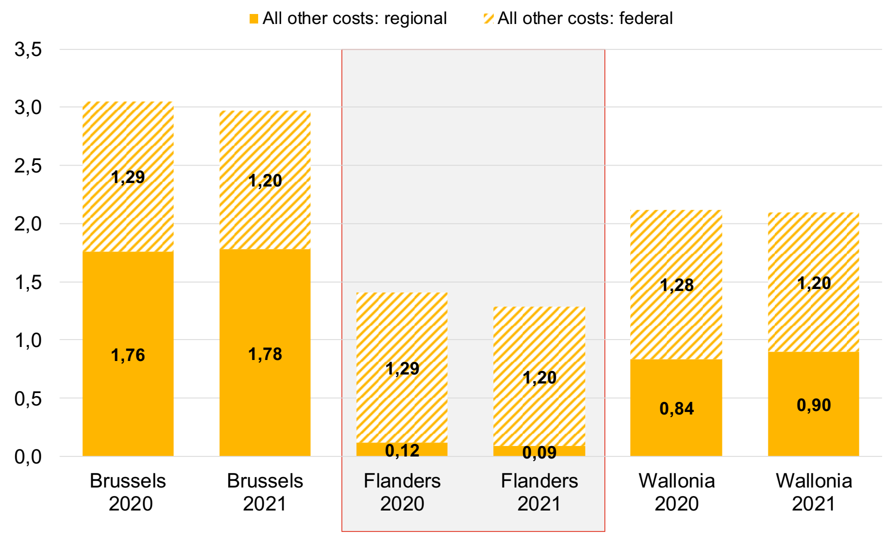


Figure 80 : Regional and Federal all other costs in Belgium in EUR/MWh (profile G0)



Since the **commodity cost**[294] is based on the market price and this is the same for all the bigger consumer profiles (G-PRO - G2) the price per MWh will remain the same. Nevertheless, the importance of this component in the total invoice bill will change because of cheaper network costs and/or reductions. The commodity component is a critical component and with the exception of the Netherlands makes up around 50% of the total energy bill.

The **network costs** are still an important component but has decreased in 3 out of the 7 regions/countries compared to 2020. We still see a strong fluctuation in the network cost across regions/countries going from 4,52 (Flanders) to 12,09 EUR/MWh (Germany).

Lastly, the **all other costs component's**[295] importance, compared to the G-PRO profile, stays the same in EUR/MWh in the Netherlands and Germany, but decreases in all other regions/countries. While both Germany and France have a price range falling under the reduction scheme is much more beneficial in France. The competitive position of Germany compared to other regions/countries will not change whether the reduction is applied or not, but it can have a big impact on the competitive position of France. In Belgium we observe that the regional factor in EUR/MWh becomes less important when comparing it to smaller consumer profiles.

[294] The large increase of the commodity component in Belgium compared to 2020 is the result of the adapted methodology that takes the natural gas price of January which is inconsistent with the yearly average. The methodology behind the natural gas commodity price will be updated next year as detailed in Chapter 5: Large industrial consumers (p.190).

[295] This cost includes taxes, levies and certificate schemes.

KEY FINDINGS

The first industrial natural gas profile (G0) analysis leads to the following findings:

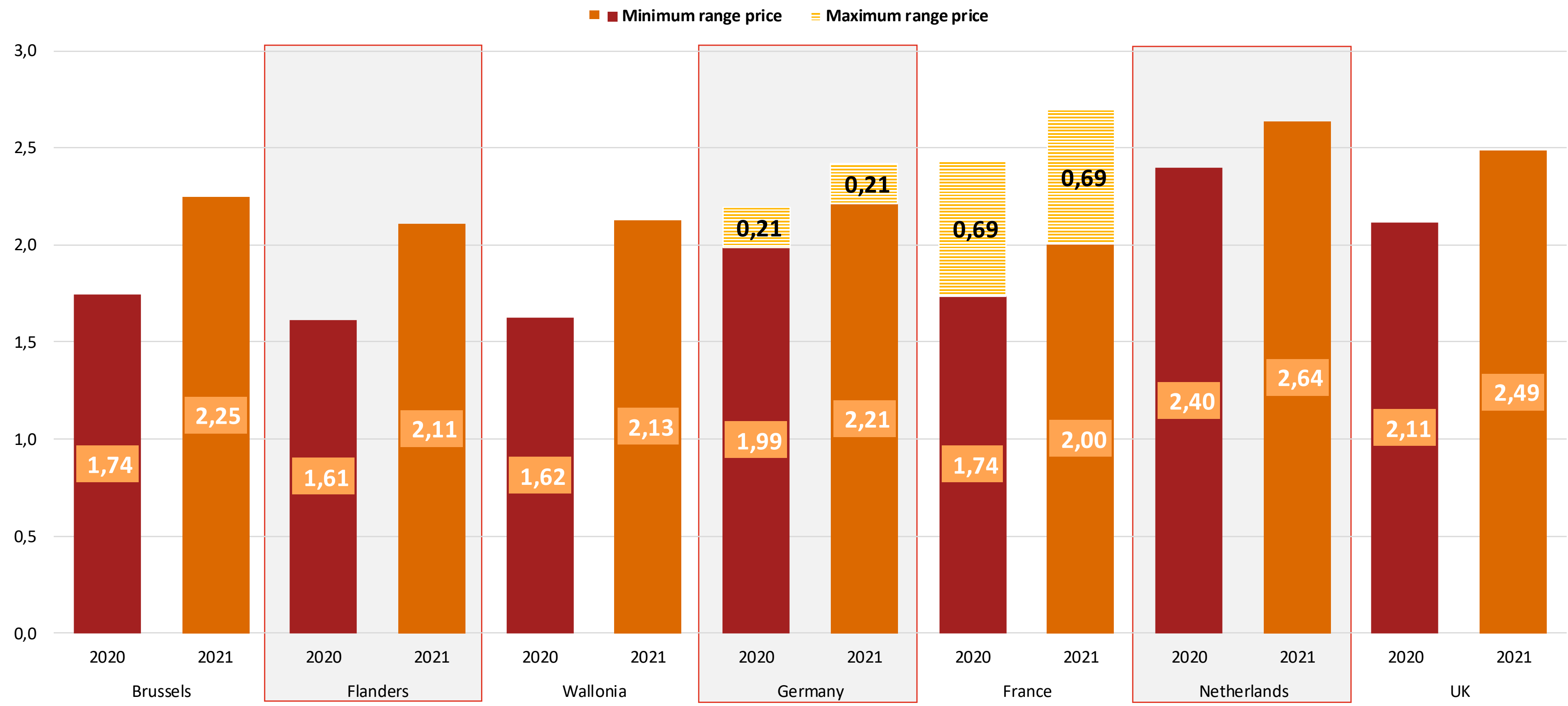
- Similar to the smaller profiles (G-RES and G-PRO) and last year's results the Netherlands is still the most expensive country regarding natural gas. This is because of the large amount of taxes regarding natural gas that have increased even more compared to last year (39,97 to 42,22 EUR/MWh).
- Flanders is still the cheapest region overall and Brussels and Wallonia are 2nd and 3rd, depending on the reduction in France. Flanders' more competitive position compared to the other regions/countries is mainly thanks to the lower network costs in this region.
- While we no longer present a percentual representation of each component starting G0 we can still see that the **commodity component** makes up the majority of the total bill and the importance of the cost will keep increasing as the consumption augments.
- There is quite some variation regarding the **network cost component** and while the relative importance of this component compared to the total invoice is not out of the ordinary, it is still a deciding factor. As discussed above it has an impact on the position of the Belgian regions, but we also observe that it is a deciding component for the German competitive position.
- The **all other cost component** is still the biggest component in the Netherlands and makes them the least competitive country. Furthermore, it is important to note that the price per MWh remains the same between G-PRO and G0 in the Netherlands. While there is now a range for Germany and France, we see that only the possible reduction in France can change the competitive position of the regions/countries. The regional differences regarding this component are losing importance in Belgium compared to the G-PRO profile.

Profile G1 (Natural gas)

Total invoice analysis

The figure below provides a comparison of the total yearly invoice paid by an industrial G1 profile in the different studied countries and regions. The results are expressed in MEUR/year. The second figure gives the Belgian average natural gas invoice. This figure aims to further ease the percentual price differences with other countries.

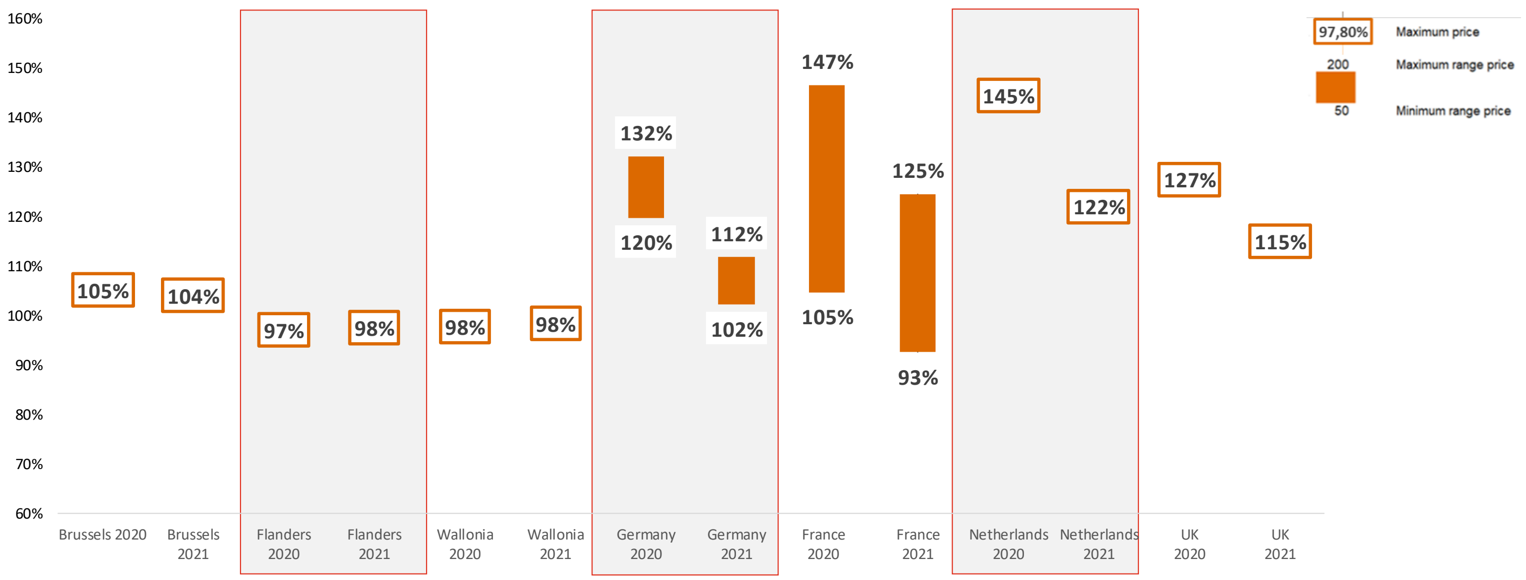
Figure 81 : Total yearly invoice in MEUR/year for industrial consumers (profile G1)



When comparing 2020 and 2021 we see the biggest increase in total invoice in all the Belgian regions and the UK. The difference in total invoice between countries has decreased and we see that not only France has the possibility to be cheaper than the Belgian regions, when taking the minimum range into account, but that this is also the case for Germany at least compared to Brussels and Wallonia. Flanders is still the cheapest or second cheapest region overall. Another big change is that the Netherlands was always far less competitive, but they are closing the gap with the other regions/countries. If we take the maximum range of France into account the Netherlands is not the most expensive country under review, as was the case for the smaller natural gas profiles. Lastly when looking at the Belgian level, Wallonia used to be the most expensive of the three regions, but they are now less expensive than Brussels.

Below, we compare each region and country's yearly bill with the average Belgian price, which is set at 100. The Belgian average is computed as the mean value from each region's yearly bill and since the figure has the results of 2020 and 2021, we take the average of their respective year into account.

Figure 82 : Total yearly invoice comparison in % (profile G1; Belgium average = 100)



Similar to the analysis for G0 we observe that the competitive position of Belgium as a whole keeps deteriorating compared to 2020. In 2020 Germany's and France's minimum range were still above the Belgian average, while in 2021 France's minimum range is already under the Belgian average. Furthermore, Germany's maximum was still 20% above the Belgian average in 2020 and this is now only 2%. The other countries are also closing the gap compared to last year. We also note that the Netherlands was 143 % above the Belgian average for the G0 profile and that this is now 22% which is a significant improvement.

Breakdown by component

The previous results are further detailed for profile G1 in the figure underneath, which provides a closer look at the breakdown of the different price components.

Figure 83 : Natural gas price by component in EUR/MWh (profile G1)

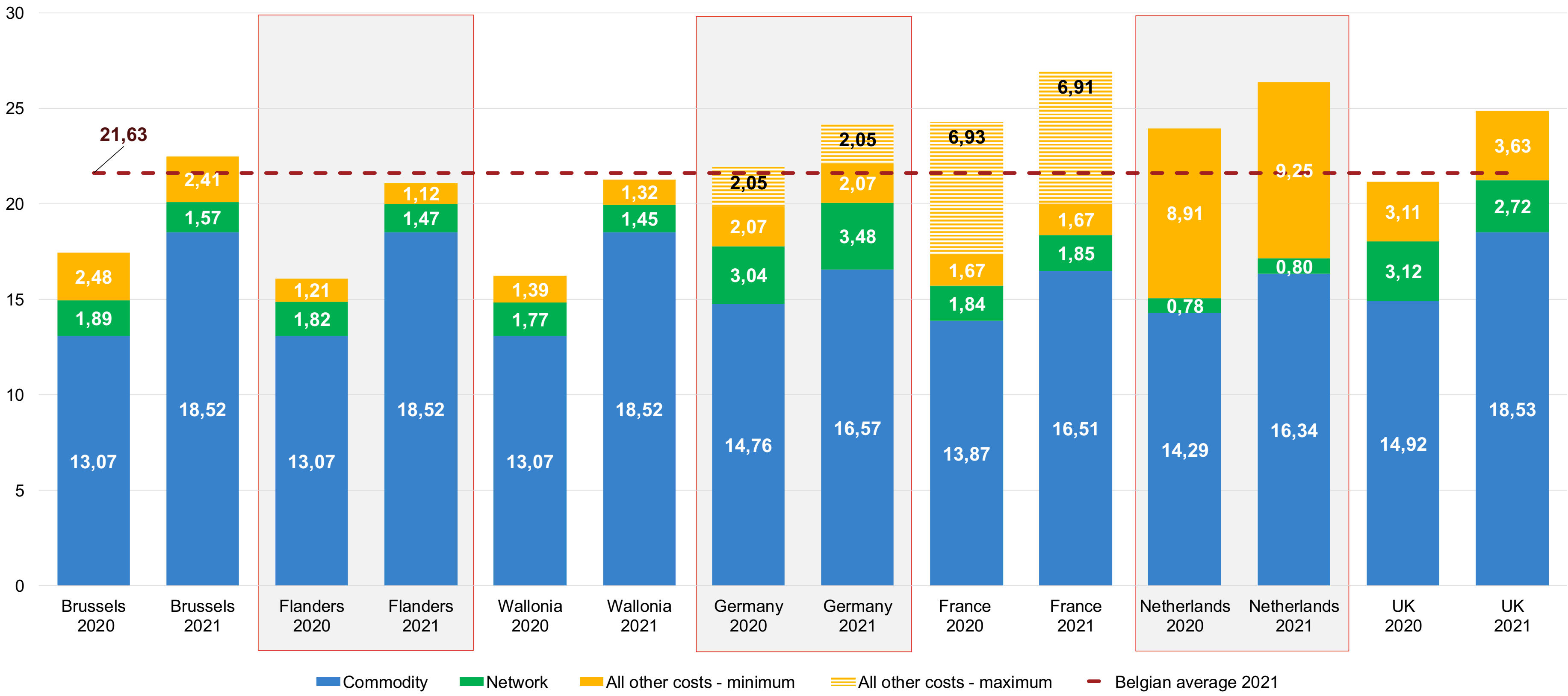
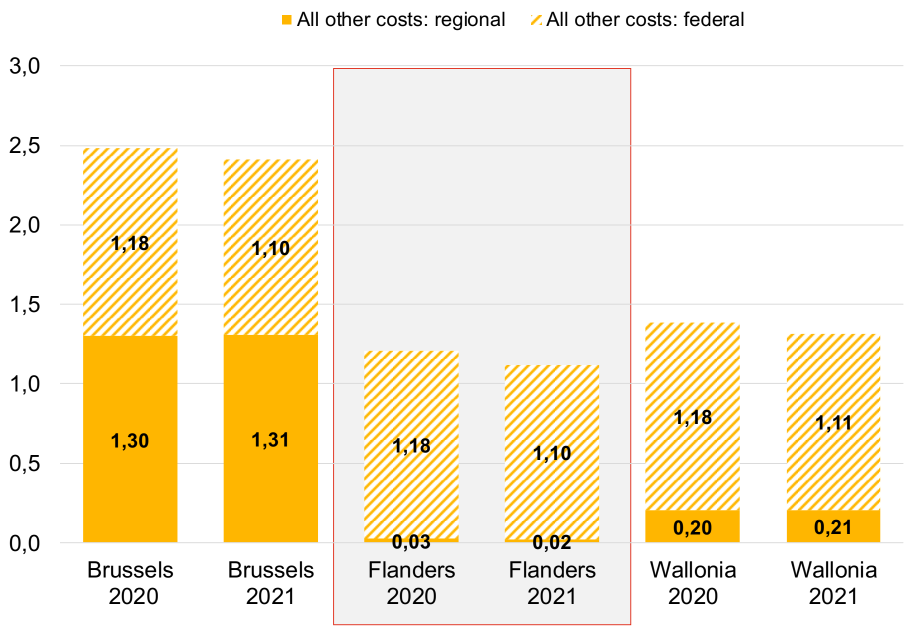


Figure 84 : Natural gas price by component in EUR/MWh (profile G1)



The importance of the **commodity component**[296] has increased even further compared to the G0 profile. This is especially the case in Belgium and the UK where the commodity price has increased the most. While the Belgian regions have the second most expensive commodity cost, after the UK, they are still very competitive compared to the other countries under review.

Similar to the analysis for G0 we see that the importance of the **network costs** keeps decreasing when looking in EUR/MWh. Germany still has the highest networks cost, while this component is almost non-existent in the Netherlands anymore. In Belgium we see that Flanders still has the lowest network cost of the three regions.

The **all other costs component**[297] has vastly decreased in the Netherlands compared to the G0 profile which results in a much more competitive position in the Netherlands even if it is still the most expensive or second-most expensive country under review. In France, the reduction on the TICGN still plays an important role in the overall positioning of the country compared to the other regions/countries. In Belgium, the distinction between federal and regional all other costs component makes it clear that the regional cost is almost non-existent in Flanders and Wallonia while in Brussels this cost is still greater than the federal all other costs component.

[296] The large increase of the commodity component in Belgium compared to 2020 is the result of the adapted methodology that takes the natural gas price of January which is inconsistent with the yearly average. The methodology behind the natural gas commodity price will be updated next year as detailed in Chapter 5: Large industrial consumers (p.190).

[297] This cost includes taxes, levies and certificate schemes.

KEY FINDINGS

The second industrial natural gas profile (G1) analysis leads to the following findings:

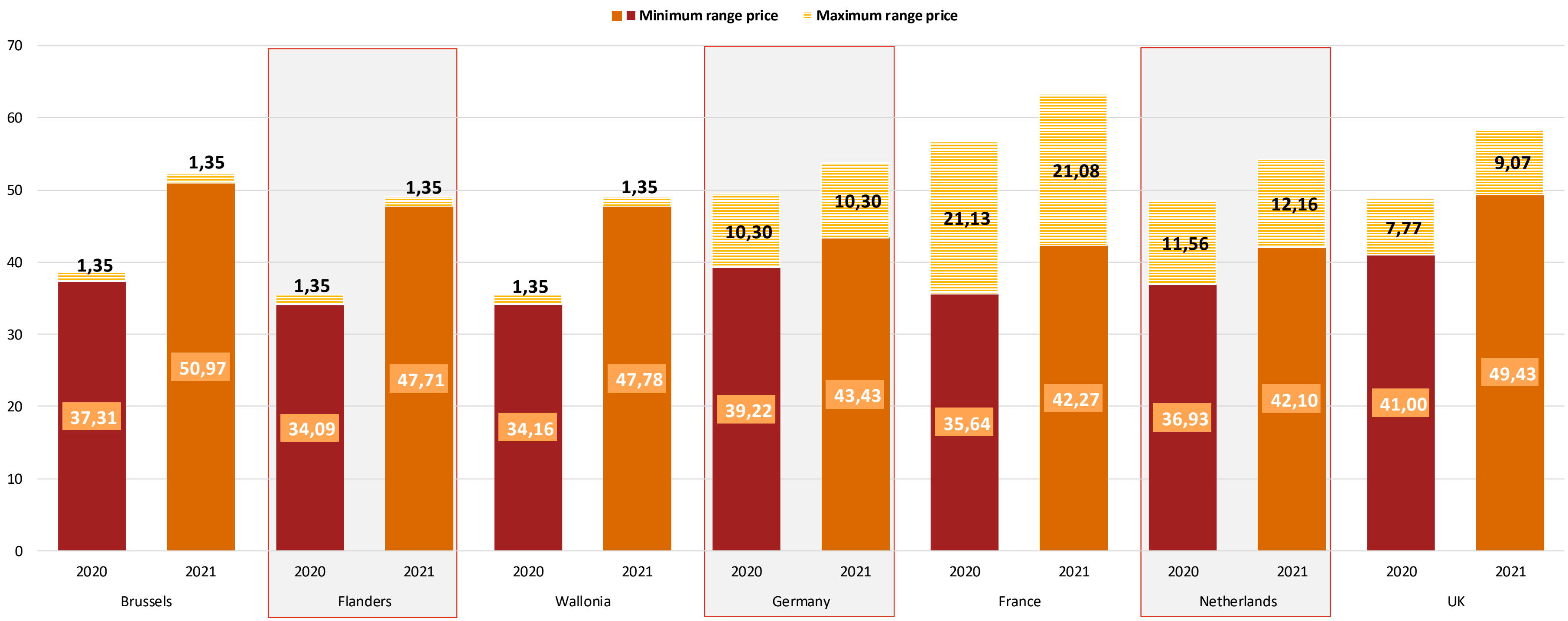
- When comparing to last year, the total invoice has increased in all regions/countries and this is mainly due to the higher commodity cost.
- Whether Flanders or France is the cheapest region, regarding the G1 profile, depends on the possible reduction in France. From a Belgian perspective, Flanders is still the most competitive region. Furthermore, the competitive position of Wallonia and Brussels also depends in the possible reduction of the all other costs component in Germany.
- With reductions and cheaper network costs applying to the bigger profiles the importance of the **commodity cost** is still increasing. In Belgium it makes up 75% or more of the total invoice.
- When looking at the EUR/MWh cost of the components, we observe that the **network cost** does not have a big impact anymore. This component is the largest in the UK (2,72 EUR/MWh) and Germany (3,48 EUR/MWh).
- Lastly, the **all other costs component** is very important regarding the competitive position of the region/country. Especially for France that can be the least or most expensive country depending on the reduction applying or not.
- While Flanders is the cheapest Belgian region there is but a slight difference with the other regions.

Profile G2 (Natural gas)

Total invoice analysis

The figure below provides a comparison of the total yearly invoice paid by an industrial G2 profile in the different studied countries and regions. The results are expressed in MEUR/year. The second figure gives the Belgian average natural gas invoice. This figure aims to further ease the percentual price differences with other countries.

Figure 85 : Total yearly invoice in MEUR/year for industrial consumers (profile G2)



The G2 profile is the largest natural gas consumer under review and the first observation is that every region/country has price range for this profile, while only France and Germany had one for the smaller natural gas profiles. The range in Belgium is the result of a possible exemption on the energy contribution for feedstock consumers. In the UK the G2 profile can benefit from an exemption from the climate change levy which is why they also have a range. Lastly, we have the Netherlands that always had the highest all other costs component that offers an exemption of the energy tax and ODE. Now that every region/country has potential reductions and/or exemptions to take into account the competitivity of a region/country is more ambiguous since it depends on the profile of the consumer. Under the right circumstances every country (except the UK) can become the least expensive one for the G2 profile. This becomes clear in the figure below. This figure takes the Belgian average as a base and compares the total invoice of the neighbouring countries with the Belgian average. As we have done with all the previous profiles, the 2020 results are set out against the 2020 Belgian average and the same logic applies to 2021.

Figure 86 : Total yearly invoice comparison in % (profile G2; Belgium average = 100)

Figure 86 shows that all our neighbouring countries have the possibility to be cheaper than the Belgian average with the exception of the UK. Furthermore, we also note that the range in France is very large for the G2 profile and they can both be the most and least expensive country under review. Lastly, we observe that the position of the Netherlands has completely changed compared to the smaller profiles since for the first it has the possibility to be the least expensive country under review for natural gas.

Breakdown by component

The previous results are further detailed for profile G2 in the underneath figure, which provides a closer look at the breakdown of the different price components.

Figure 87 : Natural gas price by component in EUR/MWh (profile G2)

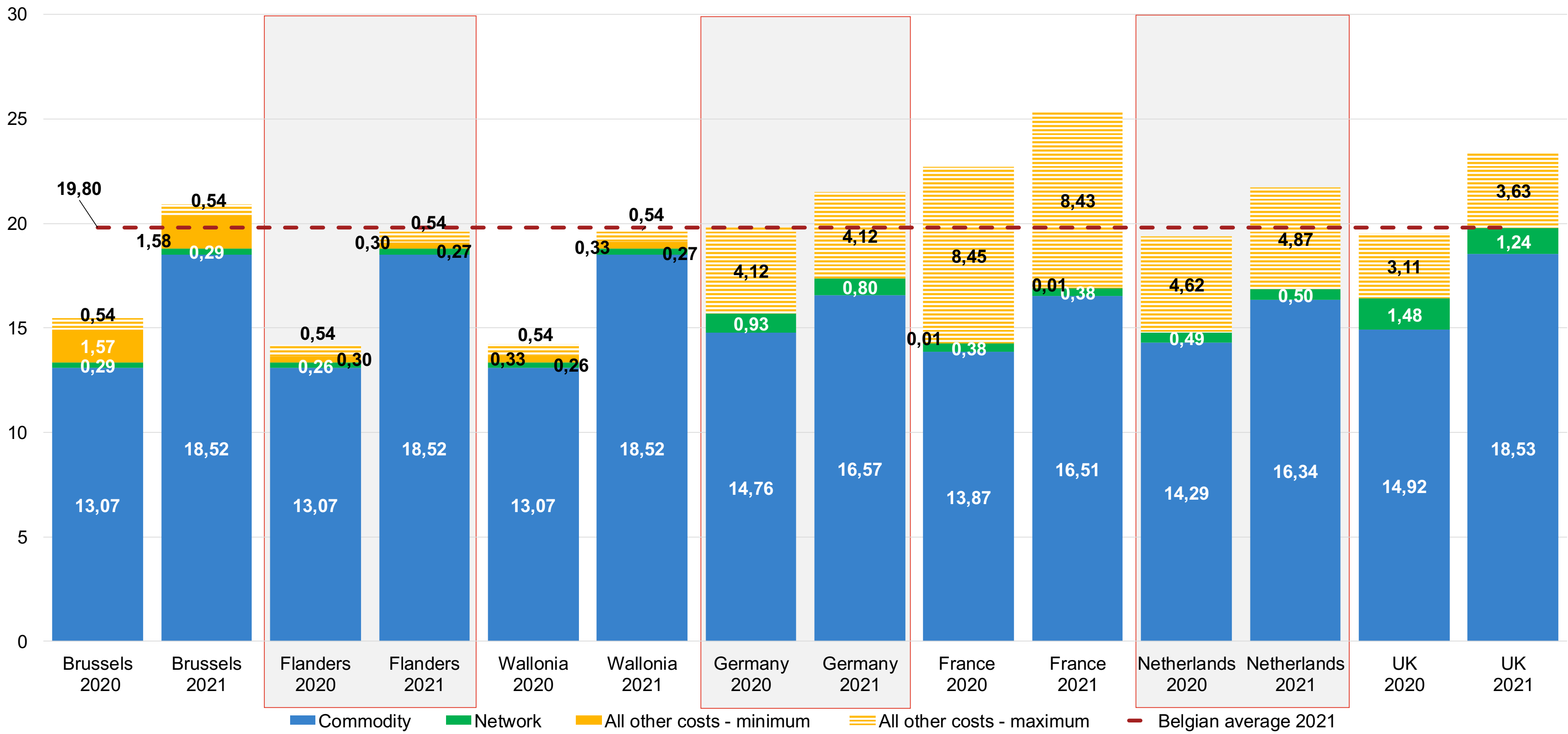
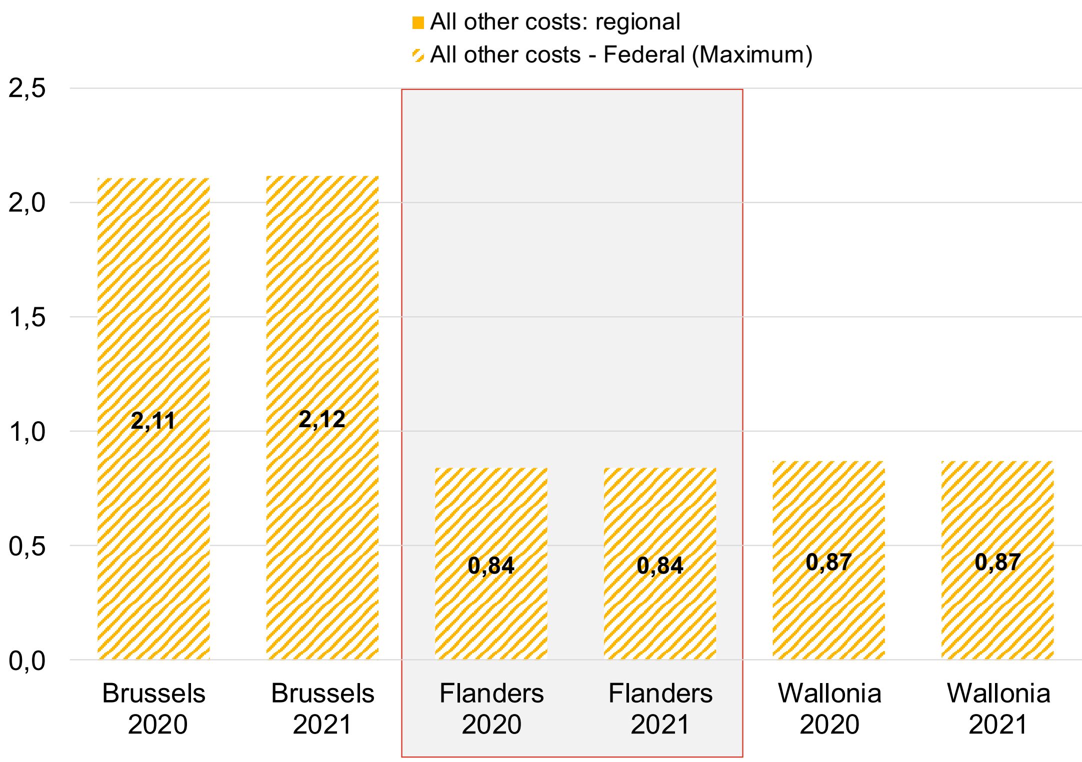


Figure 88 : Natural gas price by component in EUR/MWh (profile G2)



The figure speaks for itself, the **commodity component**[298] makes up the most of the total invoice. Since the commodity component in the Netherlands is the lowest of the regions/countries under review this greatly benefits their competitive position.

When comparing the different components in EUR/MWh we observe that the **network cost** is almost negligible, and the UK has the highest cost with 1,24 EUR/MWh.

Lastly, the **all other costs component**[299] still plays a big role in defining the competitivity of the regions/countries, in particular whether or not the reduction(s) applies or not. When the reduction applies this component becomes negligible in every region/country except Brussels where it still has a role to play (1,58 EUR/MWh).

[298] The large increase of the commodity component in Belgium compared to 2020 is the result of the adapted methodology that takes the natural gas price of January which is inconsistent with the yearly average. The methodology behind the natural gas commodity price will be updated next year as detailed in Chapter 5: Large industrial consumers (p.190).

[299] This cost includes taxes, levies and certificate schemes.

KEY FINDINGS

The biggest industrial natural gas profile (G2) analysis leads to the following findings:

- In 2021, Flanders and Wallonia are no longer clearly and consistently more competitive than the other regions/countries and it clearly depends on the possible reductions. This is an important change compared to 2020.
- The **commodity cost** has had a radical impact on the competitive position of the regions/countries under review. Since this component becomes more and more important as the consumption augments and since the Netherlands has the lowest commodity cost they have an advantage regarding this component. This also affects the Netherlands' overall positioning.
- Overall, the **network cost component** no longer has a significant impact on the strategic positioning of a region/country for the G2 profile. The UK has the highest network cost, followed by Germany.
- As clearly depicted by the figures and the analysis above the **all other costs component** shows large variations that will impact the competitive position of all regions/countries.

7. Energy prices: Conclusions

7. Energy prices: Conclusions

Electricity

Residential and small professional consumers

1. Belgium is not very competitive for the E-RES and E-SSME profile but is for the E-BSME profile. The Belgian regions are less expensive than all the other regions for E-BSME, with the exception of France depending on the CTA reduction that impacts the all other costs component. Brussels is the most competitive Belgian region for E-RES and E-SSME because of the lower regional all other costs while Flanders is the cheapest for the E-BSME profile. Wallonia is the most expensive region for all the residential and small professional profiles, and this is mainly because of their high network costs rather than the all other costs as it is the case in Flanders.
2. There is quite some variation in the total invoice across regions/countries and while the competitivity of a region/country changes depending on the profile it is always Germany that is the most expensive, in all its regions. The difference is especially great for E-RES where in some German regions the total invoice is (nearly) twice as high.
3. To actually compare the profiles, it is best to look at the €/MWh and then it becomes clear that small professional consumers usually pay less than residential consumers per MWh of electricity. The reason for this is twofold, first the impact of the VAT. We take the assumption that VAT is deductible for professional profiles and since this amounts to ca. 17% of the total invoice in Belgium there is a big difference when we remove this component. If you remove the VAT component you will see that E-RES and E-SSME are quite close per MWh. Secondly some tariffs depend on connection levels which is why we see a difference between E-RES and E-SSME on one hand and E-BSME on the other hand.

   Additionally, we can state that the commodity and network cost both tend do decrease for larger consumers.

Industrial consumers

1. The commodity cost is a very important component for the industrial profiles even more so for the larger industrial consumers where reduction and/or exemptions are applied on network and all other costs. The commodity cost often makes up more than 50% of the total invoice except for Germany that has big ranges for the all other costs component and important network costs. Germany has the lowest commodity cost while the UK has the highest. The commodity cost remains the same from E0 to E2, but changes for E3 and E4 since we assume that these profiles consume 24/7.
2. The reductions and exemptions on network and all other costs greatly varies between regions/countries and profiles and have an important impact on the competitivity of the regions/countries. These reductions are especially important in Germany, that is the least competitive from E1 to E2 and is then a top contender for E3 and E4. Flanders also offers reductions starting E0 and this significantly improves their competitive position or at least decreased the difference with other regions/countries that offer large(r) reductions. Since Brussels and Wallonia do not offer any reductions, they are a part of, together with the UK, the less competitive regions/countries under review. There is also a clear distinction between electro- and non-electro-intensive consumers. Numerous regions/countries (Flanders, France, Germany and the Netherlands) have designed a mechanism to support electro-intensive consumers by offering lower fares, the cheapest being France and the Netherlands.
3. Looking at the competitiveness of the Belgian regions, for electro-intensive consumers, compared to the other regions/countries we see that our most competitive region, Flanders, will only be able to be the cheapest country for E0 and E1 (2 out of the 5 profiles). The lack of competitivity is mainly because of the all other costs component on which too small or no reductions, as it is the case in Brussels and Wallonia, can be applied. However, this is not the only factor, certainly for the very large profiles (E3 and E4) where the commodity component plays a major role. When comparing the total invoices for the non-

electro-intensive consumers Belgium's competitivity is much higher, while Belgium is still more expensive than the Netherlands it has the opportunity to be cheaper than France which offer large reductions on network and all other costs.

4. The UK is an outlier for all the industrial profiles and the bigger the profile the more the difference between the UK and the other regions/countries is accentuated. They often display higher prices (with the exception of the non-electro-intensive consumers in Germany) and while they are sometimes more competitive for the smaller industrial profiles if we take their maximum range into account this is no longer the case for the bigger profiles.

Summary

The figure below depicts the global trend followed by yearly electricity bills once considered across all countries and regions simultaneously. In Figure 89, solid lines may represent three different kind of prices depending on countries[300]: a unique price (e.g. the UK), a maximum price due to a range of possibilities in network and/or tax prices (e.g. France for residential and small professional consumers) or a maximum price for non-electro-intensive consumers - from profile E0. Dotted lines symbolise maximum prices for electro-intensive consumers (from profile E0) whereas dashed lines are minimum prices.

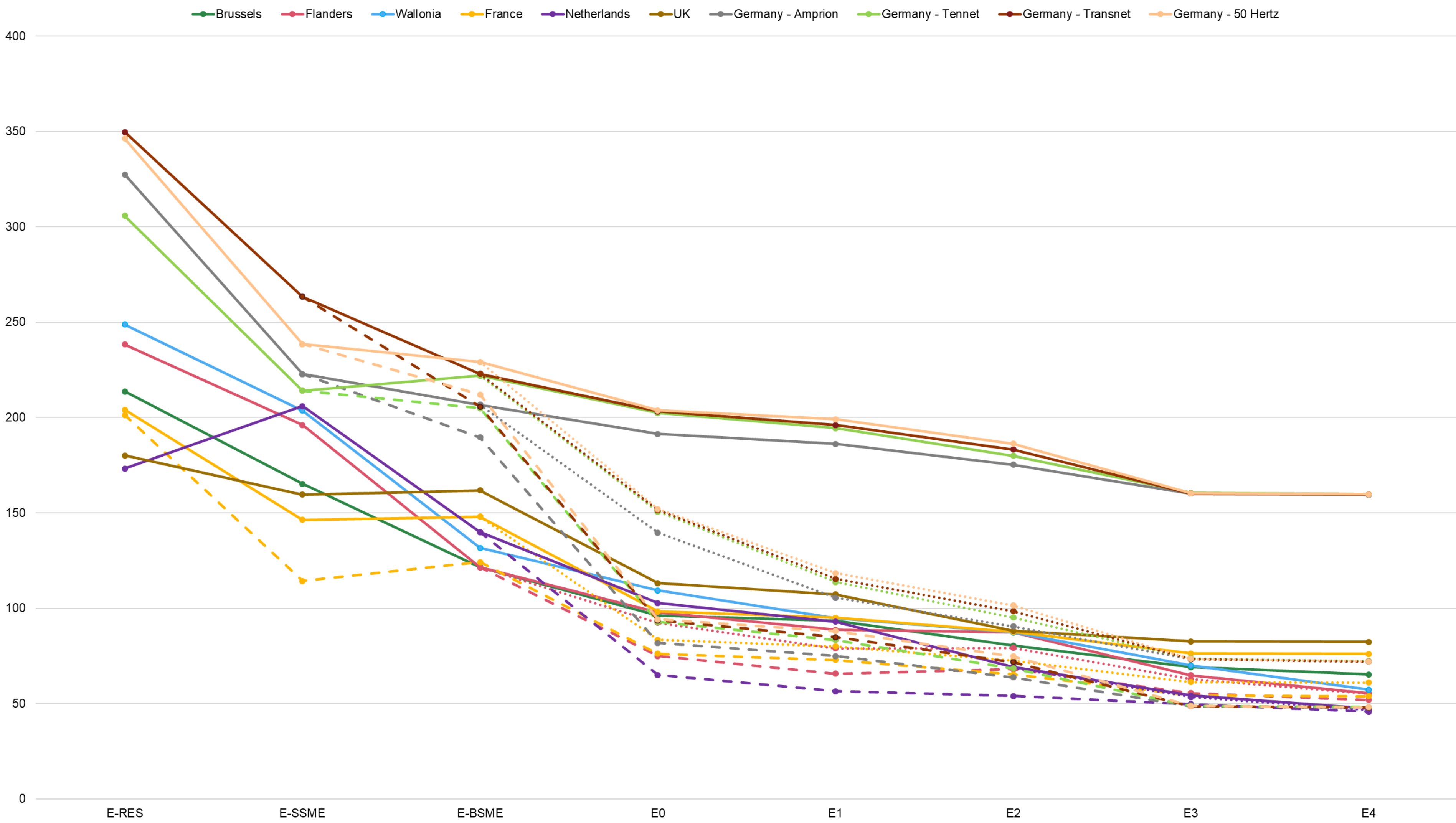
The general decreasing trend seems to indicate that, in all countries, governments have chosen to allocate electricity consumption costs differently depending on the profile: the smaller the profile, the higher the price per unit of electricity consumed. The only exception lies in the Dutch E-SSME profile whose fares are higher than residential consumers (E-RES). This reflects a cost burden transfer from large consumers to small consumers but is also related to the network that the consumer is connected to. The higher the connection level of the consumer the lower the network cost.

The taxing mechanisms, as identified by the splitting of lines (i.e. multiple pricing possibilities) from profile E0, designed to support electro-intensive consumers also indicate a transfer of electricity costs from electro-intensive consumers to non-electro-intensives consumers as the former face much higher fares. This can be further exemplified in Germany as costs charged to non-electro-intensive consumers may be as high as residential or small professional prices from most studied regions/countries. Overall, France is the only country to differentiate all profiles as prices differ on selected pricing options as of consumer E-RES.

When looking at Belgium we do see a difference in the price evolution for the residential and small professional profiles. The price steadily decreases from E-RES to E-SSME in all Belgian regions, but in Flanders and Wallonia the price decreases much more between E-SSME and E-BSME. This mainly because the E-BSME profile is connected to a higher tension level than E-SSME, from LS to MS, and the higher the tension level the lower network costs.

[300] We elaborate further on multiple potential prices (i.e. range of prices) for the studied countries in chapter 4, 5 and 6. For instance, Germany has three different prices for industrial consumers: minimum price, the maximum price for electro-intensive consumers and maximum price for non-electro-intensive consumers).

Figure 89 : Electricity yearly bill in EUR/MWh per profile



Natural gas

Residential and small professional consumers

1. The commodity cost is more important for natural gas consumers than it is for electricity consumers. The role of the network costs is also quite similar between regions/countries, again with the exception of the Netherlands, and makes up a third to a fourth of the total invoice. In Belgium, Flanders is the most competitive region followed by Brussels and the regional all other costs play a role in this. When comparing with the electricity conclusions we see that Belgium is much more competitive regarding this energy source even though the total invoice has increased in all Belgian regions for G-RES and G-PRO. We also see that the Netherlands is by far the most expensive country, mainly because of their all other costs.
2. There are some regional differences in Belgium that have an impact on the competitivity of the Belgian regions compared to each other, but also when comparing to the other countries under review. While Belgium as a whole is the 2nd most competitive country for G-RES (after the UK), but when looking at G-PRO we see that Flanders and Brussels are the two most competitive regions while Wallonia is in 5th place after the UK and France. The regional differences are the result of larger network and regional all other costs in Wallonia.
3. To further compare the two residential and small professional consumers we have to look at the price they pay per MWh. We clearly see that the professional consumers pay less per MWh and the reason behind this is firstly the absence of VAT for the professional consumers. Secondly, we also see that the commodity and network cost is also less per MWh for professional consumers.

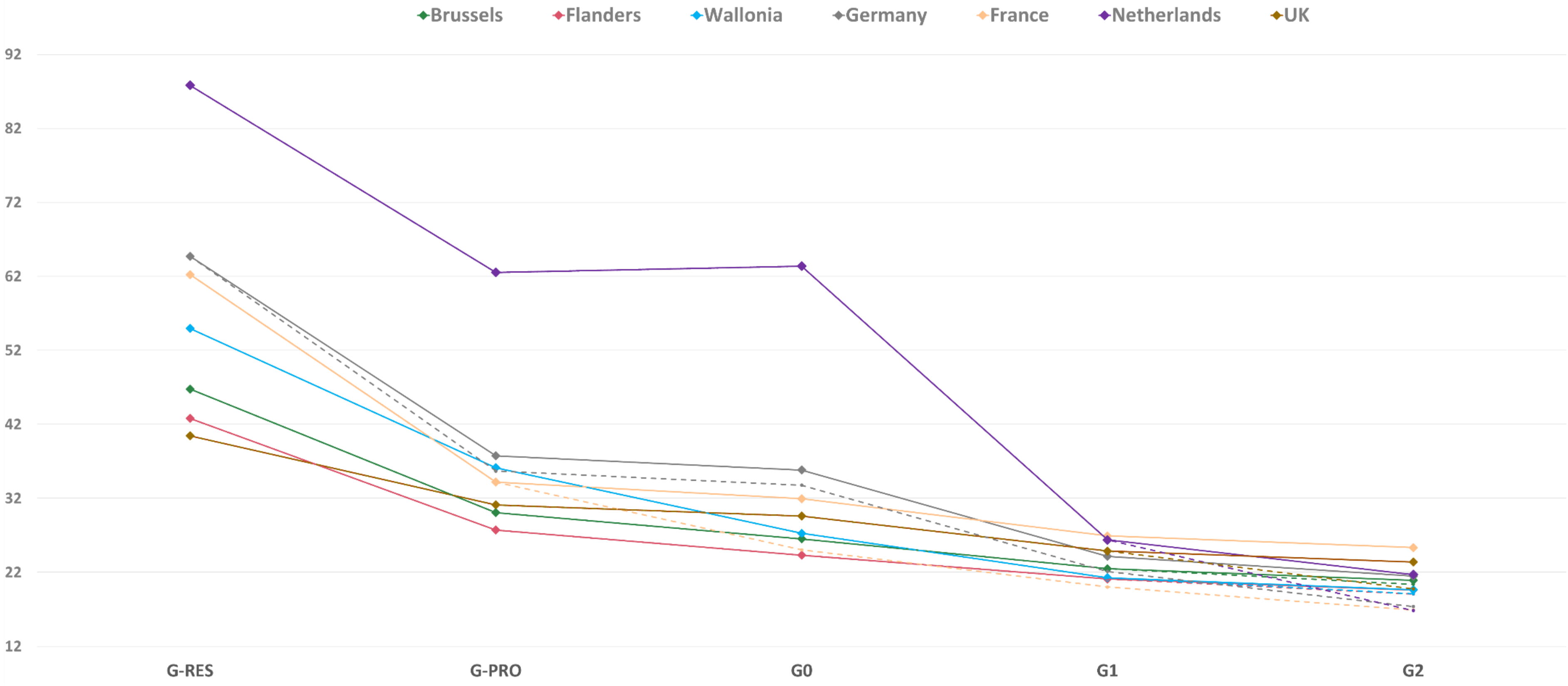
Industrial consumers

1. Similar to the residential profiles the commodity component is also very important for industrial natural gas consumers and the bigger the profile the more that the total invoice is determined by the commodity component. Belgium has the highest commodity cost this year, contrary to 2020, and this has changed the competitive position of Belgium. While Belgium is still quite competitive for G0 the position deteriorates as the consumption of the profiles increases. In Belgium the difference between the regions is smaller than it was for electricity. Flanders is the least expensive region, followed by Brussels. In the Netherlands the all other costs component constitutes more than 50% of the invoice for G0, but this cost undergoes a serious decrease when looking at the G1 and G2 profiles. Since the Netherlands are very competitive regarding electricity, we could assume that they want smaller industrial natural gas consumers to switch to electricity while not undermining the competitive position of the larger industrial profiles that use natural gas as a resource (feedstock consumers).
2. There is quite some variation regarding the competitivity of the regions, while Belgium is still competitive for the small regions, Germany and the UK become more competitive for G1 and G2 and the Netherlands also becomes a top contender starting G2. The application of the ranges of the all other costs will be very important in determining the competitivity of the region.

Summary

Similarly, to electricity the figure below depicts the global trend followed by natural gas yearly bills once considered across all countries and regions simultaneously. Solid lines represent unique or maximum prices, whereas dashed lines constitute minimum prices.

Figure 90 : Natural gas yearly bill in EUR/MWh per profile



Again, a clear decreasing trend can be observed, implying a bigger natural gas cost burden for small consumers compared to large consumers: the smaller the profile, the higher the cost per unit of natural gas consumed. An exception can be found in the Netherlands as G0 profile pays a higher fare than G-PRO. All countries offer reductions and/or exemptions for profile G2: if less clear than for electricity, consumers not benefitting from these reductions and exemptions may bear the financial costs to ensure lower prices for consumers eligible to these reductions and exemptions (i.e. feedstock consumers) – yet in a less pronounced fashion. Germany is the only country to offer different pricing options for all consumers, while France starts from G-PRO profile onwards.

Competitiveness score

Throughout this report, we addressed complex situations with a lot of nuances that we intend to present in a simplified manner. For this reason, we have drawn up competitiveness scorecards that give a clearer representation of how competitive Belgium/Brussels/Flanders/Wallonia is, regarding a certain profile, compared to neighbouring countries/regions.

Methodology

Results presented in this section were derived following two approaches: a national and a regional approach. The first method (national) compares figures obtained for Belgium with the other four countries from our study, namely Germany, France, the Netherlands and the UK. Belgian values were estimated by using the arithmetic average of all three Belgian regions. The second approach (regional) compares each Belgian region with the foreign regions and countries. While this leads Belgian regions to be compared with the same four countries previously mentioned for natural gas, seven countries and regions are used when it comes to electricity: Amprion (Germany), Tennet (Germany), Transnet BW (Germany), 50 Hertz (Germany), France, the Netherlands and the UK.

Electricity

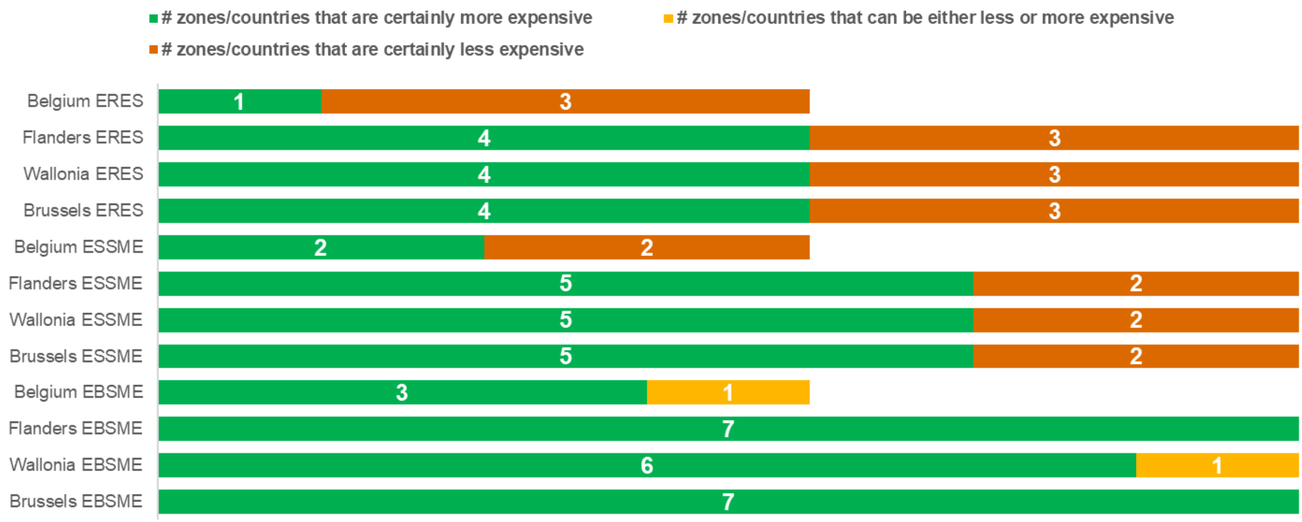
Residential and small professional consumers

Firstly, we discuss the competitive position of the regions/countries for residential and small professional consumers under review. Before going more in-depth, we can already note that for the residential and small professional profiles the competitiveness of a region/country is clearly identifiable and does not depend on certain qualifications of the consumers as it can be seen under the industrial profiles. The only exception is for E-BSME where France presents a range that can impact the competitive position of Wallonia.

On the national level, Belgium is not very competitive regarding the E-RES profile but as we move to the small and big SMEs the competitiveness improves and Belgium is in a relatively good position compared to the other regions/countries. Regardless of the residential or small professional consumer profiles (E-RES, E-SSME and E-BSME), a general observation can be drawn from our results: Germany is always more expensive than Belgium. As such, Germany appears as the only country whose electricity prices are higher than in Belgium for E-RES. On the contrary, France, the Netherlands and the UK are all cheaper for this particular profile. For the other two profiles considered, Belgium’s competitiveness improves: considering E-SSME, Belgium is cheaper than Germany and the Netherlands; as for E-BSME, relatively lower prices in all three regions help Belgium’s average bill getting smaller than in Germany, the Netherlands and the UK. The difference between the Belgian average and the France minimum price (minimum network and all other costs) is negligible.

On the regional level, the prices are approximately similar even though Brussels is the cheapest Belgian region for E-RES and E-SSME while Flanders is the cheapest for E-BSME. While Brussels’ competitiveness is explained by their lower all other costs, Flanders’ cheaper network costs makes them more competitive regarding E-BSME.

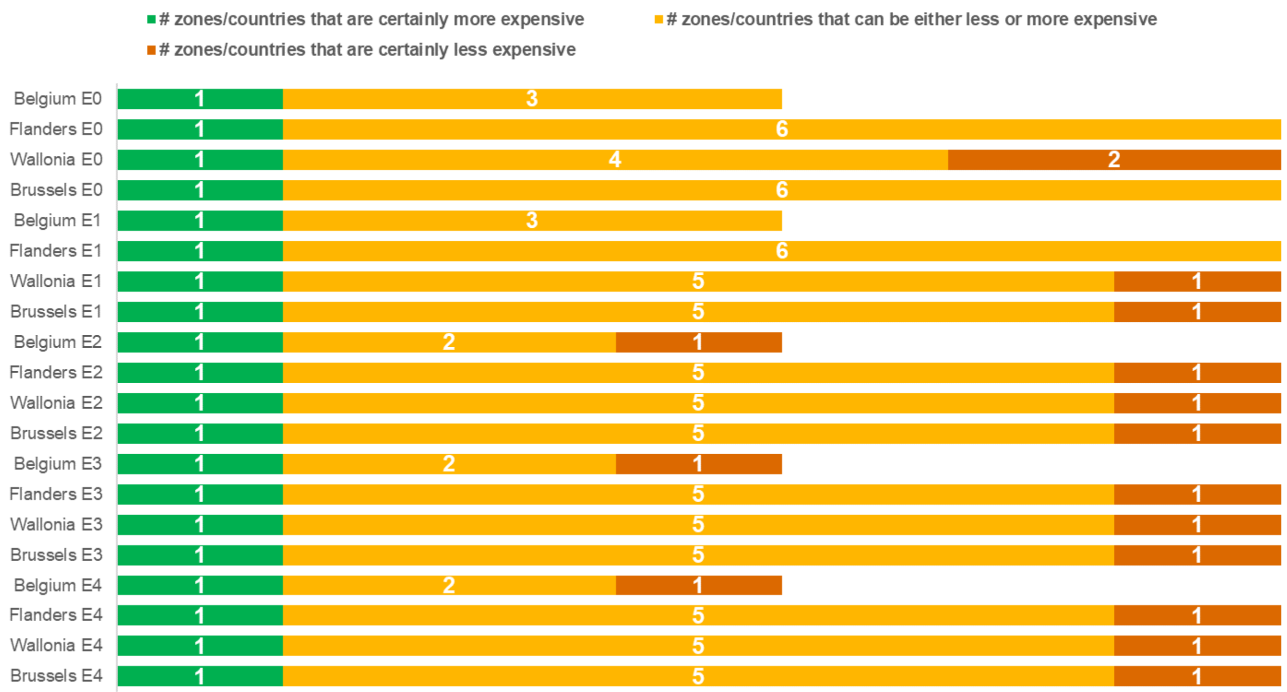
Figure 91 : Competitiveness scorecard for residential and small professional electricity consumers (profile E-RES, E-SSME and E-BSME)



Large industrial consumers

Hereunder, we have set out the scorecards for every industrial profile (profiles E0 to E4), which gives an overall overview but also a specific one for electro- and non-electro-intensive consumers. The competitive position is more complex to grasp for our industrial profiles, compared to the residential and small professional profiles, the competitiveness of a region/country cannot always be determined in a binary approach (certainly less or more expensive). Comparing the scorecards of the industrial profiles we see that the complexity mainly stems from the electro-intensive consumers where there are different reductions to take into account.

Figure 92 : Competitiveness scorecard for industrial electricity consumers (profiles E0 – E4)



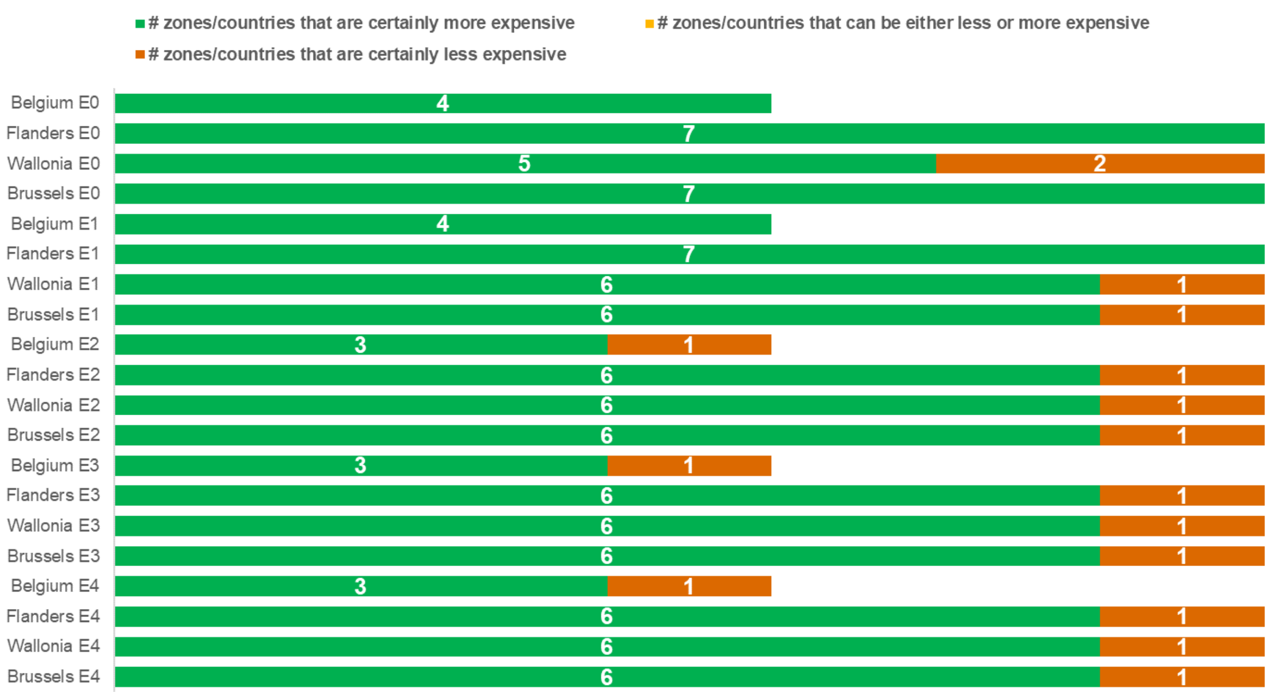
Before going into detail of Figure 92 we note that Belgium as a whole and each region is always cheaper than the UK. Another general observation we can make is that starting E2 there is only one country that is certainly less expensive which is the Netherlands. This is the case whether we look on the national or regional level. With the exception of the 2 aforementioned statements the competitive position of Belgium and its regions is very ambiguous for all the profiles.

The position of Belgium as a whole does not seem to vary while we observe some small changes on the regional level for E0 and E1. For these two smaller industrial profiles Flanders still has the possibility to be cheaper than the Netherlands which is no longer the case for the larger profiles. This means that starting E2 the minimum range for electro-intensive consumers in Flanders is above the maximum range of non-electro-intensive consumers in the Netherlands. We have to note that the difference between electro- and non-electro-intensive consumers in the Netherlands is smaller than in other countries like France and especially Germany.

The figure above does not really tell us a lot which is why we also present scorecards that detail the competitive position of Belgium and its regions for non-electro-intensive and electro-intensive consumers. We firstly analyse the competitive situation for the non-electro-intensive consumers.

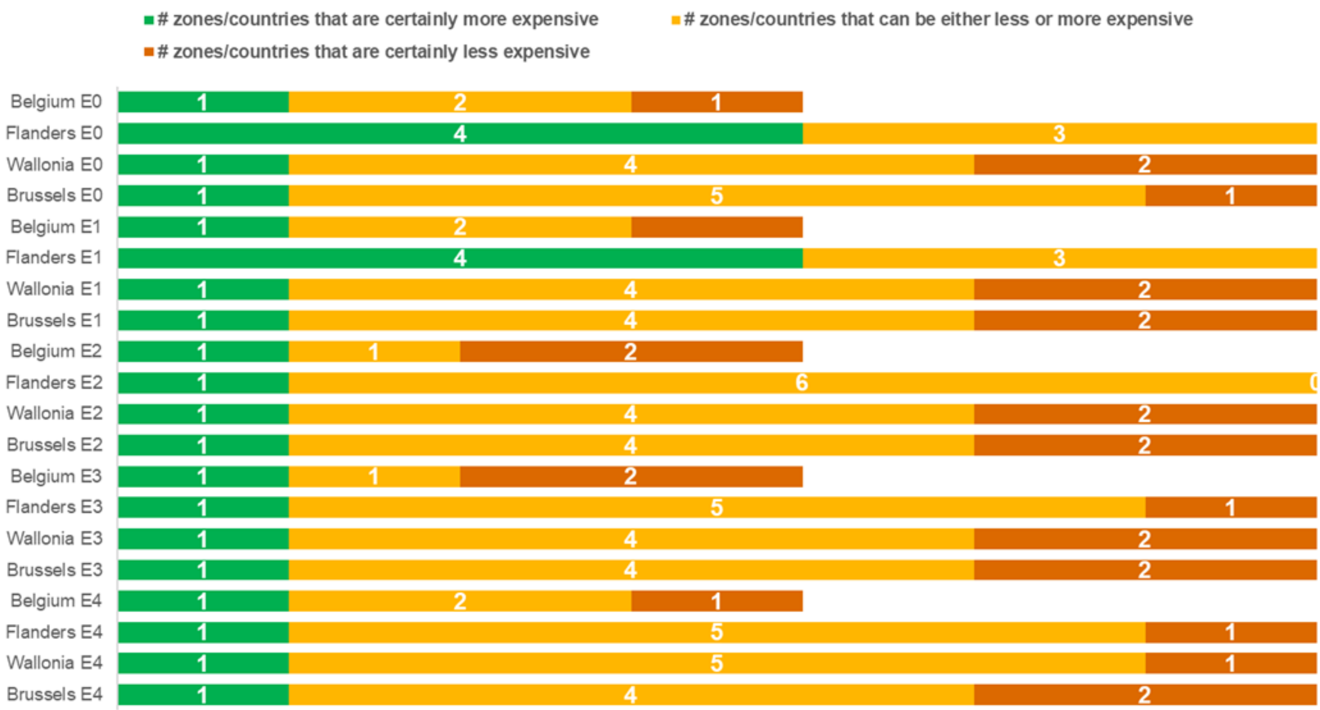
Since there are no ranges for non-electro-intensive consumers the competitive position of each region and country is much clearer. Belgium and all its regions are very competitive regarding non-electro-intensive consumers. While Flanders is still more competitive (except for E2) for these consumers the regional difference is much smaller than it is for electro-intensive consumers since Brussels and Wallonia do not offer reductions. On the national level we see that for the largest profiles (E2 - E4) there is always one country that is certainly less expensive, this is the Netherlands. Knowing this the figure below is very easy to read, Belgium and all its regions are always cheaper than the UK, France and the four German regions for a total of six as depicted in the scorecard. We do see one small exception for E0 where the higher price in Wallonia also makes them certainly more expensive than France.

Figure 93 : Competitiveness scorecard for industrial non-electro-intensive consumers (profiles E0 – E4)



As we noted before the complexity and ambiguity of the competitive position of Belgium and its regions is mainly because of the potential reductions for electro-intensive consumers. Compared to Figure 92 the figure below makes it easier to see the regional differences but the country that is certainly more expensive is the UK similar to the general scorecards. For E0 and E1 we see that Flanders position is better than the other 2 Belgian regions because their prices are more competitive than all the German regions, with the exception of the Amprion region for E0. Furthermore, we observe that for profile E2 and E3 Brussels and Wallonia are certainly more expensive than two regions, which are the Netherlands and France. The reduction in Flanders is thus an important factor that determines the competitivity compared to the other Belgian regions, but also to the other regions/countries under review.

Figure 94 : Competitiveness scorecard for industrial electro-intensive consumers (profile E0 – E4)

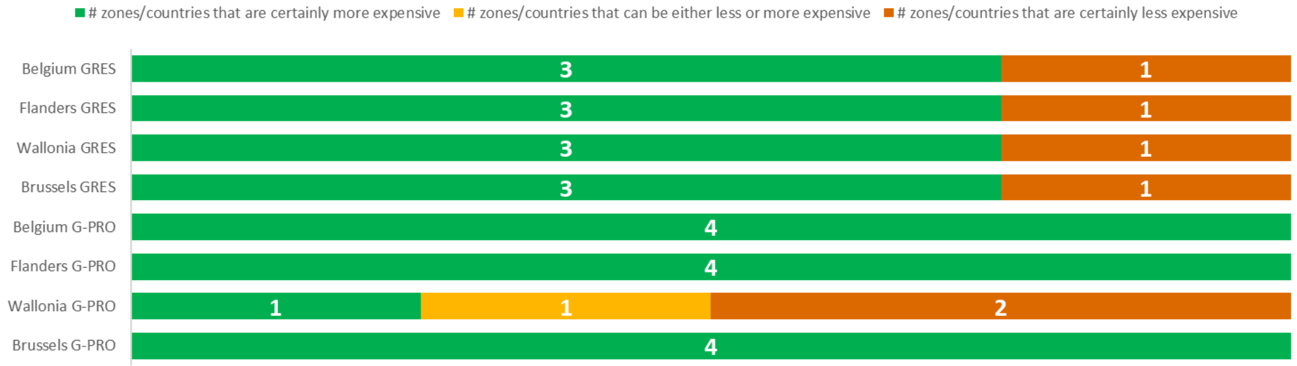


Natural Gas

Residential and small professional consumers

Figure 95 clearly shows Belgium's high degree of competitiveness regarding natural gas. The UK is the only country that offers lower prices than Belgium for the G-RES profile. However, Belgium is the most competitive country with regards to the G-PRO profile. On a regional level, Flanders and Brussels are more competitive than all the other countries even though Brussels is 706 EUR/year more expensive than Flanders. Wallonia is clearly the most expensive Belgian region and is less competitive than France and the UK while their position compared to Germany depends on the potential German minimum range.

Figure 95 : Competitiveness scorecard for residential and small professional natural gas consumers (profile G-RES and G-PRO)

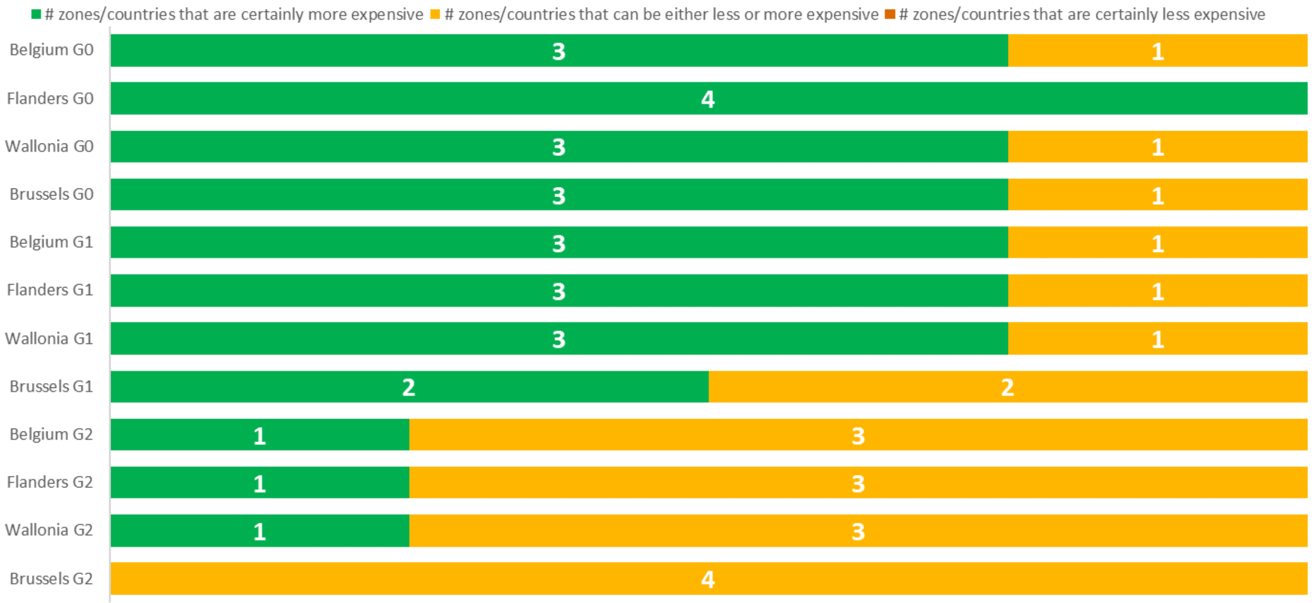


Large industrial consumers

Belgium and its regions are either more competitive or have the potential to be more competitive than the other countries under review. As detailed in CH 6 the prices in Belgium have greatly increased for natural gas because of the commodity component. This increase was enough to make the competitive position of Belgium more ambiguous as more countries are in the yellow zone rather than green, certainly for G2. Belgium is very competitive for G0 and G1 and in particular Flanders that is certainly the least expensive off all the countries for profile G0 and for 3 out of the 4 countries for G1. While Brussels is cheaper than Wallonia for G0 (as it was for the residential and small professional consumers) this is no longer the case for G1 and G2. For G1 and G2 we note that the difference between Flanders and Wallonia is very small with Flanders being a bit cheaper.

In Belgium there are only reduction to take into account for G2 while Germany and France already present ranges starting G0. Similar to Belgium, the Netherlands and UK also only offer reductions for G2. Regarding the natural gas profiles France is the country with the largest range and can either be the cheapest or most expensive country under review. It is thus very important in France to know if you fall under in this category or not. Belgium on the other hand shows the smallest range.

Figure 96 : Competitiveness scorecard for industrial natural gas consumers (profile G0 – G2)



The tax burden for electricity and natural gas consumers

When presenting the results, the importance of the third component (all other costs) was already set forward. It is thus interesting to compare the variations of this component across countries and for all consumers and particularly, its evolution as a result of reductions.

Electricity

Residential and small professional consumers

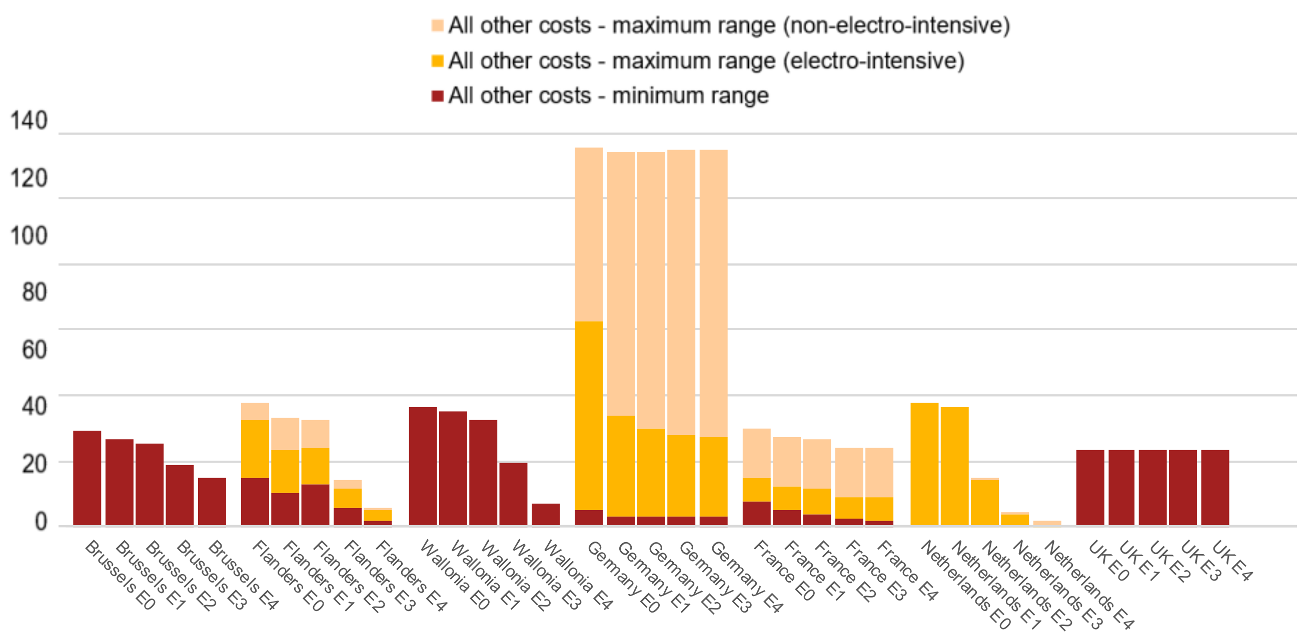
The all other costs component bears a significant importance on residential and small professional consumers' bills, and great variances can be observed across regions/countries. The general trend seems to indicate that the larger the consumer, the lower the tax rate. If reductions apply in certain countries (Belgium, France and Germany), they are granted based on criteria directly related to consumers' annual offtakes or the nature of a small professional consumer's activity.

Large industrial consumers

It was observed that depending on the countries' tax regimes, electro-intensive and non-electro-intensive consumers could be charged differently. This differentiation entails competitive (dis)advantages across regions/countries when they introduced electro-intensity criteria to lower industrial consumers' tax burden. It is thus interesting to compare the variations of this component across regions/countries from our studied panel.

In the figure below, the full red bars represent the minimum amount of taxes that each consumer profile has to pay in the specific country/region. The full yellow bar indicates the minimum-maximum cost range where different options are possible. Lastly, there is a transparent orange bar which represents the difference between the minimum and maximum cost for non-electro intensive consumers. This last bar is only applicable in Flanders, Germany, France and the Netherlands.

Figure 97 : Variance of the all other costs component in EUR/MWh (profile E0 - E4)



Firstly, we observe that the component is different in all Belgian regions and that only Flanders displays variable prices between non-electro- and electro-intensive consumers. While the extent of the reductions differs, we see a decreasing trend across all countries/regions, namely that the larger the consumption, the lower the tax burden. One exception exists for all the profiles in the UK. The UK's all other costs component does not vary between profiles as no specific threshold depending on consumption level exist. This explains, among others, the less competitive position of the UK compared to all other regions/countries under review. We also observe a shift towards electro-intensity criteria regarding the allocation of the tax burden, namely in Flanders, Germany, France and the Netherlands. The higher competitiveness of Flanders compared to the other Belgian regions results from this shift made by the region when implementing the cap on the costs related to the green certificate quota. In the Netherlands, qualifying as an electro-intensive consumer significantly lowers the importance of the component in the total electricity cost. If France remains quite competitive for non-electro-intensive consumers, German's fares might indicate that non-electro-intensive consumers could finance the cost of reductions granted to electro-intensive consumers as the taxes soar to a maximum that is more than 4 times greater than for electro-intensive consumers.

Belgian federal and regional authorities mainly grant reductions and/or exemptions on taxes, levies and certificate schemes based on the level of electricity offtake, and not on the level of electro-intensity of an industrial consumer, except in Flanders with the cap on the financing of renewable energy. This could entail that Wallonia and Brussels' taxes, but also federal taxes, favour consumers that are not particularly affected by a lack of competitiveness of electricity prices given the lower prices they benefit from in comparison with other countries, while consumers that are more at risk suffer from significant disadvantage compared to their electro-intensive counterparts in neighbouring countries. For Brussels, this has to be nuanced as it is a very urban region where the number of large industrial consumers is limited. On the other hand, it could also be implied that large industrial electro-intensive consumers do not wish to settle in these regions because of the lower competitiveness.

In Belgium, delving further into this component composition highlights that for Brussels and Wallonia, the cost of regional green certificates is the top-most tax component – apart from profile E4 in Brussels.[301] This also the case for Flanders if we consider the non-electro-intensive consumers. This tends to emphasize that regional strategies largely support the financing of renewable energies through taxes included in the electricity bill. In Brussels the "Levy for occupying road network" is one of the two most important components for profile E3 and E4, thereby confirming the support towards renewables energies.

This strategy appears to be also reflected at federal level given that for most profiles across all three Belgian regions (exceptions are mentioned previously), the second most important tax is the federal public service obligations (PSO), which are mostly composed by the financing of green federal certificates PSO.[302]

Natural gas

Residential and small professional consumers

The weight of taxes' weight on residential and small professional natural gas consumers is, by far, less important than on the electricity's annual invoice. Comparing E-RES and G-RES for example we see the biggest differences in Flanders and Germany. For electricity they respectively have all other costs of 79 EUR/MWh and 115 EUR/MWh while this component for this region/country is 3 EUR/MWh and 13 EUR/MWh for G-RES. Germany is the only country to have designed reductions on natural gas taxes depending on the use made of natural gas.

[301] See 5.1 Electricity: Detailed description of the prices, price components and assumptions Belgium Component 3 – all other costs (p.162)
[302] *Ibid.*

Again, tax rates seem to follow a decreasing trend when larger profiles are considered – apart from the Netherlands and the UK where flat tax rates apply.

Large industrial consumers

Similar to residential and small professional consumers, tax fares imposed on industrial consumption of natural gas are relatively low compared to rates charged on electricity. If reductions and exemptions may be granted on taxes, one can observe that taxes are less numerous, and conditions of applications are less complex.

Impact of reductions on network costs

Electricity

When presenting the results of the electricity and natural gas costs, it was observed that network costs are quite small, but might play a significant role when comparing the overall competitiveness of a country/region. As such, we detail below the importance reductions on network costs may have for countries.

Residential and small professional consumers

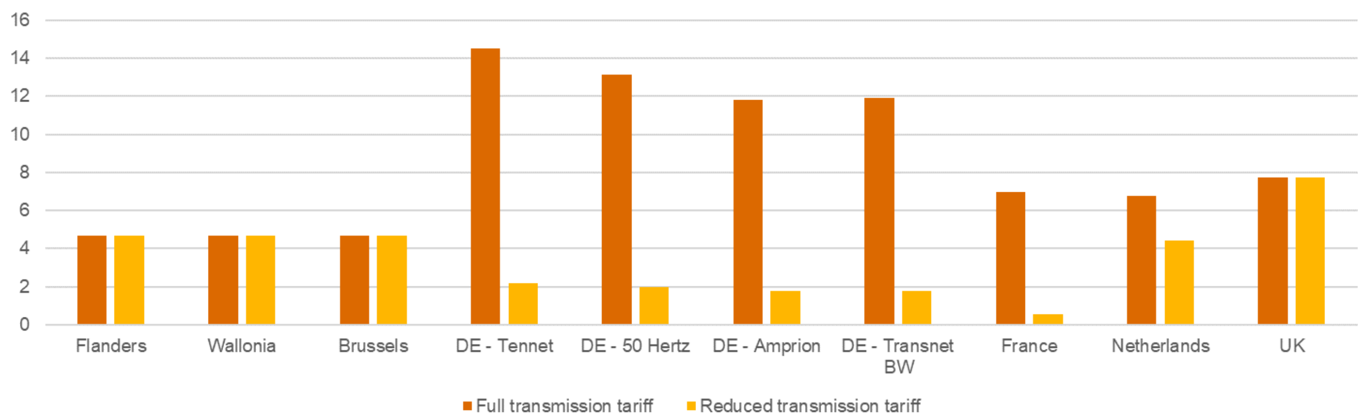
There is no reduction in force on network costs for electricity residential and small professional consumers.

Large industrial consumers

The figures below set out the reductions that can be granted in the regions/countries under the review and which might affect their global competitiveness. The dark orange bar represents the full transmission tariff while the yellow bar represents the transmission tariffs after reductions. The reductions that apply in France are more complex and depend on different conditions, which is why the corresponding bars are represented by a range. The minimum cost is represented by a full bar while the range is white and yellow.

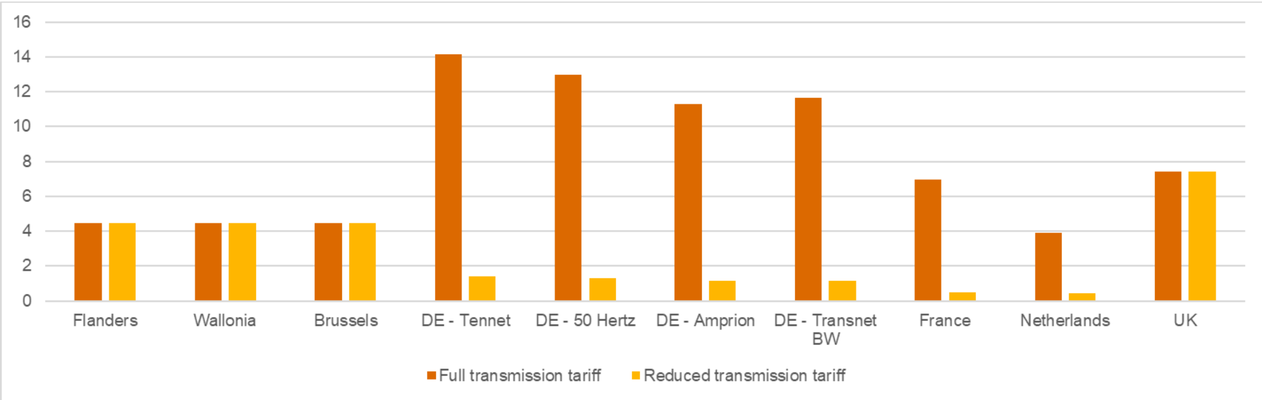
Belgium and the UK do not offer any reduction on the network cost component, but in the other countries under review, large baseload consumers such as E3 and E4 from this study can benefit from a transmission tariff reduction up to 90% (Germany). It should be clear from the figures below that these reductions have a significant impact on the network costs eventually paid by industrial consumers.

Figure 98 : Network costs reduction in EUR/MWh (profile E3)[303]



[303] The hatched bar in France represents the range of prices for the network costs following reductions.

Figure 99 : Network costs reduction in EUR/MWh (profile E4)[304]



The reductions in Germany, France and the Netherlands have to be financed, and this is done differently in France and the Netherlands compared to Germany. While the Netherlands and France compensate these reductions with the transmission tariff itself (through regulatory accounts, for instance), Germany created a separate levy (the "StromNEV §19- Umlage") to pay for the reduction. This levy is due by all consumers, but the large consumer profiles benefit from a large reduction. We can, therefore, state that high transmission tariffs in Germany are not the consequence of the reductions, but rather the cause. This reduction also explains the higher competitiveness of Germany when it comes to larger consumers. It is also interesting to note that the German Tennet region is significantly more expensive than the other regions.

Above we mentioned the complexity of the French reduction on network costs which is the result of introducing the notion of electro-intensity in the criteria for tariff reductions. While all consumers that complete these requirements can benefit from these reductions, the height of these reductions varies in function of the electro-intensity level of the individual consumer. This explains the reason behind the minimum-maximum ranges used for France.

Natural gas

There exists no reduction for natural gas' network costs for residential, small professional consumers and industrial consumers as identified by this study.

[304] The hatched bar in France represents the range of prices for the network costs following reductions.

8. Comparison of social measures for residential consumers

8. Comparison of social measures for residential consumers

Impact of social measures

For all countries under review, we provide an extensive analysis of social measures that were implemented in order to financially support households that are exposed to energy poverty, which develops "as a result of energy-inefficient buildings and appliances, high energy expenditures, low household incomes and specific household needs"[305]. Depending on the country, the concept varies but globally targets households with difficulties to afford their energy bills. As social measures are most frequently designed to tackle energy as a whole, we consider financial measures applying as such, and therefore including both electricity and natural gas. This chapter explores the impact of potential reductions on total energy bills for residential consumers (E-RES and G-RES) across countries and regions under review.

Methodology

The cross-country comparison of social measures is based on a three-step approach:

1. An extensive research is conducted to identify all measures that are offered to households in the situation of energy poverty. While measures in most countries are considered at the national level, measures in Belgium are looked at the federal and regional level;
2. The aggregated energy bill, electricity and natural gas, are compared between countries and regions. Results are then adjusted by the disposable income of each country. To eventually assess the share of residential consumers' revenues allocated to pay for energy bills, the latter is weighed compared with the gross disposable adjusted income[306,307]. This can be understood as a household's energy effort rate[308]. Moreover, the share of housing costs is deducted from one's gross disposable adjusted income to stress the remaining income once a major basic need is excluded. In this section, we refer to disposable income as the income we estimated via this methodology. All data was extracted from Eurostat at the national level and are figures for 2019 – most recent data available.
3. Based on the above-mentioned research, all social measures that can be quantified are deducted from the total energy bill of residential consumers to evaluate the possible reductions applying in each country from our panel. Once reductions are applied, the final bill is compared to the living income from which low-income consumers may benefit in each country. Depending on one's situation (isolated person or couples, with or without children, jobless or with limited financial revenues, etc.), the support granted may

[305] (European Commission, 2020)

[306] This gross disposable adjusted income reflects the purchasing power of households and their ability to invest in goods and services or save for the future, by accounting for taxes and social contributions and monetary in-kind social benefits. It is calculated as the adjusted gross disposable income of households and Non-Profit Institutions Serving Households (NPISH) divided by the purchasing power parities (PPP) of the actual individual consumption of households and by the total resident population".

[307] In this study, this indicator was corrected from the PPP factor to adjust for variable disposable income in the studied countries. This prevents from double counting by neutralising initially considered adjustments between countries.

[308] In France, the ONPE defines the energy effort rate as the "share of total energy expenditure in the household's disposable income". (ONPE, 2020)

vary. To limit the extent of this exercise, two hypotheses are taken. Firstly, it is assumed that households have a maximum of two children[309]. Then, given that we have no information on our consumers' economic conditions, it is assumed that they do not benefit from incomes related to professional activities in order to stress the maximum intervention level that could be granted for vulnerable people. This way, we intend to more easily grasp the extent of the potential living wage varying only based on age and household composition. Accordingly, we present a range from a minimum to a maximum potential living income. All data were extracted from countries' governmental websites and depict figures for 2021.

As this exercise is based on the assessed energy bills from this study, it is important to mention that the objective of this task is not to reflect real consumer profiles. The residential profiles (3.500 kWh of electricity and 23.260 kWh of natural gas) from this study are usually considered as "standard" consumption profiles for a 2 parents-family with 2 children[310]. Clearly, this does not necessarily correspond to credible consumption profiles for people in the situation of energy poverty, especially considering an isolated person without children, for instance. However, the ultimate objective is, for a given profile, to determine each consumer's effort rate with or without reductions and finally compare across countries the impact of governmental interventions on consumers' energy financial burden. Figures reported with regards to the living income always refer to a four-members household including 2 parents and 2 children.

Identification of social measures and living income within studied countries

Belgium

Social measures

Residential consumers may benefit from several measures to lower their energy bills. The present section covers all social measures existing in Belgium while distinguishing common federal measures from specific regional ones. In Belgium, the support granted to households mainly depends on the granting of a specific status: federal or regional protected consumer, which is broader. This status opens the possibility for households to meet eligibility criteria to benefit from social measures.

Federal level - Belgium

At the federal level, residential households meeting the below-listed criteria are recognised as "**federal protected consumer**":

- **Category 1**: households benefitting from one of the below allocations from the Public Social Welfare Centre (PSWC)[311] :
  - Social integration income;
  - Financial social assistance equivalent to the social integration income;
  - Social assistance partially or fully covered by the State;
  - An advance on the income guarantee for the elderly or a disabled person's allowance.
- **Category 2A**[312]: households benefitting from one of the below allocations from the FPS Social Security:
  - Allowance for the disabled due to permanent work incapacity of 65%;
  - Income replacement allowance;

309 In most countries, specific allowances are granted based on the number of children, for which limits do not necessarily apply.

310 (CREG, 2018)

311 Centre public d'action sociale (CPAS) / Openbaar Centrum voor Maatschappelijk Welzijn (OCMW)

312 There is a category 2B and 2C but these are regional protected consumer categories.

- Social integration allowance;
    - Allowance for third party assistance;
- **Category 3**: households benefitting from one of the below allocations from the Federal Pension Service:
    - Income guarantee for the elderly (GRAPA/IGO);
    - Allowance for assistance to the elderly;
    - Allowance for the disabled due to permanent work incapacity of 65%;
    - Allowance for assistance from a third party.
- **Category 4** (only for natural gas): households are tenants of a social apartment whose natural gas heating depends on a collective installation, in a building managed by:
    - A social housing corporation;
    - Regional housing corporations;
    - Social housing companies approved by the regional governments (Vlaamse Woningfonds, Fonds du Logement des Familles nombreuses de Wallonie, Fonds du Logement de la Région de Bruxelles-Capitale)
    - Public Social Welfare Centre.
- **Temporary category:** consumers benefiting from the increased intervention of the social security on medical expenses ("intervention majorée"313) and having signed a contract for the electricity and/or natural gas for their own use (households) are temporarily eligible to the social tariff from February 1st 2021 to December 31st 2021 included. Such beneficiaries will see the impact on their energy invoice as from May 2021 earliest. The social tariff will be applied retroactively as from February 1st 2021 and is applicable at the home address only.

Common social measures that apply at the federal level are detailed below:

Table 126: Belgium (federal) social measures

Federal social measures		
Measures	**Explanation**	**Eligibility criteria**
Social tariff	The social tariff for electricity and/or natural gas is a reduced tariff reserved for specific categories of households. It corresponds to the lowest commercial tariff on the market and is the same for all energy suppliers and distribution system operators. As it is set every three months we consider the social tariff in force for January 2021. Besides the reduced tariff, households do not pay any rental charges on electricity and/or natural gas meters and do not pay either for the energy contribution (cotisation énergie).	Meeting the conditions to be eligible as a federal protected consumer.
Electricity and Gas Fund	A fund supporting material or financial assistance by PSWCs to households having difficulties in paying for their electricity and/or natural gas bills. This fund enables PSWCs to negotiate payment plans, clear invoices, intervene in the buying of low-consumption appliances, provide training on how to	Any household facing financial difficulties that submit its application to benefit from such help. The latter may be granted once PSWCs has conducted a preliminary inquiry of the household's situation. As the help provided depends on each PSWC's policies, this social measure is presented in this study in a qualitative manner.

[313] The increased intervention on medical expenses is granted by the social security body ("mutuelle") to beneficiaries of social allocations or based on specific status (widow, invalid, retired person, handicapped person, unemployed or long-term incapacity, single-parent family, etc.). See more detailed explanations on https://www.inami.fgov.be/fr/themes/cout-remboursement/facilite-financiere/Pages/intervention-majoree-meilleur-remboursement-frais-medicaux.aspx (only in French or Dutch)

	lower one's bill or reduce one's energy consumption, etc.	

Regional level - Brussels

Brussels may grant a "**regional protected consumer"** status to households in debt with their current energy supplier and which have received a formal notice. In Brussels, households must apply to be granted this regional status. Depending on the institution by which the status is wished to be obtained, households also have to be engaged in a debt mediation process, have revenues below a fixed threshold or be subject of a social inquiry by a PSWC.

If you receive the following regional allocations, you can also benefit from the social tariff (category 2B and 2C[314]):

- Allocation for the elderly (IRISCARE)
- Additional family allowance for children with a physical or mental disability with a minimum score of 4 points in pillar 1 of the medical-social scale.

If the consumer/household falls under one of the aforementioned categories, they can benefit from the below-listed measures:

Table 127: Brussels social measures

Brussels Social Measures		
Measures	**Explanation**	**Eligibility criteria/Conditions of application**
Social tariff	The social tariff for electricity and/or natural gas is a reduced tariff reserved for specific categories of households. It has the lowest commercial tariff on the market and is the same for all energy suppliers and distribution system operators. As it is set every three months we consider the social tariff in force for January 2021. Besides the reduced tariff, households do not pay any rental charges on electricity and/or natural gas meters. The social tariff granted to additional regional categories – in comparison with federal categories – is financed by DSOs PSO's tariffs.	Federal and regional protected consumers can benefit from the social tariff. For regional protected consumers, the social tariff can only be granted if they are supplied by the DSO
Payment plan	A payment plan can be planned when a household faces financial issues to pay for its electricity and/or natural gas bills.	Such a mechanism can be activated either: • Upon household's demand; • Upon the supplier's initiative in the event of formal notice following the non-payment of an invoice. A 2.300-watt power limiter is placed on the meter for a minimum of 6 months in case the household does not agree on a payment plan or fails to respect it. As the payment plan depends on each household's situation, this social measure is presented in this study in a qualitative manner.[315]

[314] Categories considered for social tariffs, https://www.creg.be/fr/consommateur/tarifs-et-prix/tarif-social#h2_2

[315] The power limiter itself is not a social measures, but is a necessary step an energy supplier must make to continue the end of contract procedure before the justice of the peace ; Payment plan is concluded for free and the procedure costs are limited at 55€.

Regional level - Flanders

In Flanders, residential households can only be recognised under the **federal protected consumer** status as no additional regional categories of consumers exist to benefit from the social tariff.

However, if you receive the following regional allocations, you can also benefit from the social tariff (category 2B and 2C[316]):

- A care budget for older people in need of care (Zorgkas)
- Additional family allowance for children with a physical or mental disability with a minimum score of 4 points in pillar 1 of the medical-social scale.

Besides, households facing financial difficulties may be granted the below-listed measures:

[316] Categories considered for social tariffs, https://www.creg.be/fr/consommateur/tarifs-et-prix/tarif-social#h2_2

Table 128: Flanders social measures

Flanders Social Measures		
Measures	**Explanation**	**Eligibility criteria/Conditions of application**
Pre-paid meters[317]	Meter that works as a conventional meter but with a prepayment function. The consumer is either be subject to the maximum social tariff or a fixed price (average price of commercial suppliers).	Such meter is placed when: • DSO is the energy supplier, and consumer is in payment default; • DSO becomes an energy supplier as a commercial supplier terminates the contract due to payment default, and consumer does not have a new supplier after 2 months. Minimum energy supply for pre-paid meters: • Electricity: pre-paid meters for electricity are equipped with a 10 Ampere function that switches on when all credit (including emergency credit) has been used. This function can, however, be switched off permanently when a household fails to charge his meter for a certain amount of time. • Natural gas: during the winter months (1/11 – 31/03), PSWCs can be asked for financial help to have a minimum natural gas supply. The decision to grant financial help is discretionary to each PSWC and based on a review of each applicant's profile. If granted, financial help is provided every two weeks, and the extent of the help depends on the consumer status (protected customer or not) and house.
Payment plan	A payment plan can be planned when a household faces financial issues to pay for its electricity and/or natural gas bills.	Such a mechanism can be activated either: • Upon household's demand; • Upon the supplier's initiative in the event of formal notice following the non-payment of an invoice. As the payment plan depends on each household's situation, this social measure is presented in this study in a qualitative manner.
Payment exemptions	Consumers recognised as federal protected consumers are exempted from paying the: • Bijdrage energiefonds (or Energieheffing)[318]; • Costs related to reminders or notices of default.	Meeting federal protected consumers conditions.

When a consumer is in payment default, is supplied by the DSO and does not have a federal protected consumer status, then they would also pay a different price based on a market average.

Regional level - Wallonia

Wallonia may grant a "**regional protected consumer**" status to households which are in:

- Educational guidance of a financial nature from the PSWC;
- Debt mediation with a PSWC or an approved debt mediation centre;

[317] (Vlaamse overheid, 2020)
[318] (Vlaamse Overheid, 2020)

- Collective debt settlement.

Furthermore, if you receive the following regional allocations, you can also benefit from the social tariff (category 2B and 2C[319]):

- A care budget for older people in need of care (AVIQ)
- Additional family allowance for children with a physical or mental disability with a minimum score of 4 points in pillar 1 of the medical-social scale.

Table 129: Wallonia social measures

Walloon Social Measures		
Measures	**Explanation**	**Eligibility criteria/Conditions of application**
Social tariff	The social tariff for electricity and/or natural gas is a reduced tariff reserved for specific categories of households[320]. It has the lowest commercial tariff on the market and is the same for all energy suppliers and distribution system operators. As it is set every three months we consider the social tariff in force for January 2021. In addition to the reduced tariff, households do not pay any rental charges on electricity and/or natural gas meters. The social tariff granted to additional regional categories – in comparison with federal categories – is financed by DSOs PSO's tariffs.	Federal and regional protected consumers can benefit from the social tariff. For regional protected consumers, social tariff can only be granted if they are supplied by the DSO.
Pre-paid meters	Meter that works as a conventional meter with a prepayment function. The prepayment meter is free of charge if requested by the PSWC or in case of a move if the consumer had a prepayment meter in his former place. Pre-paid meters placement costs are free for: • Unprotected consumers with payment default from 100 euros (electricity or natural gas) or 200 euros (electricity and natural gas). • Federal or regional protected consumers.	Such meter is placed: • Upon any consumer's demand; • Upon PSWC's demand; • Upon supplier's demand in case of payment default from 100 euros (electricity or natural gas) or 200 euros (electricity and natural gas). Federal or regional protected consumers who have pre-paid meters: • Are directly provided in electricity and natural gas by their DSO; • Are provided with meters equipped with a power limiter (only for electricity) to ensure a minimum supply. The guaranteed minimum supply is only activated at the request of the PSWC; • Can receive financial assistance to recharge their natural gas budget meter during the winter period if they encounter payment difficulties. The decision to grant winter assistance is overseen by the local energy commission.
Payment plan	A payment plan can be planned when a household faces financial issues to pay for its electricity and/or natural gas bills.	Such a mechanism can be activated either: • Upon household's demand; • Upon the supplier's initiative in the event of formal notice following the non-payment of an invoice.

[319] Categories considered for social tariffs, https://www.creg.be/fr/consommateur/tarifs-et-prix/tarif-social#h2_2

[320] As detailed previously, 4 households categories exist. The 4th category can only benefit from the social tariff on natural gas. A temporary category based on different criteria exists for electricity and/or natural gas from February 1st 2021 to December 31st 2021 included.

		The supplier must propose a reasonable payment plan to his customer and inform him that he can benefit from the assistance of the PSWC in his negotiation. The collection procedure is suspended if a reasonable payment plan is concluded or until the PSWC can make a socio-budgetary analysis of the customer and intervene, if necessary, in the payment of the customer's debt. No fee can be claimed for a reasonable payment plan. Furthermore, a limit is set on the collection costs that can be claimed by suppliers from customers under the non-payment procedure[321]. As the payment plan depends on each household's situation, this social measure is presented in this study in a qualitative manner.

Disposable income and living wage

According to Eurostat, Belgium's ***gross adjusted disposable income*** for 2019 reached 27.082,00 EUR. This value is used to weigh energy's relative share in a residential consumer's income. Eurostat uses a 2020 EU27 average to determine Purchasing Power Parities (PPP), and in 2019 Belgium has PPP of 1,17 on this scale. From the latter, 18,70% are dedicated to housing that is deducted, resulting in a corrected gross disposable income of 18.800,40 EUR for all three Belgian regions.

In Belgium, the living wage ("revenu d'intégration") is under the responsibility of PCSWs. They may grant such revenues to low-income people that meet all the following conditions:

1. The person must be of Belgian ***nationality*** or:
   a. A European citizen (or a family member with European nationality), and have the right of residence for more than three months;
   b. a foreigner registered in the population register;
   c. a recognized refugee;
   d. a stateless person;
2. The person must ***live in Belgium*** and be legally resident;
3. The person must be of ***legal age*** (18) or:
   a. a minor emancipated by marriage;
   b. an unmarried minor who is responsible for one or more children;
   c. a minor who is pregnant;
4. The person must ***not have enough financial resources*** and not able to obtain them on his own;
5. The person must be ***willing to work*** unless health reasons or special reasons related to one's situation prevent from doing so;
6. The person ***must have asserted all his entitlement*** to other social benefits, such as unemployment.

[321] According to the March 30th 2006 Walloon Government decrees on public service obligations in the electricity and natural gas markets (respectively Art. 30 ter and Art. 33 ter), the collection costs cannot exceed the sum of: the outstanding balance due on overdue invoices, any contractual interest, capped at the legal rate and any collection costs for unpaid invoices, capped at 7.5 euros for a reminder letter and 15 euros for a letter of formal notice. The total costs claimed for sending reminders and letters of formal notice or for non-payment may not exceed 55 euros per year and per energy.

The amount of this living wage varies depending on one's conditions as presented below:

- **Category 1**: a person living with one or more other people with whom they constitute a common household;
- **Category 2**: a person living alone;
- **Category 3**: a person responsible for a family with at least one unmarried minor child.

Conformingly to our hypotheses, this analysis assumes to cover two adults and two children household. Therefore, a monthly living income of 1.330,74 EUR (category 3)[322] is employed. In addition, children allowances are granted in Belgium to any household with children. These extra allowances increase the maximum potential living income perceived by Belgian low-income households. Depending on the region, these allowances might change as follows:

- **Brussels[323]**: for a two-children household, allowances for both children would reach a minimum of 452,20 EUR/month[324] to a maximum of 1.645,76 EUR/month[325]. For Brussels, we thus use a range from a monthly minimum of 1.782,94 EUR to a monthly maximum of 2.976,50 EUR.
- **Flanders**: for a two-children household, allowances for both children would reach a minimum of 471,80 EUR/month[326] to a maximum of 1.663,98 EUR/month[327]. For Flanders, we thus use a range from a monthly minimum of 1.802,54 EUR to a monthly maximum of 2.994,72 EUR.
- **Wallonia[328]**: for a two-children household, allowances for both children would reach a minimum of 423,33 EUR/month[329] to a maximum of 1.571,57 EUR/month[330]. For Wallonia, we thus use a range from a monthly minimum of 1.693,84 EUR to a monthly maximum of 2.842,08 EUR.

[322] Allocation for a couple in charge of minimum one minor child.

[323] (KidsLife, 2020)

[324] This situation is a minimum situation when the children are between 0-11 years old following higher education (+153 EUR/month per child). Plus, if parents have gross yearly revenues <31 kEUR, extra allowances are granted (71,4 EUR/month per child between 0 and 11). Finally, an additional age allowance is granted yearly and reaches 20,4 EUR/year per child between 0 and 5. Allowances for large households are not considered as this starts from 3 children.

[325] This situation is a maximum situation when the children are between 18-24 years old following higher education (+163,2 EUR/month per child). Plus, if parents have gross yearly revenues <31 kEUR, extra allowances are granted (81,6 EUR/month per child between 12 and 24), and in situation of severe physical and mental disability resulting in serious impacts on daily child management and private life (571,28 EUR/month per child). Finally, an additional age allowance is granted yearly and reaches 81,6 EUR/year per child between 12 to 24 years old registered in high school. Allowances for large households are not considered as this starts from 3 children.

[326] Considering the 2020 system, this situation is a minimum situation when the children and above 18 (166,46 per child). Plus, if parents have gross yearly revenues <31 kEUR, extra allowances are granted (52,02 EUR/month per child). An additional 135,25 EUR/year per child if (s)he goes to kindergarten school (kleutertoeslag), 20,81 EUR/year per child (schoolbonus) and lastly an additional 105,98 EUR/year (former "schooltoelage").

[327] Considering the 2020 system, this situation is a maximum situation when the children are born before 2019 and above 18 (166,46 EUR/month per child). Plus, if parents have gross yearly revenues <31 kEUR, extra allowances are granted (52,02 EUR/month per child), and in situation of severe physical and mental disability resulting in serious impacts on daily child management and private life (560,1 EUR/month per child). An additional 62,42 EUR/year per child is granted if child goes to school as well as an extra 1156,98 EUR/year per child if (s)he is 3rd year of technical secondary education.

[328] (Agence pour une Vie de Qualité (AVIQ), 2020)

[329] This situation is a minimum situation when the child is between 0-18 years old (+155 EUR/month per child). Plus, if parents have gross yearly revenues <30 kEUR, extra allowances are granted as social supplement (+55 EUR/month per child). An additional 20 EUR/year per child is granted if children go to school and are between 0-5. Allowances for large households are not considered as this starts from 3 children.

[330] This situation is a maximum situation when the child is between 18-24 years old (+165 EUR/month per child). Plus, if parents have gross yearly revenues <30 kEUR, extra allowances are granted as social supplement (+55 EUR/month per child), in case of disability of one of the parents (+10 EUR/month per child) and in situation of severe physical and mental disability resulting in serious impacts on daily child management and private life (549,12 EUR/month per child). An additional

Germany

Social measures

In Germany, extraordinary electricity costs or debts can be covered by the social welfare office/jobcentre in the following exceptional cases[331]:

- The threat of the electricity supplier to cut off the electricity;
- Electric heating systems, decentralised hot water production;
- If a subsequent payment from the annual electricity settlement cannot be made.

Cash payments for back payments or accrued electricity debts are generally made in the form of loans, in rare cases aid is granted, and partial loans and partial aid are also possible. A loan can only be refused if it can be proven that the high electricity costs are due to their own fault. High electricity costs imply higher costs than estimated by the law (Hartz IV).

If the water heating is operated with electricity, there is a claim for additional demand. In the case of a flat with electrically operated heating systems, only the actual, reasonable heating costs are covered.

These measures are difficult to quantify because they are discretionary and applicable on a case-by-case basis. Consequently, no social measures with regards to the reduction of electricity and natural gas bills can be used in this exercise. However, we do depict the difference in effort rates for low-income consumers compared with other consumers in more prosperous conditions.

Disposable income and living wage

Germany's ***gross adjusted disposable income*** amounted to 30.333,00 EUR in 2019. Following the methodology previously explained, the gross adjusted disposable income is divided by 1,08, German's PPP in 2019, in order to correct it for cross-countries comparisons. As housing costs are estimated to be 25,90% of Germany's disposable income, we obtain a corrected gross disposable income of 28.854,10 EUR.

Regarding low-income consumers, Germany offers '*Arbeitslosengeld II*' – ALG II in short – (or Unemployment Benefit II) and '*Sozialgeld*' (or Social Security Benefit) as part of the benefits for securing living and thus part of the benefits for securing a decent minimum subsistence level[332]. ALG II and SGB II have been merged under the Hartz IV law.

The standard requirements for securing subsistence include, in particular, requirements for food, clothing, personal hygiene, household effects, household energy (excluding heating and hot water) and requirements for participation in social and cultural life, for a monthly amount of 401,00 EUR for adults living with a partner[333].

The minimum amount that can be claimed by a household of this type is 1.302,00 EUR whereas the maximum amount reaches 2.960,08 EUR[334]. For the minimum amount, the ALG II allocation and the children allowance have been solely taken into account, as a higher allowance is pre-determined depending on specific cases, further detailed. The given amounts are based on a monthly period for a household of two adults and two children.

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80 EUR/year per child is granted if children go to school and are at least 18 years old. Allowances for large households are not considered as this starts from 3 children.

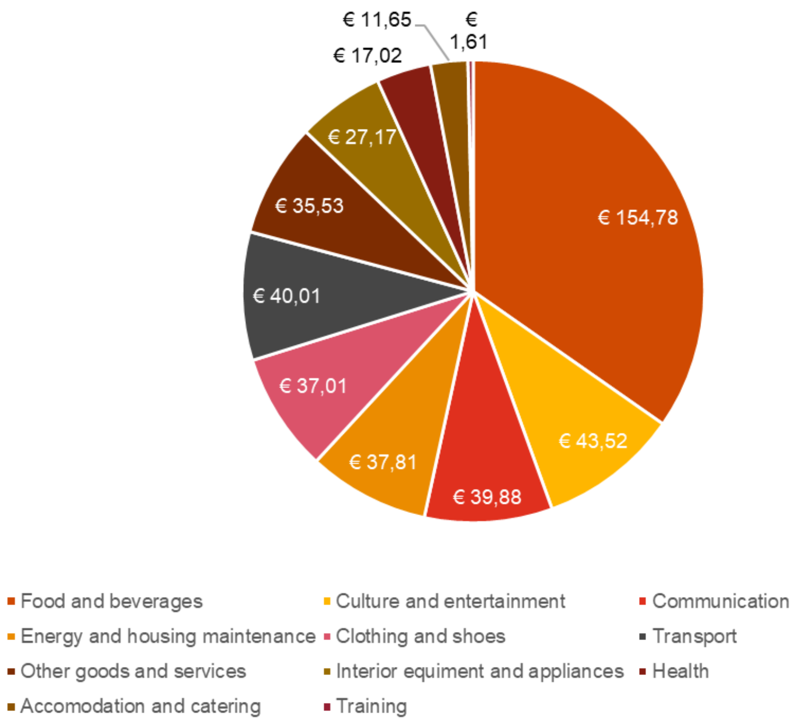
[331] (Betanet.de, 2019)

[332] Bundesministerium für Arbeit und Soziales, 2021

[333] HartzIV.org, 2021

[334] In very particular case, this allocation can be more important but specific amounts are not defined in the German law.

Figure 100: Computation of 2021 maximum living income (446 EUR) under Hartz IV



Benefits according to the '*Sozialgesetzbuch*' (or Social Security Code) (SGB II) are paid to persons who meet the following criteria:

- have reached the age of 15 and have not yet reached the age limit pursuant to § 7a (67 years old maximum);
- are fit for work;
- are in need of help, and
- have their habitual residence in the Federal Republic of Germany (eligible for benefits);
- children who live with beneficiaries in a so-called needs-based community are also entitled to Hartz IV benefits.

Persons entitled to benefits receive the so-called standard rate ('*Regelsatz*'). The Hartz IV standard rate (or living income) is calculated on the basis of statistically recorded data on income and expenditure from around 60.000 households. The level of the standard rate is based on the lower 20 per cent of households[335].

In addition to this basic allowance, a children allocation has to be taken into account for our studied household. In the case of children, adolescents and young adults, needs for education and participation in social and cultural life in the community are taken into account separately in addition to the regular needs (§ 28 SGB II). – from 250,00 EUR up to 328,00 EUR per child, depending on their age, on a monthly basis.

335 Bundesministerium für Arbeit und Soziales, 2021

Besides, additional financial supports can be granted under certain circumstances[336]. Still, on a monthly basis, these are specific cases where additional allowances per person are justified:

- Payment of health and long-term care insurance contributions for persons entitled to benefits which are obliged to pay insurance pursuant to § 5.1 no. 2a SGB V or § 20.1 no. 2a SGB XI (§ 251.4 SGB V, § 59.1 SGB XI) – max: 160,00 EUR[337];
- Grant towards insurance contributions for private health and long-term care insurance in accordance with § 26 SGB II – max: 384,58 EUR[338];
- Disabled people: Disabled persons who are able to work and who receive benefits for participation in working life, benefits for school and training within the framework of integration assistance according to SGB XII or other assistance to obtain a job are entitled to an additional requirement of 35 % of the standard requirement (148,40 EUR, § 21 para. 4 SGB II). Disabled children are not entitled to the additional requirement, disabled persons with reduced earning capacity are only entitled to it within the framework of education (§ 23 point 2 SGB II). – max: 156,10 EUR[339];
- Decentralised hot water supply: If the energy required for the production of hot water is not already included in the heating costs because the hot water is produced separately from the heating by devices installed in the accommodation (e.g. instantaneous water heaters), an additional requirement is initially recognised in accordance with § 21 Para. 7 SGB II, the amount of which is between 0,8 and 2,3% of the standard requirement, unless there is a different requirement in the individual case or part of the reasonable hot water requirement is recognised in accordance with § 22 Para. 1 SGB II. – max: 10,26 EUR[340];
- Individual cases: In the case of persons entitled to benefits, additional needs are recognised if in the individual case there is an irrefutable, ongoing, not just one-off special need (§ 21 para. 6 SGB II). The additional need is irrefutable if it is not covered in particular by the contributions of third parties and taking into account the potential savings of the beneficiaries and its amount deviates considerably from an average need. E.g. Care products for neurodermatitis, hygiene products for HIV infection; cleaning and household help for wheelchair users, costs of exercising rights of access, etc. – min: 40,10 EUR[341];

France

Social measures

France implemented social measures to help households considered in "energy poverty" ("précarité énergétique"). To be considered as vulnerable, a household or person must face "difficulties in obtaining the supply of energy necessary to meet his or her basic needs in his or her home because of inadequate resources or housing conditions"[342]. Objectively speaking, three criteria are defined to measure energy poverty:

1. Energy effort rate ("Taux d'effort énergétique (TEE)"):
    a. More than 10% of income is spent on energy;

[336] Further financial support mechanisms exist but could not be quantified as this is discretionary depending on one's conditions: One-off benefits for initial equipment for the dwelling including household appliance, costly nutrition or supplementary loans for instance.
[337] https://www.lohn-info.de/krankenversicherung_freiwillig.html
[338] https://www.arbeitsagentur.de/datei/merkblatt-zuschusskvpv_ba01540
[339] https://www.hartziv.org/mehrbedarf/behinderte.html
[340] https://www.hartziv.org/mehrbedarf/warmwasser.html
[341] https://www.hartziv.org/mehrbedarf/haertefaelle.html
[342] (Ministère de la Transition écologique et solidaire, 2020)

b. Household is part of the poorest 30% of the French population (first 3 income deciles).

2. Low income, high expenses indicator (“Indicateur bas revenus, dépenses élevées”): the household is considered in the situation of “energy poverty” if they have:

   a. An income below the poverty line or 60% of national median income;

   b. Energy expenditures, compared to their housing size (m²) or family composition, are higher than national median energy expenditures.

3. Feeling of discomfort: a subjective indicator that assesses people’s feelings towards thermal (dis)comfort and economic vulnerability.

To counter energy poverty, France replaced social tariffs by an energy voucher (“chèque énergie”) in 2018. This energy voucher is a direct financial help that households are to use to pay for their energy bills, regardless of their heating means (electricity, natural gas, fuel, wood, etc.). The amount perceived depends on the level of income and the composition of the household. Any household whose Reference Tax Income (RTI) is below 10.800,00 EUR per consumption unit[343] (CU) is automatically granted this energy voucher. The table below depicts the amount perceived in 2021.

Table 130: France energy vouchers amounts

Energy Voucher 2020				
Consumption Unit (CU)	**RTI < 5.600 EUR/CU**	**RTI between 5.600 and 6.700 EUR/CU**	**RTI between 6.700 and 7.700 EUR/CU**	**RTI between 7.700 and 10.700 EUR/CU**
1	194 EUR	146 EUR	98 EUR	48 EUR
Between 1 and 2	240 EUR	176 EUR	113 EUR	63 EUR
≥ 2	277 EUR	202 EUR	126 EUR	76 EUR

Given the variable potential value of this measure and the limited economic and private information on our residential profile, we use a range from the minimum value (48 EUR) to the maximum value (277 EUR)[344].

In France there is also a fund that helps people regarding different housing costs aspects. This help can take many forms, e.g. payment of first rent, payment of the costs regarding the opening of meters (gas, electricity, water), etcetera. However, this help is not quantified and is thus not taken into account for the computation of social measures.

Disposable income and living wage

The ***gross adjusted disposable income*** for France was of 26.158,00 EUR in 2019. As explained in the methodology, the gross adjusted disposable income is corrected by dividing it with France’s PPP in 2019 (1,10). Furthermore, we deduct housing costs that are deemed to be 17,60% of France’s disposable income. Therefore, we estimate a corrected gross disposable income of 19.602,74 EUR.

France implemented a living income, called “Revenu de Solidarité Active” (RSA) since 2009, which targets low-income people. To benefit from this allowance, one must respect several conditions that are listed hereafter:

[343] Consumption units are computed as follows:

- 1 CU = first person of household
- 0,5 CU = second person of household
- 0,3 CU = other dependants of household

[344] Where we assume a family composed of 2 adults and 2 children (CU= 1+0,5+0,3+0,3=2,1).

- Be over 25 years old or of 18 if the applicant has a dependent or unborn child or if he can prove 2 years of full-time equivalent professional activity in the last 3 years;
- No age requirement exists for people who are responsible for the care of one or more children (or unborn children);
- Permanent residence in France. Stays outside France must not exceed 3 months;
- For European Union nationals: a valid residence permit is required;
- For people of foreign nationality, the applicant must have been legally resident in France for at least 5 years;
- The average monthly income for the 3 months preceding the application of the entire household must be less than the amount of the RSA corresponding to the composition of the family;
- Entitlement to other aid (e.g. specific solidarity allowance) must have been claimed as a matter of priority.

Similarly, to Belgium and Germany, the amount provided varies according to the person's conditions (e.g. isolated or not). Again, this amount increases with the number of children that we assumed to be limited to two, which means a RSA reaching 1.186,04 EUR/month. In addition, France also grants children allowances[345] to all households with a minimum of two children, which according to one's situation can rise from 131,95 EUR/month[346] to 2.532,50 EUR/month[347].

In France, we thus present a living wage ranging from a maximum monthly amount of 3.718,54 EUR to a minimum monthly amount of 1.317,99 EUR.

The Netherlands

Social measures

In the Netherlands, no specific reduced tariff or other governmental measure exists to help vulnerable consumers lower their electricity or natural gas bills. However, as already introduced in chapter 4 (p.105) from this study, a reduction of the energy tax (461,62 EUR for 2021), for each electricity connection, has been taken into account when assessing the costs of our profile E-RES notably. If the yearly energy tax is inferior to the reduction, the surplus is deducted from the remainder of the electricity bill only. While this tax reduction lowers the final bill, this does not constitute a social measure. Therefore, there are no social measures aiming to reduce the bill for electricity and/or natural gas in the Netherlands that can be of use in this exercise.

Disposable income and living wage

According to Eurostat, the Netherlands' ***gross adjusted disposable income*** reached 26.496,00 EUR for 2019. With a PPP amounting to 1,20, in 2019, along with a 23,40% share of disposable income for housing costs, the Netherlands has a corrected gross disposable income of 16.953,26 EUR.

Additionally, several financial support incomes exist for low-income people designed to address different basic needs. In this regard, four support incomes are here-below presented:

[345] (Centre des liaisons européennes et internationales de sécurité sociale, 2020)

[346] Only allowances perceived would be the basic family allowance for two children.

[347] This amount is computed as follows : basic family allowances (131,55 EUR/month for two children), an additional complement for children above 14 years old (65,78 EUR/month for the second child), education allowance for the disabled child (up to 1.121,92 EUR/month depending on disability severity) and the return to school allowance for children from 15 to 18 years old (402,67 EUR/year per child).

1. **Housing allowance ("*huurtoeslag*")**[348]: allowance granted to low-income people in order to help them pay for their rent. To be granted this allowance, the following criteria must be met:
    a. Rent is below 752,33 EUR (for people >23 years old or with a child) or 442,46 EUR (for people between 18 and 23 years old);
    b. The rent is a self-contained living space;
    c. The income of the person and his partner/co-inhabitants is not too high. This limit depends on the person's rent, age and composition of the household;
    d. Assets are below 31.340,00 EUR/person;
    e. The person must live in the Netherlands, be registered at the municipality and have (or the partner/co-residents) the Dutch nationality or a valid residence permit;
    f. The person must be ≥ 18 years old;
    g. The person must have a signed tenancy agreement, pays the rent and can prove it with bank statements;
    h. Other specific situations may slightly change applying rules if the person is under 18 years old, is cared for at home, has a large household, is disabled, etc.

    Depending on one's conditions and its children's', this allowance may range from a minimum of 2,00 EUR/month to a maximum of 377,00 EUR/month.

2. **Care allowance *("Zorgtoeslag")***[349]: this allowance is a contribution to help support the costs of people's Dutch health insurance. In order to be granted this allowance, people must meet the following criteria:
    a. Be ≥ 18 years old;
    b. Have Dutch health insurance;
    c. Have an income < 31.138,00 EUR (lone person) or < 39.979,00 EUR (partners);
    d. Have the Dutch nationality or a valid residence permit;
    e. Have a maximum (combined) assets of 118.479,00 EUR (149.819,00 EUR for partners).
    f. Other specific situations may slightly change applying rules be a military, detained, foreign student, not having a fixed address, etc.

    Partners would be granted a total monthly amount of 207,00 EUR.[350]

The Dutch government introduced a social minimum ("*sociaal minimum*")[351] that represents the minimum amount a person needs to make a living. In case a person who is entitled to the above-mentioned allowances does not reach the social minimum, a supplement can be granted[352] for low-income people to make up for the social minimum. For the year 2021 the social minimum is 1.684,76 and we assume that our protected customers do not reach this minimum and we therefor take the social minimum. There are two allowances for children that can be added on top of the minimum:

[348] (Belastingdienst, 2020)
[349] (Belastingdienst, 2021)
[350] This figure comes from the potential amount of 199 EUR/month per couple divided by 2.
[351] (Rijksoverheid, 2020)
[352] Toeslagenwet.

1. **Regular children allowances** ("*kinderbijslag*") that can be of minimum 223,37 (children between 0 to 5 years) or maximum 316,14 EUR[353] (children aged between 12 to 17 years old) per child and per quarter[354]. In case of disability and the need for serious care, this allowance can be doubled, reaching a maximum amount of 632,28 EUR/month per child and per quarter.
2. **Child budget allowance *("kindgebonden budget")***: people having children benefit from this allowance under the same conditions applying for the care allowance and have 1 or more children under the age of 18. For a two-parents and two-children household, a minimum of 185,00 EUR/month to a maximum amount of 259,00 EUR/month can be reached if regular children allowances ("*kinderbijslag*") are granted.

We thus consider a living wage ranging from a minimum of 2.018,67 EUR/month to a maximum of 2.365,28 EUR/month.

The United Kingdom

Social measures

In the UK, in 2018, 2,40 million households (or 10,93 of the total population)[355] are considered to be energy poor, which happens when[356] :

- Energy costs are above average (> national median level)[357];
- If that amount was to be spent, households would be left with a residual income[358] below the official poverty line, which is of 60% of national median income.

To further delimit energy poverty, the UK also considers the average energy poverty gap, defined as the reduction in the energy bill that the average energy-poor household needs in order to not be classified as energy poor[359]. This amounted to 334 GBP in 2018.

Several measures exist in the UK to support households in a situation of energy poverty. The table below lists the existing measures.

[353] https://www.svb.nl/nl/kinderbijslag/nieuws/kinderbijslag-1-januari-2021-gaat-omhoog
[354] (Sociale Verzekeringsbank, 2020)
[355] (Department for Business, Energy & Industrial Strategy, 2019)
[356] This definition was introduced in 2013 and is in application in England. Officially, remaining countries part of the UK (Northern Ireland, Scotland and Wales) still use the old definition where a household is living in energy poverty if, to heat their home to a satisfactory standard, they spend more than 10% of their household income on fuel.
[357] Costs required to have a warm, well-lit home, with hot water and the running of appliances. An equivalisation factor is applied to reflect that households require different levels of energy depending on who lives in the property. This term encompasses various energy goods (e.g. natural gas).
[358] Residual income is defined as equivalised income after housing costs, tax and National Insurance. Equivalisation reflects that households have different spending requirements depending on who lives in the property.
[359] (Department for Business, Energy & Industrial Strategy, 2020)

Table 131: UK social measures

UK Social Measures		
Measures	**Explanation**	**Eligibility criteria/Conditions of application**
Warm Home Discount Scheme	Direct financial support to a lower energy bill. It was introduced to replace social tariffs in 2011. While some people are automatically granted this help, others must apply.	Mainly two groups of people are concerned by this measure that grants a 140 GBP rebate on energy bills: • Core group: low-income pensioners that receive a Guarantee Credit via the Pension Credit[360], i.e.: ○ People have reached State Pension age (66 or 67 depending on birth date); ○ People over State Pension age are getting Universal Credit (help to pay for living costs[361]). • Broad group households at risk of energy poverty. Five cases determine a person/household's belonging to the broad group[362]: 1. People receiving Income Support; 2. People receiving an Income-related Employment and Support Allowance; 3. People receiving an Income-based Jobseeker's Allowance; 4. People receiving child tax credit based on an annual income not exceeding 16.190 GBP. For these first four cases, in addition to allowances mentioned, people/households must either: - have parental responsibility for a child under the age of 5 who ordinarily resides with the people/household; - Or receive any one of the following: - Child tax credit which includes a disability or severe disability element; - A disabled child premium; - A disability premium enhanced disability premium or severe disability premium; - A pensioner premium, higher pensioner premium or enhanced pensioner premium. 5. People are receiving Universal Credit or having earned income between zero and 1.349 GBP in at least one of the relevant assessment periods, a rolling one-month period. Besides, the person must meet one of the three following conditions: - Have limited capability for work and/or work-related activity; - Be in receipt of the disabled child element; - Have parental responsibility for a child under the age of 5 who ordinarily resides with the person.
Winter Fuel Payment	Direct financial support to lower energy bill aiming elderly people.	One-off payment of 100 to 300 GBP to reduce heating bills for people meeting both following conditions: • Being born on or before 5 April 1954; • Having lived in the UK at least one day during the "qualifying week" (16 to 22 September 2019). In case the person did not live in the UK for the qualifying week, the person must have lived in Switzerland or a

[360] (UK Government, 2020)
[361] (UK Government, 2020)
[362] (OFGEM, 2018)

		European Economic Area (EEA) country and have a genuine and enough link to the UK (work, facility, etc.) to qualify for this payment. Considering the potential variable amount, which depends on the age, household composition and living situation (private or care home) we present a range from a minimum of 100 GBP to a maximum of 300 GBP[363].
The Cold Weather Payment	Direct financial support to lower energy bill only offered during periods of extremely cold weather.	Payments of 25 GBP/week when the temperature drops below 0°C between 1 November and 31 March. To qualify, households must be getting one of the following allowances: • Pension Credit, • Income Support, • Income-based Jobseeker's Allowance, • Income-related Employment and Support Allowance, • Universal Credit, • Support for Mortgage Interest. For all above-listed allowances, people/households must also meet the conditions listed for the Warm Home Discount Scheme. Considering the potential variable amount, we present a range from a minimum of 0 GBP (no days with temperature <0°C) to a maximum amount of 525 GBP (for 2019-2020, 21 full weeks with temperature <0°C).

Disposable income and living wage

The ***gross adjusted disposable income*** for The UK amounted for 25.155,00 EUR in 2019. Based on the methodology detailed at the beginning of this section, the UK's PPP, which was of 1,08 in 2019, is used to correct the gross adjusted disposable income. Besides, housing costs, that were of 25,10% of the UK's disposable income are deducted. Consequently, we assess a corrected gross disposable income of 17.381,73 EUR.

The UK provides a living wage ("Income Support") to help low-income people cover their living costs. To be entitled to this allowance, people must respect all below-listed criteria[364]:

- Have either no income or a low income, with a maximum of 16.000,00 GBP in savings;
- Not being in full-time paid work (<16 hours a week, and, if any, a partner working <24 hours a week);
- Not being eligible for Jobseeker's Allowance or Employment and Support Allowance;
- Living in England, Scotland or Wales;
- Be between 16 and legal pension age, and at least one of the following:
    - Pregnant;
    - A lone parent (including a lone adoptive parent) with a child under 5;
    - A lone foster parent with a child under 16;
    - A single person looking after a child under 16 before they're adopted;
    - A carer;
    - Be on maternity, paternity or parental leave;

[363] (Government, 2020)
[364] (UK Government, 2020)

- Be unable to work and receiving Statutory Sick Pay, Incapacity Benefit or Severe Disablement Allowance;
- Be in full-time education (not university), aged between 16 and 20, and a parent;
- Be in full-time education (not university), aged between 16 and 20, and not living with a parent or someone acting as a parent;
- Be a refugee learning English;
- Be in custody or due to attend court or a tribunal.

The income support ranges from 89,00 GBP/week for couples below 18 with children to 116,80 GBP for couples 18 or over and with children. Besides, (severe) disability premiums can be added on top of the income support if the person, under the legal retirement age, is either blind or recognised as disabled. This can amount up to 183,7 GBP/week if both partners are eligible for the severe disability premium[365].

Based on the person's situation with regards to the status (single, lone parent or living with a partner) and the age, the living wage changes. Furthermore, child benefits[366] are granted to UK's households with, for a two-children household, a maximum of 35,00 GBP/week[367]. In case children are recognised as disabled, they can benefit from an additional allowance (Disability Living Allowance) of up to 151,40 GBP/week[368].

As a result, we make use of a living wage ranging from a maximum monthly amount of 496,00 GBP (or 583,30 EUR) to a minimum monthly amount of 1.947,60 GBP (or 2.290,38 EUR) for a two-parents and two-children household.

Energy effort rates comparison

Based on the above-mentioned information, we present six charts designed to compare effort rates of residential consumers to pay for their energy bills. The energy effort rate can be understood as "the share of total energy expenditure in the household's disposable income" (ONPE, 2020). The higher this share is, the more effort one makes to pay for the energy and the less can be spent on other goods and services.

The first two charts (Figure 101 and Figure 102) look closer at the weight of electricity and natural gas bill in a household's disposable income. The following two charts (Figure 103 and Figure 104) analyse the same effort rates in comparison with the maximum living income whereas the last two charts (Figure 105 and Figure 106) observe these effort rates in relation with the minimum living income. The rates, changing depending on the implementation (or not) of social measures and the level of interventions, are compared across countries.

Countries and regions' effort rates compared to disposable income

As previously mentioned, the disposable income reflects the purchasing power of households and their ability to invest in goods and services or save for the future, by accounting for taxes and social contributions and monetary, in-kind social benefits. In this case, the share of housing costs was retrieved for disposable income.[369]

[365] Computed as the sum of the couple rate for the disability premium (49,80 GBP/week) and for the severe disability premium (133,90 GBP/week). (UK Government, 2020)

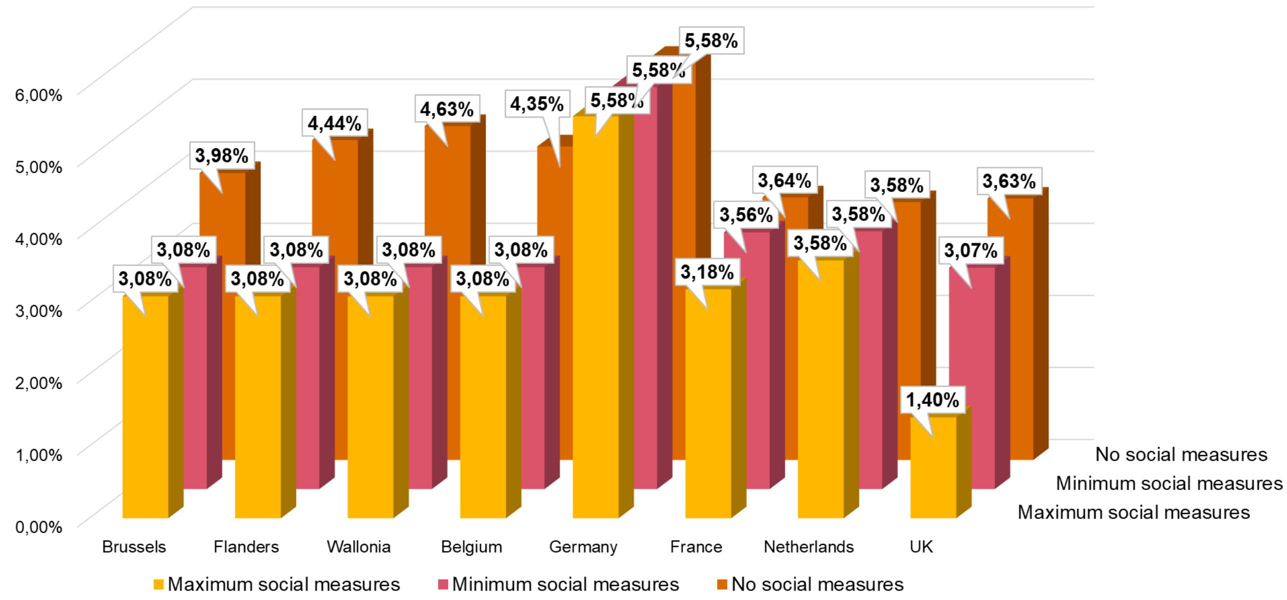
[366] Computed as the sum of the two child benefit rates: 21,05 and 13,95 GBP/week respectively for the first and second child. (UK Government, 2020)

[367] Computed as 21,05 GBP for the first child and 13,95 GBP for second child multiplied by the conversion factor of 1 GBP=1,1035 EUR. See **Error! Reference source not found.**, p.77.

[368] Computed as the sum of the highest rates of the care (89,15 GBP/week) and mobility components (62,25 GBP/week). (UK Government , 2020)

[369] This comparison must be nuanced since most consumers that have the possibility to benefit from social measures will, in most cases, have below average disposable income.

Figure 101: Electricity effort rate compared to disposable income

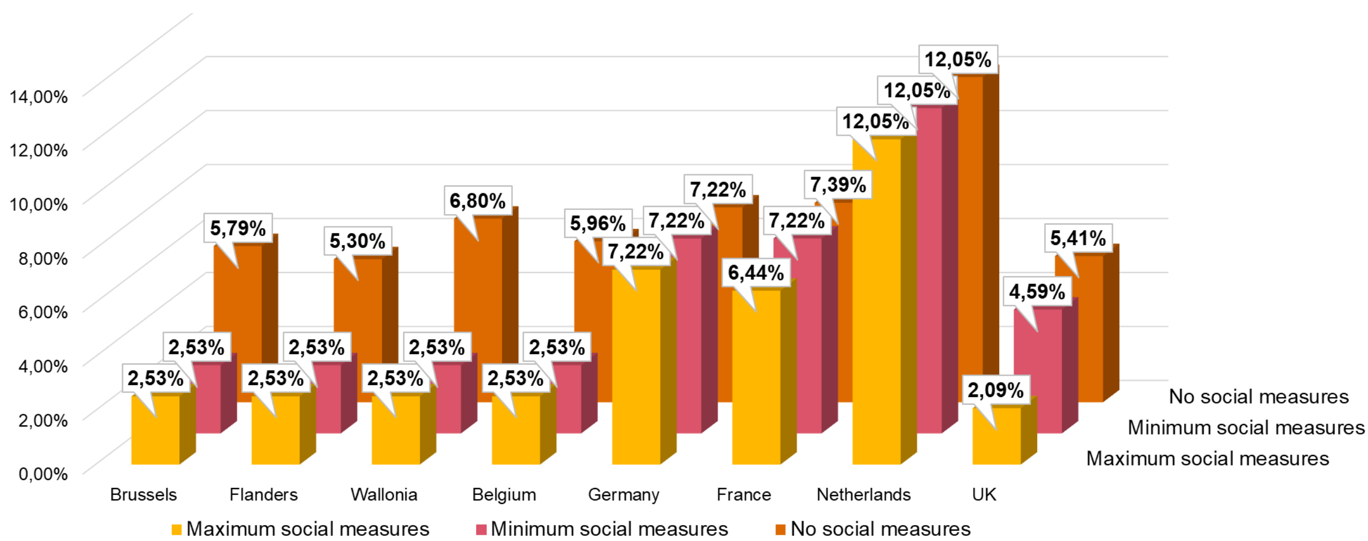


Germany has the highest effort rate of all regions/countries under review, whether social measures are applied or not. It is important to note that no specific quantifiable social measures, aiming at reducing electricity and/or natural gas bill, could be considered for Germany. When no social measures are considered the Belgian regions have the highest effort rate after Germany. Brussels is the Belgian region with the lowest effort rate (3,98%) and Wallonia with the highest (4,63%)

When social measures enter into action the positioning of the regions/countries changes and in particular for the Belgian regions and the UK. If we disregard Germany and take the minimum social measures into account France shows the highest effort rate while the Netherlands has the highest effort rate when maximum social measures are considered. In both cases the Belgian regions show a lower effort rate than every country except the UK. There is a significant difference between the effort rate of the UK and Belgium when the maximum social measures are considered, namely 1,68%.

As a whole, Belgian households often face the lowest electricity effort rate, after the UK, when social tariff applies.

Figure 102: Natural gas effort rate compared to disposable income



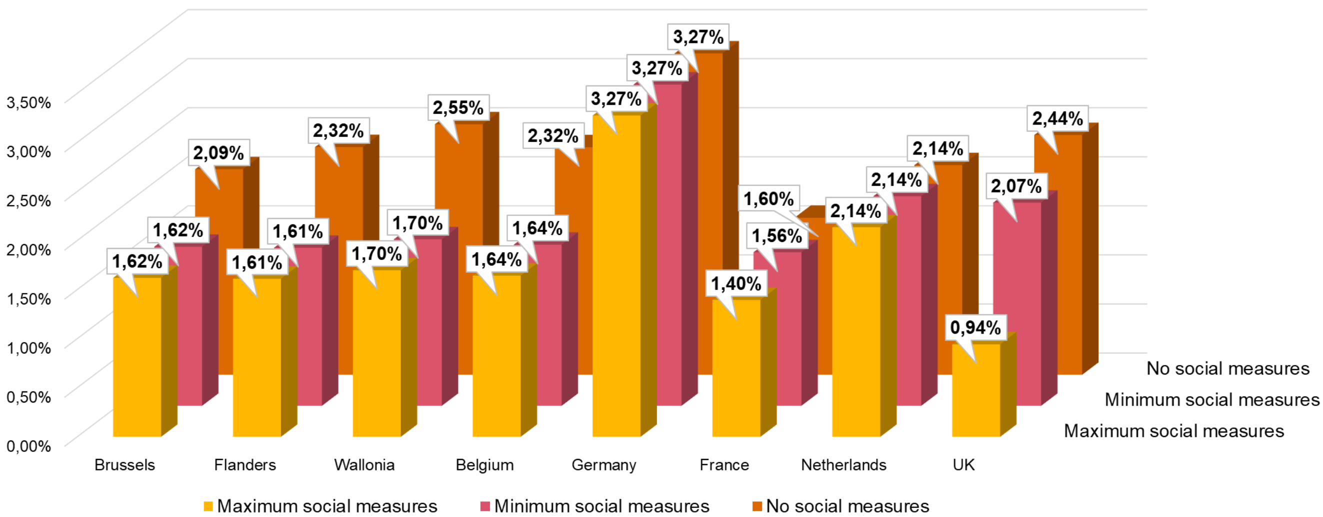
When comparing the natural gas effort rate with the electricity effort rate we do observe that this is much higher for natural gas consumers. There are a few observations to be made, firstly the regional differences in Belgium are more apparent regarding natural gas. Wallonia has the highest effort rate when no social measures are taken into account and is in third place overall, after the Netherlands and France. Secondly there is an impressive effort rate in the Netherlands which is also the country with the highest total invoice for G-RES. Lastly, similar to the effort rate for electricity we see a significant drop in effort rate when taking the social measures into account in the Belgian regions and the UK.

In general, the Belgian household consuming 3.500 kWh of electricity and 23.260 kWh of natural gas makes a relatively low effort to pay its bill compared to a similar household in foreign countries studied. Belgian households benefit from leveraging social measures as effort rates lower by 1,27% on average, with Belgium going down from second-most demanding country to second least demanding. As for natural gas, Belgian households always demonstrate relatively low effort rates compared to other countries as it is the second least (after the UK) demanding country even with no applicable social measures. The latter further widen the gap in terms of effort rates

Countries and regions' effort rates compared to a maximum living income

In this study, the maximum living income is considered as the potential maximum income one may be granted through allowances providing that several conditions are met (e.g. low-income household, children).

Figure 103: Electricity effort rate compared to a maximum living income

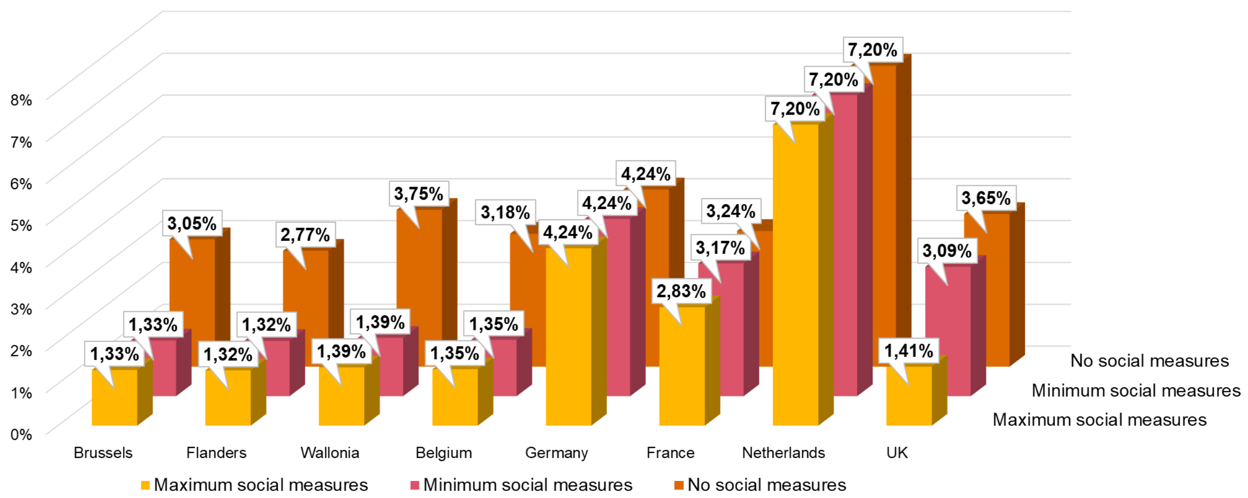


The figure above shows the effort rate of all the regions/countries under review compared to the living income that is granted. The height of the living income depends on different factors like health, family and financial situation. While there are some effort rate differences compared to Figure 101: Electricity effort rate compared to disposable income the positioning of the regions/countries remains very similar. In Belgium, Wallonia still has the highest effort rate and is in second position overall after Germany. We do see that the effort rate of the UK is higher than Flanders when comparing to the maximum living income which was not the case when comparing to disposable income.

Germany has the highest effort rate whether we take social measures into account or not. The effort rate in the Netherlands does not change depending on the social measures that are taken into account, but their position does change. While they did not display a high effort rate when not taking social measures into account, they do have the second highest effort rate once we take these measures into account.

Taking the social measures into account means a significant drop in the effort rate of the Belgian regions even though their competitive position does not really change. This is not the case for the UK that has one of the higher effort rates when no social measures are taken into account and the lowest effort rate when taking the maximum social measures into account.

Figure 104: Natural gas effort rate compared to a maximum living income



Again, we do see a big change between the electricity and natural gas effort rates when compared to the living income. While the effort rate in the Netherlands is lower than when we compared to the disposable income (12,05%) it is still by far the highest effort rate of all the regions/countries under review. The 2nd highest effort rate is observed in Germany is almost 3% lower than the Netherlands. It is interesting to note that while the Netherlands has the highest natural gas total invoice (for G-RES) they also have the highest effort rate.

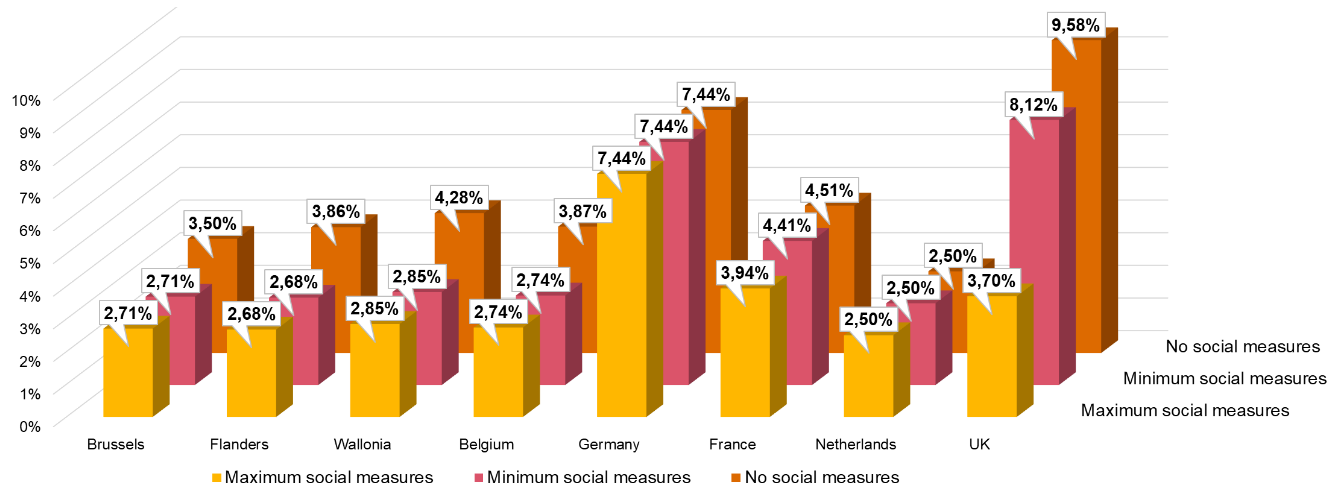
We do observe one other big change and that is the fact that while the UK was always the country with the lowest effort rate when taking the maximum social measures into account this is no longer the case. All the Belgian regions have a lower effort rate than the other countries under review when taking the maximum social measures into consideration. Wallonia is still the Belgian region with the highest effort rate.

Taking Belgium as a whole (average of the three regions), Belgium comes as the third most demanding country for electricity when no social measure applies. Although the countries change, once social measures are granted, Belgium remains the third most (or closely aligned) demanding country for electricity. However, regarding natural gas, Belgium either has the lowest (maximum social measures) or second-lowest effort rate.

Countries and regions' effort rates compared to a minimum living income

In this study, the minimum living income is considered as the basic income one may be granted through allowances depending on one's conditions (e.g. low-income household, children).

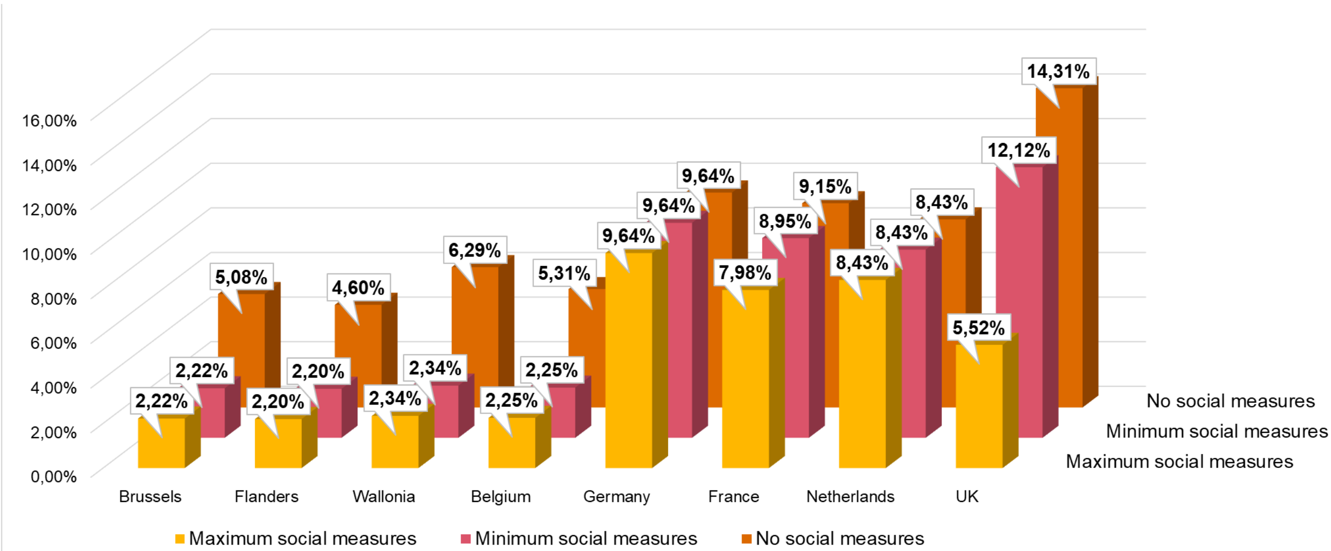
Figure 105: Electricity effort rate compared to a minimum living income



When comparing the effort made by governments to the minimum living income, we observe a few changes compared to the comparison with the disposable income and the maximum living income. While Germany was always the country with the highest effort rate for electricity this is no longer the case. The UK had one of the higher effort rates, but now displays the highest effort rate when taking no or the minimum social measures into account. Similar as before in Germany the highest effort rate is observed when the maximum social measures are considered. The Netherlands displays the lowest effort rate independent of the fact that social measures are considered or not.

On the Belgian level we do not see a very high effort rate, but our position is better than when comparing to the disposable income and maximum living income. While we still had a high effort rate compared to the other countries, when no social measures were taken into account, this is not the case when comparing to the living income.

Figure 106: Natural gas effort rate compared to a minimum living income



Similar to the previous analysis's we observe that the effort rate is higher for gas than for electricity. The UK again displays the highest effort rate, followed by Germany. Contrary to what we observed in Figure 105 the effort rates of Germany, France and the Netherlands are much closer to each other. The lower effort rate in Belgium is very apparent and is less than half the effort rate of the UK which has the second-lowest effort rate. Important to note is that Belgium and the UK are also the countries that display the lowest total invoice for G-RES.

Conclusions

Energy poverty is defined differently across countries. Nonetheless, most countries do provide financial support and/or social measures aimed at attenuating the bill for consumers having difficulties in supporting energy costs. From our analysis, it appears that the position of Belgium seems in line with or, in some cases, better than other countries under review. While this depends on the application of social measures when it comes to electricity, the Belgian effort rate for natural gas is certainly (one of or) the lowest across considered countries. This is regardless of the income (e.g. disposable income, maximum or minimum living income) it is compared to although results are slightly inferior when the maximum living income is considered.

The governmental intervention through the granting of a living income and social measures aimed at reducing one's energy expenses have a significant impact on lowering the financial burden for households. As Belgium displays one of the highest living incomes between the countries analysed, it directly helps dilute the efforts made to pay for energy. Besides, the existing social tariff further supports vulnerable households as this significantly reduces their energy expenses. When looking at the effort rate for electricity, Germany has the highest effort rate with the exception of the comparison with the minimum living income. This might be the result of the absence of quantifiable direct financial support for energy costs in this country. We observe higher effort rates for natural gas, and it is always the Netherlands that has the highest rate. This has to be nuanced because the Netherlands also has the highest total invoice for our natural gas household consumer.

Within Belgium and considering both living incomes, a tendency can be highlighted as Brussels tends to display lower effort rates for electricity whereas Flanders observes a smaller share of natural gas expenses in the households' revenues when no social measures apply. However, Flanders usually appears as the least demanding regions once social measures are in force.

Limitations of the analysis

This analysis has potential limitations that are here outlined. The study scope covers the comparison of households' energy effort rates depending on their income. Various scenarios were designed to take different incomes into account. Firstly employed, the disposable income constitutes a European macro-economic data measured uniformly across European countries. However, it is measured at a national level, preventing from highlighting regional differences in disposable incomes. Then, minimum and maximum living incomes were estimated for each country. If a clear direction was given by considering all basic incomes and potential allowances for a two-adults and two-children household, no common measure exists between the countries and regions under study. This entails increasing comparison difficulties. Moreover, it was preferred to opt for a broad understanding of minimum and maximum living income by including potentially "extreme" cases (e.g. highest level of children disability). If this ensures a higher income range, it may not always be highly representative of a country or region's situation as few families might be concerned by all the measures in effect simultaneously. Lastly we have to note that when comparing to the living income the "no social measures apply" situation is purely theoretical since these consumers will always benefit from the social tariff in Belgium.

At the reading of this analysis' conclusions, one must bear in mind the limitations mentioned here before. In this regard, complementary research must be conducted to consolidate the results obtained. As such, conducting similar research based on the first deciles of the average household income from the E-SILC study could offer a harmonised measure to derive households' lower incomes. Besides, taking into account the number of households impacted by each governmental intervention would be necessary. We notably refer to studies from the CEER[370] to do so.

370 (CEER, 2019)

9. Competitiveness of the Belgian industry in terms of energy and recommendations

9. Competitiveness of the Belgian industry in terms of energy and recommendations

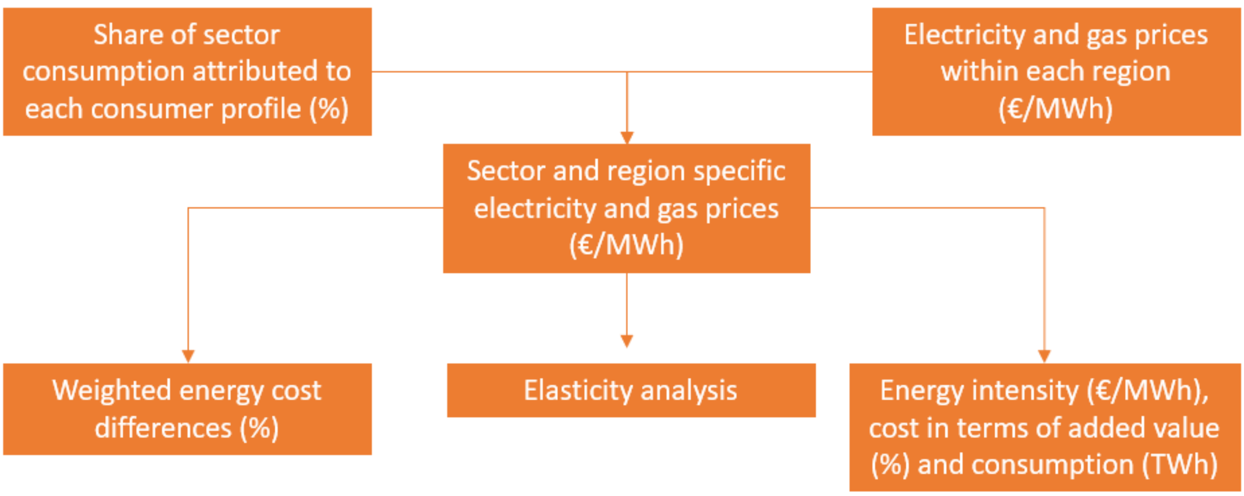
Competitiveness analysis

Methodology

In the 2020 report, the five most prominent industrial sectors in Belgium, in the framework of an energy price comparison, were selected : the chemical (NACE 20), the pharmaceutical (NACE 21), the basic metal (NACE 24), food & beverages (NACE 10-12) and the coke and petroleum products (NACE 23) industries[371]. In the previous chapters of this report, the gas and electricity prices were compared with those of Belgium's neighbouring countries: Germany, France, the Netherlands and the United Kingdom.

In this chapter, the information gathered in previous parts is combined to analyse the competitiveness of the five most important sectors in Belgium and its regions. The reasoning behind the analysis is detailed in the following figure.

Figure 107 : Methodology flowchart



As shown in the figure above, first, the electricity and natural gas prices in Flanders, Wallonia and Brussels are combined with the distribution of the different consumer profiles over the CREG data over the five most important sectors, resulting in sector- and region-specific electricity and natural gas prices. Then, these prices are used to calculate two important variables, through two separate pathways. The first pathway computes a weighted energy cost difference, which combines electricity and natural gas prices in one single measure that makes it possible to compare energy prices of a certain sector (within a certain region) with that of the European average, while

[371] In this section, we will use this order to present the results, accordingly to the importance order of the mentioned sectors.

the second pathway elaborates on the energy intensity, which expresses the energy cost of a certain sector and region in terms of added value.

This chapter is structured around this flow chart, which is further elaborated and detailed in the following sections.

Sector- and region-specific electricity and natural gas prices

In the previous chapters, the electricity and natural gas prices for the Belgian three regions were collected. Since the aim of this chapter is to analyse the competitiveness of these prices for the five most important sectors, it is necessary to define a method which uses these regional prices and expresses them at the sectoral level. That is done by combining the regional electricity and natural gas prices with the breakdown of consumer profiles by sector. They are based on data provided by the CREG[372] and show how the consumer profiles are broken down by sector[373], which consumer profile is the most predominant within each sector and therefore has the greatest impact on electricity and natural gas prices for that sector.

The relative frequency of each consumer profile per sector (obtained by multiplying the absolute number of profiles by the consumption of each profile[374][375] and dividing it by the total consumption per sector) is presented in the tables below. As it can be seen in the following table, E4 is the predominant profile in the food and beverages sector (NACE 10-12) and in the manufacture of chemicals (NACE 20), while it is E3 for the petroleum products (NACE 19), pharmaceuticals (NACE 21) and basic metals (NACE 24) sectors. The prices of these predominant consumer profiles have the largest effect on electricity prices for each of the first five sectors in each region. The Table 133 shows that in all sectors, the G2 profile is predominant in the chemicals (NACE 20), the pharmaceuticals (NACE 21) and the basic metals (NACE 24) sectors, while G1 profile is preponderant for the food and beverages (NACE 10-12) and the petroleum products (NACE 19).

The first column, for each profile, of the table underneath refers to absolute frequencies (#), while the second column, for each profile, of the same table refers to relative frequencies weighted by consumption profiles (%).

[372] The calculations were made on the basis of the same data as in the 2020 report.

[373] To identify the proportion of E0 companies, we used a specific methodology. The “Tableau de bord des PME et des entrepreneurs indépendants 2019” states that SMEs represent 99,8% of the total companies (619.414) in Belgium. Thanks to this report, we extrapolated the number of big companies and thanks to the CREG data, we extrapolated the proportion of big companies in the E0 profile.

[374] The data in both tables based on billing data from the CREG for all consumers with an offtake of more than 2 GWh of electricity or 1,25 GWh of natural gas per year.

[375] For electricity – E0: 2GWh, E1: 10GWh, E2: 25 GWh, E3: 100GWh, E4: 500GWh; For natural gas – G0: 1,25GWh, G1: 100GWh, G2: 250 GWh

Table 132: Distribution of electric consumer profiles per sector

Code NACE - Sector	E0 (2-10 GWh/year)[376]		E1 (10-17,5 GWh/year)		E2 (17,5-62,5 GWh/year)		E3 (62,5 -300 GWh/year)		E4 (>300 GWh/year)	
	#	%	#	%	#	%	#	%	#	%
NACE 20 - Manufacture of chemicals and chemical products	303	9,2%	19	3,7%	29	13,6%	15	42,7%	2	30,8%
NACE 21 - Manufacture of basic pharmaceutical products and pharmaceutical preparations	47	15,2%	1	2,6%	6	25,9%	3	56,2%	0	0,0%
NACE 24 - Manufacture of basic metals	149	6,2%	8	2,1%	9	5,5%	11	36,5%	4	49,7%
NACE 10-12 - Manufacture of food products; beverages and tobacco products	481	27,5%	51	19,6%	47	40,7%	5	12,2%	0	0,0%
NACE 19 - Manufacture of coke and refined petroleum products	42	2,8%	1	0,5%	1	2,0%	2	13,5%	5	81,2%

Source: CREG (2019), PwC Computations

Table 133 : Distribution of gas consumer profiles per sector

Code NACE - Sector	G0 (2-10 GWh/year)		G1 (10-17,5 GWh/year)		G2 (17,5-62,5 GWh/year)	
	#	%	#	%	#	%
NACE 20 - Manufacture of chemicals and chemical products	219	1,9%	43	29,5%	4	68,6%
NACE 21 - Manufacture of basic pharmaceutical products and pharmaceutical preparations	56	1,7%	11	14,0%	1	84,3%
NACE 24 - Manufacture of basic metals	75	2,3%	15	36,6%	1	61,1%
NACE 10-12 - Manufacture of food products; beverages and tobacco products	714	5,5%	153	94,5%	0	0,0%
NACE 19 - Manufacture of coke and refined petroleum products	126	3,0%	26	49,5%	1	47,6%

Source: CREG (2019), PwC Computations

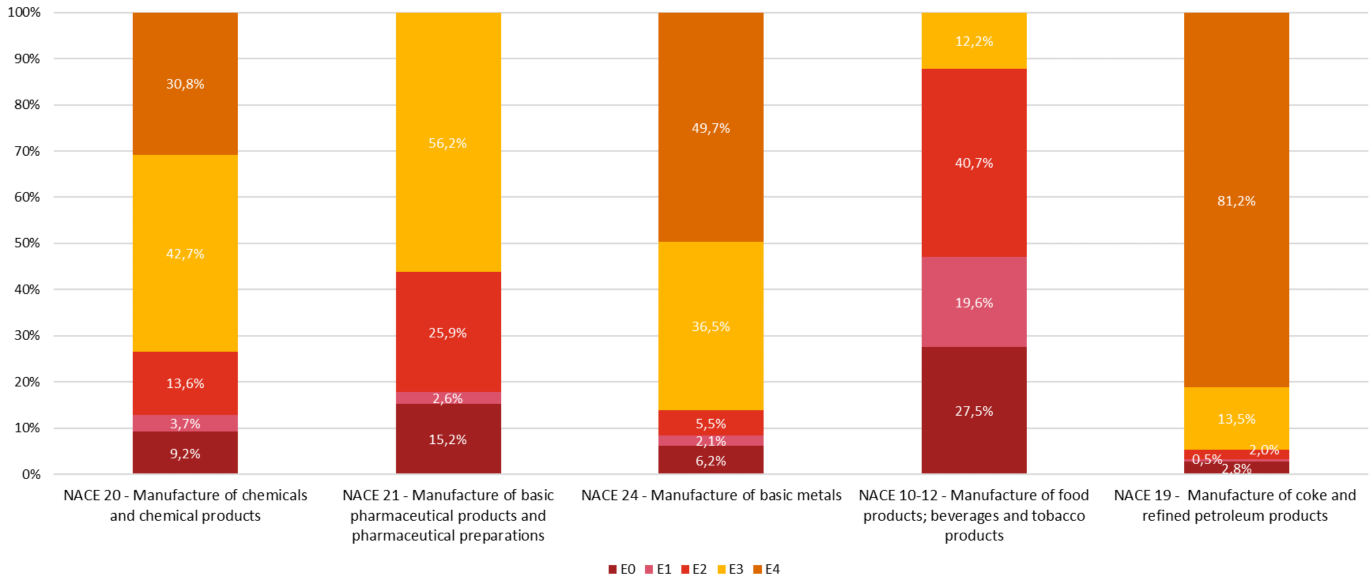
As an example, the absolute frequencies for the food and beverage (NACE 10-12) sector is 504 for E0. This means that 504 consumers have a quantity of invoiced electricity similar to the consumption of profile E0, 47 consumers for E1, 41 consumers for E2, 13 consumers for E3 and 7 consumers for E4. Multiplying these numbers by their respective consumption and summing them, results in theoretical total electricity consumption on the sector level of 6.300 GWh. Expressed in relative frequencies, 13% of the total consumption is represented by profile E0, 8% by E1, 16% by E2, 20% by E3 and 44% by E4. For this sector, the prices for E4 have a predominant effect on the calculation of the weighted electricity price for that sector, as it simply represents the largest share in the total electricity consumption for that sector. For natural gas, there are 714 consumers of profile G0, for G1

[376] The split between E0 and E1 is different from the other profiles split, due to a lack of data for companies consuming less than 10 GWh/year. We estimated the E0 number of companies and relative consumption based on the Belgian companies landscape while the other profiles are based on data given by the CREG

and 0 for G2. Multiplying these numbers by their consumption and summing both up, results in total theoretical consumption for the sector of 14.600 GWh. This reflects a relative frequency of 5,5% for G0, 94,5% for G1 and 0% for G2.

Along with the same logic, the relative frequencies of the consumer profiles for the other sectors have been calculated and are presented again in the two following figures. As it is clear from the figure below, profile E3 is the predominant profile in most of the sectors (NACE 20, 21 and relatively predominant for NACE 24), while for the food and beverages sector (NACE 10-12) it is profile E2 and for the NACE 19 (petroleum products) this is the profile E4, easily explained by the energy-intensity nature of the sector.

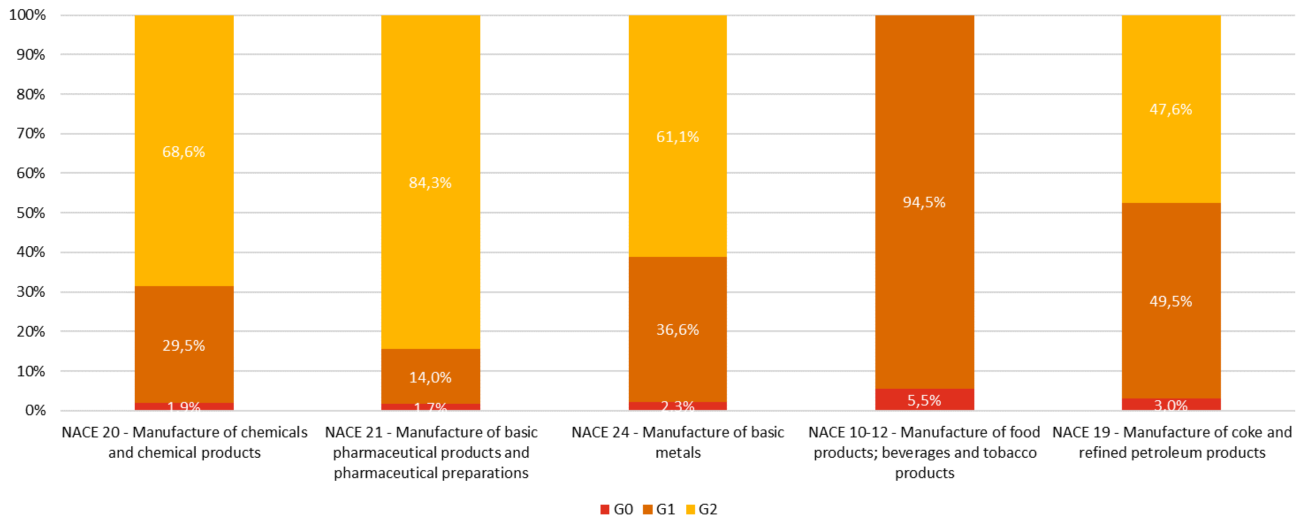
Figure 108 : Share of sectoral electricity consumption attributed to each consumer profile



Source: CREG (2019), PwC Computations

From the figure below, it is observed that for half of the sectors, G2 is the profile with the highest relative frequency (NACE 20, 21 and 24). Although there are just a few G2 consumer profiles represented in the different sectors, they can have a substantial relative frequency, caused by their high volume of natural gas consumption; it can be seen for the pharmaceuticals sectors with more than 80% of the total consumption with very few companies operating.

Figure 109: Share of sectoral natural gas consumption attributed to each consumer profile



Source: CREG (2019), PwC Calculations

As previously stated, these relative frequencies can be used together with the electricity and natural gas prices for each region to calculate sector and region-specific electricity and natural gas prices (in EUR/MWh). This is done by summing the multiplications of the prices retrieved for each consumer profile and their relative frequencies according to the formulas below:

$$\mathrm{P_{elec}\ for\ Sector_i\ in\ Region_j} = \sum_{X=0}^{4} (Price\ for\ E_X\ in\ Region_j * Relative\ frequency\ of\ E_X\ in\ Sector_i)$$

$$\mathrm{P_{gas}\ for\ Sector_i\ in\ Region_j} = \sum_{X=0}^{2} (Price\ for\ G_Y\ in\ Region_j * Relative\ frequency\ of\ G_Y\ in\ Sector_i)$$

When comparing those regions and sector-specific prices to the European average[377], they can be expressed as price differences with the European average. We have calculated the average prices of electricity and natural gas in the neighbouring countries according to the following formulas[378]:

$$\mathrm{European\ average\ of\ P_{elec}\ for\ Sector_i} = \sum_{X=0}^{4} (Average\ price\ for\ E_X\ in\ neighbouring\ countries * Relative\ frequency\ of\ E_X\ in\ Sector_i)$$

$$\mathrm{European\ average\ of\ P_{gas}\ for\ Sector_i} = \sum_{X=0}^{2} (Average\ price\ for\ G_Y\ in\ neighbouring\ countries * Relative\ frequency\ of\ G_Y\ in\ Sector_i)$$

Electricity and natural gas price differences (in %) measure the difference in price for a certain sector *i* in a certain region *j* with the European average. These electricity and natural gas price differences in relation to the average in Belgium's neighbouring countries, specific to a sector or region, are presented below and are illustrated in

[377] The European average throughout this section refers to the average of the neighbouring countries under scope in this report: Germany, France, the Netherlands and the United Kingdom.

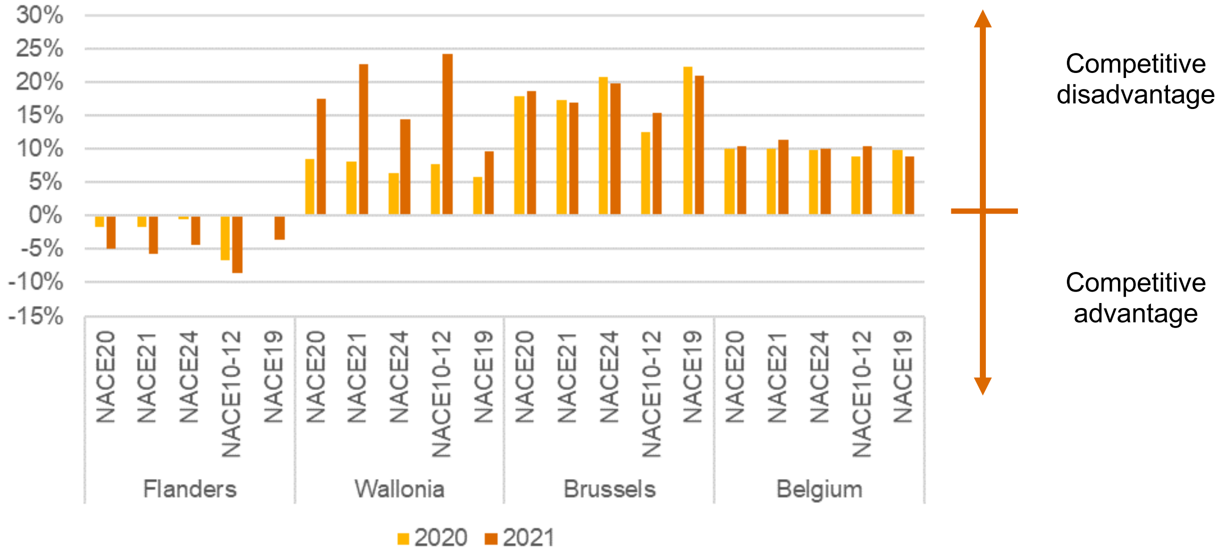
[378] We have used the same share of sectoral electricity and natural gas consumption attributed to each consumer profile to calculate the average price of electricity and natural gas in the neighbouring countries. This way we assume that the different consumer profiles are equally distributed in the sectors under scope of the neighbouring countries.

Figure 110 (for electro-intensive consumers), Figure 111 (for non-electro-intensive consumers) and Figure 105 for natural gas consumers.

$$X_{ij} = (\frac{P_{elec}\ in\ Sector_i\ in\ Region_j\ - European\ average\ of\ P_{elec}\ in\ Sector_i}{European\ average\ of\ P_{elec}\ in\ Sector_i})$$

$$Y_{ij} = (\frac{P_{gas}\ in\ Sector_i\ in\ Region_j\ - European\ average\ of\ P_{gas}\ in\ Sector_i}{European\ average\ of\ P_{gas}\ in\ Sector_i})$$

Figure 110: Electricity price differences for electro-intensive consumers compared with the average in the neighbouring countries

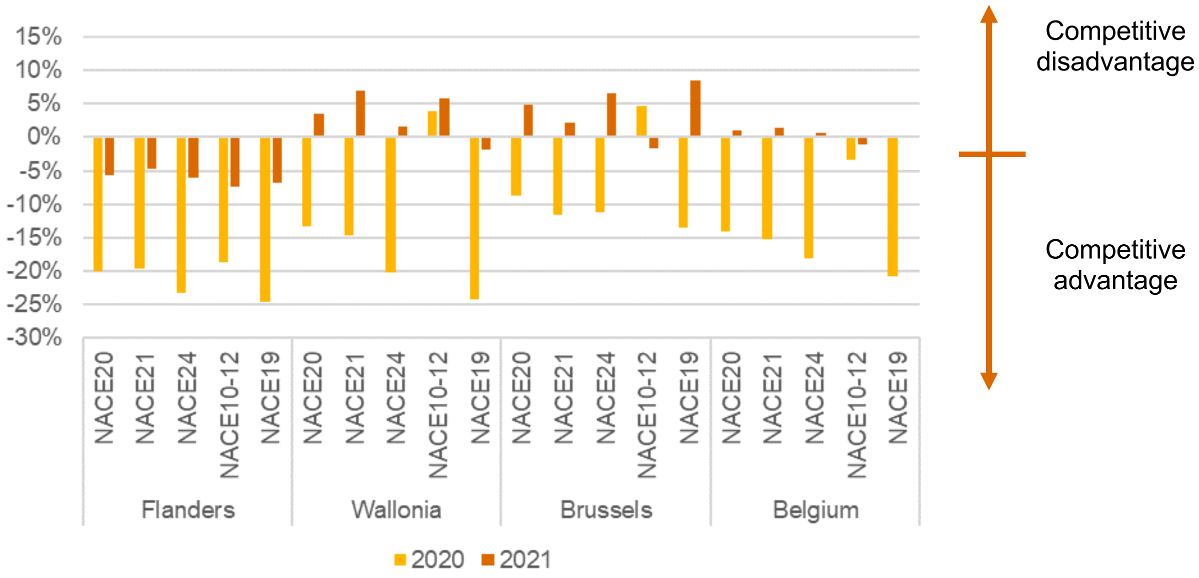


Source: CREG (2019), PwC Calculations

One can observe on the above figure, that electricity price differences differ substantially from sector to sector and region to region. Belgium globally faces a competitive disadvantage when it comes to comparing electro-intensive consumers. However, Flanders appears to be the most competitive region as it always faces a competitive advantage compared to our European average, as a consequence of the cap. The cap instituted in Flanders leaves the NACE 10-12 as the most significant advantage for Flanders whereas the NACE 19 sector is the smallest from all studied sectors. Flanders welcomes relatively more companies in the food manufacturing industry, compared to the Wallonia and Brussels. Conversely, Brussels and Wallonia, regarding all sectors, are seen as relatively non-competitive, with NACE 21 being the least competitive sector in both regions. In the case of Brussels, this region is probably a theoretical case due to the limited number of industries on its territory.

Regarding the evolution of competitivity, no major differences are noticeable for Flanders and Brussels between 2020 and 2021. Wallonia has seen its situation particularly deteriorate between the years 2020 and 2021, facing a higher competitive disadvantage in 2021, especially in the NACE 21 and NACE 10-12 sectors.

Figure 111: Electricity price differences for non-electro-intensive consumers compared with the average in the neighbouring countries



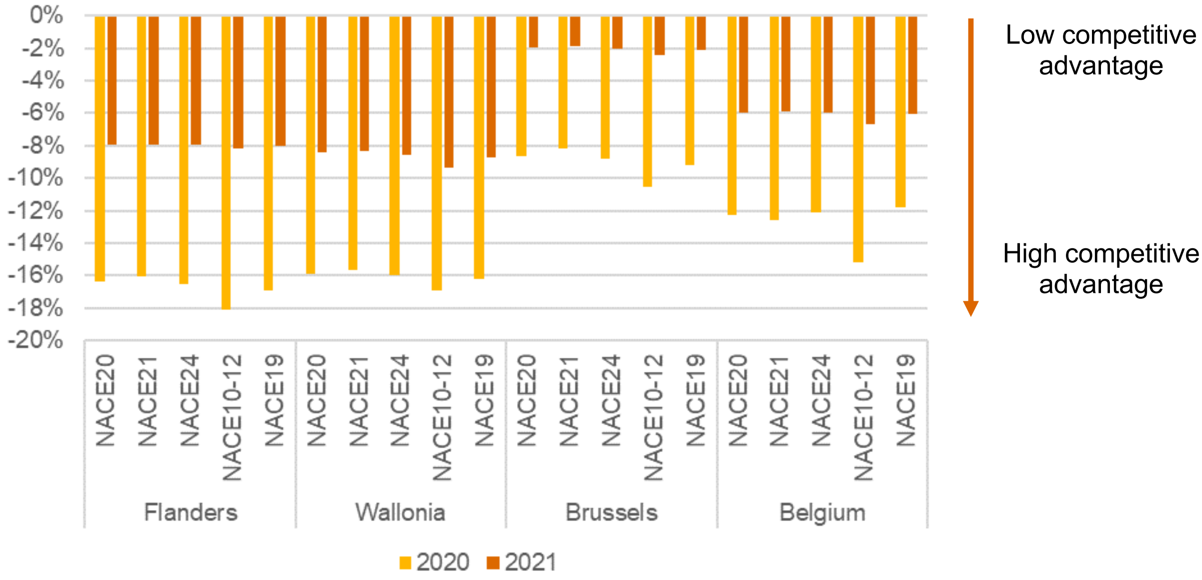
Source: CREG (2019), PwC Calculations

From the figure above, one can observe that Flanders display an important competitive advantage, for all the studied sectors when looking at non-electro-intensive industries. However, similarities can be drawn between 2020 and 2021: Flanders remains the most competitive region among all, whereas Brussels is the least competitive, especially regarding the sector NACE 19. Nevertheless, Belgium used to face a competitive advantage while the situation is controversial : Belgium is now facing little to no advantage or a slight disadvantage. The most advantageous sectors are different between electro-intensive and non-electro-intensive industries. Regarding non-electro-intensive consumers, the food and beverages sector (NACE 10-12) for two regions exhibits the highest advantage for electricity prices in Flanders. Wallonia's most competitive sectors are the manufacture of coke and refined petroleum products (NACE 19) and the manufacture of basic metals (NACE 24) while this is the NACE 10-12 (food and beverages) for Brussels.

Overall, Belgium's competitiveness has deteriorated: Flanders shows a smaller competitive advantage, Wallonia now faces a disadvantage in the NACE 20, 21, and 24 sectors, in addition to the previously disadvantaged NACE 10-12 sector, Brussels appears to face a disadvantage in all sectors, except the NACE 10-12. Similarly to the competitiveness for electro-intensive consumers, Wallonia is the region whose situation has deteriorated the most. This would therefore be a structural problem.

When comparing the two figures regarding the electricity price differences, we observe a mitigated situation for non-electro-intensive industries whereas electro-intensive industries are facing a competitive disadvantage – except for Flanders thanks to the cap on the financing of renewable energy. Brussels shows, in both case a relatively less competitive advantage or a relatively higher competitive disadvantage.

Figure 112: Natural gas price differences for natural gas consumers in comparison with the average in the neighbouring countries



Source: CREG (2019), PwC Calculations

From the figure above, it can be observed that natural gas prices – generalized on a sectoral level - are more competitive in Belgium than in the neighbouring countries, for all sectors and in all regions, and so even more for sectors with a heavier part of G1 and G2 consumers (for example NACE 19)[379]. However, while Belgium retains a competitive advantage in all sectors, this advantage has decreased, as is the case for electricity.

Electro-intensive and non-electro-intensive consumers

In the previous and following sections, two different results in terms of energy price differences are presented: one shows the comparison within electro-intensive consumers, and the other shows the comparison within non-electro-intensive consumers. The first, valid for the electro-intensive consumer, compares prices in each region of Belgium with the lower range of prices observed in neighbouring countries; assuming that, in each of the neighbouring countries, the 'competitors' of Belgian industrial consumers meet the national electro-intensity criteria and therefore benefit from significant reductions in several components of the electricity price, as shown in the following table.

[379] Belgium's competitiveness level notably results from its lower commodity prices. These prices were estimated based on ZTP trading hub prices, which was 0,8 to 1,9 EUR/MWh smaller than in other studied countries for January 2020. However, one should be aware that a relatively strong convergence was observed between North-Western European countries for the other months in 2020.

Table 134: National electro-intensity criteria

Country/Region	Criteria
Germany	For consumers of most industrial sectors: when electricity cost >14% of gross value added. For consumers of a less extensive list of industrial sectors: when electricity cost >20% of gross value added [380].
The Netherlands	Industrial consumers classified as being energy-intensive and concluded a multiple-year agreement with the Dutch government to save energy by improving their energy efficiency[381].
France	Substantial reductions exist for industrial consumers where the CSPE (of 22,50 EUR/MWh) represents at least 0,50% of their value added. For example, for a consumer of 10 GWh/year, a value added of 45 MEUR or less in the annual accounts is necessary to qualify for this criterion (i.e. the CSPE is at least 0,50% of the value added).
Flanders	Reductions exist for industrial consumers with an electro-intensity of more than 20 % for the sectors listed in Annexes 3 and 5 of the EEAG (cap of 0,50 % of gross value added) and for all consumers belonging to the sectors listed only in Annexe 3 of the EEAG (cap of 4 % of gross value added).[382]

The second result, on the contrary, is valid for non-electro-intensive industrial consumers in Belgium. It compares prices in the three Belgian regions with the upper range of prices observed in neighbouring countries, assuming that, in each of the neighbouring countries, the 'competitors' of Belgian industrial consumers do not meet the national electro-intensity criteria and therefore pay the maximum price.

Whenever a series of results in neighbouring countries was available, we compared the prices in the three Belgian regions in the middle of the range of neighbouring countries.

At the Belgian level, there is a lack of publicly available information, making it impossible to identify the importance of electro-intensive enterprises in each of the industrial sectors studied. However, it is possible to give an indication at the purely macroeconomic level as to the electro-intensity (and natural gas intensity) of the sector. It must be made clear that behind these figures, at the macroeconomic level, lies a great complexity in terms of specific sub-sectors and consumer profiles. They do, however highlight the sectoral energy intensity in Belgium and the severity of the criteria in neighbouring countries.

To get an idea of the relationship between the electro-intensity criteria of the neighbouring countries and the level of electro-intensity in Belgium and its 5 main sectors, we first introduce in this section the concept of energy cost based on:

- The electricity and natural gas prices for each sector and region (EUR/MWh) on the one hand (Figure 113);
- Energy intensity or MWh/EUR of value added for both electricity and natural gas per sector on the other hand (Figure 114).

The cost of energy reflects the cost of electricity and natural gas for the sector as a whole in terms of value added.

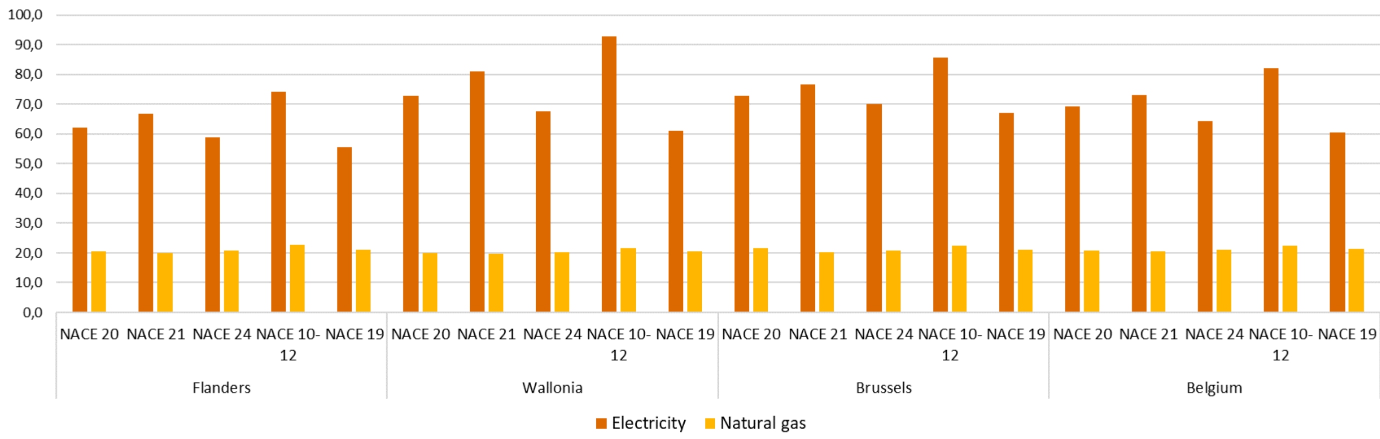
[380] These consumers have a significant reduction on some taxes for instance (e.g. EEG-Umlage)

[381] An energy-intensive enterprise is an enterprise for which energy or electricity costs represent more than 3 % of the total value of production or for which energy and mineral oil taxes represent at least 0,5 % of the value added. (Overheid.nl, 2020)

[382] Only for industry (NACE 5-33) and deep frost alimentary (46391 and 52100) and Cargo handling in seaports (NACE 52241).

As can be seen in the following figure, electricity prices are the highest for the NACE 10-12, followed by NACE 21 due to important energy consumption with a high added value created per MWh for NACE 21. Natural gas prices present a flattened curve with similar price levels among sectors.

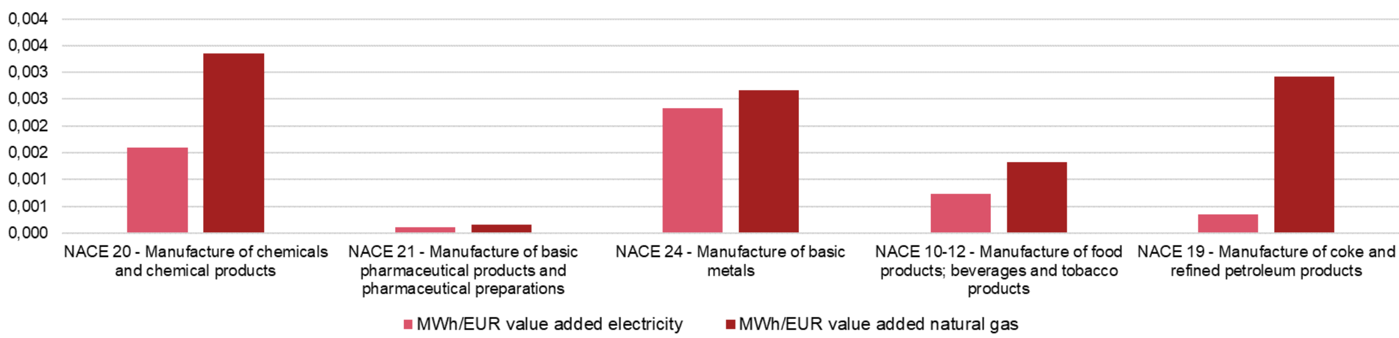
Figure 113: Sector and region-specific electricity and natural gas prices in 2021[383]



Source: CREG (2019), PwC Calculations

As shown in Figure 114, the energy intensity is higher for natural gas than for electricity and varies depending on the sector. Sectors with high values in MWh/EUR value added are considered as energy-intensive, as is the case for NACE 24 and NACE 20 regarding natural gas. NACE 19 seems to be a contrasting case: it is the most natural gas-intensive sector, whereas it is one of the lowest electricity-intensive sectors when talking about these 5 sectors.

Figure 114: Energy intensity per sector in Belgium in 2021



Source: Federal Planning Bureau, Eurostat (2019), PwC Calculations

Combining sector- and region-specific electricity and natural gas prices with energy intensity figures produces a measure that represents the cost of electricity or natural gas as a percentage of value added (presented in

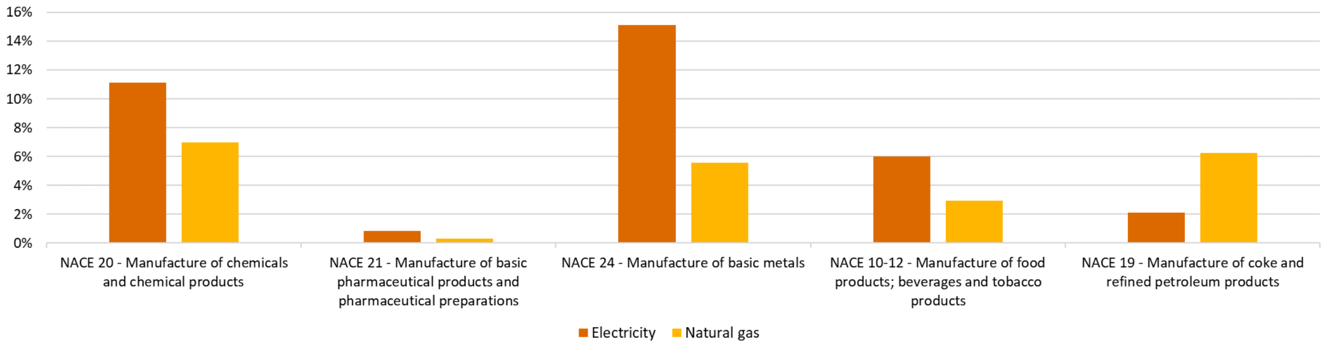
Figure 115). These data are extracted according to the following formulas:

$$\text{Electricity cost for Sector i in Region j (\% of added value)} \\ = P_{elec}\ for\ Sector\ i\ in\ Region\ j * Energy\ intensity\ (electricity)\ for\ Sector\ i$$

[383] This graph is based on average price values between electro-intensive consumers and non-electro-intensive consumers

$$\text{Natural gas cost for Sector i in Region j (\% of added value)} = P_{gas}\, for\ Sector\ i\ in\ Region\ j * Energy\ intensit\ (natural\ gas) for\ Sector\ i$$

Figure 115: Energy cost as % of value added in Belgium in 2021



Source: Federal Planning Bureau, Eurostat (2019), PwC Calculations

The figure above shows that, although natural gas is relatively more consumed in the production process than electricity, its cost as a percentage of value added is much lower than that of electricity. This is due to the relatively low prices of natural gas compared to electricity, and the fact that the consumption of natural gas per euro of value added is only slightly higher than that of electricity. Furthermore, it can be observed that the cost of electricity in relation to value added is highest for the NACE 24 (predominantly E3) and NACE 20 (predominantly E4) sectors in all regions, while the cost of energy, in general, is lowest for the NACE 21 sectors in Belgium (predominantly E3).

As mentioned above, in Germany, France and the Netherlands, certain industrial consumers can claim reductions or exemptions from their energy taxes, based on national criteria. Most of these criteria are related to the cost of energy as a percentage of value added. For example, in Germany, the criterion for a lower tax regime is the cost of electricity exceeding 14% of value added. As shown in the above figure, no sector (with the exception of NACE 24) in Belgium achieves an electricity cost of more than 11% at sector level. However, as these are aggregated figures that hide information on the level of industrial consumers, some individual industrial consumers may have a higher than average electricity intensity and therefore have to compete with the so-called electro-intensive consumers in neighbouring countries. As will be seen in the next section, these energy-intensive companies could be at a significant disadvantage compared to their European competitors.

Weighted energy cost differences

The graphical representation of the energy prices in the regions/countries under review are interesting to see what the origin of the cost differences are. However, they cannot tell us whether or not the cost of energy as a whole is advantageous. It depends on the amount of electricity and natural gas consumed throughout the production process. As this information is publicly available, we detail in this section how to combine the differences in electricity and natural gas prices with the consumption volumes of both types of energy into a single measure: the weighted energy cost difference. This measure compares the overall cost of energy in a given sector and region with the European average[384]. If an industrial company consumes a lot of electricity and almost

[384] The European average throughout this section refers to the average of the neighbouring countries under scope in this report: Germany, France, the Netherlands and the United Kingdom

no natural gas during its process, it is highly likely that electricity prices will have a significant impact on its energy bill.

The weighted energy cost difference is calculated according to the below formulas[385]. The two first formulas are helpful to better understand the final computation, which is the relative energy cost difference expressed in percentage

$$\text{Energy cost difference for Sector}_\text{i} \text{ in Region}_\text{j} \text{ (in } \frac{\text{EUR}}{\text{MWh}}\text{)}$$
$$= \frac{(European\ average\ of\ P_{elec}\ for\ Sector_i\ *\ X_{ij}) * C_i + (European\ average\ of\ P_{gas}\ for\ Sector_i * Y_{ij})}{C_i + 1}$$

$$\text{Energy cost difference for } \text{P}_\text{energy} \text{ for Sector}_\text{i} \text{ (in } \frac{\text{EUR}}{\text{MWh}}\text{)}$$
$$= \frac{(European\ average\ of\ P_{elec}\ for\ Sector_i\ *\ C_i + European\ average\ of\ P_{gas}\ for\ Sector_i}{C_i + 1}$$

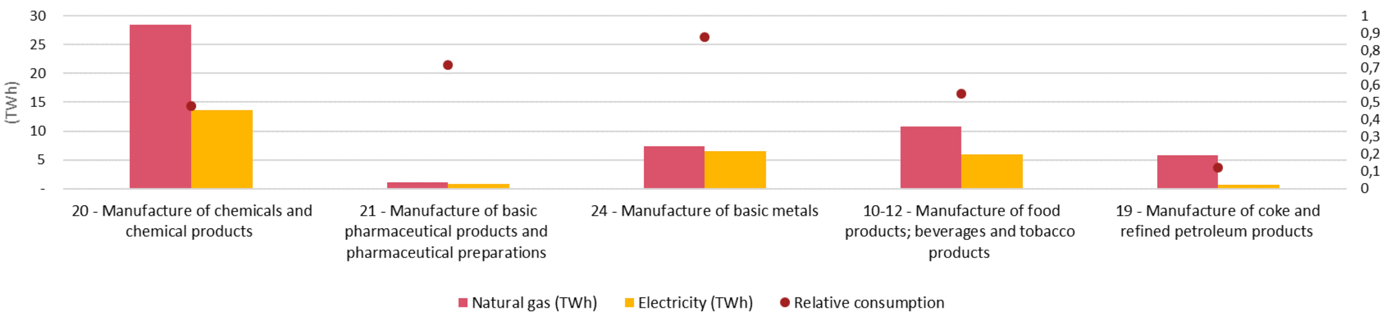
As mentioned previously, using the two formula above, we compute the energy cost difference thanks to the following formula:

$$\text{Weighted energy cost difference for Sector}_\text{i} \text{ for Region}_\text{j} \text{ (in \%)}$$
$$= \frac{European\ cost\ difference\ for\ Sector_i\ in\ Region\ _j}{European\ average\ of\ P_{energy}\ for\ Sector_i}$$

The relative consumption (C_i) used in the first equation to calculate the energy cost difference is the ratio of the total volume of electricity to the total volume of natural gas consumed in each sector. It represents which of the two types of energy is used more intensively during the production process. It is calculated on the basis of the macro-economic data from the energy consumption accounts that we have recovered for each sector (from the Federal Planning Bureau). The following figure gives an overview of relative consumption by sector.

The volume of each energy type consumer by sector is presented on the left axis, while the relative consumption (volume of electricity divided by the volume of natural gas) is presented on the right axis. It is clear that the 5 most important sectors have a relative consumption of less than 1, which means that the 5 most important sectors consume more natural gas than electricity during the production process. For NACE 24, consumption is relatively balanced (relative consumption of 0,87), but within NACE 20 and NACE 19, natural gas consumption is almost double compared to electricity consumption.

Figure 116: Energy consumption per sector



Source: Federal Planning Bureau, PwC Calculations

[385] Where X_{ij} refers to the electricity price for Sector i in Region j and Y_{ij} refers to the natural gas price for Sector i in Region j

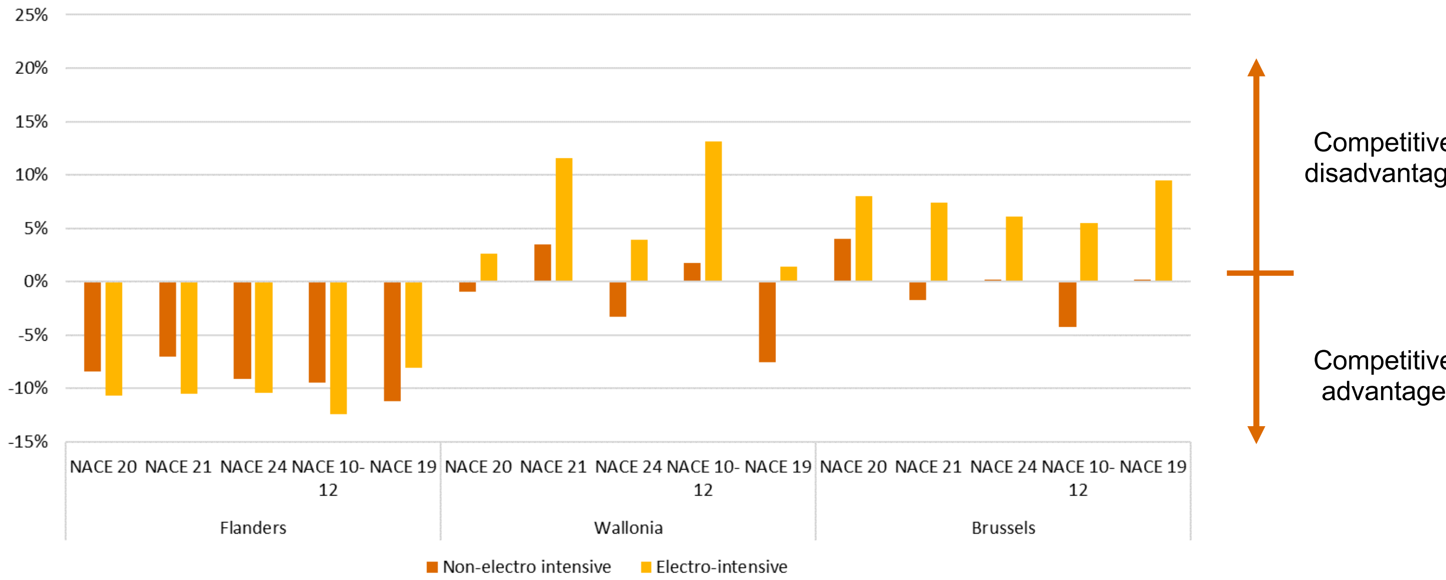
Relative consumption plays an important role in the calculation of the weighted energy cost differences since the lower the value of C_i (i.e. the more natural gas is consumed compared to electricity fed during the production process), the greater the importance of natural gas prices in the total cost of energy and in the calculation of the weighted energy cost differences is.

The results of the electricity and natural gas price differences for electro-intensive and non-electro-intensive consumers and the calculation of the weighted energy cost differences are presented in Table 135. These electricity and natural gas price differences have been calculated for the whole sector. As they are presented at a macro level, they may hide important differences between industrial consumers in the same sector.

Table 135 : Results for every industrial sector in Flanders, Wallonia and Brussels compared to the average prices in Germany, France, the Netherlands and the UK (2021)

Region	Sector	Electricity price difference (electro-intensive)	Electricity price difference (non-electro-intensive)	Natural gas price difference	Relative consumption	Weighted energy cost difference (electro-intensive)	Weighted energy cost difference (non-electro-intensive)
Flanders	NACE 20	-11,18%	-8,76%	-9,12%	0,48	-10,65%	-8,45%
	NACE 21	-11,24%	-7,34%	-8,05%	0,72	-10,48%	-7,03%
	NACE 24	-10,92%	-9,56%	-9,11%	0,88	-10,44%	-9,08%
	NACE 10-12	-13,46%	-9,18%	-9,02%	0,55	-12,39%	-9,48%
	NACE 19	-10,45%	-10,77%	-1,74%	0,12	-8,05%	-11,20%
Wallonia	NACE 20	5,79%	0,83%	-9,19%	0,48	2,58%	-0,97%
	NACE 21	16,27%	4,37%	-8,05%	0,72	11,55%	3,49%
	NACE 24	7,79%	-1,59%	-9,17%	0,88	3,91%	-3,32%
	NACE 10-12	18,25%	4,26%	-9,02%	0,55	13,13%	1,76%
	NACE 19	2,51%	-5,55%	-1,79%	0,12	1,43%	-7,55%
Brussels	NACE 20	11,09%	5,64%	-1,60%	0,48	8,03%	3,99%
	NACE 21	10,07%	-1,19%	-3,89%	0,72	7,43%	-1,76%
	NACE 24	11,71%	1,98%	-5,71%	0,88	6,07%	0,22%
	NACE 10-12	9,46%	-3,49%	-7,23%	0,55	5,51%	-4,25%
	NACE 19	12,37%	3,53%	-10,62%	0,12	9,51%	0,15%

Figure 117: Sectoral weighted energy costs differences (electricity and natural gas) between the Belgian regions and the average of 3 European countries (Germany, France and the Netherlands, including the United Kingdom) for electro-intensive and non-electro-intensive consumption



As the previous figure shows, there are variations within the regions: all sectors in Flanders enjoy a competitive advantage, while Brussels faces competitive disadvantages in all sectors in terms of differences in weighted energy costs when comparing electro-intensive consumers. For non-electro-intensive consumers, a majority of sectors presents a significant competitive advantage.

- Electro-intensive consumers: industrial consumers in all sectors in Flanders who compete with electro-intensive consumers in neighbouring countries have a competitive advantage from 7% to 11%. As regards to the Wallonia, electro-intensive consumers cross-sectors face low (NACE 19) to high competitive disadvantages (NACE 21, 20, and 10-12). As for Brussels, electro-intensive consumers face competitive disadvantages for all sectors.
- Non-electro-intensive consumers: for industrial consumers in the three Belgian regions which are in competition with non-electro-intensive competitors in Germany, France, the Netherlands and the United Kingdom, the situation remains particularly competitive. Some exceptions are noticeable: such as a low disadvantage for the Walloon and Brussels regions. This conclusion can also be drawn based on the following figure. A negative percentage symbolises a price level below the average of neighbouring countries and thus a competitive advantage. In Flanders, the petroleum sector (NACE 19) and the basic metal sector (NACE 24) have the most advantageous weighted energy cost, while this is the petroleum sector (NACE 19) in Wallonia. This is due mainly to the importance of the E4 profiles, less expensive profiles than E0-E3.

The differences in weighted energy costs for non-electro-intensive consumers are large and negative (advantageous) for all regions and sectors in Belgium. Compared with non-electrically intensive consumers in neighbouring countries, weighted energy prices in Belgium are up to 11% lower than the average in neighbouring countries. Wallonia and Brussels count disadvantage for some sectors.

Both electro-intensive and non-electro-intensive consumers benefit from competitive advantages in Flanders, while Wallonia and Brussels present advantages only for non-electro-intensive consumers.

Weighted energy cost differences when excluding the UK

A comparison of energy prices in the Belgian regions in relation to the average of the four neighbouring countries studied enables us to address some of the complexity of the results presented in previous sections. Most importantly, we observed that the United Kingdom was a distinctive high-end outlier for all four electricity consumer profiles, particularly in the case of electro-intensive consumers. Therefore, it is also interesting and relevant to do the same exercise in terms of total energy price differences between the Belgian regions and neighbouring countries without taking the UK into account.

If the United Kingdom is excluded from the price comparisons, the situation at the sectoral level is very different for consumers in Belgium who are competing with the so-called electro-intensive consumers in neighbouring countries: Brussels and Wallonia face a competitive disadvantage opposite to Flanders. For consumers in Belgium who compete with non-electro-intensive consumers in neighbouring countries, the impact is less significant and does not affect the general conclusion that they enjoy a significant competitive advantage.

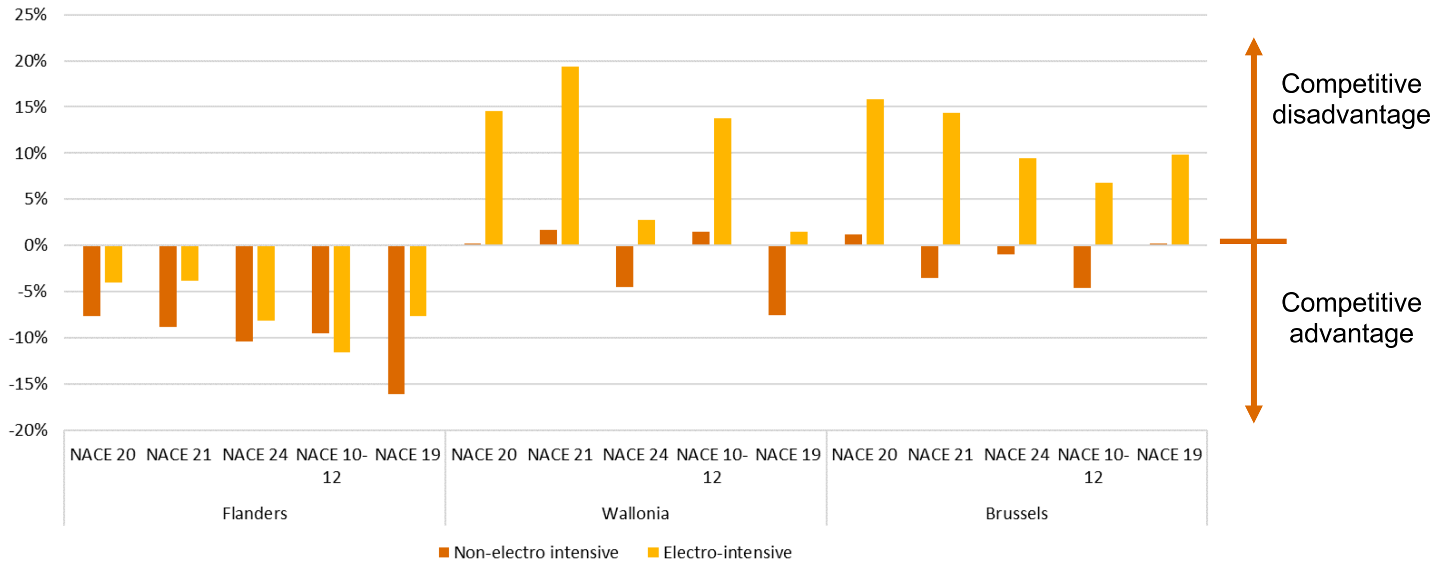
For electro-intensive industries, the competitiveness of all sectors in all regions is negatively affected when the UK is not taken into account whereas the situation is more contrasted for non-electro-intensive industries: some sectors gain in competitiveness while others lose, as pictured afterwards.

The results of the comparison for (non-)electro-intensive consumers are shown in the below table. The differences in weighted energy costs for electro-intensive and non-electro-intensive consumers are shown in the below figure.

Table 136 : Results for every industrial sector in Flanders, Wallonia and Brussels compared to the average prices in Germany, France and the Netherlands (2021)

Region	Sector	Electricity price difference (electro-intensive)	Electricity price difference (non-electro-intensive)	Natural gas price difference	Relative consumption	Weighted energy cost difference (electro-intensive)	Weighted energy cost difference (non-electro-intensive)
Flanders	NACE 20	-5,43%	-5,95%	-9,12%	0,48	-3,99%	-7,66%
	NACE 21	-5,56%	-7,34%	-8,05%	0,72	-3,86%	-8,79%
	NACE 24	-10,92%	-9,56%	-9,11%	0,88	-8,17%	-10,40%
	NACE 10-12	-13,46%	-9,18%	-9,02%	0,55	-11,56%	-9,48%
	NACE 19	-10,45%	-17,49%	-1,74%	0,12	-7,71%	-16,16%
Wallonia	NACE 20	18,45%	3,94%	-9,19%	0,48	14,53%	0,20%
	NACE 21	23,70%	4,37%	-8,05%	0,72	19,40%	1,70%
	NACE 24	7,79%	-1,59%	-9,17%	0,88	2,72%	-4,52%
	NACE 10-12	18,25%	4,26%	-9,02%	0,55	13,78%	1,47%
	NACE 19	2,51%	-5,55%	-1,79%	0,12	1,43%	-7,55%
Brussels	NACE 20	18,28%	3,80%	-1,60%	0,48	15,86%	1,16%
	NACE 21	17,11%	-1,19%	-3,89%	0,72	14,35%	-3,50%
	NACE 24	11,71%	1,98%	-5,71%	0,88	9,41%	-1,02%
	NACE 10-12	9,46%	-3,49%	-7,23%	0,55	6,79%	-4,58%
	NACE 19	12,37%	3,53%	-10,62%	0,12	9,81%	0,15%

Figure 118: Sectoral weighted energy costs differences (electricity and natural gas) between the Belgian regions and the average of 3 European countries (Germany, France and the Netherlands, excluding the United Kingdom) for electro-intensive and non-electro-intensive consumption



Source: Federal Planning Bureau, PwC Calculations

Elasticity

In this section, Belgium's relative competitivity in terms of electricity and natural gas prices is further explored through the elasticity of demand. Previously, prices charged to industrial consumers in the 3 Belgian regions (Brussels, Flanders and Wallonia) and in 4 countries (France, Germany, the Netherlands and the UK) were estimated. The concept of elasticity of demand aims at depicting the expected reaction in terms of demand, following a change in prices or consumed quantities. This exercise becomes particularly interesting in order to help design efficient energy policies. The elasticity of demand, in this study, is evaluated from a price perspective. This reaction can be transcribed into the following equation[386]:

$$\text{The elasticity of demand} = \frac{\text{\% change in quantity demand}}{\text{\% change in price demand}} = \frac{\frac{\Delta\, Quantity}{Quantity} * 100}{\frac{\Delta\, Price}{Price} * 100}$$

Conceptually, the price elasticity of demand helps to assess how demand adapts to price variations. Changes can be looked from two time-horizon perspectives: in the short term and in the long-term. In the short-term, price elasticity of demand attempts to reflect energy consumption changes resulting from new prices. In the long-term, price elasticity of demand, which generally tends to be higher (more elastic demand) aims at reflecting rather structural changes in behaviour from the considered industrial consumers. However, when prices are high and regardless of the elasticity and the short-term or long-term changes in behaviours, a limit to adaptation and adjustments in energy demand exists from where industries would potentially consider shutting down or relocating their activity elsewhere with lower prices.

This section aims at assessing industrial consumers' price elasticity with regards to energy demand. By doing so, it is assumed to observe how industrial consumers react to price and adapt quantities.

[386] This formula means that for every increase in energy prices of 1%, energy consumption falls by the respective proportion identified.

As such, regardless of other factors that may contribute to the decision, the objective of this exercise is two-fold: it intends to evaluate the likelihood for a company to either leave or come to Belgium[387] as a result of energy prices differences. Concretely, this section tries to answer the following questions:

1. Is Belgium attractive to foreign industrial consumers with regards to power and natural gas prices?
2. Are other countries attractive to Belgian industrial consumers with regards to power and natural gas prices?

To that end, the elasticity of demand based on the price paid for both electricity and natural gas is used to observe the potential reaction of our industrial consumers. Based on the literature review that is later explained, it is assumed to consider the energy bills as a whole, thereby aggregating electricity and natural gas bills as both elasticity estimates (inelastic demand) are relatively similar. However, previously derived results led us to understand that significant price differences exist between non-electro-intensive and electro-intensive consumers.

When considering electricity, non-electro-intensive companies currently face relatively lower prices in Belgium than in other countries considered in this study. This means that these consumers should have, at the moment, high incentives to come to Belgium from an electricity price perspective only. With this in mind, we attempt to grasp the consumption variation they could face between Belgium and abroad, given the current price differences and up to what maximum price, they are expected to remain abroad. Conversely, electro-intensive consumers are here looked as companies that could potentially relocate their activity from Belgium to neighbouring countries in case prices appear to be lower abroad. As several countries under study implemented financial measures to support such consumers, they often benefit from more advantageous conditions abroad than in Belgium. Concretely, we assess what consumption adjustments these consumers would benefit from if they were to leave Belgium and how important would their price change should they consider operating a move abroad.

Considering the two different questions we want to answer, which are to evaluate to what extent consumers are either inclined to come to Belgium or at risk of leaving Belgium, prices employed play a significant role[388]. Given the different observation angles, different prices derived from previously detailed results are used. Maximum applying prices are used to estimate the probability to come to Belgium due to sufficiently low prices. Therefore, we use maximum prices paid by non-electro-intensive and natural gas consumers for consumers potentially coming to Belgium. Inversely, we employ minimum applying prices for electro-intensive consumers and natural gas consumers for consumers at risk of leaving Belgium. Our approach thus distinguishes two types of consumers that are categorised into two consumers categories based on the prices paid:

- ***High range consumers***: maximum prices paid by non-electro-intensive consumers for electricity + maximum price paid for natural gas;
- ***Low range consumers***: minimum prices paid by electro-intensive consumers for electricity + minimum price paid for natural gas

In this context, Belgium's top five sectors used in the competitivity analysis are considered[389].

[387] Given that the competitivity analysis highlighted the top five sectors in Belgium, it was decided to assess the impact of elasticity at the Belgium level. However, this exercise could be more nuanced, would it be conducted considering the economic fabric of each region specifically.

[388] One could assume that a company might only transfer part of its production volume or production assets to another country to benefit from more advantageous prices. However, given the macro-level of this analysis, we do not have enough information to consider partial transfers and consider the risk for a company, as a whole, to relocate.

[389] The identification of these five sectors was performed in chapter 3.3.

Methodology

This exercise was conducted through a four-step approach:

1. Through a literature review, presented below, elasticities rates are determined.
2. Based on existing results, the difference between countries in the average total energy bills is computed per sector. To do so, we aggregate the final electricity and natural gas bills as elasticity rates employed to apply for energy considered as a whole. The total consumption volumes and the distribution of companies per profile were identified through both data provided from the CREG and the Federal Planning Bureau. For each sector, each country's final bill was ultimately evaluated considering the average electricity and natural gas consumer weighted by the proportion of energy used per profile and the associated price per unit of energy (EUR/MWh)[390].
3. Then, for each sector, we compute the magnitude of energy demand variation that would exist for the two consumer groups. This variation is estimated both in absolute and relative terms based on countries price differences and considering the elasticity of demand. While results for high range consumers (i.e. non electro-intensive) depict their energy demand variation in Belgium if a foreign consumer were to leave Belgium, results for low range consumers (i.e. electro-intensive) represent Belgian companies' energy demand variation if they were to leave Belgium. In both cases, companies would face lower energy consumption, given the current price differences.
4. Finally, for each sector, we estimate the maximum price up to which a company is expected to remain in its current country following a variation in the quantity of consumed energy. As such, a high range of consumers' figures displays the maximum foreign price that foreign non-electro-intensive consumers are ready to accept while facing a decrease in their energy consumption. Conversely, we estimate the maximum rise in Belgian prices that Belgian consumers are willing to accept prior to considering leaving the country due to a decrease in their energy consumption. To derive the maximum price, a fixed threshold is set to determine the maximum decrease in quantity, which can be understood as the maximum acceptable company's consumption reduction due to multiple reasons such as energy efficiency, lower activity, etc. From that maximum price, it is assumed that industrial consumers start considering shutting down or relocating their activities in case they can find lower energy prices elsewhere.

Through this methodology, we expect to determine how sensitive companies are to price changes considering the sector they are active in and the existing prices in countries under study.

Literature review

Various academic papers have worked on energy price elasticity, providing a wide literature on the topic. While many research studies are relevant to this report, none identified could exactly meet our needs. Consequently, a selection of studies covering related topics was selected and used to derive values that could be used as proxies for this exercise. As research studies on elasticity are usually conducted at a macro-level and tend to aggregate

[390] Considering a specific sector - NACE 20 for instance -, there are 27 E1-like consumers out of 380. Knowing that they consume about 357 GWh out of 6.301 GWh consumed by industrial consumers from the sector, it represents 6% of the total industrial consumption. With an estimated maximum price of 88,62 EUR/MWh in Brussels (see profile E0 in chapter **Error! Reference source not found.**), the electricity bill per company weighted by the profile's relative consumption in the total sector consumption is computed as follows: 88,62*(357/27)*6% or 66.320 EUR electricity bill. Replicating this for each industrial profile, the sector total energy (electricity and natural gas) bill is eventually computed by including the natural gas bill.

large amounts of data from several countries, it was also decided to select papers covering industrialised or European countries in the priority given the considered countries for this study.

Most papers consider energy as a whole without narrowing it down to types of energy goods. As such, Labandeira et al. (2017)[391], a meta-analysis of 416 papers from 1990 to 2014, estimated price elasticity of demand for energy to be ranging from -0,22 to -0,224 in the short-term (ST), from -0,6 to -0,652 in the long-term (LT)[392]. However, the latter figures are not specific to industrial consumers whose energy price elasticity of demand would be of -0,166 on the short-term and of -0,508 on the long-term. Therefore, it can be understood that industrial consumers' price elasticity tends to be lower than when considering all consumers (e.g. households). Considering energy as a whole regardless of the time horizon, Trinomics (2018)[393] derive similar results with a relatively inelastic price demand for industrial consumers of -0,2 where Adeyemi & Hunt (2007)[394] estimate an elasticity of -0,22.

As this study focuses on both electricity and natural gas demand, it was decided to further detail elasticities to reflect differences in terms of industrial consumers' dependence towards both types of energy goods rather than sole energy. As no specific study could be found doing this, particularly for industrial consumers, figures were approximated from existing research studies. Labandeira et al. (2017)[395] observed short-term and long-term price elasticities for both electricity and natural gas. While the former is estimated to range from -0,209 to -0,231 (ST) or from -0,677 to -0,686 (LT), natural gas price elasticity is estimated to range from -0,216 to -0,239 (ST) or from -0,614 to -0,850 (LT). As mentioned here-above, this study reflects price elasticity on an economy-wide perspective. Consequently, we expect those figures to be lower (i.e. relatively less elastic demand in the short run) for industrial consumers, as suggested in previously introduced papers. Both short-term tendencies can be confirmed through other studies such as Horáček (2014)[396], benchmarking 36 studies, which evaluates electricity price elasticities to range from -0,16 to -0,21 and Bilgili (2013)[397], conducted on OECD countries, that deems that price elasticity of natural gas on the economy is of -0,318 to -0,345.

Additional attention was brought to identify papers that would assess the elasticity of demand for industrial consumers specifically and on those making the distinction between energy-intensive and non-energy-intensive sectors when possible. In this perspective, Chang et al. (2019) conducted this analysis of data from 20 OECD countries in 16 industries. Authors classified industries as follows:

Table 137: Classification of industry according to energy-intensity by Chang et al. (2019)

Energy Intensity	Industry
Energy-Intensive	Non-ferrous metals; Iron and steel; Chemical and petrochemical; Non-metallic minerals; and Paper, pulp, and printing
Non-energy-intensive	Fishing, Mining and quarrying, Commercial and public services, Non-specified (industry), Wood and wood products, Agriculture/forestry, Transport equipment, Textile and leather, Construction, Machinery, and Food and Tobacco

Their estimates resulted in price elasticity for energy demand for:

[391] (Labandeira, Labeaga, & López-Oteroa, 2017)

[392] While no specific definition is provided for short-term or long-term, it is assumed to be based on several papers to be of 1-2 years for the short-term and about 5 years for the long-term.

[393] (Trinomics, 2018)

[394] Adeyemi, O.I. and L.C. Hunt, 2007. Modelling OECD industrial energy demand: Asymmetric price responses and energy-saving technical change

[395] (Labandeira, Labeaga, & López-Oteroa, 2017)

[396] (Horáček, 2014)

[397] (Bilgili, 2013)

- ***Energy-intensive group***: in the ST, values range from -0,029 to -0,200 and, in the LT, values range from -0,128 to -0,529.
- ***Non-energy-intensive group***: in the ST, values range from -0,078 to -0,165 and, in the LT, values range from -0,210 to -0,594.

As we observed, results differ from one paper to another. This can be due to models used, data employed or scope of the study. Even if absolute values are different, tendencies observed are similar and serve as the basis for our choices of parameters. The following table synthesizes study scopes and estimated values:

Table 138: Summary of elasticities of price demand from the literature review

Articles	Focus	Energy good	Energy-intensity	Short-term elasticity	Long-term elasticity
Labandeira et al. (2017)	Economy	Energy	All	[-0,224; -0,22]	[-0,652; -0,6]
	Economy	Electricity	All	[-0,231; -0,209]	[-0,686; -0,677]
	Economy	Natural Gas	All	[-0,239; -0,216]	[-0,85; -0,614]
	Industrial consumers	Energy	All	-0,166	-0,508
Trinomics (2018)	Industrial consumers	Energy	All	-0,2	/
Adeyemi & Hunt (2007)	Industrial consumers	Energy	All	-0,22	/
Horáček (2014)	Economy	Electricity	All	[-0,21; -0,16]	-0,43
Bilgili (2013)	Economy	Natural Gas	All	-0,318	-0,345
Chang et al. (2019)	Industrial consumers	Energy	Energy-intensive	[-0,2; -0,029]	[-0,529; -0,128]
	Industrial consumers	Energy	Non-energy-intensive	[-0,165; -0,078]	[-0,594; -0,210]

From this literature review, it appears clear that setting a fixed value on elasticity is sensitive and largely variable. Therefore, to limit bias from the determination of parameters values, we use the average from values observed in the literature for both time-horizons. Estimated parameters are as follows:

- Average short-term price elasticity of demand: **-0,193**;
- Average long-term price elasticity of demand: **-0,525**.

As short-term price elasticity of demand appears to be relatively inelastic, companies are less likely to relocate as a result of energy price changes in the short run. While this statement does hold in the long-term as well, the suspected impact is already much more significant. Therefore, this exercise only makes use of the average long-term price elasticity value as the parameter. Concretely, this means that for every 1% increase in energy prices, energy consumption falls by 0,525%.

Results

Consumption change due to price variations

First and foremost, the total energy bills for an average industrial consumer in each specific sector were computed. To do so, the distribution of companies per profile and per sector, the proportion of energy they consume in the total volume of energy consumed per sector and the associated cost per unit per profile were used. Table 139 indicates average energy bills that were identified both in absolute and proportional terms. For high range consumers, foreign prices are compared to Belgium's average bill as we evaluate Belgium's attractivity towards foreign consumers (i.e. a positive percentage indicates financial incentive to move to Belgium as a result of higher foreign prices). Conversely, we evaluate the risk for Belgian low range consumers to relocate due to lower foreign prices (i.e. a negative percentage indicates financial incentive to leave Belgium as a result of lower foreign prices compared to Belgium's). Colour codes are used to ease the reading of the table. Green highlights positive situations for Belgium – either a price-based interest to come to or remain in Belgium - whereas red depicts negative cases for Belgium – either a price-based interest to leave Belgium or to remain abroad.

Table 139: Total energy (electricity and natural gas) bills in absolute and relative terms (compared to Belgium average)[398]

Sector	Consumers range	Belgium (average)	Germany		France		The Netherlands		UK	
		(kEUR)	(kEUR)	%	(kEUR)	%	(kEUR)	%	(kEUR)	%
Nace 20	High range	59.825.709	92.488.647	55%	72.883.005	22%	57.249.740	-4%	74.450.676	24%
	Low range	58.491.166	49.829.336	-15%	51.378.613	-12%	48.286.026	-17%	68.120.983	16%
Nace 24	High range	53.608.025	84.674.113	58%	65.741.991	23%	51.288.938	-4%	66.870.834	25%
	Low range	52.411.749	44.751.919	-15%	46.215.405	-12%	43.381.982	-17%	61.236.673	17%
Nace 10,11 & 12	High range	4.115.933	5.641.364	37%	4.492.346	9%	4.198.068	2%	4.676.826	14%
	Low range	4.011.769	3.917.003	-2%	4.146.340	3%	3.863.177	-4%	4.676.826	17%
Nace 21	High range	65.125.734	68.187.975	5%	79.219.374	22%	68.313.454	5%	76.395.411	17%
	Low range	63.480.622	55.172.489	-13%	54.150.355	-15%	53.565.459	-16%	65.496.542	3%
Nace 19	High range	51.119.817	92.645.342	81%	63.671.094	25%	47.418.093	-7%	65.107.221	27%
	Low range	49.986.595	42.621.882	-15%	44.720.578	-11%	41.209.132	-18%	60.720.631	21%

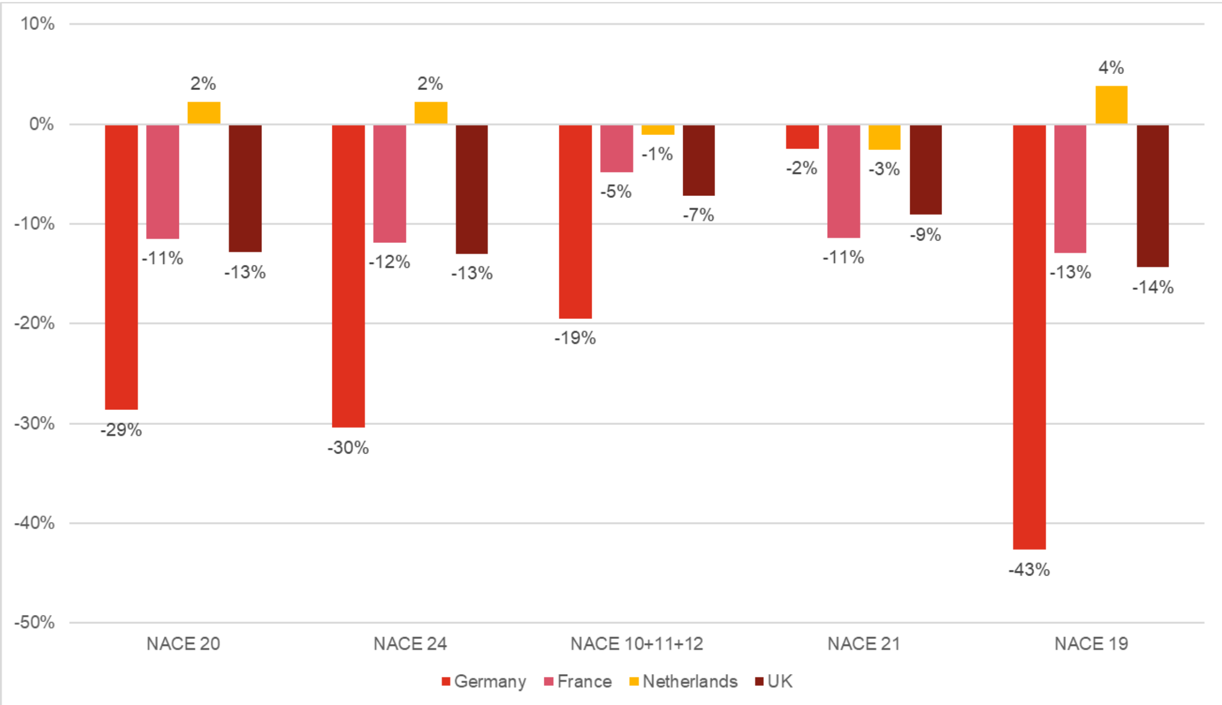
Overall, Belgium seems to offer lower prices than other countries for high range consumers for all sectors, apart from sectors 20 (chemicals), 24 (basic metals) and 19 (coke products) for the Netherlands. For instance, Germany's prices are 55% higher than Belgium's with regards to sector 20 (chemicals). This statement holds as lower natural gas prices in Belgium drive down the total energy bill compared to countries such as the Netherlands

398 As reminder, high range consumers are composed of non-electro-intensive and natural gas consumers for which we use the maximum applying prices. Low range are composed of electro-intensive and natural gas consumers for which we use the minimum applying prices.

that would display cheaper invoices if electricity was to be solely considered. Conversely, low range consumers would frequently benefit from more interesting prices abroad than in Belgium, except for the UK in all sectors, for France in sectors 10, 11 & 12 (food and beverages).

From these price differences, we can derive consumption variation given the assumed price elasticity of demand of -0,525 (see Literature review from the elasticity section). Figure 119 attests for these variations (in %) for high range consumers (i.e., the maximum applicable price range for non-electro-intensive and natural gas consumers) whereas Figure 120 details consumption changes for low range consumers (i.e., the minimum applicable price range for electro-intensive and natural gas consumers) compared to Belgium average.

Figure 119: Change in energy (electricity and natural gas) consumption for “high range” consumers (i.e. maximum applicable prices for non-electro-intensive and natural gas consumers)



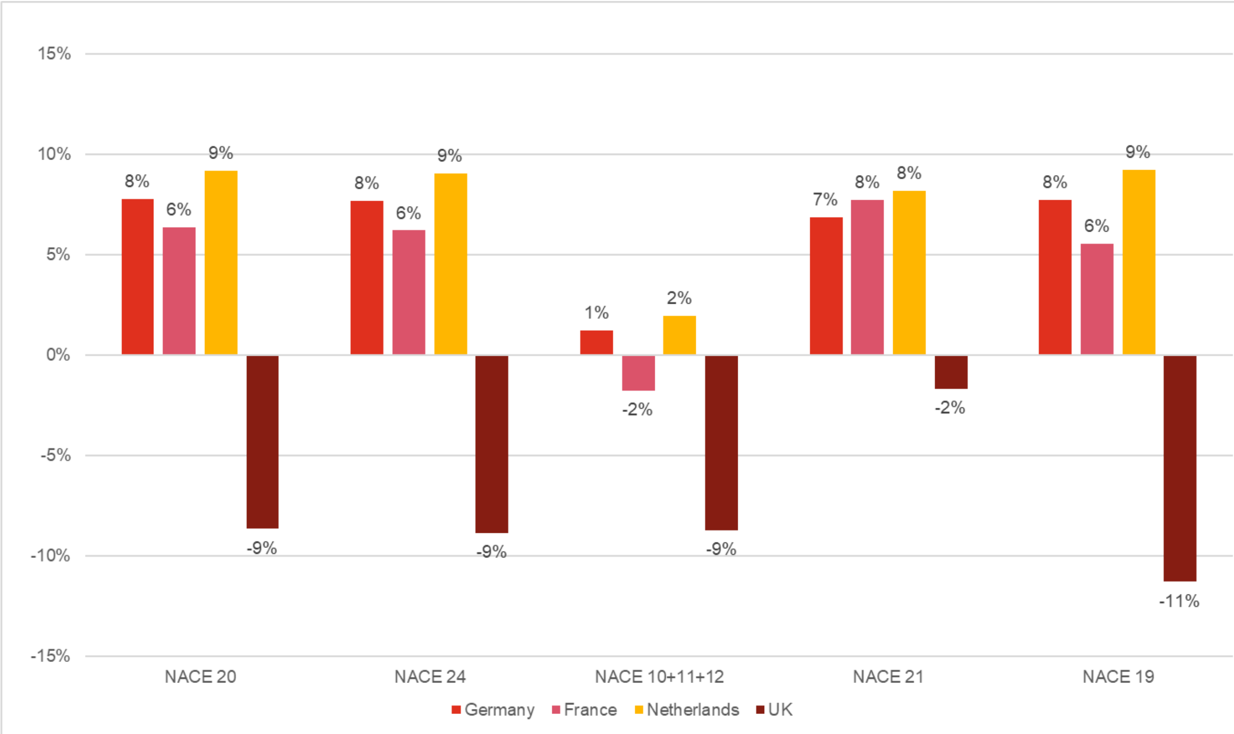
Results depicted here-above demonstrate a negative change in the high range of foreign companies' consumption. As prices are usually lower in Belgium, foreign companies usually observe positive price differences compared to Belgium. Given that the elasticity term displayed preceding is negative, a negative change in consumption is expected for foreign high range consumers regardless of the sector considered – but several sectors in the Netherlands (NACE 20, 24 and 19).

Germany appears to be the country from where consumers are currently the most affected by higher German prices (from -2% to -43% change in demand depending on the sector) whereas the Netherlands constitute the least impacted as Dutch prices are more aligned to Belgium's (from -3% to +4% change in demand).

Clearly, it demonstrates that high range of consumers would be better off in Belgium in most cases. Except in the Netherlands, it can be asserted that lower consumption levels are reached abroad compared to what they could consume in Belgium. In terms of sectors, results are variable depending on the country but, overall, sectors 19 would be one of the most affected (except in the Netherlands) whereas sector 21 (pharmaceuticals) would be the least impacted.

As opposed to high range results, low range results highlight the lower prices existing in most foreign countries considered. All sectors in the UK, sectors 10, 11 & 12 (food and beverages) in France, all Belgian consumers would experience higher consumption price levels if they were to leave Belgium. In this respect, France displays the most interesting prices for such consumers as they currently face the highest consumption variation (from -2% to 8%) and the UK (-2% to -11%). Overall, sectors 10, 11 & 12 (food and beverages) appear as being the most impacted by such change as opposed to the other sectors. The below graph depicts the situation with regards to the low range of consumers.

Figure 120: Change in energy (electricity and natural gas) consumption for "low range" consumers (i.e., the applicable minimum price for energy-intensive and natural gas consumers)



The potential relocation of high/low range consumers

So far, we have derived potential consumption change as a result of price variations. This was estimated through the price differences in energy bills across countries and the application of the elasticity term based on the elasticity formula previously detailed. The opposite exercise is now conducted.

From a determined change in consumption, we estimate the maximum prices that are acceptable for one consumer prior to deciding to leave their country. In addition to short-term and long-term adjustments of consumption, it is considered that a demand reduction limit applies, above which we assume that the industry will start considering shutting down activities or relocating, provided that a location with lower prices exists. Therefore, we identify the maximum acceptable demand reduction limit, from which a bigger reduction in demand would imply more than energy efficiency measures and output adaptation changes. As Figure 119 and Figure 120 identify the resulting change in consumption from the currently estimated energy bills, we assume that it also indicates the maximum acceptable change in consumption. Taking the average from values displayed in Figure 119 and Figure 120, we obtain -4%. Therefore, we decide to set a consumption reduction threshold of 5% (i.e. a consumer is ready to accept a 5% reduction in consumption before deciding to leave the country).

Since we intend to determine structural price differences resulting from reductions granted by public authorities on taxes or transmission tariffs as observed in this study, the applicable elasticity for this exercise is the long-term price elasticity of demand.

Consequently, both Belgian and foreign companies are expected not to relocate when the maximum acceptable prices reach an increase up to 19% of current prices:

$$Elasticity\ of\ demand = \frac{\%\ change\ in\ quantity\ demand}{\%\ change\ in\ price\ demand}$$

$$-0{,}525 = \frac{-5\%}{\%\ change\ in\ price\ demand}$$

$$\%\ change\ in\ price\ demand = \frac{-5\%}{-0{,}525} = 9{,}5\%$$

High range foreign consumers might consider it economically rational to relocate in Belgium as a result of lower energy prices. Foreign prices should be higher by more than 9,5% than Belgian prices as foreign consumers are likely to remain abroad up to that maximum acceptable price. Table 139 casts light on the current price differences across countries and Table 140 synthesizes countries where high range consumers are likely to be inclined to move to Belgium. The later countries are highlighted in green, whereas orange indicates that Belgium is no relocation option for the considered country based on the 9,5% maximum acceptable price.

Table 140: Relocation possibilities for high range consumers

Sector	Germany	France	Netherlands	UK
NACE 20				
NACE 24				
NACE 10+11+12				
NACE 21				
NACE 19				

For all sectors, Belgium constitutes a real relocation opportunity for high range consumers from all countries under study but the Netherlands and sector 10, 11 & 12 for France, sector 21 in Germany and the UK.

Conversely, low range consumers would relocate outside Belgium once they find a country where they can benefit from a price difference higher than 9,5% (i.e. prices abroad are at least 9,5% lower than in Belgium).

Table 141: Relocation possibilities for low range consumers

Sector	Germany	France	Netherlands	UK
NACE 20				
NACE 24				
NACE 10+11+12				
NACE 21				
NACE 19				

From Table 139, it appears that low range Belgian consumers have financial incentives to leave Belgium as they would frequently pay less abroad. Since a move would need to be motivated by lower prices, it seems reasonable for them to relocate on a purely price-based decision. Nonetheless, a low range of consumers would need to find locations offering lower prices by at least 9,5%. Table 141 identifies potential countries to relocate for each sector. As such, no country (except the UK for the NACE 19 with 21%) under study offers prices currently lower by more than 9,5% than Belgium prices. Yet, with prices inferior by 15, 17 and 18%, sector 20 is the sector with the highest risk of relocation by Belgian low range consumers to Germany, France and the Netherlands respectively. Then comes sectors 19 (-18%) and 24 (-17%) to the Netherlands.

Conclusions

It results from this analysis that we can answer to our first two questions originally set:

1. **Is Belgium attractive to foreign high range industrial consumers?**

   Belgium appears to be more attractive for non-energy intensive industries than other countries since the price difference might be sufficient as a financial incentive to generate industry relocation towards Belgium, should this decision only be based on power and natural gas prices and ignoring all other potential decision factors. As such, high range consumers from most sectors in Germany, France and the UK are particularly likely to find prices lower enough in Belgium to consider relocating to Belgium as they all are getting closer to their maximum acceptable price.

2. **Are other countries attractive for Belgian low range industrial consumers?**

   Belgium may suffer from less attractive fares for energy-intensive industries given that prices observed in neighbouring countries are cheaper. Belgian companies are likely to be tempted or to decide to consider a relocation abroad. This statement is plausible when considering sectors 20 and 19 in Germany, France and more particularly in the Netherlands. However, even if the maximum acceptable price is never exceeded regardless of the country and the sector, which makes such relocation less plausible given the current level of prices, this does not imply either that they are not at risk of relocating in the future.

Conclusions and recommendations

Conclusions on the competitiveness of the economy

We can draw some important conclusions from this total energy cost analysis.

While it is necessary to be cautious about the exact impact of these results, since they are based on a multitude of data at the macro level, some messages are very clear.

1. The most striking conclusion is the less beneficial situation for all important industrial sectors in Belgium when they are in competition with electro-intensive consumers in neighbouring countries than when they compete with non-electro intensive consumers in neighbouring countries[399]. Even more noticeable, the situation in Belgium has worsened, particularly for Wallonia.

   Different conclusions can be made for non-electro-intensive consumers and electro-intensive consumers. First, we will discuss the non-electro-intensive consumers. Industrial consumers in Belgium, that compete with non-electro-intensive consumers in neighbouring countries, have a clear competitive advantage in terms of the total cost of energy (natural gas and electricity combined), except for NACE 19 in Brussels and NACE 21 in Wallonia. This is the case even when including the United Kingdom (high outlier) from the equation. The situation in Belgium is beneficial for non-electro-intensive consumers.

   Secondly we observe a different competitive situation when comparing the cost of electro-intensive consumers with their counterparts in neighbouring countries that benefit from reductions and/or exemptions. In Belgium, electro-intensive consumers suffer from a price disadvantage compared to those in neighbouring countries. In this situation, the more competitive the neighbouring countries, the greater the risk of relocation. Again, this risk has increased between years 2020 and 2021. However, Flanders

399 Although a cap and super cap on the cost of Green Certificates was introduced in Flanders in 2018.

offers a competitive advantage in all of its sectors for electro-intensive and non-electro-intensive consumers.

Thirdly, Belgium's competitive position subsequently changed compared to last year, the competitive advantage for Flanders is getting smaller, the competitive advantage for Brussels and Wallonia is getting much smaller or disappearing.

In countries where discounts are granted to electro-intensive consumers, the government shifts investment from non-electro-intensive to electro-intensive sectors, as required by the European Commission's Guidelines on State aid for energy and the environment. This change is the (indirect) result of an economic protection measure (authorised by the EC) aimed at electricity-intensive consumers. In the scenarios with entry criteria (German and Flemish systems), where individual electro-intensity targets at company level must be met, this change benefits only certain electro-intensive legal entities within Annexes 3 and 5 of the EEAG.

2. The effect of the relatively **low cost of natural gas** for the industry in Belgium on the total cost of energy for industrial consumers is fairly limited. Even though some sectors consume twice as much natural gas as electricity, such as NACE 20 (chemicals), the low cost per unit of energy of natural gas means that electricity plays the decisive role in the competitiveness of the total cost of energy.
3. The position of **Wallonia and Brussels** in terms of total energy costs for the industry generally remains **less advantageous than in Flanders**. This situation is particularly striking for industrial sectors with a large number of small industrial electricity consumers (E0-E1), such as the food and drink sector (NACE 10-12). Wallonia now faces a competitive disadvantage for most of its sectors.

Recommendations

The **problem of competitiveness** on the total cost of energy that we observe in this report applies to electro-intensive industrial consumers in all sectors and in all regions. As shown in the presentation of the results, its origin lies in the cost of electricity, and in the three components of the cost of electricity: commodity price, grid charges for the E3 and E4 profiles (mainly due to the reductions granted in Germany, France and the Netherlands) and taxes, levies and certificate systems.

As recommended above, the most direct and tangible impact can be exerted on the third strand: taxes, charges and certificate systems. Currently, in all three regions, significant efforts are being made to mitigate the impact of taxes, levies and certificate systems on competitiveness. In contrast to France, Germany and the Netherlands, these efforts are generally made without taking into account the electro-intensity of industrial consumers. In 2019, the quantity of electricity taken off the grid remained the overriding criterion that has been used at the federal level (federal contribution, offshore) and at regional level (quota of green certificates, public service obligations) - to protect the competitiveness of the cost of electricity for industrial consumers. Nevertheless, Flanders now takes into account electro-intensity since the introduction in 2018 of a cap on the amount due to the costs related to the financing of renewable energy for electro-intensive consumers. Brussels is a particular case due to its small and urban territory. Wallonia does not have any reduction schemes for electro-intensive consumers which has negatively impacted the region's competitivity.

In other words, from a fiscal point of view, in addition to the cap system introduced in Flanders in 2018, the Belgian federal and regional authorities mainly grant tax reductions and/or exemptions based on the quantity of electricity taken off the grid, and not on the electro-intensity level of an industrial consumer.

Consequently, this results in significant competitive advantages for companies competing with non-electro-intensive consumers in France and certainly in Germany, while at the same time these reductions may not have a sufficient impact on the total cost of energy to protect electro-intensive industrial consumers from competition from their counterparts in France, the Netherlands and Germany. As a result, the relocation risk has increased.

Our economic impact analysis leads us to support this assertion: **consumers that are not particularly affected by a lack of competitiveness of electricity prices are somewhat protected in Belgium given the tax schemes designed in Flanders, Brussels and Wallonia (also valid for federal taxes), while consumers that are more at risk - although this is less true in Flanders since the introduction of the cap on the costs related to the financing of renewable energy - suffer from significant disadvantage compared to their electro-intensive counterparts in neighbouring countries.**

It is therefore very interesting to reflect on the possibility of adapting the current tax reductions for industrial consumers that have been introduced by the federal and regional governments. The general objective should be to generate a move towards more competitive total energy prices for industrial electro-intensive consumers, while (partly) preserving the current competitive advantage for non-electro-intensive consumers. In light of the recent events, this objective should be further pursued as electro-intensive consumers are likely to be more impacted by the economic slowdown resulting from the sanitary crisis.

We would like to reiterate a number of points and guidelines that have been stated previously, and that should be taken into consideration:

1. In the case of Belgium, in view of the competitive natural gas prices, it seems important to focus on electricity intensity and not on energy intensity as a whole.
2. The introduction of electro-intensity criteria can be combined with a minimum offtake condition under which no reduction is allowed.
3. The introduction of too many layers of different access criteria and levels of reduction (as is the case for the CSPE tax in France and the EEG-Umlage in Germany) may have a negative influence on the assessment of the effectiveness of the measures. This may also reduce the predictability of tax revenues.
4. One should be aware of possible negative side-effects. Granting access to certain reductions depending on the load profile (as is the case for reductions in network charges in Germany and the Netherlands) may have the negative effect of discouraging the development of demand response and energy efficiency.

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10. Appendix

10. Appendix

Industry reduction criteria and measures supporting the development of renewable energy sources

As an annexe 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 natural gas consumers. In addition, it is specified whether each measure supports the development of renewable energy sources.

Electricity

Belgium

Federal level

Component	Measure	Supports the development of renewable energy sources	Criteria	Reduction/exemption/caps
All other costs	Federal contribution	No	Annual offtake (condition: energy efficiency agreement)	The ***federal contribution*** has a base rate of 3,4735 EUR/MWh, with potential progressive reductions: • 20 - 50 MWh/year: -15% • 50 - 1.000 MWh/year: -20% • 1.000 - 25.000 MWh/year: -25% • > 25.000 MWh/year: -45% In two cases is the federal contribution increased: • If charged by the TSO: increased by 1,1% to compensate for the administrative and financial costs of the electricity supplier and to compensate for the part of the federal contribution that would not be paid by the end-consumer; • If charged by the DSO: increased by 1,1% (see above) and by an additional 0,1% for profiles connected to the distribution grid to compensate for the administrative costs of the DSO. This tax is capped at 250.000 EUR/year.
All other costs	Energy contribution	No	Annual offtake	The ***energy contribution*** has a base rate of 1,9261 EUR/MWh. However, consumers with an electric connection > 1 kV are exempted.
All other costs	Funding for the connection of offshore wind turbine parks	Yes	Annual offtake (condition: energy efficiency agreement)	The ***funding for the connection of offshore wind turbine parks*** PSO has a base rate of 0,084 EUR/MWh.

All other costs	Funding for green certificates	Yes	Annual offtake (condition: energy efficiency agreement)	The ***funding for green certificates*** PSO has a base rate of 11,69 EUR/MWh, with potential progressive reductions: • 20 - 50 MWh/year: -15% • 50 - 1.000 MWh/year: -20% • 1.000 - 25.000 MWh/year: -25% • > 25.000 MWh/year: -45% This tax is capped at 250.000 EUR/year.

Regional level

Brussels

Component	Measure	Supports the development of renewable energy sources	Criteria	Reduction/exemption/caps
All other costs	Financing of regional energy policies	Yes	Connection capacity	Capped at 5.000 kVA

Flanders

Component	Measure	Supports the development of renewable energy sources	Criteria	Reduction/exemption/caps
All other costs	Certificate schemes – Green certificates	Yes	Annual offtake	Progressive reductions on quota: • 1.000-20.000 MWh/year: -47%* • 20.000-250.000 MWh/year: -80% • > 250.000 MWh/year: -98% * only for industry (NACE 5-33) and deep frost alimentary (46391 and 52100) and Cargo handling in seaports (NACE 52241). The companies listed in Annexe 3 and 5 of EEAG correspond to the companies listed in the Energiedecreet with the exception of Nace 3832 (Recycling of waste) which is listed in Annexe 3 EEAG but not in the Energiedecreet. Additionally, two caps were introduced in 2018: • The certificate cost is capped at 0,5% of gross value added (average last 3 years) for all consumers with an electro-intensity over 20% for consumers belonging to sectors that are listed in annexes 3 and 5 of the EEAG. • The certificate cost is capped at 4% of gross value added (average last 3 years) for all consumers belonging to sectors that are listed in annexe 3 of the EEAG. Since 2021 this is a combined cap on GC and CHPC.
All other costs	Certificate schemes – Combined heat/power (WKK)	Yes	Annual offtake	Progressive reductions on quota: • 1.000 - 20.000 MWh/year: -47%* • 20.000 - 100.000 MWh/year: -50% • 100.000 - 250.000 MWh/year: -80% • > 250.000 MWh/year: -85% * only for industry (NACE 5-33) and deep frost alimentary (NACE 46391 and 52100) and Cargo handling in seaports (NACE 52241).

Wallonia

Component	Measure	Supports the development of renewable energy sources	Criteria	Reduction/exemption/caps
All other costs	Certificate schemes – Green certificates	Yes	Annual offtake (condition: energy efficiency agreement)	Progressive reductions on quota: • 0 - 20.000 MWh/year: -25% • 20.000 - 100.000 MWh/year: -50% • 100.000 - 300.000 MWh/year: -85% • > 300.000 MWh/year: -90%

All other costs	PSO - Financing of measures supporting renewable energy in Wallonia	Yes	Annual offtake	Partial exemptions of the tariff for public service obligation financing support measures for renewable energy (only Elia), that has a base rate of 13,82 EUR/MWh:
				• **Exemption of 85%** for final consumers with a sector agreement, regardless of the level of consumption;
				• **Exemption of 50%** for final consumers connected to a voltage level higher than low voltage without a sector agreement and with an activity that falls under the NACE code 'culture and animal production' (01 - without distinction between principal and complementary activities);
				• **Exemption of 50%** for final consumers connected to a voltage level higher than low voltage without a sector agreement and with an annual consumption higher than 1 GWh, in so far as they fall under the following primary NACE codes:
				  ○ industrial enterprises (10 to 33);
				  ○ education (85);
				  ○ hospitals (86);
				  ○ medico-social (87-88).
				
				On the exempted part of the consumption, a surcharge of 2,55 EUR/MWh is due.

All other costs	Connection fee	No	Annual offtake	Connection fee (base rate: 0,75 EUR/MWh) has two reduced tariffs for high voltage clients: • **Reduced rate** for clients with yearly consumption **< 10 GWh/year**: 0,6 EUR/MWh; • **Reduced rate** for clients with yearly consumption **> 10 GWh/year**: 0,3 EUR/MWh

Germany

Component	Measure	Supports the development of renewable energy sources	Criteria	Reduction/exemption/caps
Transmission costs	Transmission tariffs reductions	No	Annual offtake + offtake hours	Reduction on the transmission tariff apply for all companies that exceed 10 GWh/year, if annual offtake hours is: • ≥ 7.000 hours/year: - 80% • ≥ 7.500 hours/year: - 85% • ≥ 8.000 hours/year: - 90%
All other costs	KWK-Umlage	Yes	Annual offtake + Electricity cost/gross value added	The ***combined heat and power surcharge*** has a base rate of 2,54 EUR/MWh. For users with an annual consumption that exceeds 1 GWh/year, two reduced rates exist: **A.** If consumption > 1 GWh/year and electricity cost is: • For an extensive list of industrial sectors (annexe 3 of EEAG): > 17% of gross value added • For a less extensive list of industrial sectors (annexe 5 of EEAG): > 20% of gross value added The rate is 0,38 EUR/MWh (85% reduction) but capped at: 0,5% of gross value added (average last 3 years) for all consumers with electricity cost >20% of gross value added, and 4,0% of gross value added (average last 3 years) for all consumers with electricity cost <20% of gross value added. **B.** If consumption > 1 GWh/year and electricity cost is: • For an extensive list of industrial sectors (annexe 3 of EEAG): between 14 and 17% of gross value added (avg. last 3 years) The rate is 0,51 EUR/MWh (80% reduction), but capped at 0,5% of gross value added (average last 3 years) for all consumers with electricity cost >20% of gross value added and 4% of gross value added (average last 3 years) for all consumers with electricity cost <20% of gross value added. **C.** For consumers meeting the conditions from option A or B and active in the aluminium, lead, zinc or copper production, can benefit from a bottom rate of 0,3 EUR/MWh.
All other costs	StromNEV §19 - Umlage	No	Annual offtake + electricity cost/turnover	The ***electricity network charges ordinance*** has a base rate of 4,32 EUR/MWh. It is applicable to the first GWh offtaken on an annual basis. For offtake that exceeds 1 GWh/year two rates exists:

				• If offtake > 1GWh/year: 0,5 EUR/MWh • If offtake > 1 GWh/year and the consumer is part of the manufacturing industry with electricity cost > 4% of turnover: 0,25 EUR/MWh
All other costs	Offshore-Netzumlage	Yes	Annual offtake + Electricity cost/gross value added	The ***offshore liability overload*** is a levy to pay for offshore wind power generation units. It has a base rate of 3,95 EUR/MWh. For users with an annual consumption that exceeds 1 GWh/year, two reduced rates exist: **A.** If consumption > 1 GWh/year and electricity cost is: • For an extensive list of industrial sectors (annexe 3 of EEAG): > 17% of gross value added • For a less extensive list of industrial sectors (annexe 5 of EEAG): > 20% of gross value added The rate is 0,593 EUR/MWh (85% reduction) but capped at: 0,5% of gross value added (average last 3 years) for all consumers with electricity cost >20% of gross value added, and 4% of gross value added (average last 3 years) for all consumers with electricity cost <20% of gross value added. **B.** If consumption > 1 GWh/year and electricity cost is: • For an extensive list of industrial sectors (annexe 3 of EEAG): between 14 and 17% of gross value added (avg. last 3 years) The rate is 0,790 EUR/MWh (80% reduction), but capped at 0,5% of gross value added (average last 3 years) for all consumers with electricity cost >20% of gross value added and 4% of gross value added (average last 3 years) for all consumers with electricity cost <20% of gross value added. **C.** For consumers meeting the conditions from option A or B and active in the aluminium, lead, zinc or copper production, can benefit from a bottom rate of 0,3 EUR/MWh.
All other costs	EEG-Umlage	Yes	Annual offtake + Electricity cost/gross value added	The EEG-Umlage has a base rate of 65,00 EUR/MWh. For users with an annual consumption that exceeds 1 GWh/year, two reduced rates exist: **A.** If consumption > 1 GWh/year and electricity cost is: • For an extensive list of industrial sectors (annexe 3 of EEAG): > 17% of gross value added

				• For a less extensive list of industrial sectors (annexe 5 of EEAG): > 20% of gross value added The rate is 9,75 EUR/MWh (85% reduction) but capped at: 0,5% of gross value added (average last 3 years) for all consumers with electricity cost >20% of gross value added, and 4% of gross value added (average last 3 years) for all consumers with electricity cost <20% of gross value added. **B.** If consumption > 1 GWh/year and electricity cost is: • For an extensive list of industrial sectors (annexe 3 of EEAG): between 14 and 17% of gross value added (avg. last 3 years) The rate is 13,00 EUR/MWh (80% reduction), but capped at 0,5% of gross value added (average last 3 years) for all consumers with electricity cost >20% of gross value added and 4% of gross value added (average last 3 years) for all consumers with electricity cost <20% of gross value added. For consumers meeting the conditions from option A or B and active in the aluminium, lead, zinc or copper production, can benefit from a bottom rate of 0,5 EUR/MWh.
All other costs	Stromsteuer	No	Pension contributions + process criteria	The ***electricity tax*** in Germany has a base rate of 20,50 EUR/MWh, and a lowered rate of 15,37 EUR/MWh for all industrial companies. Initially implemented to fund employees' pensions, companies may be granted important reductions on the electricity tax if they have low pension contributions due to a limited number of employees. The maximum reduction is 90%. A company that uses electricity as a raw material is exempted from the tax.
All other costs	Konzessionsabgabe	No	(indirect) electricity cost/turnover	For the ***concession fee*** on electricity, all industrial consumers benefit from a basic rate of 1,1 EUR/MWh. If an industrial consumer's total electricity bill is below an annually fixed threshold (2018: 139,2 EUR/MWh) it is exempted 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 reduction.

France

Component	Measure	Supports the development of renewable energy sources	Criteria	Reduction/exemption/caps
Transmission costs	Transmission tariffs reductions	No	Load profile + annual offtake+ offtake/value added + trade intensity	On transmission tariffs, several reductions apply: **<u>Group A:</u>** • Stable consumption profiles with annual offtake >10 GWh/year and over 7000 hours; • Anti-cyclical profiles with annual offtake >20 GWh/year and off-peak grid utilisation over 44%; • Large consumers with annual offtake >500 GWh/year and off-peak grid utilisation between 40-44%. Group A is granted: • 80% reduction when hyper electro intensive*; • 45% reduction when electro intensive**; • 30% reduction for power storage sites connected to the grid; • 5% reduction when none of both. **<u>Group B:</u>** • Stable consumption profiles with annual offtake >10 GWh/year and over 7000 hours; • Anti-cyclical profiles, annual offtake >20 GWh/year and off-peak grid utilisation over 48% Group B is granted: • 85% reduction when hyper electro intensive*; • 50% reduction when electro intensive**; • 40% reduction for power storage sites connected to the grid; • 10% reduction when none of both. **<u>Group C:</u>** • Stable consumption profiles, >10 GWh/year and over 8000 hours; • Anti-cyclical profiles, annual offtake >20 GWh/year and off-peak grid utilisation over 53%. Group C is granted: • 90% reduction when hyper electro intensive*; • 60% reduction when electro intensive**; • 50% reduction for power storage sites connected to the grid;

				• 20% reduction when none of both. *Hyper-electro-intensity is defined as > 6 kWh consumption per euro of value added, with a trade-intensity over 25%. **Electro-intensity is defined as >2,5 kWh of consumption per euro of value added with a trade-intensity over 4% and an annual offtake over 50 GWh.
All other costs	Contribution au service public d'électricité (CSPE)	Yes	Offtake/value added	The ***CSPE*** has a base rate of 22,5 EUR/MWh. Three reductions apply, based on consumption criteria: 1. For electro-intensive consumers where the CSPE would have been (without reductions and exemptions) at least equal to 0,5% of value added, the CSPE is equal to: • For consumers consuming above 3 kWh per euro of value added, CSPE is equal to 2 EUR/MWh; • For consumers consuming between 1,5 and 3 kWh per euro of value added, CSPE is equal to 5 EUR/MWh; • For consumers consuming below 1,5 kWh per euro of value added, CSPE is equal to 7,5 EUR/MWh. 2. For hyper-electro-intensive consumers, the tariff amounts to 0,5 EUR/MWh. To be very electro-intensive, consumers must satisfy both conditions: • its energy consumption represents more than 6 kWh per euro of value added • its activity belongs to a sector with a high trade intensity with third countries (> 25%). 3. Sectors with a high risk of carbon leakage are metallurgy, electrolysis, non-metal minerals or chemical sectors. For electro-intensive consumers described under (i) above with a high risk of carbon leakage linked to indirect carbon emissions, the CSPE amounts to: • for consumers consuming above 3 kWh per euro of value added, CSPE is equal to 1 EUR/MWh; • for consumers consuming between 1,5 and 3 kWh per euro of value added, CSPE is equal to 2,5 EUR/MWh; • for consumers consuming below 1,5 kWh per euro of value added, CSPE is equal to 5,5 EUR/MWh.
	Contribution tarifaire	No		The ***CTA*** for electricity is a surcharge for energy sector pensions. It amounts to

	d'acheminement" (CTA)			27,04% of the fixed part of the distribution tariff (that implicitly includes transmission costs) for consumers connected to the distribution grid. One reduction applies, based on grid level criteria: for consumers directly connected to the transmission grid (E2; E3 and E4), the CTA amounts to 10,14 % of the fixed part of the transmission tariff.

The Netherlands

Component	Measure	Supports the development of renewable energy sources	Criteria	Reduction/exemption/caps
Transmission costs	Volumecorrectie	No	Annual offtake + load profile	A substantial reduction ("volumecorrectie") on transmission tariffs is granted to large baseload consumers when they meet both the following criteria: • Annual consumption > 50 GWh/year; • Annual off-peak consumption > 65% of all 2.920 annual off-peak hours. Reductions are incremental and cannot exceed 90%
All other costs	Regulerende Energie Belasting (REB)	No	Annual consumption	The energy tax is a digressive tax with the applying rates: • 0 - 10 MWh/year: 94,28 EUR/MWh; • 10 - 50 MWh/year: 51,64 EUR/MWh; • 50 - 10.000 MWh/year: 13,75 EUR/MWh; • > 10.000 MWh/year: 0,56 EUR/MWh.
All other costs	Opslag Duurzame Energie (ODE)	Yes	Annual consumption	The ODE-levy is a digressive tax with the applying rates: • 0 - 10 MWh/year: 30,00 EUR/MWh; • 10 - 50 MWh/year: 41,10 EUR/MWh; • 50 - 10.000 MWh/year: 22,50 EUR/MWh; • > 10.000 MWh/year: 0,40 EUR/MWh.
All other costs	Teruggaafregeling	No	Annual consumption + taxes/value added + process criteria (condition: energy efficiency agreement)	The ***"teruggaafregeling"*** is destined for industrial consumers who are classified as being energy-intensive and who concluded a multiple-year agreement with the Dutch government to save energy by improving their energy efficiency. These consumers can apply for a refund of any tax paid above their consumption of 10.000 MWh after each financial year. Concretely, the payback potentially granted is computed as the positive difference between: a. The tax due on electricity consumption and;

				b. The highest amount between the tax normally due on the first 10 GWh consumption and the tax that would be due if all consumption was taxed at a rate equal to the European minimum level of taxation (0,5 EUR/MWh). This refund is to be computed on joined taxes amounts for the Energy tax and the ODE. An energy-intensive company is a company for which the costs of energy or electricity is more than 3% of the total value of production or the energy taxes and tax on mineral oils is at least 0,5% of the value added (Wet Belastingen op Milieugrondslag, Artikel 47, 1p). An exemption is also granted to those industrial consumers that use their electricity for chemical reduction, electrolytic and metallurgic processes.

United Kingdom

Component	Measure	Supports the development of renewable energy sources	Criteria	Reduction/exemption/caps
All other costs	Climate Change Levy	Yes	Energy efficiency	The ***Climate Change Levy*** has a base rate of 8,11 GBP/MWh. When users have signed up to a Climate Change Agreement (sectoral or individual), they can obtain a 93% reduction.
All other costs	Renewables Obligation	Yes	Annual offtake	A quota of 0,471 Renewable Obligation Certificate (ROC) applies per MWh. Companies missing this quota must pay 50,05 GBP/missing ROC.

Natural gas

Belgium

Federal level

Component	Measure	Supports the development of renewable energy sources	Criteria	Reduction/exemption/caps
All other costs	Federal contribution	No	Annual offtake (condition: energy efficiency agreement)	The ***federal contribution*** has a base rate of 0,6482 EUR/MWh, with potential progressive reductions: • 20 - 50 MWh/year: -15% • 50 - 1.000 MWh/year: -20% • 1.000 - 25.000 MWh/year: -25% • > 25.000 MWh/year: -45% In two cases is the federal contribution increased: • If charged by the TSO: increased by 1,1% to compensate for the administrative and financial costs of the electricity supplier and to compensate for the part of the federal contribution that would not be paid by the end-consumer; • If charged by the DSO: increased by 1,1% (see above) and by an additional 0,1% for profiles connected to the distribution grid to compensate for the administrative costs of the DSO. This tax is capped at 750.000 EUR/year.
All other costs	Energy contribution		Energy efficiency + sector criteria	***Energy contribution*** with a base rate of 0,9978 EUR/MWh. Two other cases exist: • Companies part of an energy efficiency agreement pay 0,54 EUR/MWh; • Companies that use natural gas as a raw material are totally exempted.

Regional level

Wallonia

Component	Measure	Supports the development of renewable energy sources	Criteria	Reduction/exemption/caps
All other costs	Connection fee	No	Annual offtake	Digressive rates apply to the ***connection fee***. For the first 100 kWh, the rate is of 7,5 EUR/MWh for all consumers. Above that base rate, different rates apply to different consumers: • 0,75 EUR/MWh for consumers with an annual consumption below 1 GWh; • 0,06 EUR/MWh for consumers with an annual consumption from 1 to 10 GWh; • 0,03 EUR/MWh for consumers with an annual consumption equal to or above 10 GWh.

Germany

Component	Measure	Supports the development of renewable energy sources	Criteria	Reduction/exemption/caps
All other costs	Energiesteuer	No	Pension contributions + process criteria	The ***energy tax*** on natural gas in Germany has a base rate for industrial use of 5,5 EUR/MWh, and a standard reduced rate of 4,12 EUR/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 2,068 EUR/MWh. When a company uses natural gas for purposes other than fuel or heating, it is exempted from the energy tax on natural gas.

France

Component	Measure	Supports the development of renewable energy sources	Criteria	Reduction/exemption/caps
All other costs	Taxe intérieure sur la consommation de gaz naturel (TICGN)	No	Carbon market participation + sector criteria	The ***TICGN*** tax has a base rate of 8,43 EUR/MWh with potential reductions/exemption applying as follows: • companies that participate in the carbon market and that are energy intensive can pay a reduced rate: 1,52 EUR/MWh; • companies that belong to a sector with a high risk of carbon leakage and that are energy-intensive can pay a reduced rate: 1,60 EUR/MWh; • companies that do not use natural gas as a fuel (for example as a raw material) are exempted from the TICGN.
All other costs	Contribution tarifaire d'acheminement (CTA)	No	Grid level	The ***CTA*** is a surcharge for energy sector pensions. For clients connected to the distribution grid, the CTA amounts to 20,8% of the fixed part of the transmission tariff. One reduction applies: for clients directly connected to the transmission grid, the CTA amounts to 4,71% of the fixed part of the transmission tariff.

The Netherlands

Component	Measure	Supports the development of renewable energy sources	Criteria	Reduction/exemption/caps
All other costs	Regulerende Energie Belasting (REB)	No	Annual consumption	The ***energy tax*** is a digressive tax with the following applying rates: • 0 – 5.000 m³: 0,34856 EUR/m³; • 5.000 – 170.000 m³: 0,06547 EUR/m³; • 170.000 – 1.000.000 m³: 0,02386 EUR/m³; • 1.000.000 - 10.000.000 m³: 0,01281 EUR/m³; Companies that do not use natural gas as a fuel (for example as a raw material) are exempted from the energy tax.
All other costs	Opslag Duurzame Energie (ODE)	Yes	Annual consumption	The ***ODE-levy*** is a digressive tax with the applying rates: • 0 – 5.000 m³: 0,0851 EUR/m³; • 5.000 – 170.000 m³: 0,0235 EUR/m³; • 170.000 – 1.000.000 m³: 0,0232 EUR/m³; • 1.000.000 - 10.000.000 m³: 0,0232 EUR/m³. Companies that do not use natural gas as a fuel (for example as a raw material) are exempted from the ODE Levy.

United Kingdom

Component	Measure	Supports the development of renewable energy sources	Criteria	Reduction/exemption/caps
All other costs	Climate Change Levy	Yes	Energy efficiency + sector criteria	The Climate Change Levy has a base rate of 4,06 GBP/MWh for natural gas (January 2021). When users have signed up to a Climate Change Agreement (sectoral or individual), they obtain a 19% reduction. Companies that do not use natural gas as a fuel (for example as a raw material) are exempted from the Climate Change Levy.