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

May 2020

Final report

pwc

CREG

CWaPE
Commission Wallonne pour l'Energie

brugel
LE REGULATEUR BRUXELLOIS POUR L'ENERGIE
DE BRUSSELSE REGULATOR VOOR ENERGIE

VREG
ENERGIE WIJZER

Supported by FORBEG

Table of Content

LIST OF ACRONYMS 11
GLOSSARY 13
1. EXECUTIVE SUMMARY 15
Executive summary – English 15
Samenvatting – Nederlands 30
Résumé – Français 46
2. INTRODUCTION 63
3. DESCRIPTION OF THE DATASET 66
General assumptions 66
Consumer profiles 68
Identification of industrial sectors 71
Electricity: Countries/Zone(s) identified 85
Natural gas: Countries/Zone(s) identified 93
Summary table on the number of zones per country 100
4. RESIDENTIAL AND SMALL PROFESSIONAL CONSUMERS 103
Residential and small professional consumers' commodity computation methodology 103
Electricity: Detailed description of the prices, price components and assumptions 105
Natural gas: Detailed description of the prices, price components and assumptions 130
5. LARGE INDUSTRIALS CONSUMERS 147
Electricity: Detailed description of the prices, price components and assumptions 147
Natural gas: Detailed description of the prices, price components and assumptions 173
6. PRESENTATION OF RESULTS 187
Presentation of figures (Electricity) 187
Presentation of figures (Natural gas) 224
7. ENERGY PRICES: CONCLUSIONS 244
Electricity 244
Natural gas 246
Competitiveness score 248
The tax burden for electricity and natural gas consumers 253
Impact of reductions on network costs 256
8. COMPARISON OF SOCIAL MEASURES FOR RESIDENTIAL CONSUMERS 259
Impact of social measures 259
Methodology 259
Identification of social measures and living income within studied countries 260
Energy effort rates comparison 275
Conclusions 281

Limitations of the analysis 282

9. COMPETITIVENESS OF THE BELGIAN INDUSTRY IN TERMS OF ENERGY AND RECOMMENDATIONS 284

Competitiveness analysis 284

Conclusions and recommendations 309

BIBLIOGRAPHY 313

APPENDIX 322

Industry reduction criteria and measures supporting the development of renewable energy sources .322

List of figures and tables

Figures

Figure 1: Value added of the industry in total GDP 73
Figure 2: Importance of industry employment on total employment 74
Figure 3: Value added of most important sectors in terms of GDP 75
Figure 4: Share of employment in total employment for the main sectors 75
Figure 5: Specialisation indicator compared to the average of neighbouring countries 76
Figure 6: Cost of energy (electricity/natural gas/steam) as part of the total value added 77
Figure 7: Electricity and natural gas consumption compared with value added creation 78
Figure 8: Relative share of exports compared to total exports 79
Figure 9: Exports compared with gross output 80
Figure 10: Electricity and natural gas compared with the value added creation 81
Figure 11: Electricity consumption compared to the value added creation 82
Figure 12: Natural gas consumption compared to the value added creation 82
Figure 13: Radar chart of the top five most important sectors 84
Figure 14: Belgium national electricity market 85
Figure 15: Map of the German transmission system operators 88
Figure 16: Map of the Netherlands electricity distribution system operators 90
Figure 17: The United Kingdom electricity distribution networks 91
Figure 18: The United Kingdom electricity transmission networks 91
Figure 19: Belgium national natural gas market 93
Figure 20: German national natural gas market 95
Figure 21: French national gas market 97
Figure 22: Map of the Netherlands natural gas distribution system operators 98
Figure 23: Market shares of Dutch natural gas DSOs 98
Figure 24: The United Kingdom national natural gas market 99
Figure 25: The United Kingdom natural gas distribution networks 99
Figure 26: Capping in 2020 for the ARENH 160
Figure 27: Total yearly invoice in EUR/year for residential consumers (profile E-RES) 187
Figure 28: Electricity price by component in EUR/MWh (profile E-RES) 188
Figure 29: Proportional component analysis for electricity (profile E-RES) 189
Figure 30: Total yearly invoice in EUR/year (profile E-SSME) 191
Figure 31: Electricity price by component in EUR/MWh (profile E-SSME) 192
Figure 32: Proportional component analysis (profile E-SSME) 193
Figure 33: Total yearly invoice in EUR/year (profile E-BSME) 195
Figure 34: Electricity price by component in EUR/MWh (profile E-BSME) 196
Figure 35: Proportional component analysis (profile E-BSME) 197

Figure 36: Total yearly invoice in kEUR/year (profile E0) 199
Figure 37: Total yearly invoice comparison in % (profile E0; Belgium Average 2020 = 100) 199
Figure 38: Electricity price by component in EUR/MWh (profile E0) 200
Figure 39: Green certificate actual cost for E0 profile (Case 1) 202
Figure 40: Green certificate actual cost for E0 profile (Case 2) 203
Figure 41: Total yearly invoice in MEUR/year (profile E1) 204
Figure 42: Total yearly invoice comparison in % (profile E1; Belgium Average 2020 = 100) 204
Figure 43: Electricity price by component in EUR/MWh (profile E1) 205
Figure 44: Green certificate actual cost for E1 profile (Case 1) 207
Figure 45: Green certificate actual cost for E1 profile (Case 2) 207
Figure 46: Total yearly invoice in MEUR/year (profile E2) 209
Figure 47: Total yearly invoice comparison in % (profile E2; Belgium Average 2020 = 100) 209
Figure 48: Electricity price by component in EUR/MWh (profile E2) 210
Figure 49: Green certificate actual cost for E2 profile (Case 1) 212
Figure 50: Green certificate actual cost for E2 profile (Case 2) 212
Figure 51: Total yearly invoice in MEUR/year (profile E3) 214
Figure 52: Total yearly invoice comparison in % (profile E3; Belgium Average 2020 = 100) 214
Figure 53: Electricity price by component in EUR/MWh (profile E3) 215
Figure 54: Green certificate actual cost for profile E3 (Case 1) 217
Figure 55: Green certificate actual cost for profile E3 (Case 2) 217
Figure 56: Total yearly invoice in MEUR/year (profile E4) 219
Figure 57: Total yearly invoice comparison in % (profile E4; Belgium Average 2020 = 100) 219
Figure 58: Electricity price by component in EUR/MWh (profile E4) 220
Figure 59: Green certificate actual cost for profile E4 (Case 1) 222
Figure 60: Green certificate actual cost for profile E4 (Case 2) 222
Figure 61: Total annual invoice in EUR/year (profile G-RES) 224
Figure 62: Natural gas price per component in EUR/MWh (profile G-RES) 225
Figure 63: Proportional component analysis (profile G-RES) 226
Figure 64: Total annual invoice in EUR/year (profile G-PRO) 228
Figure 65: Natural gas price per component in EUR/MWh (profile G-PRO) 229
Figure 66: Proportional component analysis (profile G-PRO) 230
Figure 67: Total yearly invoice in kEUR/year for industrial consumers (profile G0) 232
Figure 68: Total yearly invoice comparison in % (profile G0; Belgium average 2020 = 100) 233
Figure 69: Natural gas price by component in EUR/MWh (profile G0) 233
Figure 70: Total yearly invoice in MEUR/year for industrial consumers (profile G1) 235
Figure 71: Total yearly invoice comparison in % (profile G1; Belgium average 2020 = 100) 236
Figure 72: Natural gas price by component in EUR/MWh (profile G1) 237
Figure 73: Total yearly invoice in MEUR/year for industrial consumers (profile G2) 239

Figure 74: Total yearly invoice comparison in % (profile G2; Belgium average 2020 = 100) 240
Figure 75: Natural gas price by component in EUR/MWh (profile G2) 241
Figure 76: Electricity yearly bill in EUR/MWh per profile 246
Figure 77: Natural gas yearly bill in EUR/MWh per profile 248
Figure 78: Competitiveness scorecard for residential and small professional electricity consumers (profile E-RES, E-SSME and E-BSME) 249
Figure 79: Competitiveness scorecard for industrial electricity consumers (profiles E0 – E4) 250
Figure 80: Competitiveness scorecard for industrial non-electro-intensive consumers (profiles E0 – E4) 251
Figure 81: Competitiveness scorecard for industrial electro-intensive consumers (profile E0 – E4) 252
Figure 82: Competitiveness scorecard for residential and small professional natural gas consumers (profile G-RES and G-PRO) 252
Figure 83: Competitiveness scorecard for industrial natural gas consumers (profile G0 – G2) 253
Figure 84: Variance of the “All other costs” component in EUR/MWh (profile E0 - E4) 254
Figure 85: Network costs reduction in EUR/MWh (profile E3) 256
Figure 86: Network costs reduction in EUR/MWh (profile E4) 257
Figure 87: Computation of 2020 maximum living income (432 EUR) under Hartz IV 268
Figure 88: Electricity effort rate compared to disposable income 276
Figure 89: Natural gas effort rate compared to disposable income 277
Figure 90: Electricity effort rate compared to a maximum living income 278
Figure 91: Natural gas effort rate compared to a maximum living income 279
Figure 92: Electricity effort rate compared to a minimum living income 280
Figure 93: Natural gas effort rate compared to a minimum living income 281
Figure 94: Methodology flow chart 284
Figure 95: Share of sectoral electricity consumption attributed to each consumer profile 287
Figure 96: Share of sectoral natural gas consumption attributed to each consumer profile 288
Figure 97: Electricity price differences for electro-intensive consumers compared with the average in the neighbouring countries 289
Figure 98: Electricity price differences for non-electro-intensive consumers compared with the average in the neighbouring countries 290
Figure 99: Natural gas price differences for natural gas consumers in comparison with the average in the neighbouring countries 290
Figure 100: Sector and region-specific electricity and natural gas prices in 2020 292
Figure 101: Energy intensity per sector in Belgium 293
Figure 102: Energy cost as % of value added in Belgium 293
Figure 103: Energy consumption per sector 295
Figure 104: 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 297
Figure 105: 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 300

Figure 106: 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) 306

Figure 107: 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) 307

Tables

Table 1: Consumer profiles for electricity 68

Table 2: Detailed view of the connection level of consumer profiles for electricity per country 69

Table 3: Consumer profiles for natural gas 70

Table 4: Detailed view of the connection level of consumer profiles for natural gas per country 70

Table 5: Economic activities related to basic manufacturing industries with NACE classification 71

Table 6: Economic activities related to other sectors of the manufacturing industry with NACE classification ... 72

Table 7: Sectors ranking 83

Table 8: Electricity distributed and market share for each Flemish DSO (electricity) 86

Table 9: Electricity distributed and the market share for each DSO in Wallonia (electricity) 86

Table 10: Overview of voltage distribution to Belgian system operators 87

Table 11: Market shares of German electricity DSOs 89

Table 12: Market shares and the number of connections for each Dutch DSO (electricity) 90

Table 13: TSOs and DSOs in the United Kingdom zones 91

Table 14: Market shares of the United Kingdom electricity DSOs 92

Table 15: Market shares of Flemish natural gas DSOs 94

Table 16: Market shares of DSOs in Wallonia for natural gas 94

Table 17: Normalised market shares of German natural gas DSOs 96

Table 18: Market shares of the United Kingdom’s natural gas DSOs 100

Table 19: Summary table on the number of zones per country 100

Table 20: Number of products according to the HHI-index 103

Table 21: Profile weights depending on the Belgian product 106

Table 22: Annual cost of selected products for profile E-RES in Belgium 106

Table 23: Annual cost of selected products for profile E-SSME in Belgium 106

Table 24: Network cost components per Belgian region 107

Table 25: Adoption date of new tariffs by regional DSOs in Belgium 108

Table 26: Distribution cost composition in Belgium 108

Table 27: Other distribution cost component in Belgium 108

Table 28: Other costs for residential and small professional electricity consumers applying in all three Belgian regions 109

Table 29: Regional other costs for residential and small professional electricity consumers 110

Table 30: Market share of German energy suppliers 111

Table 31: Profile weights depending on the German product 112

Table 32: Annual cost of selected products for profile E-RES in German 113

Table 33: Annual cost of selected products for profile E-SSME in Germany 114
Table 34: Components of the German network costs 115
Table 35: French product weights depending on the profile 117
Table 36: Annual cost of selected products for profile E-RES in France 117
Table 37: Annual cost of selected products for profile E-SSME in France 117
Table 38: Distribution costs in France 118
Table 39: Allocation of consumption per temporal class in France 118
Table 40: Hours per temporal classes in France 119
Table 41: Other costs in France (E-RES, E-SSME, E-BSME)... 120
Table 42: Normalised market shares of the largest two Dutch energy suppliers 121
Table 43: Profile weights depending on the Dutch product 121
Table 44: Annual cost of selected products for profile E-RES in the Netherlands 122
Table 45: Annual cost of selected products for profile E-SSME in the Netherlands................................. 122
Table 46: Network cost for electricity in the Netherlands (E-RES, E-SSME, E-BSME) 123
Table 47: Electricity Energy Tax and ODE bands (Netherlands)... 123
Table 48: Normalised market share of energy supplier in the UK 124
Table 49: Profile weights depending on the products in the UK 125
Table 50: Annual cost of selected products for profile E-RES in the UK 125
Table 51: Annual cost of selected products for profile E-SSME in the UK 125
Table 52: Transmission costs options 126
Table 53: Distribution costs in the United Kingdom 127
Table 54: Profile weights depending on the products in Belgium 130
Table 55: Annual cost of selected products for profile G-RES in Belgium.. 131
Table 56: Transmission cost of Belgian TSO 131
Table 57: Other costs for residential and small professional natural gas consumers applying to all Belgian regions 132
Table 58: Other regional costs for residential and small professional natural gas consumers 133
Table 59: Market shares of German natural gas suppliers 134
Table 60: Profile weights depending on the products in Germany 134
Table 61: Annual cost of selected products for profile G-RES in Germany 135
Table 62: Distribution costs in Germany 136
Table 63: Profile G-RES weight for each product 137
Table 64: Annual cost of selected products for profile G-RES in France 137
Table 65: Categories depending on the yearly consumption in France.. 138
Table 66: Normalised market shares of the largest two Dutch energy suppliers 139
Table 67: Profile weight for each product in the Netherlands 139
Table 68: Annual cost of selected products for profile G-RES in the Netherlands 140
Table 69: Components of network costs in the Netherlands 140
Table 70: Energy tax and ODE 2020 rates in the Netherlands... 141

Table 71: Market share of energy supplier in the United Kingdom ... 142
Table 72: Weight for each product in the United Kingdom ... 142
Table 73: Annual cost of selected products for profile G-RES in the UK ... 142
Table 74: Transport costs components in the UK ... 143
Table 75: Distribution costs for residential users and small professionals in the United Kingdom ... 143
Table 76: Load factors for profiles G-RES and G-PRO ... 143
Table 77: Date of adoption of new transmission tariffs in Belgium ... 148
Table 78: Voltage level for industrial profiles in Belgium ... 149
Table 79: Tariff for the usage of the distribution grid in Belgium ... 149
Table 80: Additional components for Belgian industrial consumers ... 149
Table 81: Other costs for industrial electricity consumers applying in all three Belgian regions ... 150
Table 82: Regional other costs for industrial electricity consumers ... 151
Table 83: Certificate schemes in each Belgian region ... 152
Table 84: Connection voltage for each consumer profile ... 153
Table 85: Components of German transmission costs ... 153
Table 86: Grid fee reduction conditions ... 154
Table 87: KWKG-Umlage tax in Germany ... 155
Table 88: StromNEV tax in Germany ... 156
Table 89: Offshore-Netzumlage tax in Germany ... 156
Table 90: EEG-Umlage tax in Germany ... 157
Table 91: Reference period for the ARENH ... 159
Table 92: Percentage of ARENH hours compared to their overall consumption hours ... 160
Table 93: Tension connection level and tension domain in France ... 161
Table 94: French transmission tariffs ... 162
Table 95: Hours per temporal classes in France ... 162
Table 96: Transmission reductions eligibility criteria and rates ... 163
Table 97: Definitions of electro- and hyper-electro-intensive consumers ... 163
Table 98: Network cost component in the Netherlands ... 166
Table 99: Energy tax and ODE levy according to the consumption level for electricity (industrials) ... 167
Table 100: Tariff scheme regarding transmission cost in the United Kingdom ... 168
Table 101: Half-hourly (HH) tariff option in the United Kingdom ... 169
Table 102: Distribution costs (CDCM) in the United Kingdom ... 169
Table 103: Distribution costs (EDCM) in the United Kingdom ... 170
Table 104: Natural gas type by grid type for each Belgian region (in%) ... 174
Table 105: Other costs for industrial natural gas consumers applying to all Belgian regions ... 175
Table 106: Other regional costs for industrial natural gas consumers ... 175
Table 107: Components of German transport costs ... 176
Table 108: Components of German distribution costs ... 177

Table 109: Other costs for large industrial natural gas consumers ... 178
Table 110: TSOs natural gas offtake in France ... 179
Table 111: Transport cost component in France ... 179
Table 112: Distribution cost components in France ... 180
Table 113: Surcharges on natural gas in France ... 181
Table 114: Network cost component in the Netherlands ... 182
Table 115: Energy tax and ODE 2020 rates in the Netherlands ... 183
Table 116: Companies directly connected to the transport grid in the Netherlands ... 183
Table 117: Transport costs components in the UK ... 184
Table 118: Distribution cost components in the UK ... 184
Table 119: Load factors for profiles G0, G1 and G2 ... 185
Table 120: Flanders' cap on profile E0 ... 202
Table 121: Flanders' cap on profile E1 ... 206
Table 122: Flanders' cap on profile E2 ... 211
Table 123: Flanders' cap on profile E3 ... 216
Table 124: Flanders' cap on profile E4 ... 221
Table 125: Belgium (federal) social measures ... 261
Table 126: Brussels social measures ... 262
Table 127: Flanders social measures ... 263
Table 128: Wallonia social measures ... 264
Table 129: France energy vouchers amounts ... 270
Table 130: UK social measures ... 273
Table 131: Distribution of electric consumer profiles per sector ... 286
Table 132: Distribution of natural gas consumer profiles per sector ... 286
Table 133: National electro-intensity criteria ... 291
Table 134: Results for every industrial sector in Flanders, Wallonia and Brussels compared to the average prices in Germany, France, the Netherlands and the UK (2020) ... 296
Table 135: Results for every industrial sector in Flanders, Wallonia and Brussels compared to the average prices in Germany, France and the Netherlands (2020) ... 299
Table 136: Classification of industry according to energy-intensity by Chang et al. (2019) ... 303
Table 137: Summary of elasticities of price demand from the literature review ... 304
Table 138: Total energy (electricity and natural gas) bills in absolute and relative terms (compared to Belgium average) ... 305
Table 139: Relocation possibilities for high range consumers ... 308
Table 140: Relocation possibilities for low range consumers ... 308

List of acronyms

Acronym	Definition
AMR	Automatic meter reading
BE	Belgium
BT	Basse Tension
CHP	Combined Heat and Power
CU	Consumption unit
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)
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 2020. 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 3.2.

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).

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.

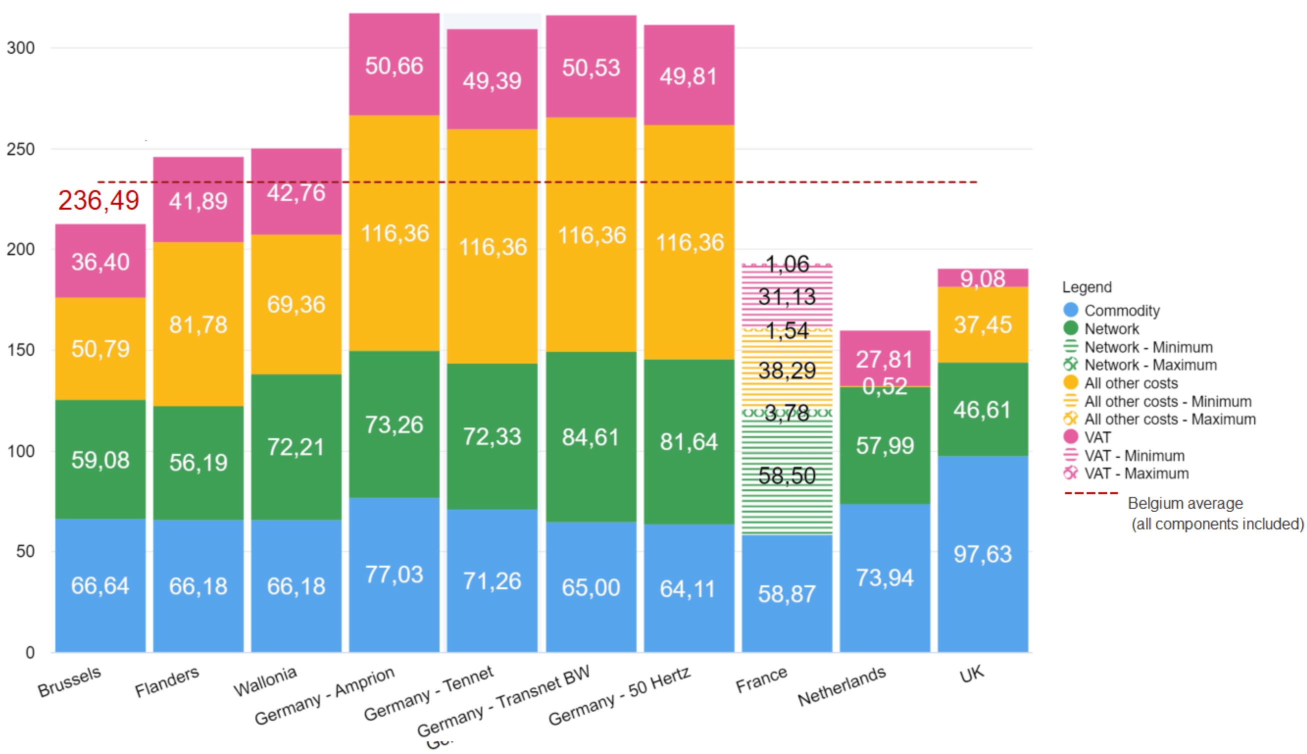
Comparison of electricity prices

Comparison of electricity prices for residential and small professional consumers

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

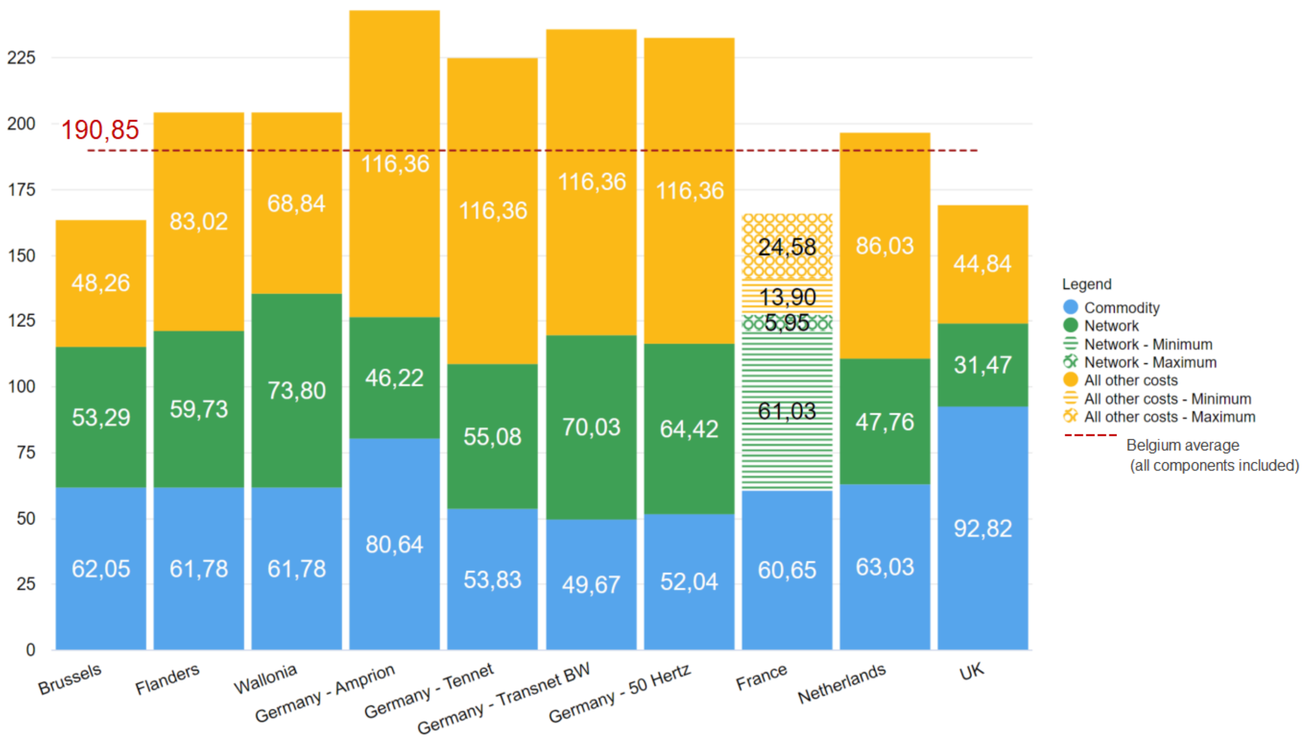
Of our three residential and small business consumers, the Netherlands has the lowest annual bill for residential consumers (E-RES profile), partly due to a large rebate on taxes (belastingvermindering”). On the other hand, Germans pay the most (i.e. almost twice as much as Dutch households) and have 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.

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



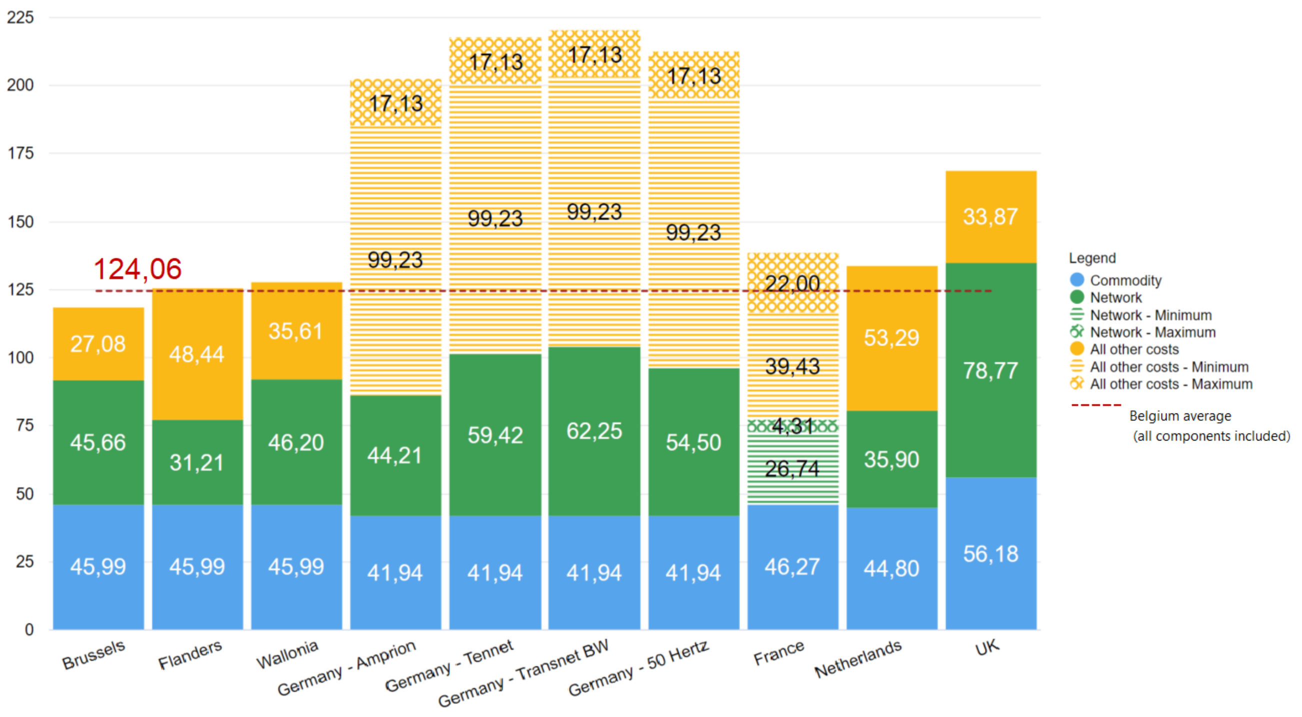
The situation is relatively similar for the E-SSME profile, among small professional consumers, as Germany still has the highest annual bill of all and Belgium has relatively high prices. The most notable differences are the weaker competitive position of the Netherlands and the United Kingdom: the tax refund only applies to households and does not benefit small Dutch professionals; the United Kingdom applies the lowest VAT rate of all studied countries for profile E-RES, which explain why it is the most affected country by the disappearance of VAT for the E-SSME profile. The competitive position of the United Kingdom is also affected by the disappearance of VAT, as it applies the lowest rate of all the countries under consideration. Like the E-RES profile, Brussels remains the cheapest Belgian region - and is potentially the cheapest region of all depending on the price option chosen by French consumers. On the other hand, Flanders is the most expensive Belgian region.

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



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*. Conversely, thanks to lower network costs France potentially keeps offering the cheapest yearly bill depending on the chosen price option. 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. Wallonia is the most expensive region in Belgium.

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

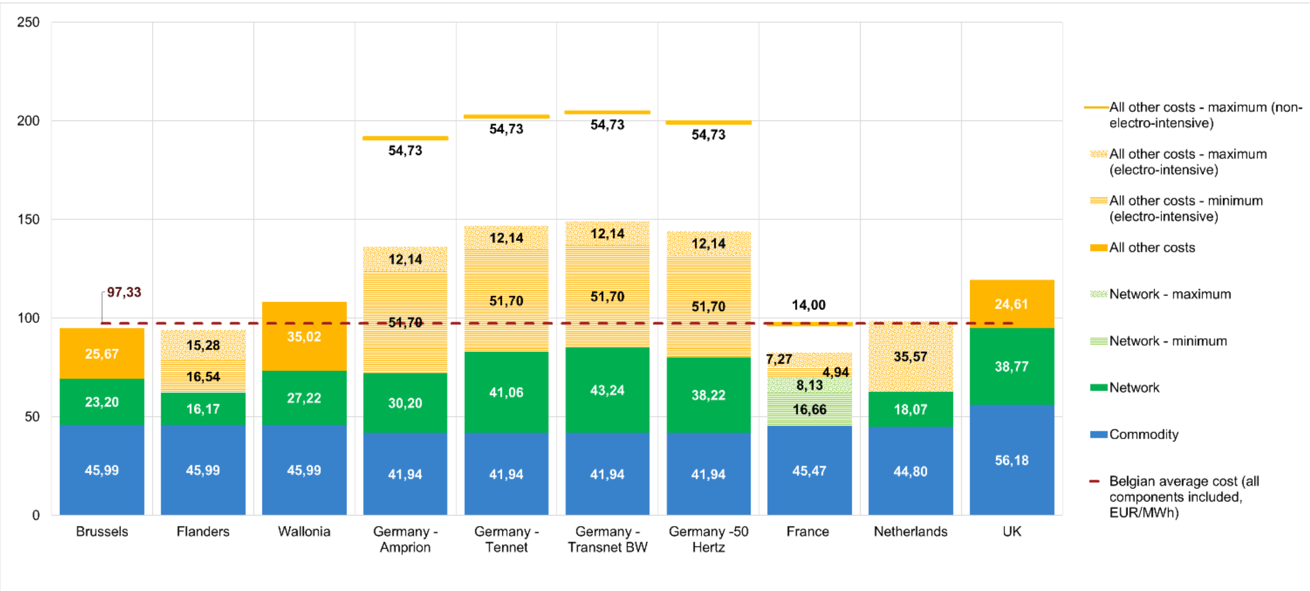


The different components examined for each country and region can vary considerably and have an impact on the competitive position of each country. If commodity prices are reasonably convergent across countries - except the United Kingdom - there are significant differences in the components "network 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 which are relatively high, especially for E-RES and E-SSME.

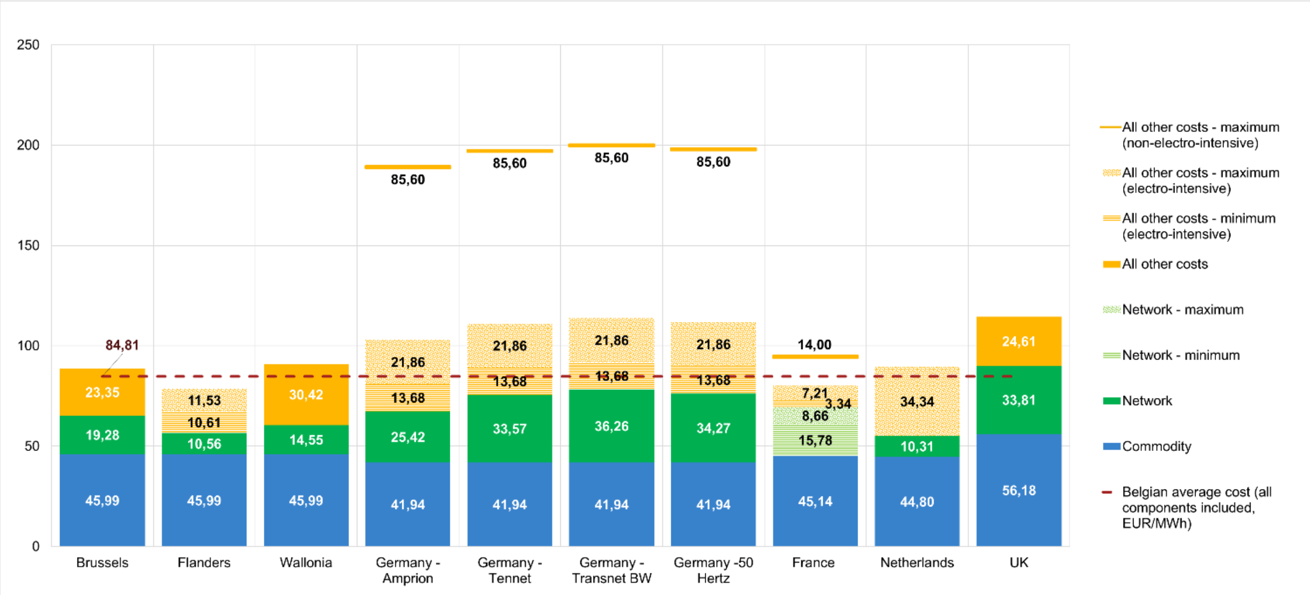
Comparison of electricity prices for industrial consumers

The lowest cost of electricity for the E0, E1 and E2 consumer profiles is potentially in the Netherlands, slightly ahead of France. 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 average annual bills 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 network costs and "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.

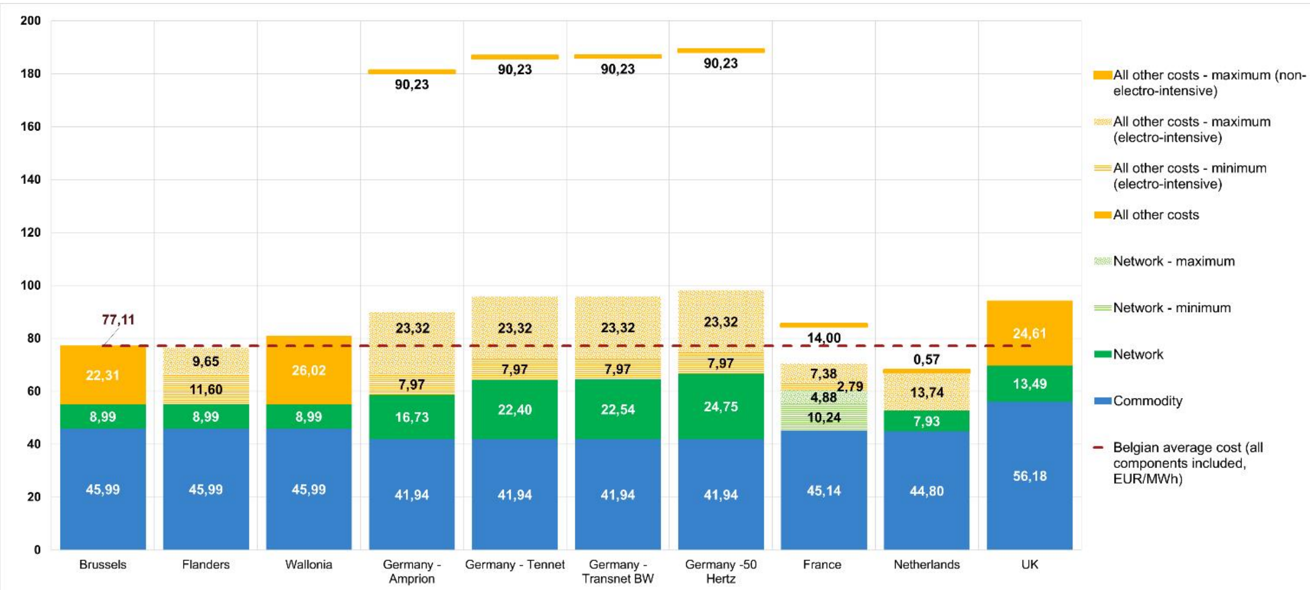
Electricity price by component in EUR/MWh (profile E0)



Electricity price by component in EUR/MWh (profile E1)

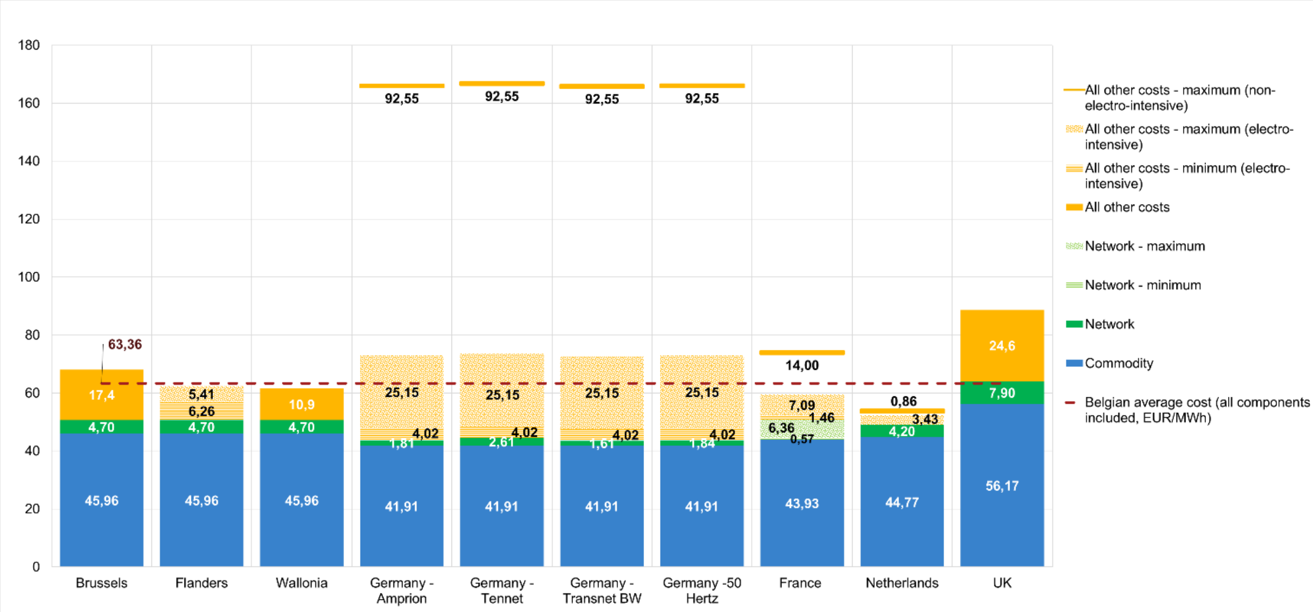


Electricity price by component in EUR/MWh (profile E2)

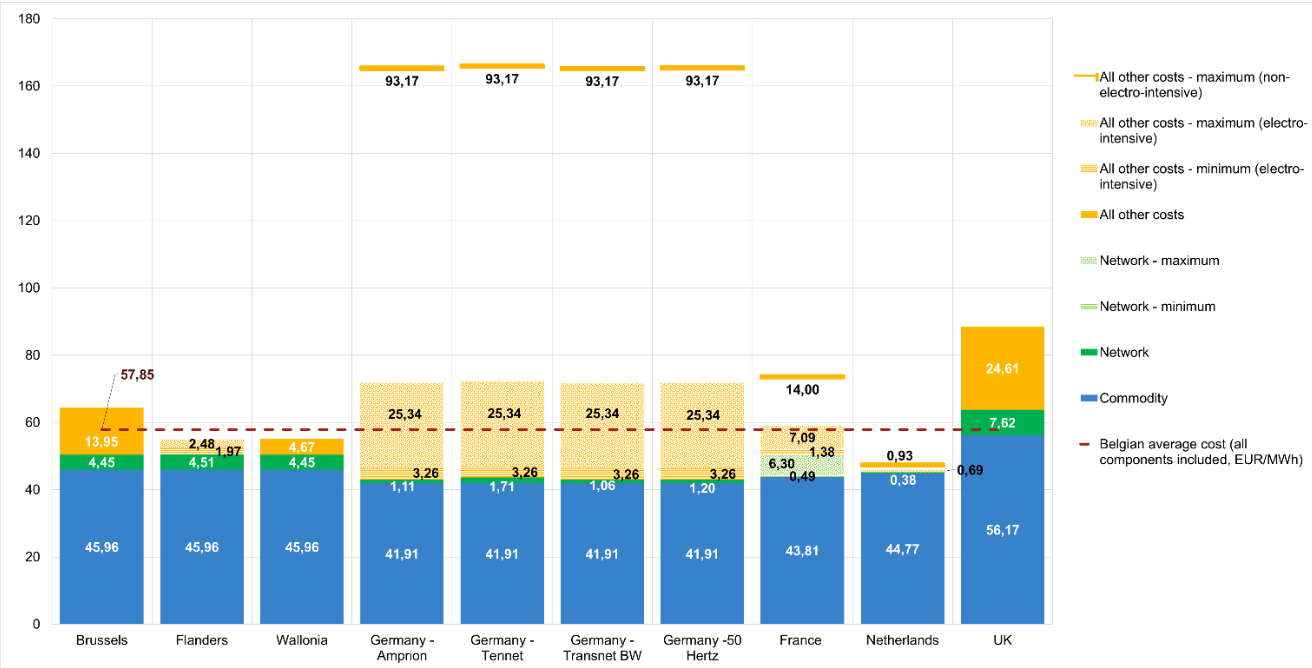


Although the results are almost similar to those of the profiles previously considered, profile E3 is the only consumer for which France potentially has the lowest prices, when considering the minimum price option, due to potentially lower network costs. Nevertheless, the situation is reversed for profile E4, with the Netherlands again becoming the cheapest country of all. Conversely, the United Kingdom remains the most expensive country, except when considering German tariffs for non-electro-intensive consumers. Here again, Belgium shows relatively high average prices. However, the picture is more nuanced as regards the regions: Wallonia is potentially more competitive than Flanders for E3, while Flanders is slightly more competitive for E4. Brussels is the most expensive Belgian region for the E3 and E4, but the limited presence of industrial consumers on its territory tends to make this a rather hypothetical case.

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



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



On the whole, the countries under consideration face converging commodity prices, except for the United Kingdom. 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. Concerning the network reduction criteria, Germany appears to be less strict than other countries as it takes into account only the annual offtake (from 10 GWh) and the number of operating hours. 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 fiscal 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, which was implemented this year, as market prices were higher than regulated prices.

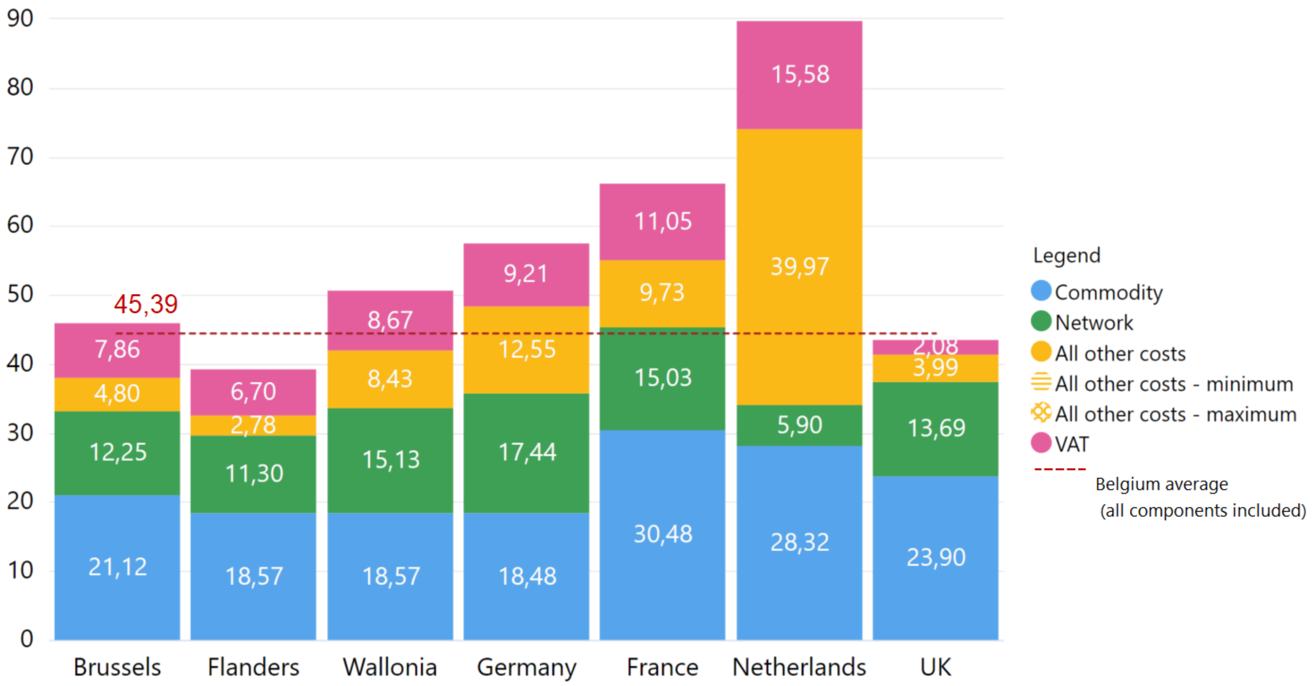
Comparison of natural gas prices

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.

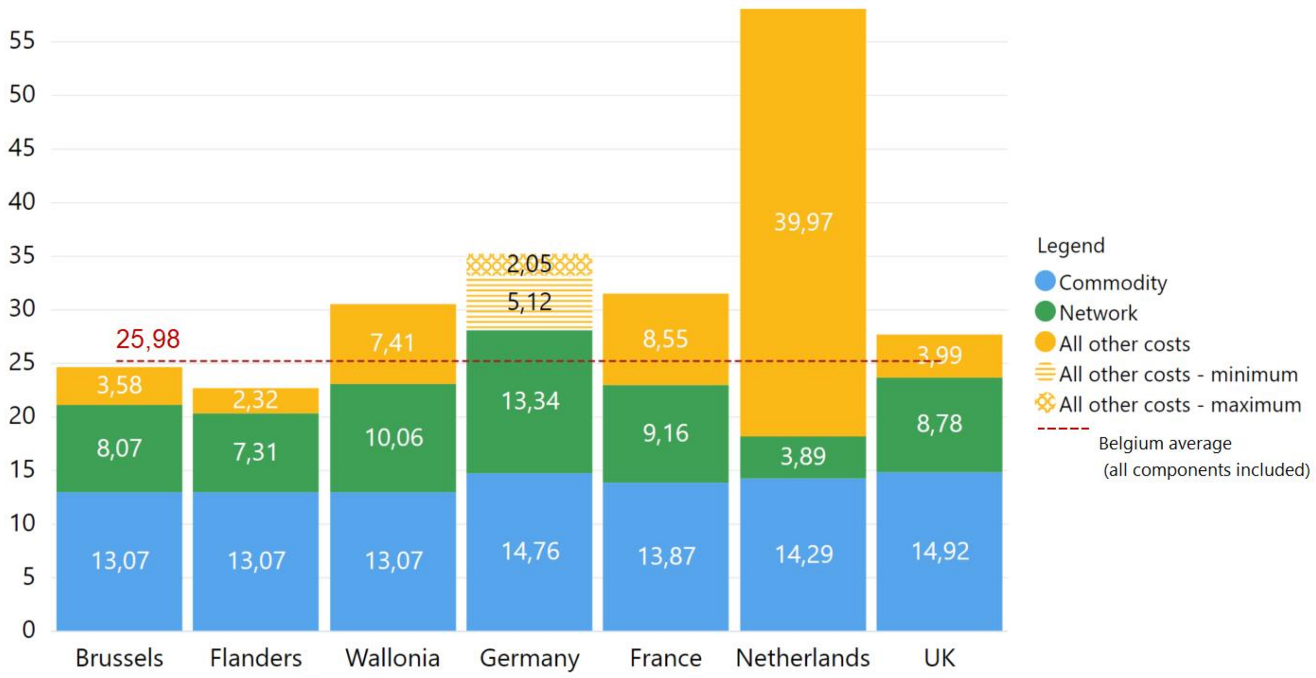
For residential consumers (G-RES), Flanders holds the least expensive country/region position, whereas the Netherlands is the most expensive country. In both cases, taxes play a determining role in their relative competitive position, with Flanders' displaying the lowest fares and the Netherlands the largest. As a whole, 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 of all before Brussels again. 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.

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



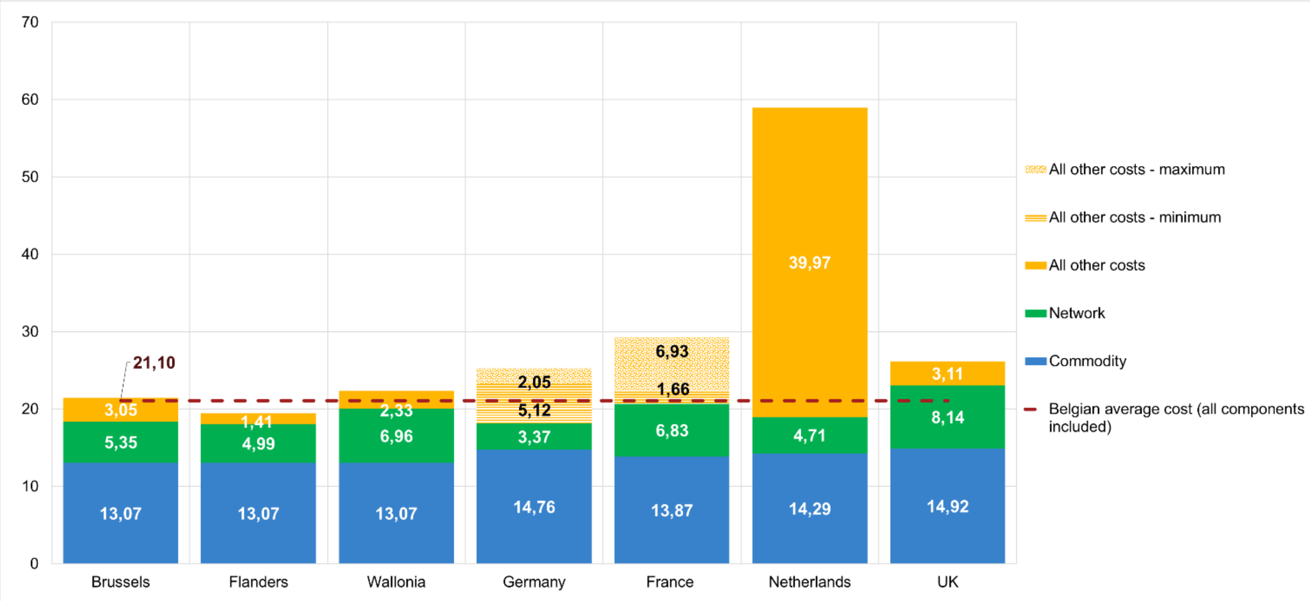
In general, Belgium aligns relatively well compared to its neighbouring countries mostly as a result of low tax prices, which is a remarkable difference compared to electricity. In terms of commodity costs, they are fairly convergent across countries, particularly considering G-PRO. As for network costs, 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.

Comparison of natural gas prices for industrial consumers

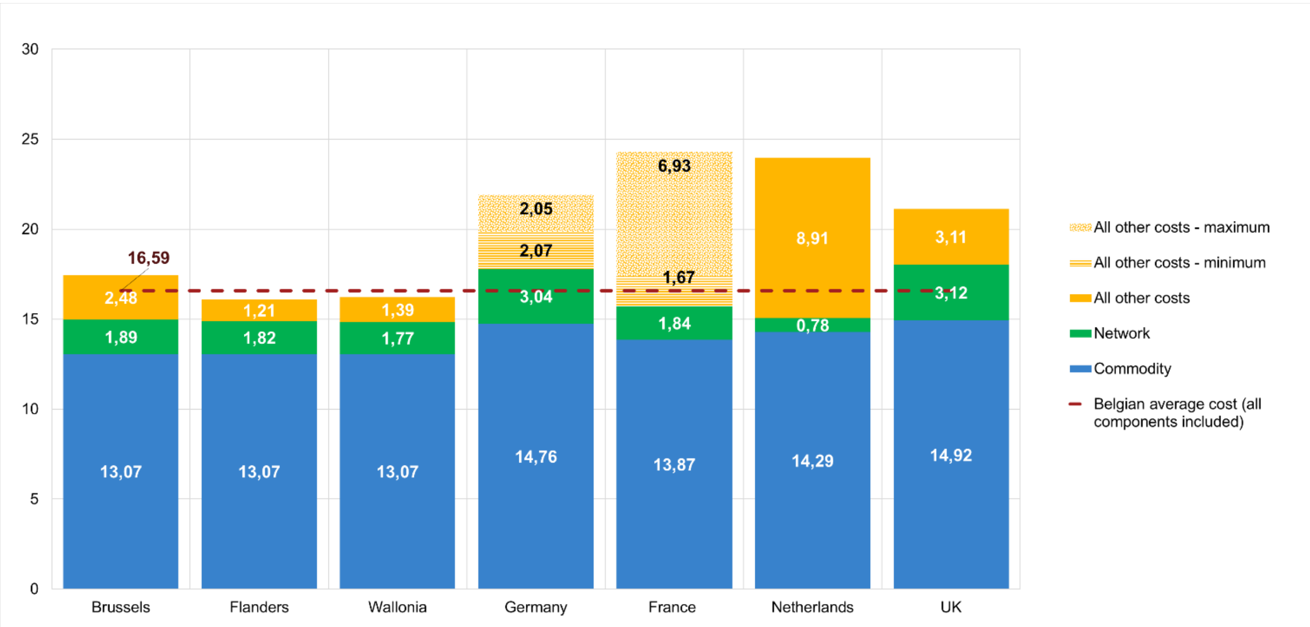
Overall, Belgium is very competitive when it comes to natural gas. For all industrial profiles (G0, G1 and G2), it has lower prices than all the other countries studied. While commodity costs are similar from one country to another, the price differentials are due to differences in network costs - to some extent - and, above all, in the levels of taxation. Thus, Belgium generally has the lowest tariffs for the two categories of components. In Belgium, Brussels is the least competitive region – except for the G0 profile. Moreover, the prices in the G2 profile may be lower than those in France or the Netherlands. As regards Flanders and Wallonia, the price differences are marginal for the G1 and G2 profiles.

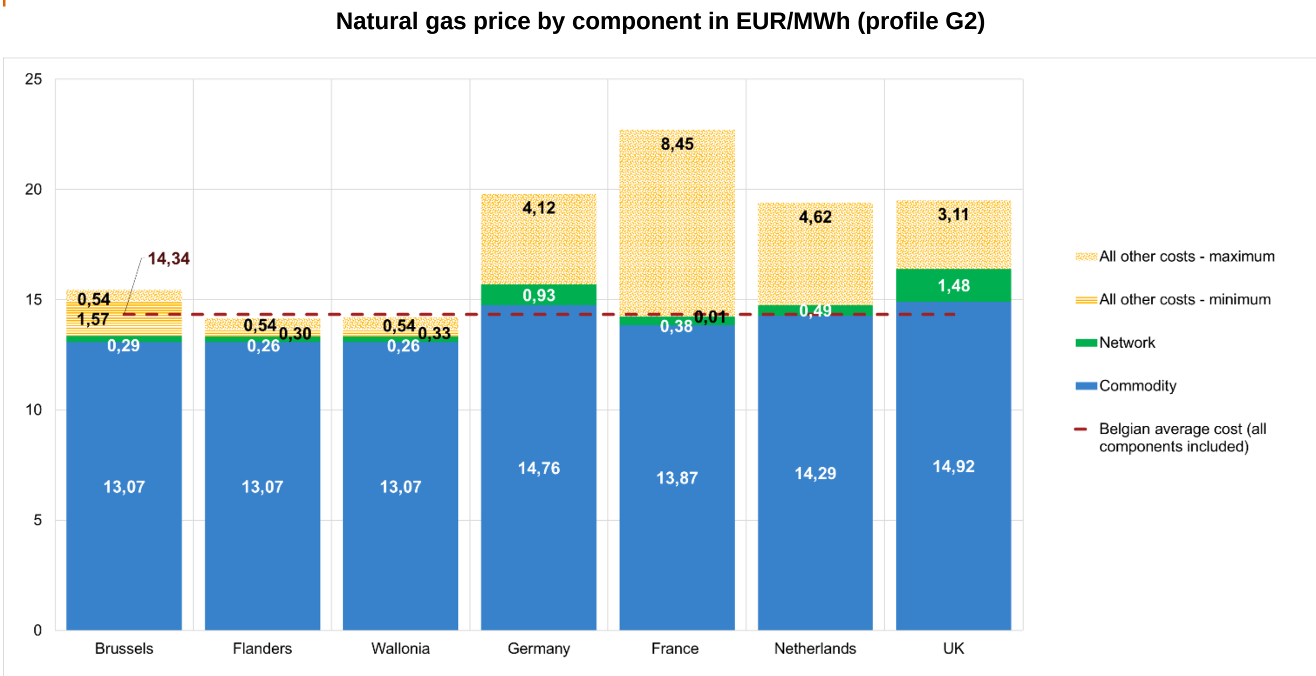
For natural gas, government intervention in network costs and taxes appears to be less common. Moreover, the complexity is much less, even if reductions or exemptions exist (e.g. exemptions for consumers using natural gas as a raw material or 'feedstock').

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



Natural gas price by component in EUR/MWh (profile G1)





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. As for 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, Brussels has the lowest electricity prices in Belgium, while Flanders is the cheapest Belgian region for natural gas. Flanders even charges the cheapest natural gas of all countries. Except for the E- SSME profile, Wallonia is the most expensive Belgian region, regardless of the energy considered. On an aggregate basis (i.e. adding up the annual electricity and natural gas bills), residential consumers in Brussels and Flanders have similar prices, which is in line with the most competitive country - the United Kingdom. Although Wallonia faces higher prices than the other two Belgian regions, its relative competitive position remains in line with the latter.

Comparison of the total bill for industrial consumers

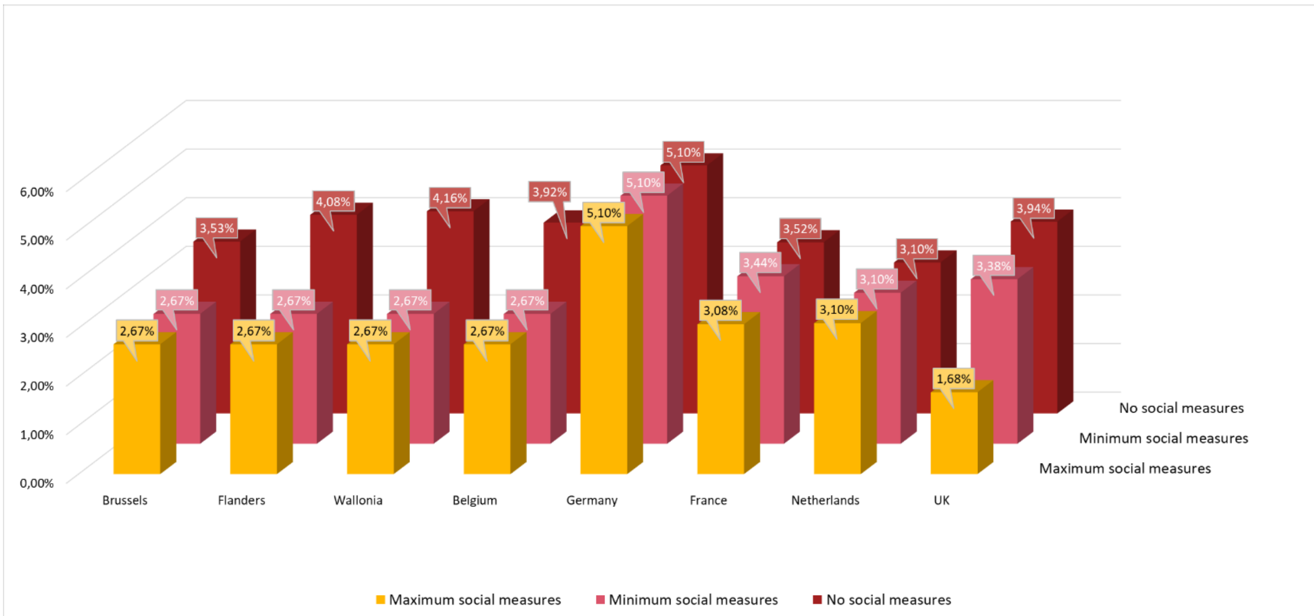
The commodity cost makes up for a greater part of the natural gas bill than the electricity bill. However, its impact on the differences between countries is larger for electricity than for natural gas. Germany benefits from a sizeable competitive advantage on the other countries in terms of electricity 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, Belgium faces a competitive disadvantage for these consumers. Concerning natural gas, Belgium displays the lowest commodity fares of all and relatively low tax levels, which has a substantial influence on Belgium's good competitiveness. For industrial natural gas consumers, Belgium offers the lowest cost of all countries under review even when comparing to feedstock consumers in the Netherlands and France for profile G2. This difference could be smaller or even null though as about half of Belgian industrial contracts are indexed on the Dutch TTF prices. In contrast, this study only considered the Belgian ZTP to estimate Belgian industrial commodity costs.

Efforts in paying for energy bills for vulnerable consumers

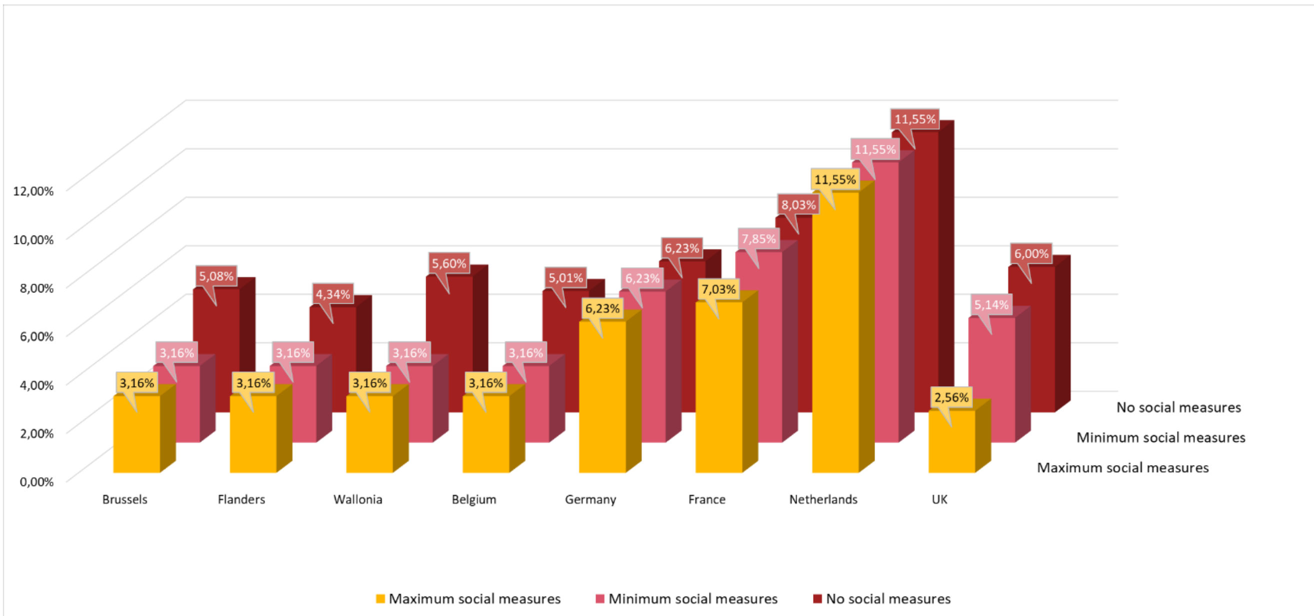
Chapter 8 aims at assessing the differences in financial efforts made by vulnerable consumers to pay for their electricity and/or natural gas bills given their income level. Within the studied countries, various governments' tools exist to reduce one's energy bill. These tools can range from social tariffs 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 %)



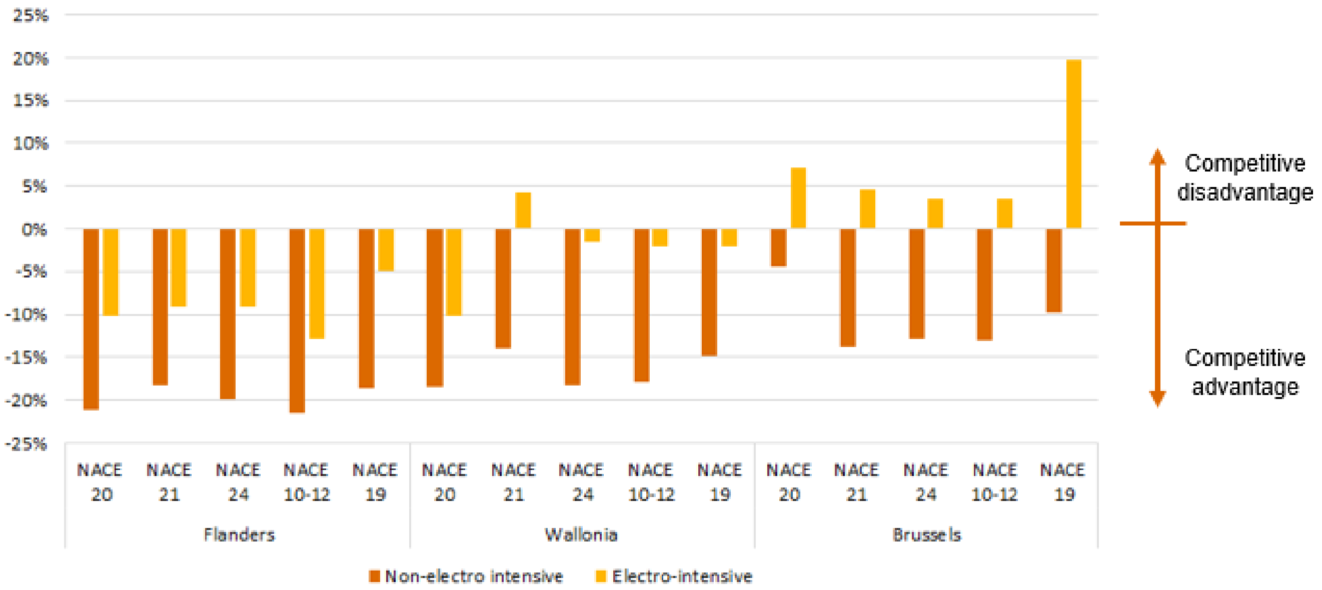
Evaluation of Belgian industries competitiveness

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 neighbouring counterparts. 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 clear competitive advantage in terms of total energy cost regardless of the inclusion of the UK as depicted in the figure below. In contrast, electro-intensive consumers' situation varies on the inclusion of the UK in the comparison. The UK included, Flanders and Wallonia (except NACE 21) both display competitive advantages compared to neighbouring countries. Brussels is the only Belgian region to face significant competitive disadvantages although less pertinent as few industrial consumers reside on its territory.

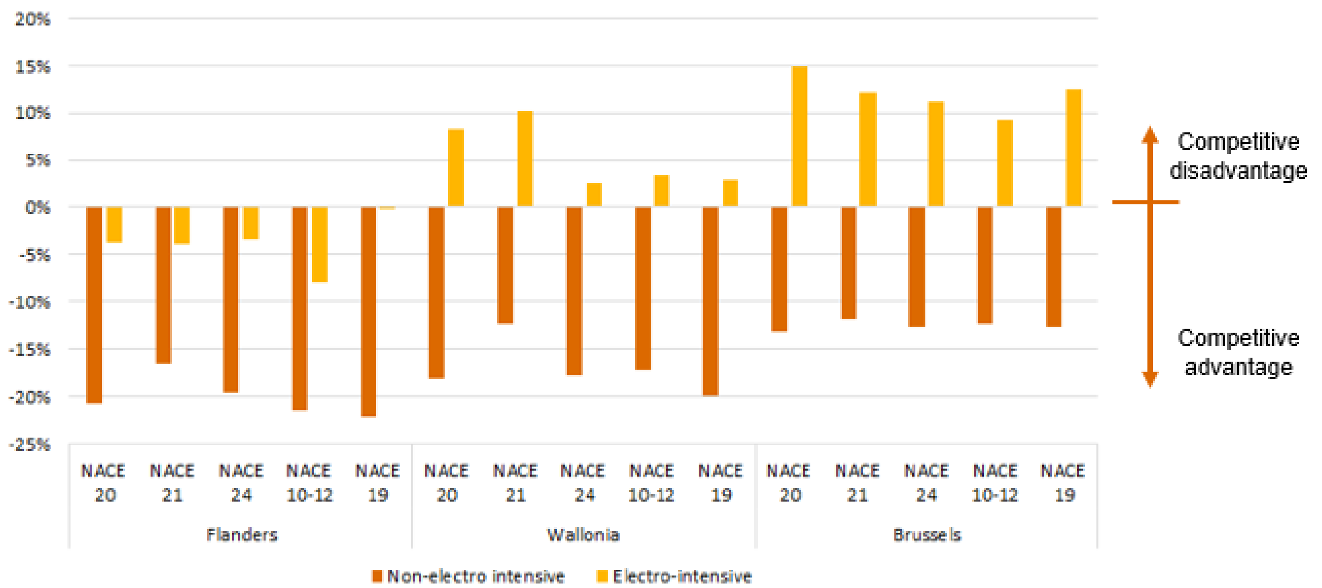
[2] These are 2016 national values, which were retrieved from Eurostat.

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 cap on the financing of renewable energy in 2018.

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, kleinzakelijke 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 2020. 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 3.2.

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	Kleinzakelijk	30	37,5	30
E-BSME	Kleinzakelijk	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).

Aardgas consumentenprofielen

Profiel	Consument type	Jaarlijkse vraag (MWh)	Gecontracteerde capaciteit (kW)
G-RES	Residentieel	23,26	-
G-PRO	Kleinzakelijk	300	-
G0	Kleinzakelijk	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 (hoofdstuken 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.

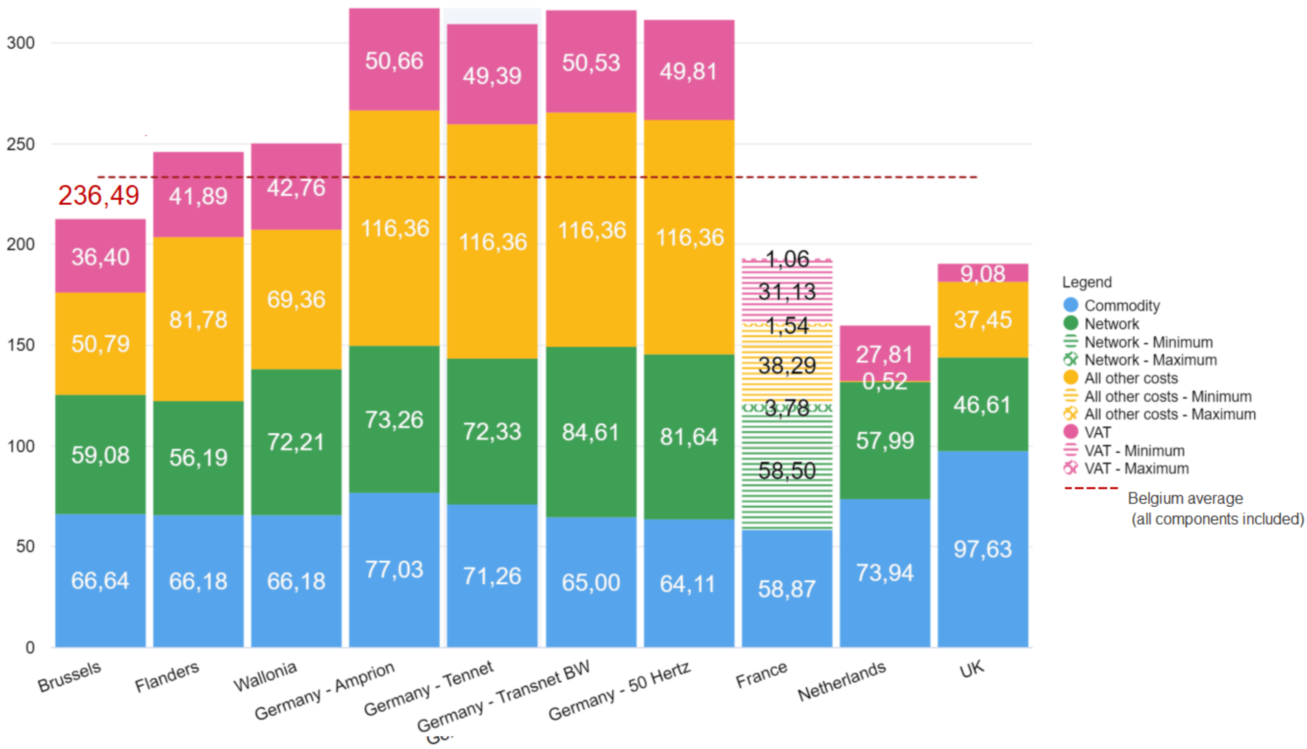
Vergelijking van elektriciteitsprijzen

Vergelijking van de elektriciteitsprijzen voor residentiële en kleine professionele consumenten

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

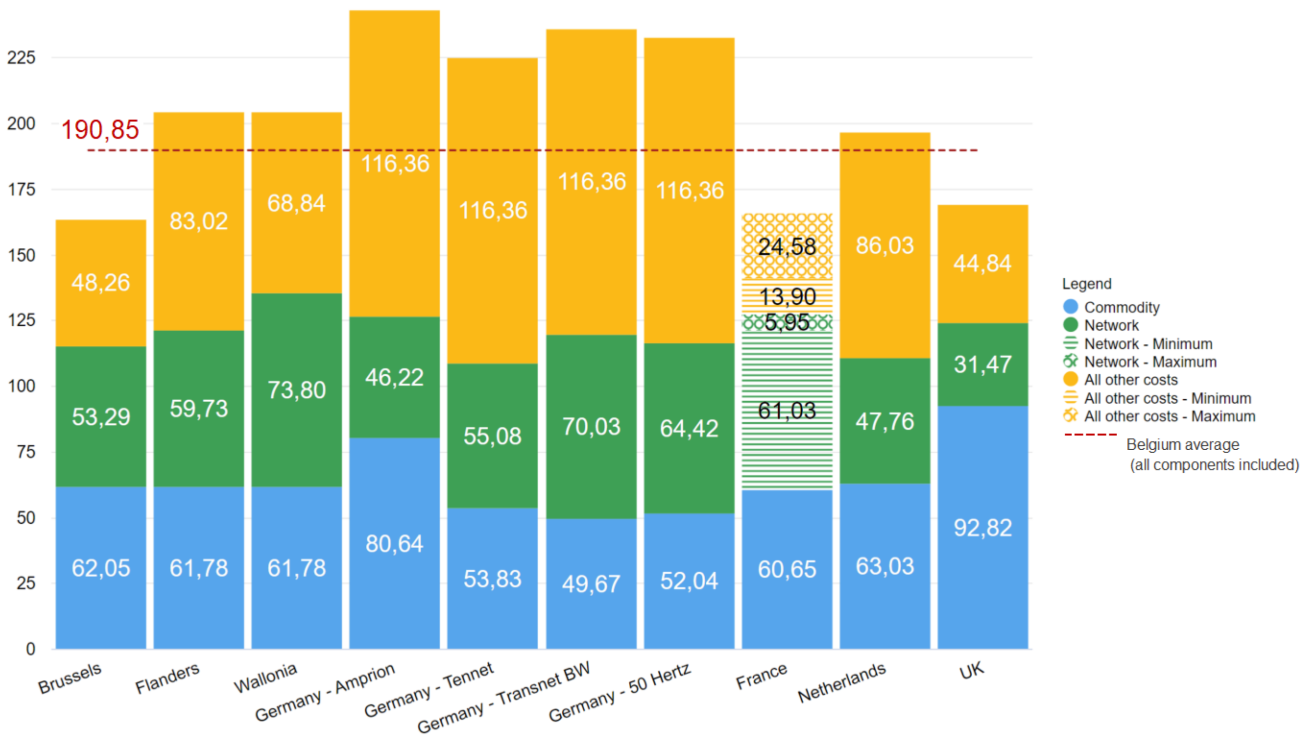
Van onze drie residentiële en kleine professionele consumenten heeft Nederland de laagste jaarfactuur voor residentiële consumenten (E-RES profiel), vooral door een aanzienlijke belastingvermindering, terwijl de Duitsers het meest betalen (d.w.z. bijna twee keer zo hoog als de Nederlandse huishoudens) en de hoogste tarieven ondervinden voor het onderdeel "alle andere kosten" (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.

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



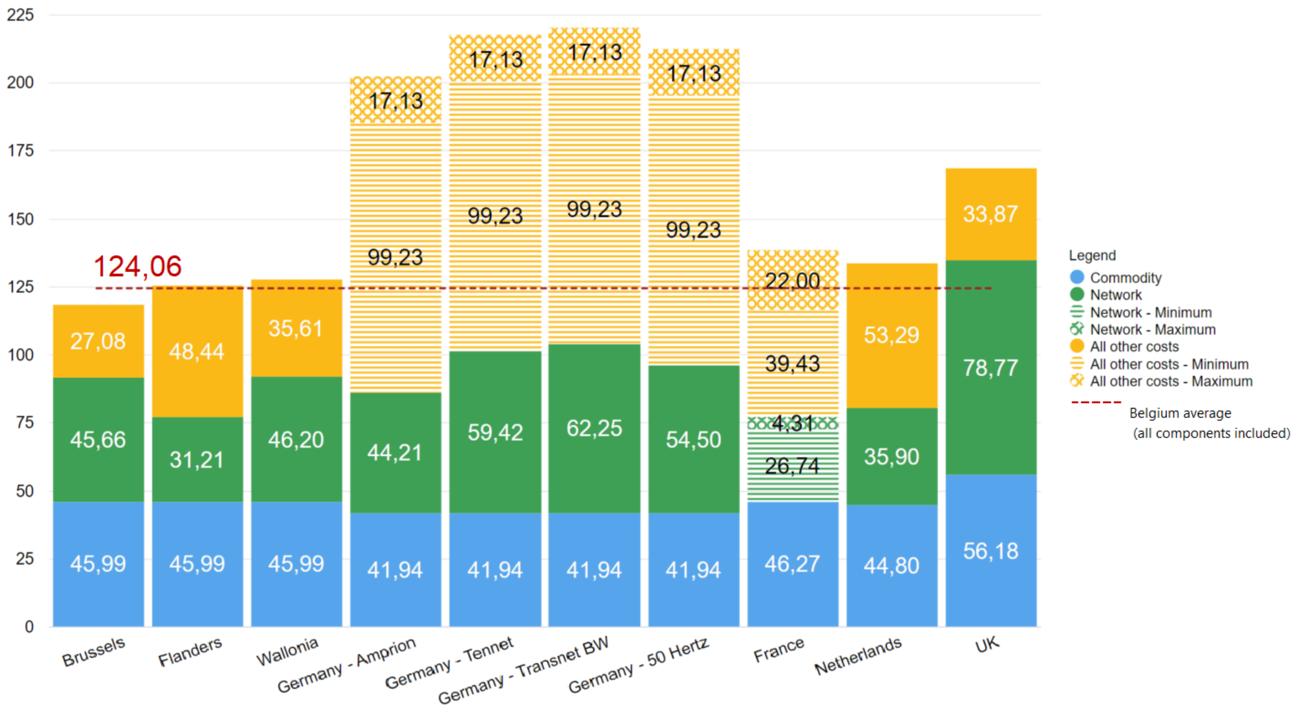
De situatie is relatief vergelijkbaar voor het E-SSME profiel, onder de kleine professionele consumenten, aangezien Duitsland nog steeds de hoogste jaarlijkse factuur van allemaal in rekening brengt en België relatief hoge prijzen laat zien. De meest opvallende verschillen zijn de zwakkere concurrentiepositie van Nederland en het Verenigd Koninkrijk: de belastingteruggave geldt enkel voor huishoudens en komt niet ten goede aan kleine Nederlandse professionals. Aangezien het Verenigd Koninkrijk het laagste BTW-tarief van alle onderzochte landen toepast, voor het profiel E-RES, zal dit land het meeste te verliezen hebben bij het verdwijnen van de BTW voor het profiel E-SSME. Net als het E-RES profiel blijft Brussel de goedkoopste Belgische regio - en is het potentieel de goedkoopste regio van allemaal, afhankelijk van de prijsoptie die de Franse consument kiest - terwijl Vlaanderen de duurste Belgische regio is.

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*. Omgekeerd blijft Frankrijk dankzij de lagere netwerkkosten potentieel, afhankelijk van de gekozen prijsoptie, de goedkoopste jaarfactuur aanbieden. Ten opzichte van de buurlanden liggen de Belgische prijzen nu beter 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. Die laatste is de duurste Belgische regio.

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



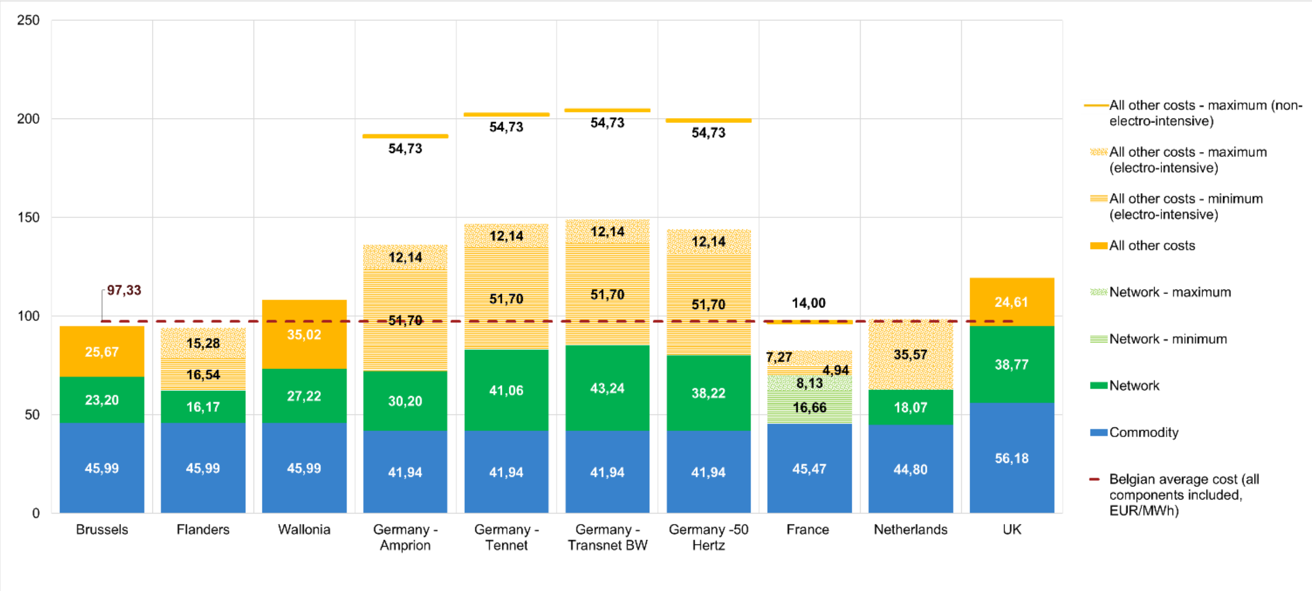
De verschillende componenten die voor elk land en elke regio worden onderzocht, kunnen aanzienlijk verschillen en de concurrentiepositie van elk land beïnvloeden. Hoewel de energiekost in de verschillende landen - met uitzondering van het Verenigd Koninkrijk - redelijk convergeren, zijn er grote verschillen 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 die relatief hoog zijn, voornamelijk voor E-RES en E-SSME.

Vergelijking van de elektriciteitsprijzen voor industriële consumenten

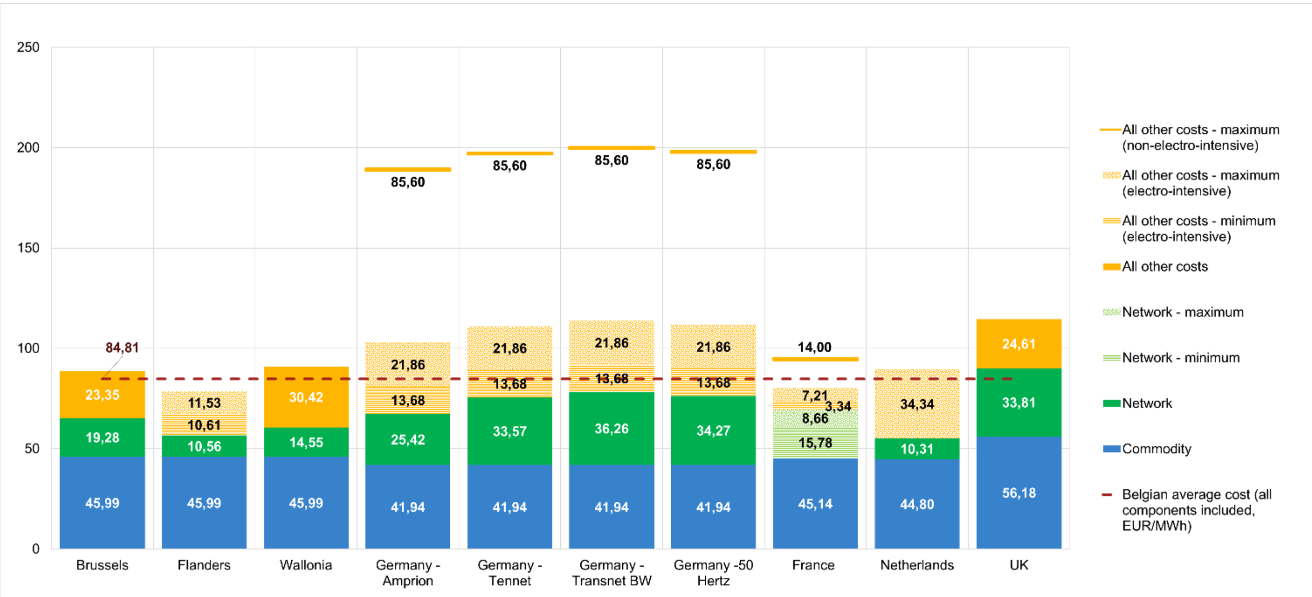
De laagste elektriciteitskosten voor de consumentenprofielen E0, E1 en E2 zijn in Nederland te vinden, iets lager dan in Frankrijk. Deze lagere prijzen zijn deels het gevolg van relatief lage netwerkkosten, maar vooral van de veel lagere "alle andere kosten" component (d.w.z. belastingen, heffingen en 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 verlagingen van de netwerkkosten en "alle andere kosten" gelden voor elektro-intensieve verbruikers, worden Duitse industriële verbruikers geconfronteerd met de duurste prijzen wanneer deze verlagingen 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.

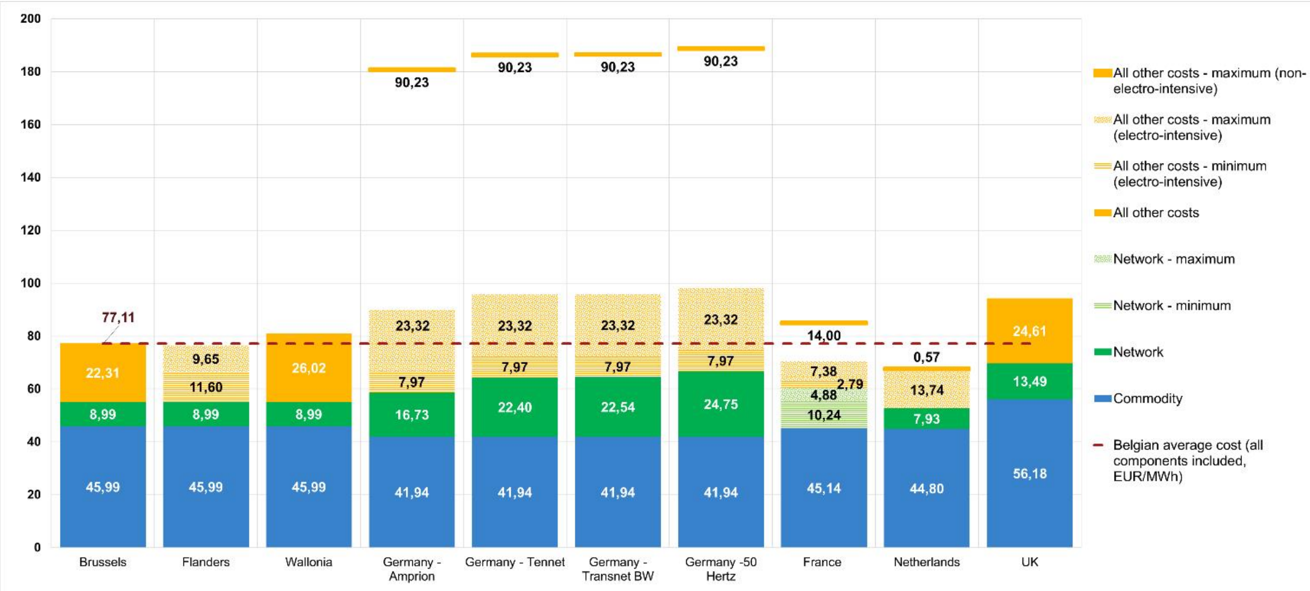
Elektriciteitsprijzen per component in EUR/MWh (profiel E0)



Elektriciteitsprijzen per component in EUR/MWh (profiel E1)

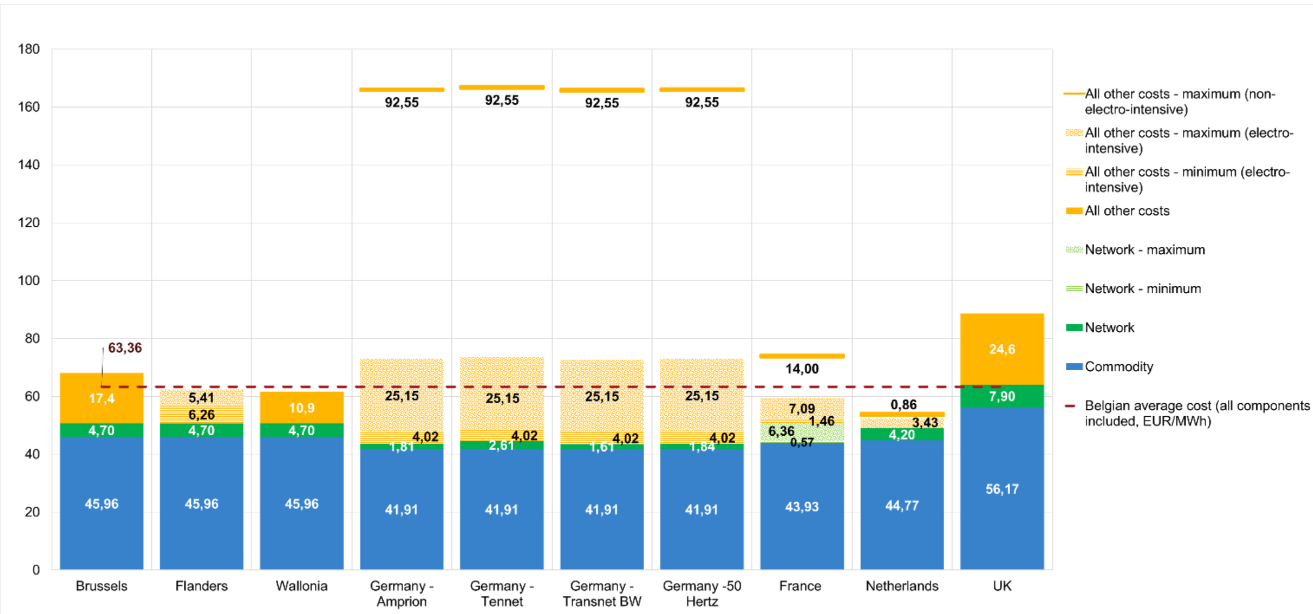


Elektriciteitsprijzen per component in EUR/MWh (profiel E2)

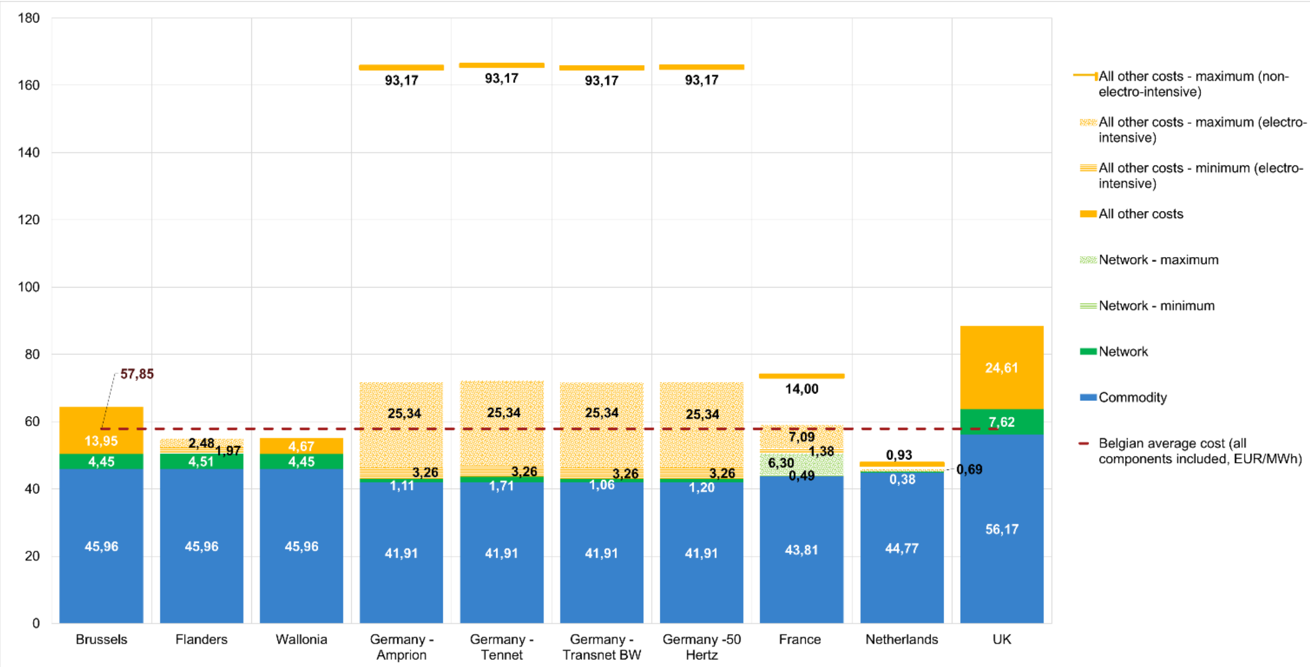


Hoewel de resultaten vrijwel gelijk zijn aan de vorige beschouwde profielen, is profiel E3 de enige consument waarvoor Frankrijk potentieel de goedkoopste prijzen laat zien, wanneer men de optie van de minimumprijs overweegt ten gevolge van de potentieel lagere netwerkkosten. Voor profiel E4 is de situatie echter omgekeerd: Nederland is weer het goedkoopste land. Omgekeerd blijft het Verenigd Koninkrijk het duurste land, tenzij rekening wordt gehouden met de tarieven van Duitsland voor niet-elektro-intensieve consumenten. Ook in België zijn de gemiddelde prijzen relatief hoog, maar het beeld is genuanceerder wat de regio's betreft: Wallonië is potentieel concurrentiëler dan Vlaanderen voor E3, terwijl Vlaanderen iets concurrentiëler is voor profiel E4. Brussel is het duurste Belgische gewest voor zowel E3 als E4, maar de beperkte aanwezigheid van industriële consumenten op zijn grondgebied maakt het een eerder theoretisch geval.

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. 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 verlagingen 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). In de door de studie gekozen regio's of landen passen Vlaanderen, Frankrijk, Duitsland en Nederland de netwerkkosten en de toegekende belastingverlagingen/maxima toe op basis van een groot aantal zeer specifieke, discriminerende 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. Gelet op de criteria voor de vermindering van de netwerkkosten lijkt Duitsland minder streng dan andere landen, aangezien er enkel rekening wordt gehouden met de jaarlijkse afname (vanaf 10 GWh) en het aantal bedrijfsuren. Wat de belastingvermindering betreft, zijn de door Nederland vastgestelde criteria (jaarlijkse afname vanaf 10 GWh of activiteit) het minst streng. De toepassing van deze verlagingen 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 fiscale 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, dat dit jaar van toepassing was omdat de marktprijzen hoger waren dan de gereguleerde prijzen.

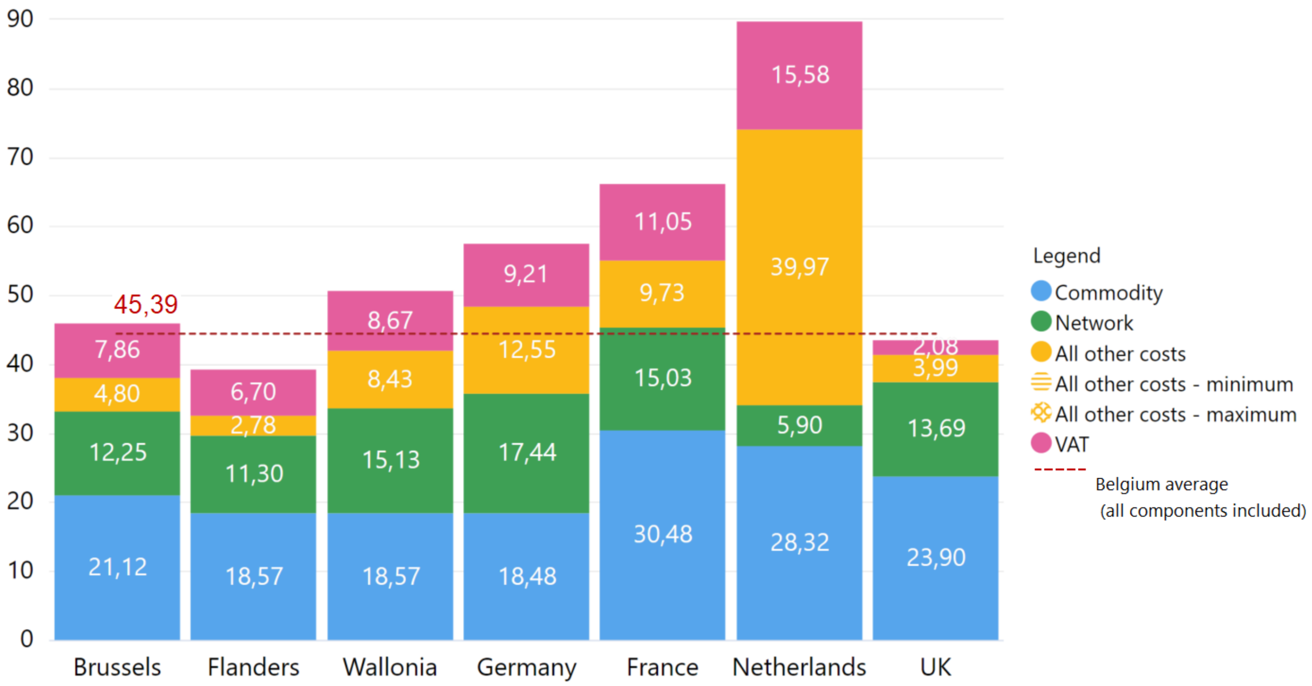
Vergelijking van de aardgasprijzen

Vergelijking van de aardgasprijzen voor residentiële en kleinzakelijke 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.

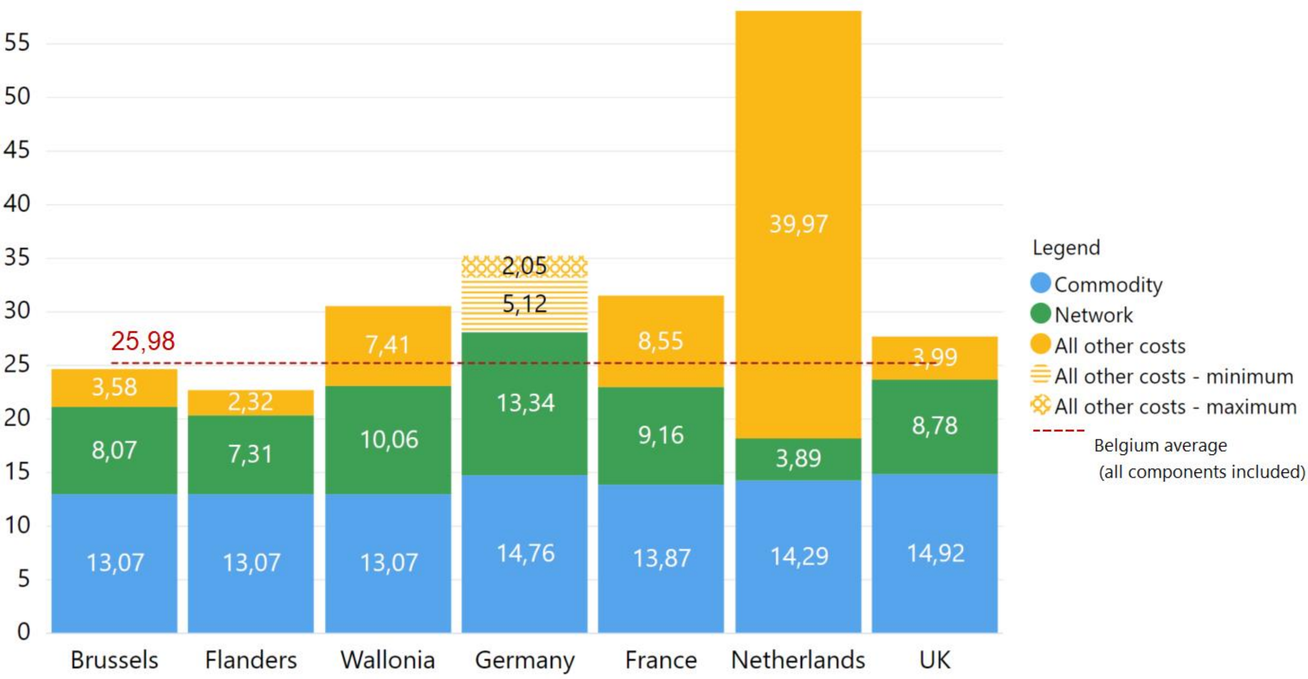
Voor de residentiële verbruikers (G-RES) heeft Vlaanderen de goedkoopste land/regio-positie, terwijl Nederland het duurste land is. In beide gevallen spelen de belastingen een bepalende rol in hun relatieve concurrentiepositie, waarbij Vlaanderen de laagste tarieven hanteert en Nederland de hoogste. 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. 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.

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

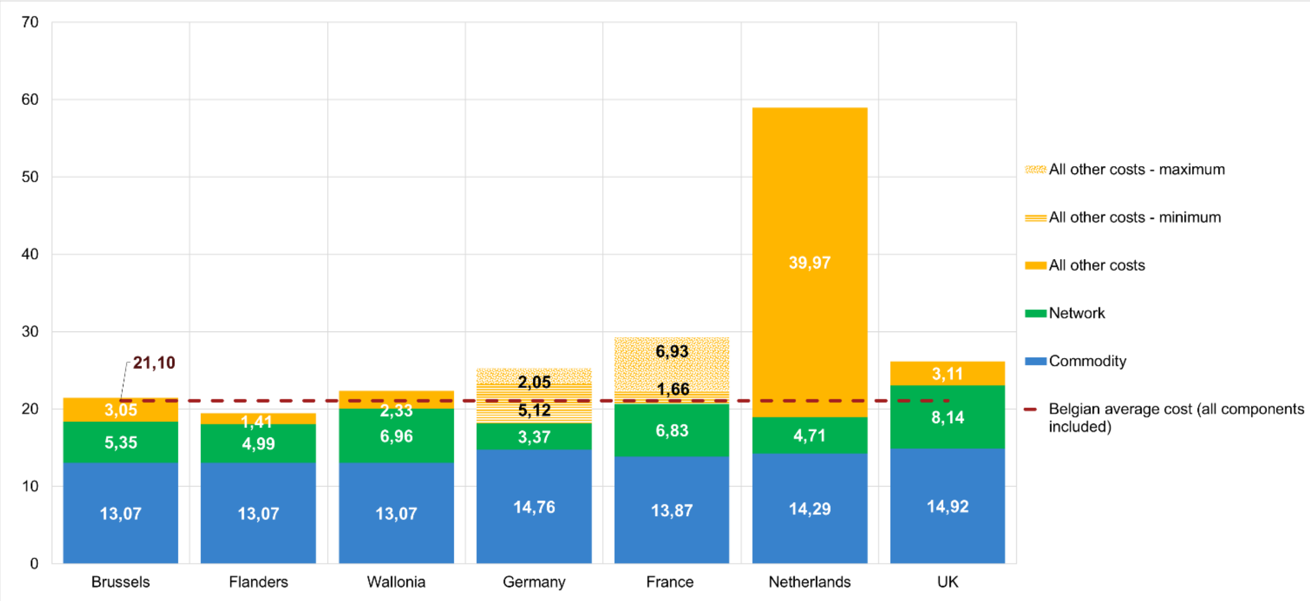


In het algemeen werd vastgesteld dat België op dezelfde lijn blijft als zijn buurlanden, voornamelijk als gevolg van de lage belastingtarieven, wat een opmerkelijk verschil is met elektriciteit. Wat de energiekost betreft, zijn deze vrij convergent tussen de landen, voornamelijk gelet op G-PRO. Wat de 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.

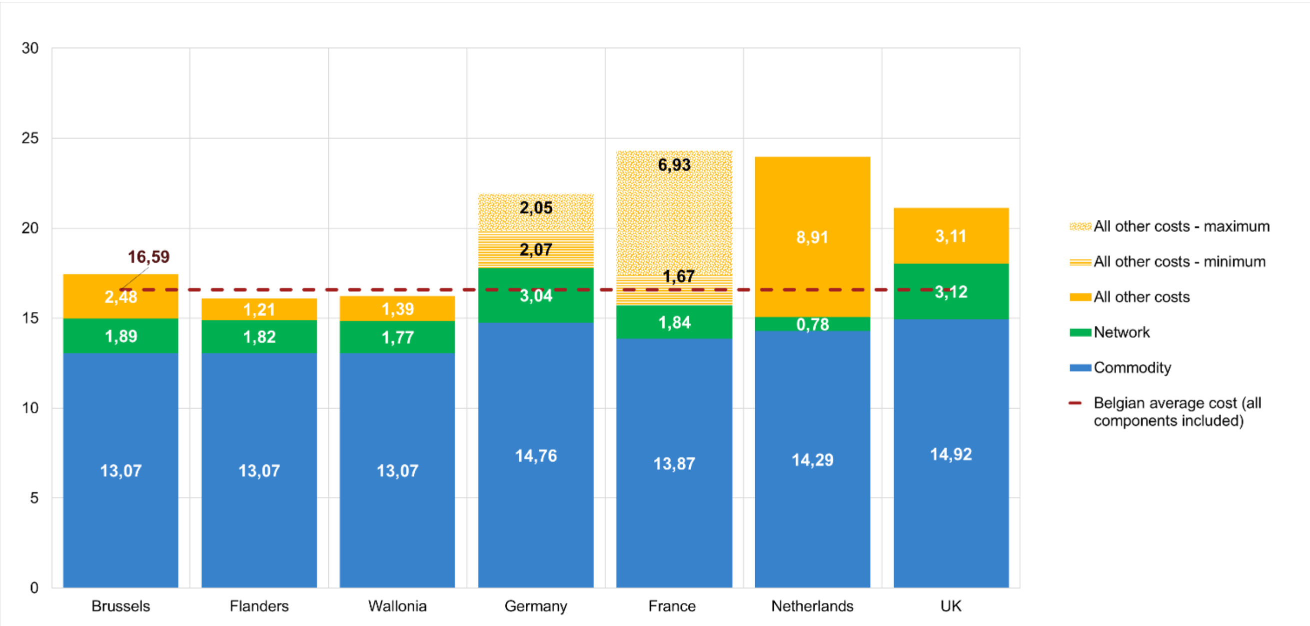
Vergelijking van aardgasprijzen voor industriële consumenten

Globaal gezien is België zeer competitief met betrekking tot aardgas. Voor alle industriële profielen (G0, G1 en G2) is het goedkoper dan alle andere onderzochte landen. Als de energiekosten in de verschillende landen vergelijkbaar zijn, liggen de prijsverschillen in de verschillende netwerkkosten - tot op zekere hoogte - en meestal in de belastingniveaus. België geeft dan ook meestal de laagste tarieven weer voor beide componenten. Binnen België is Brussel de minst competitieve regio - met uitzondering van G0. Bovendien kan er een lagere prijs van toepassing zijn in Frankrijk of Nederland voor het profiel G2. Wat Vlaanderen en Wallonië betreft, zijn de prijsverschillen voor de profielen G1 en G2 marginaal.

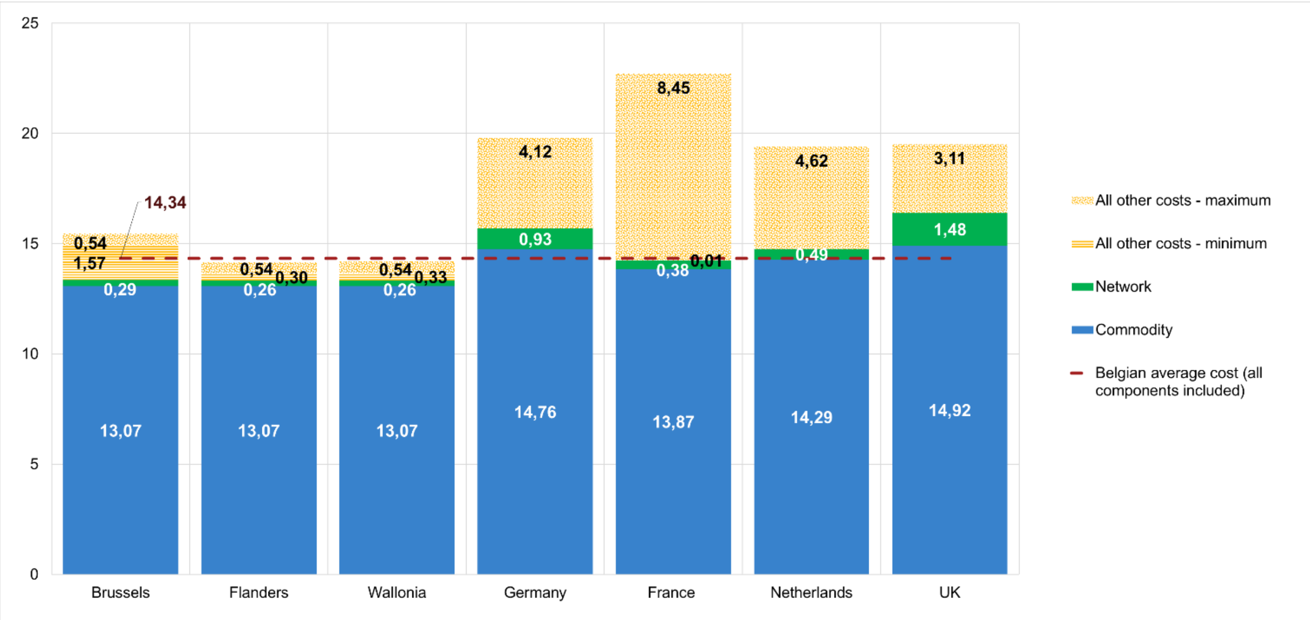
Aardgasprijzen per component in EUR/MWh (profiel G0)



Aardgasprijzen per component in EUR/MWh (profiel G1)



Aardgasprijzen per component in EUR/MWh (profiel G2)



Op het gebied van aardgas lijkt overheidsingrijpen met betrekking tot netwerkkosten en belastingen minder gebruikelijk en is er veel minder complexiteit, ook al bestaan er wel degelijk verlagingen of vrijstellingen (bijv. vrijstellingen voor consumenten die aardgas als grondstof gebruiken).

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 zwaarst op de aardgasrekening. In dit opzicht biedt België relatief concurrerende 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. 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 zijn de prijzen voor elektriciteit in België het laagst in Brussel, terwijl Vlaanderen de goedkoopste Belgische regio is voor aardgas. Over alle bestudeerde landen en regio's heen, rekent Vlaanderen zelfs de goedkoopste factuur aan voor aardgas. Met uitzondering van het profiel E-SSME is Wallonië het duurste Belgische gewest, ongeacht de beschouwde energie. Op geaggregeerde basis (d.w.z. de som van de jaarlijkse facturen voor elektriciteit en aardgas) hebben de residentiële consumenten in Brussel en Vlaanderen vergelijkbare prijzen, die zijn afgestemd op het meest concurrerende land - het Verenigd Koninkrijk. Indien Wallonië met hogere tarieven wordt geconfronteerd, in vergelijking met de twee andere Belgische gewesten, blijft zijn relatieve concurrentiepositie op hetzelfde niveau.

Vergelijking van de totale factuur voor industriële consumenten

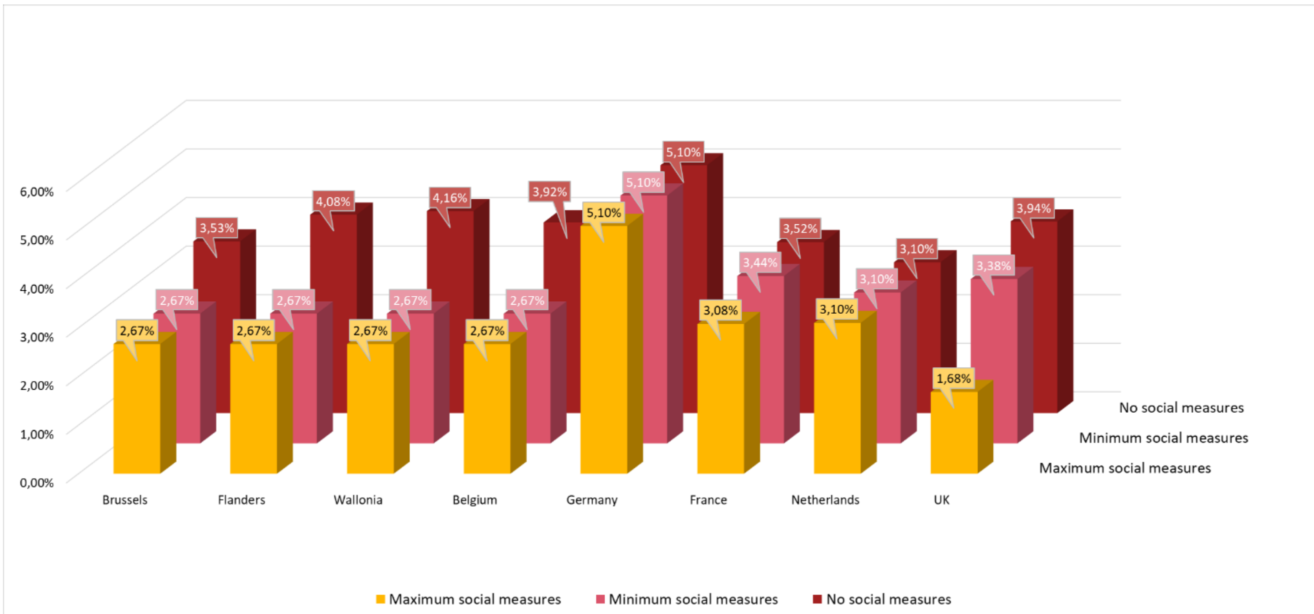
De energiekosten maken een groter deel uit van de aardgas- dan van de elektriciteitsrekening, maar de impact ervan op de verschillen tussen de landen is groter voor elektriciteit dan voor aardgas. Landelijk gezien profiteert Duitsland van een aanzienlijk concurrentievoordeel ten opzichte van de andere landen op het gebied van energiekosten voor elektriciteit. Naast de energiekost wordt de elektriciteitsfactuur vooral gedreven door de belastingen, waarvoor veel landen mechanismen hebben geïmplementeerd om de financiële lasten van de elektro-intensieve consumenten te verlagen. Aangezien alleen Vlaanderen over een dergelijk mechanisme beschikt, wordt België geconfronteerd met een concurrentienadeel voor deze consumenten. Wat aardgas betreft, heeft België de laagste tarieven voor de energiekost component van alle landen en relatief lage belastingniveaus, wat een aanzienlijke invloed heeft op de goede concurrentiepositie van België. Voor industriële aardgasverbruikers biedt België de laagste kosten van alle onderzochte landen, zelfs in vergelijking met de consumenten die aardgas gebruiken als grondstof in Nederland en Frankrijk voor het profiel G2. Dit verschil zou echter kleiner of soms zelfs onbestaande kunnen zijn, aangezien ongeveer de helft van de Belgische industriële contracten geïndexeerd zijn op de Nederlandse TTF-prijzen, terwijl in deze studie alleen het Belgische ZTP in aanmerking werd genomen bij het ramen van de Belgische industriële energiekost.

Inspanningen voor het betalen van de energiefacturen voor kwetsbare consumenten

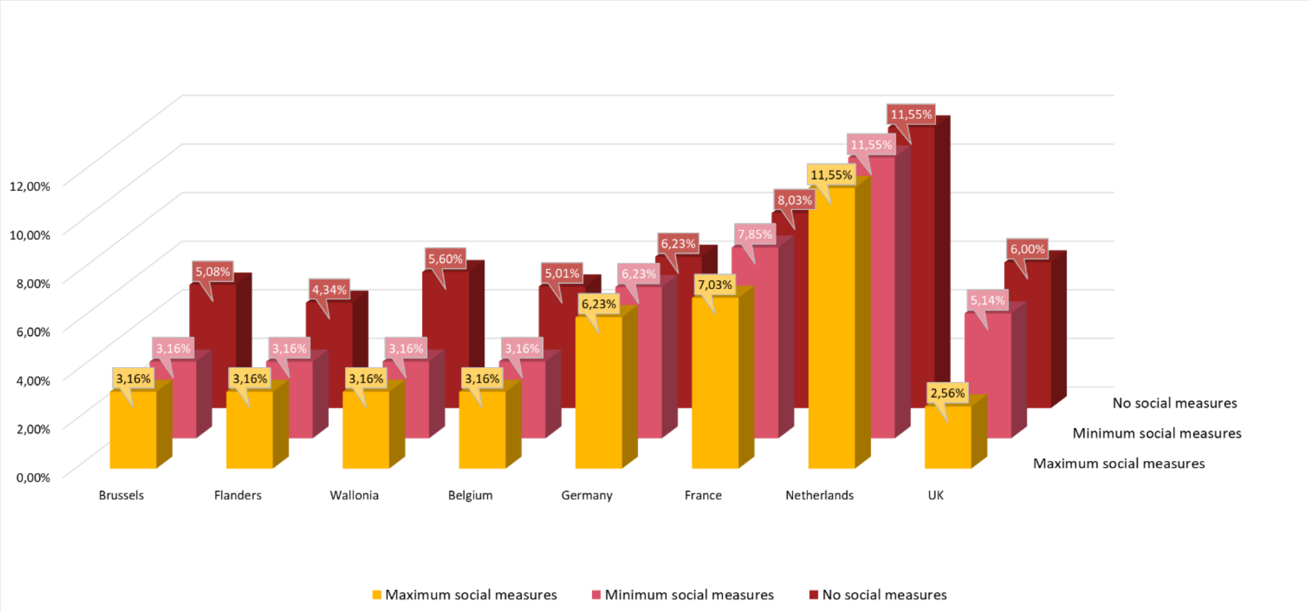
Hoofdstuk 8 heeft tot doel de verschillen te beoordelen tussen de financiële inspanningen die kwetsbare consumenten leveren om hun elektriciteits- en/of aardgasrekeningen te betalen in verhouding tot hun inkomen. Binnen de bestudeerde landen worden de consumenten geconfronteerd met zeer uiteenlopende 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 verlagingen 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 naburige tegenhangers. 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]

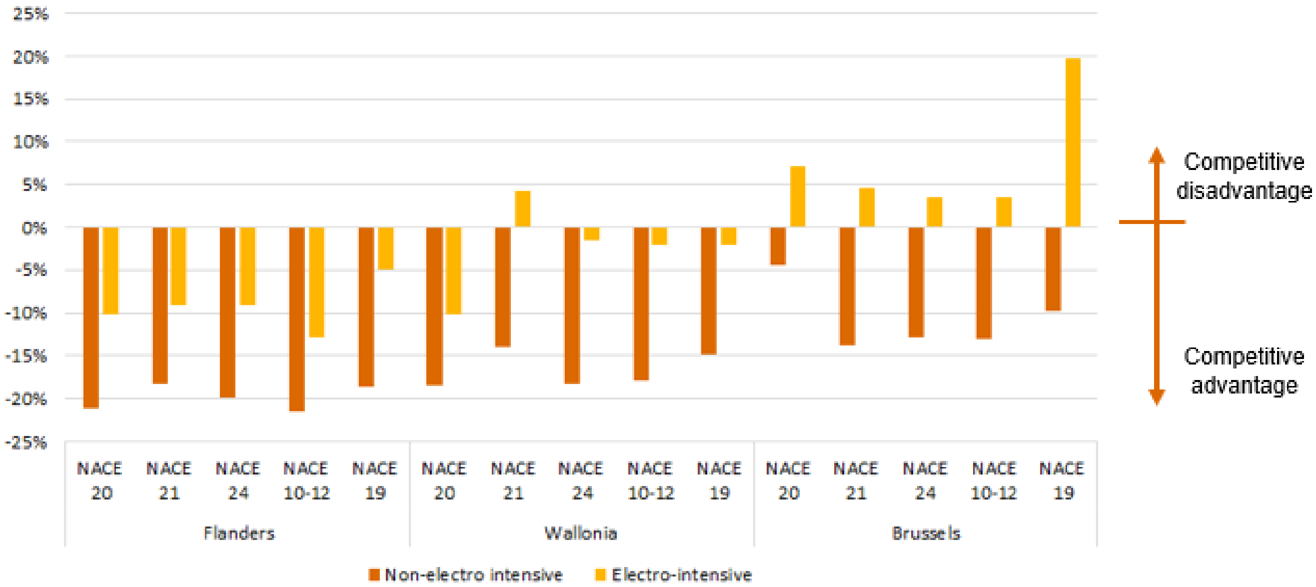
Aangezien reeds werd vastgesteld dat het Verenigd Koninkrijk een onderscheiden "high end" uitschieter is, vooral in het geval van de elektro-intensieve verbruikers, zijn de resultaten gedifferentieerd naargelang het Verenigd Koninkrijk in aanmerking wordt genomen of niet. Uit onze resultaten blijkt dat 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 figuur. De situatie van de elektro-intensieve consumenten verschilt daarentegen indien het Verenigd Koninkrijk al dan niet in aanmerking wordt genomen voor de vergelijking. Het Verenigd Koninkrijk in aanmerking genomen, hebben Vlaanderen en Wallonië (met uitzondering van NACE 21) beide een concurrentievoordeel ten opzichte van de buurlanden. Brussel is de enige Belgische regio die te

---

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

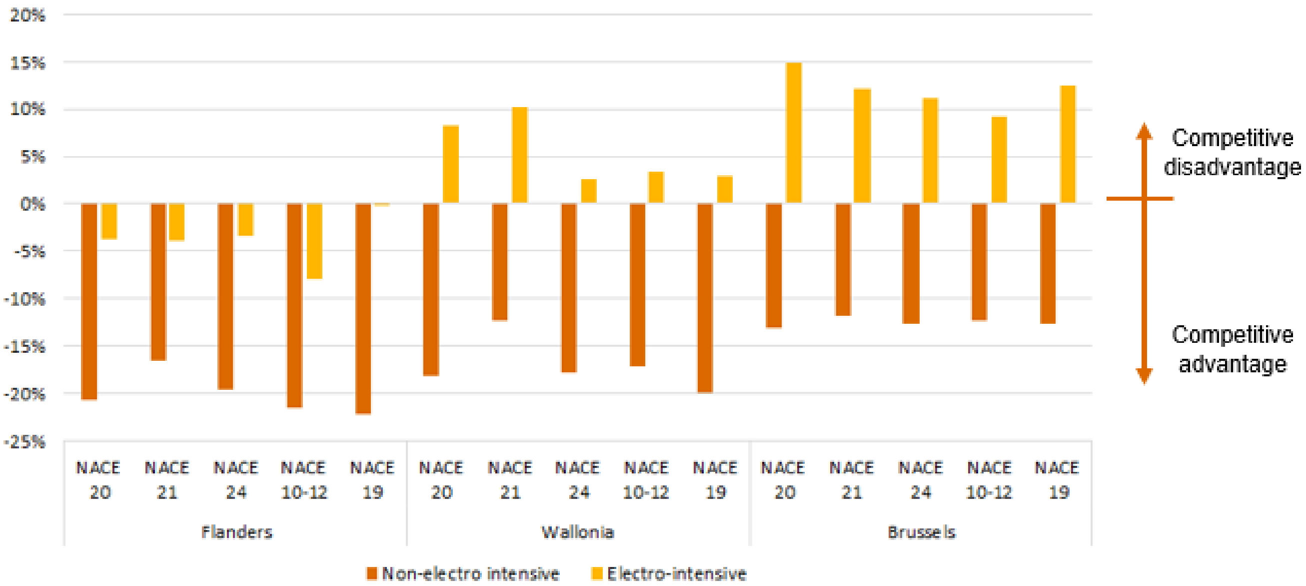
kampen heeft met aanzienlijke concurrentienadelen, hoewel deze minder relevant zijn omdat er het aantal industriële consumenten in Brussel beperkt is.

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 die 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 opgemerkt dat Vlaanderen het meest gunstige gewest van België is door de invoering van een plafond voor de financiering van hernieuwbare energie in 2018.

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 tegenhangers in de onderzochte buurlanden. Bijgevolg wijzen de resultaten op de noodzaak om na te denken over mogelijke aanpassingen van de huidige belastingverlagingsregelingen 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 concurrerende 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 2020. 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 3.2.

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).

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.

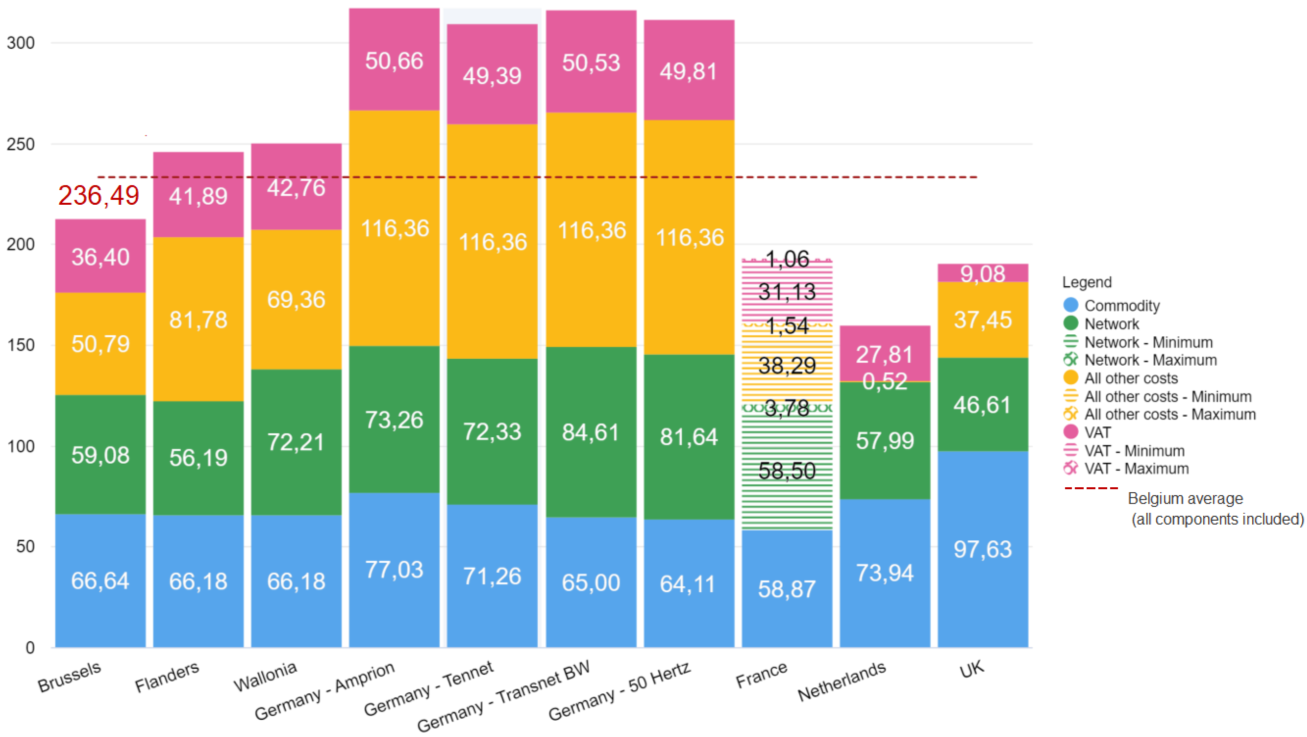
Comparaison des prix de l'électricité

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.

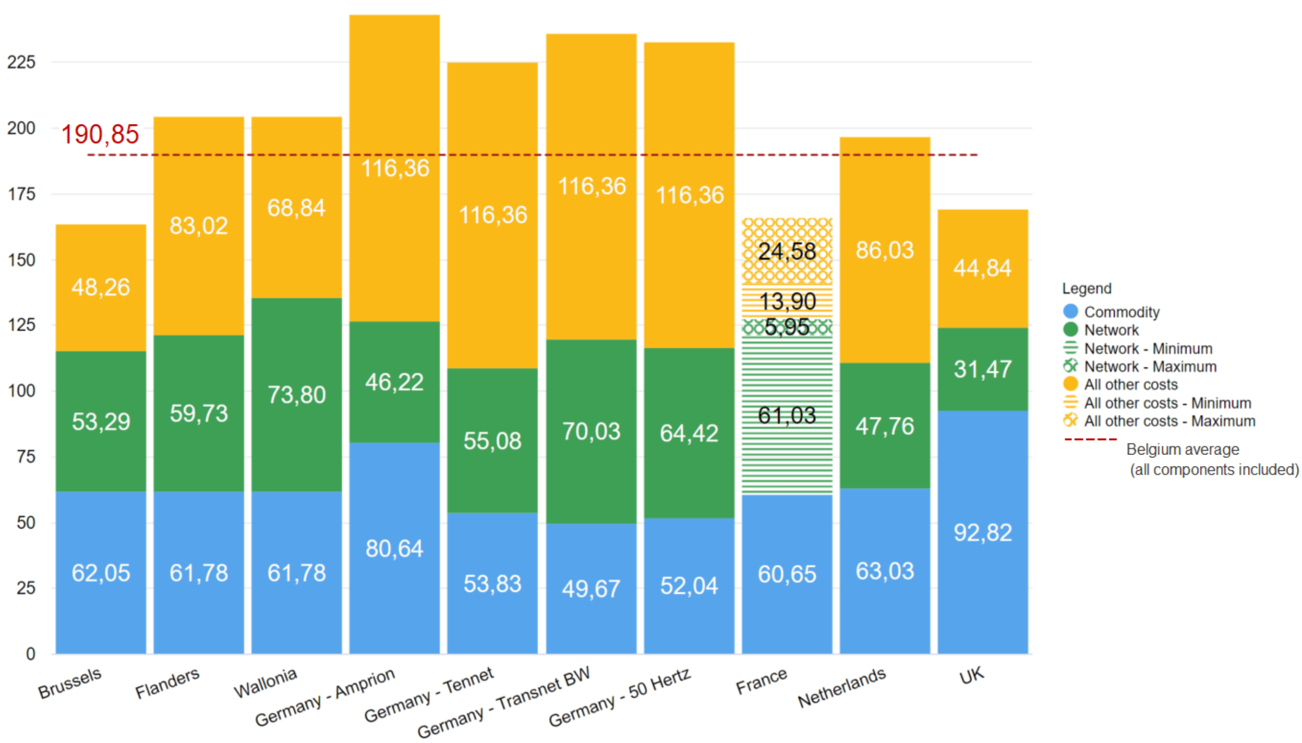
Parmi nos trois consommateurs résidentiels et petits professionnels, les Pays-Bas ont la facture annuelle la plus basse pour les consommateurs résidentiels (profil E-RES), notamment en raison d'une réduction (« *Belastingvermindering* ») importante sur les taxes financée par l'Etat, alors que les Allemands paient le plus (c'est-à-dire près de deux fois plus que les ménages néerlandais) suite à des tarifs les plus élevés pour la composante *all other costs* (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.

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



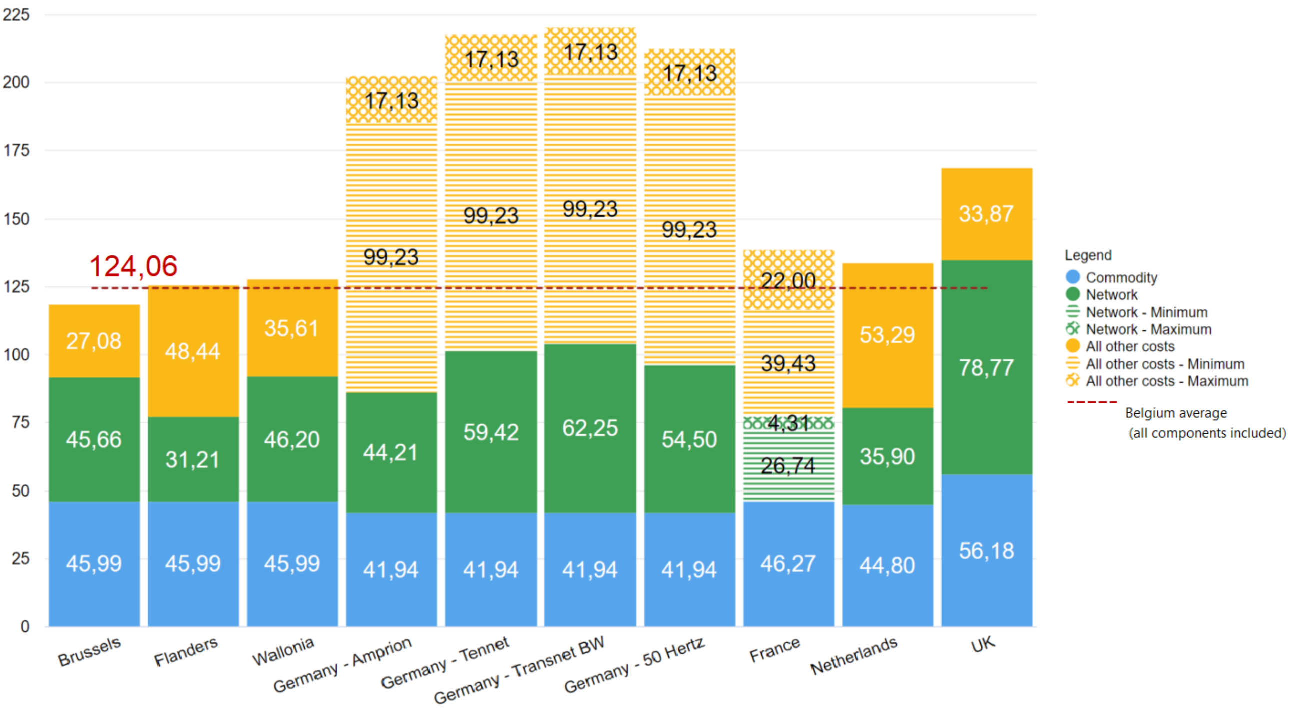
La situation est relativement similaire pour le profil E-SSME, faisant partie des petits consommateurs professionnels, car l'Allemagne a toujours la facture annuelle la plus élevée et la Belgique affiche des prix relativement importants. Les différences les plus notables se trouvent aux Pays-Bas et au Royaume-Uni où la position concurrentielle se détériore : le remboursement des taxes ne s'appliquant qu'aux ménages, cela ne profite pas aux petits professionnels néerlandais ; le Royaume-Uni appliquant le taux TVA le plus bas de tous les pays considérés pour E-RES, il est le pays le plus affecté par la disparition de la TVA pour le profil E-SSME. À l'instar du profil E-RES, Bruxelles reste la région belge la moins chère - et est potentiellement la région la moins chère de toutes selon l'option de prix choisie par les consommateurs français - alors que la Flandre est la région belge la plus chère.

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*. À l'inverse, grâce à des coûts de réseau plus faibles, la France continue potentiellement à proposer la facture annuelle la moins chère selon l'option de prix choisie. 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. Cette dernière est la région belge la plus chère.

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

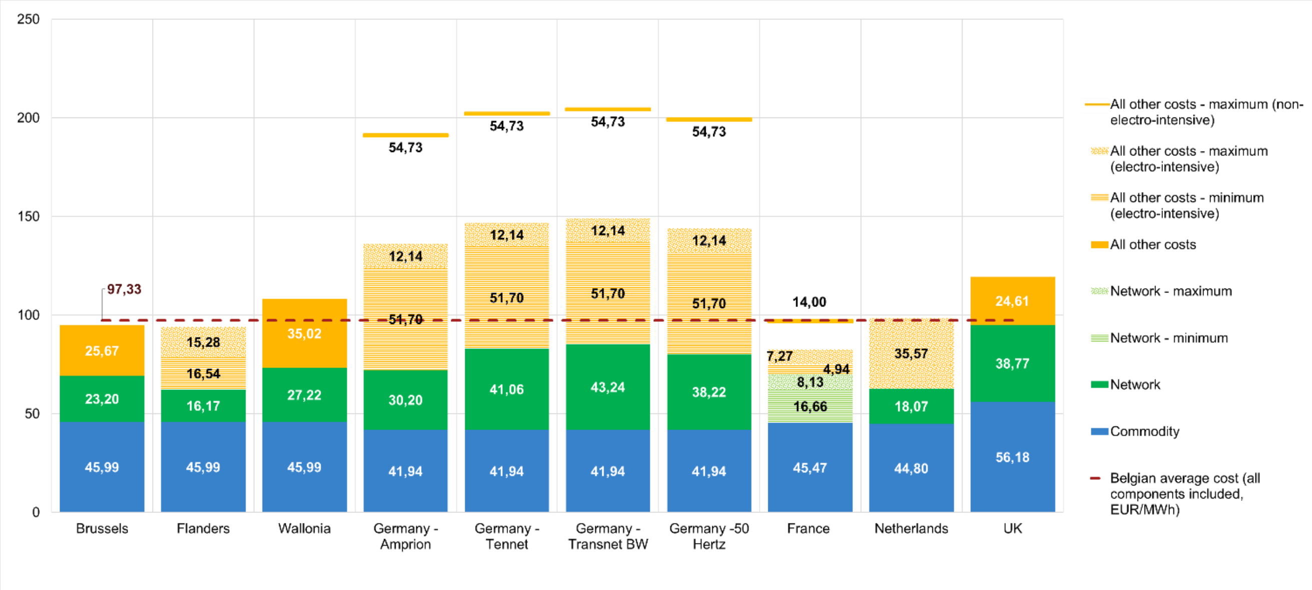


Les différentes composantes examinées pour chaque pays et chaque région peuvent varier considérablement et avoir un impact sur la position concurrentielle de chaque pays. Si les prix de la composante énergétique pure (*commodity*) sont raisonnablement convergents d'un pays à l'autre - à l'exception du 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 qui sont relativement élevés, en particulier pour E-RES et E-SSME.

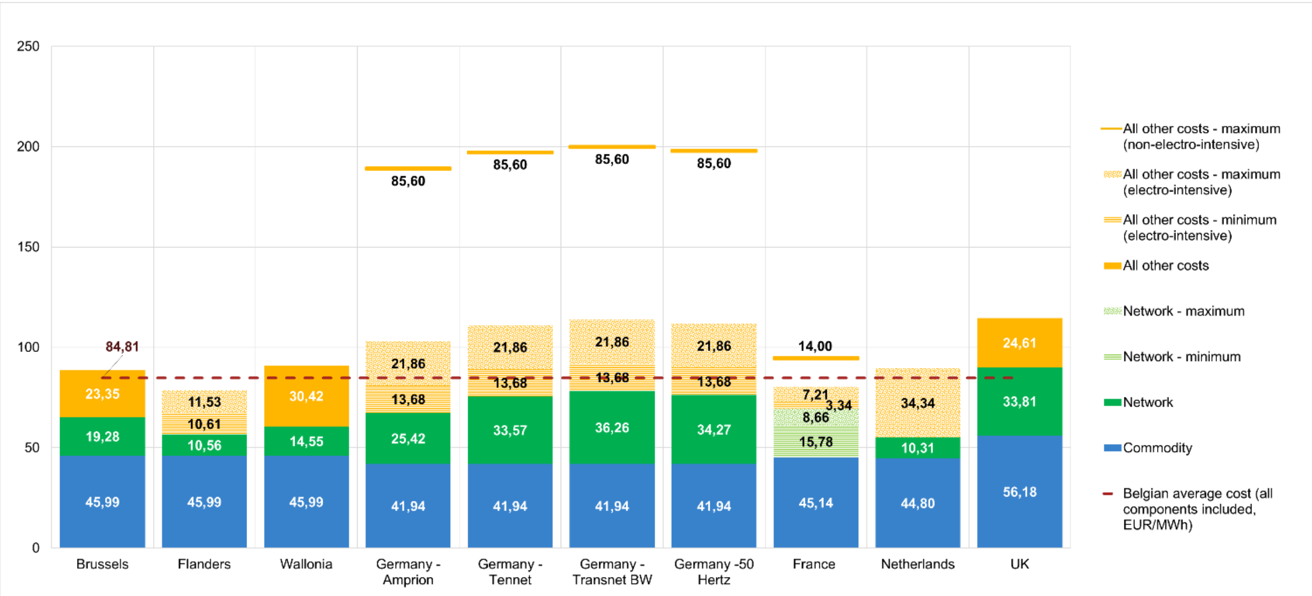
Comparaison des prix de l'électricité pour les consommateurs industriels

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. 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.

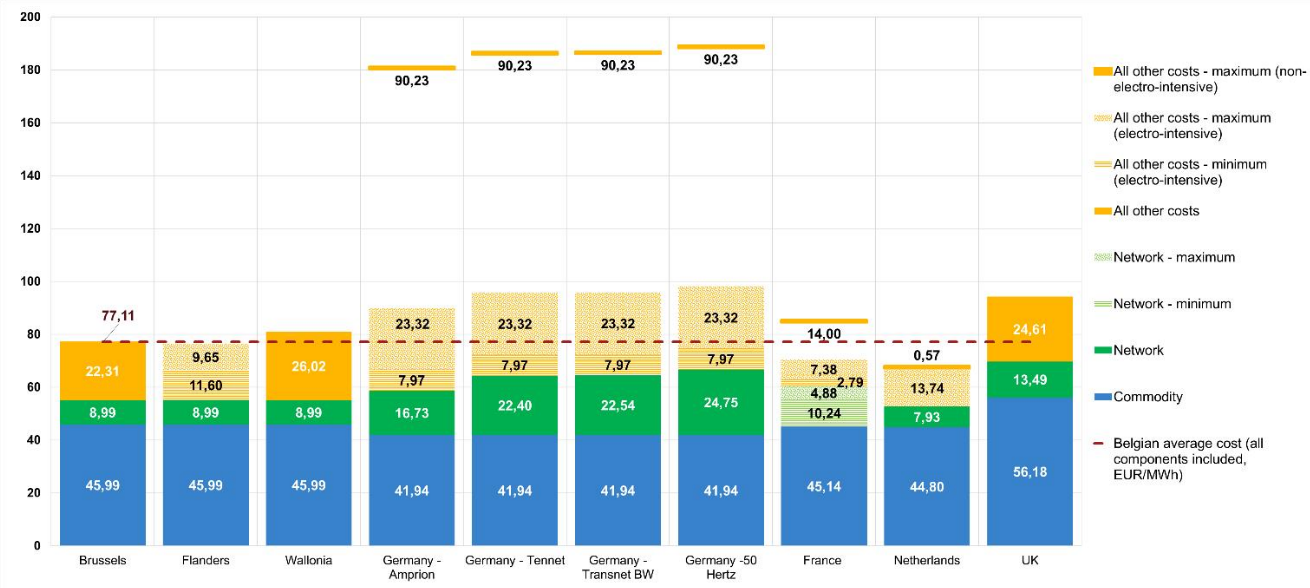
Coût de l'électricité par composante en EUR/MWh (profil E0)



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

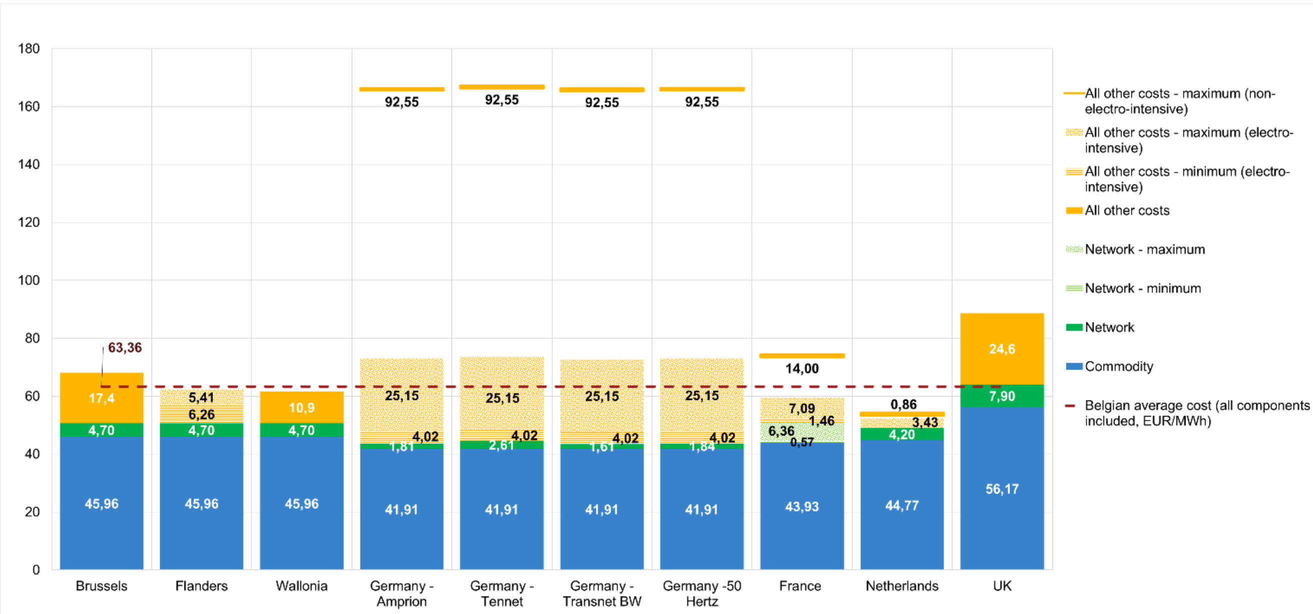


Coût de l'électricité par composante en EUR/MWh (profil E2)

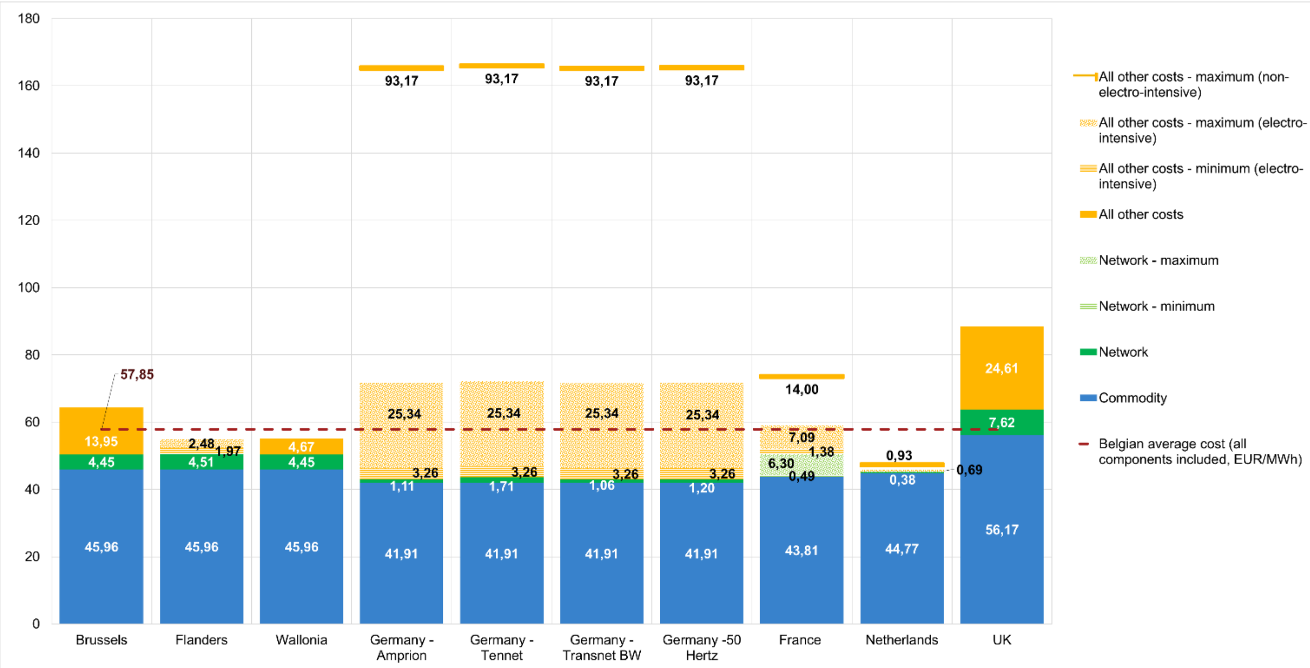


Si les résultats sont presque similaires à ceux des profils considérés précédemment, le profil E3 constitue le seul consommateur pour lequel la France affiche potentiellement les prix les plus bas, lorsqu'on considère l'option de prix minimum, en raison de coûts de réseau potentiellement inférieurs. Cependant, la situation s'inverse pour le profil E4, les Pays-Bas devenant à nouveau le pays le moins cher de tous. À l'inverse, le Royaume-Uni reste le pays le plus cher, sauf si l'on considère les prix allemands pour les consommateurs non-électro-intensifs. A nouveau, la Belgique affiche des prix moyens relativement élevés mais la situation est plus nuancée en ce qui concerne les régions : la Wallonie est potentiellement plus compétitive que la Flandre pour E3, tandis que la Flandre est légèrement plus compétitive pour E4. Bruxelles est la région belge la plus chère pour E3 et E4 mais la présence limitée de consommateurs industriels sur son territoire tend à en faire un cas plutôt théorique.

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*), à l'exception du Royaume-Uni. 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 discriminatoires généralement liés à l'électro-intensité. Cela nous oblige à présenter les résultats selon un éventail assez large de possibilités. En ce qui concerne les critères de réduction des coûts de réseau, l'Allemagne semble moins stricte que d'autres pays car elle ne prend en compte que le prélèvement annuel (à partir de 10 GWh) et le nombre d'heures de fonctionnement. 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 coûts des taxes 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, qui était en application cette année étant donné que les prix du marché étaient plus élevés que les prix réglementés.

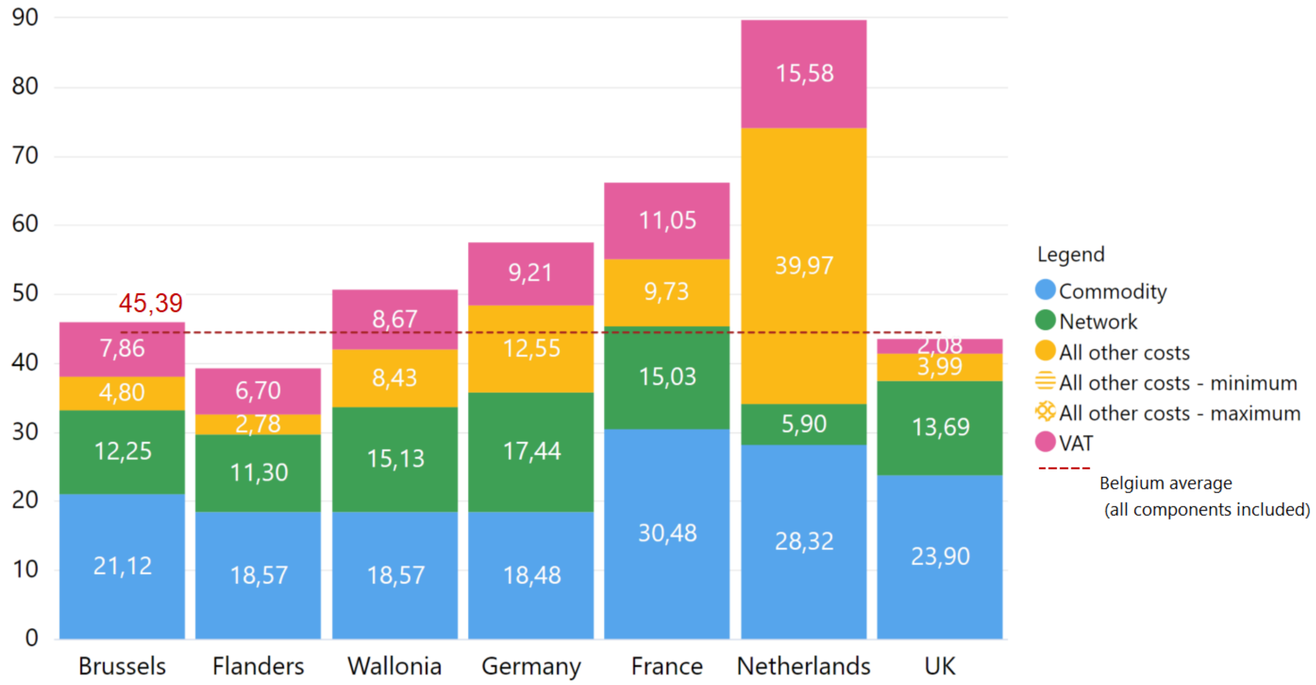
Comparaison des prix du gaz naturel

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.

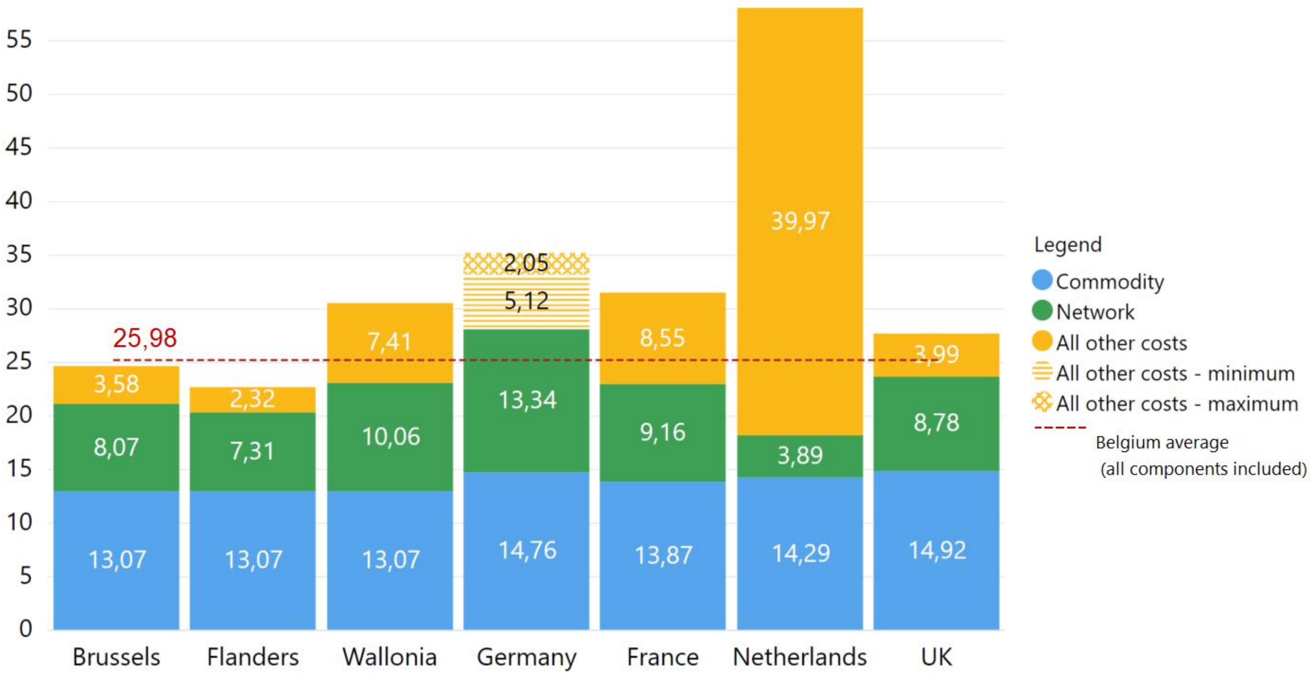
Pour les consommateurs résidentiels (G-RES), la Flandre occupe la position de pays/région le moins cher tandis que les Pays-Bas sont le pays le plus cher. Dans les deux cas, les taxes jouent un rôle déterminant dans leur position concurrentielle relative, la Flandre y affichant les prix les plus bas et les Pays-Bas les plus élevés. 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.

Coût du gaz naturel par composante en EUR/MWh (profil G-RES)



Quant au petit professionnel (G-PRO), la Flandre affiche à nouveau la facture totale la plus basse de toutes devant Bruxelles. 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.

Coût du gaz naturel par composante en EUR/MWh (profil G-PRO)

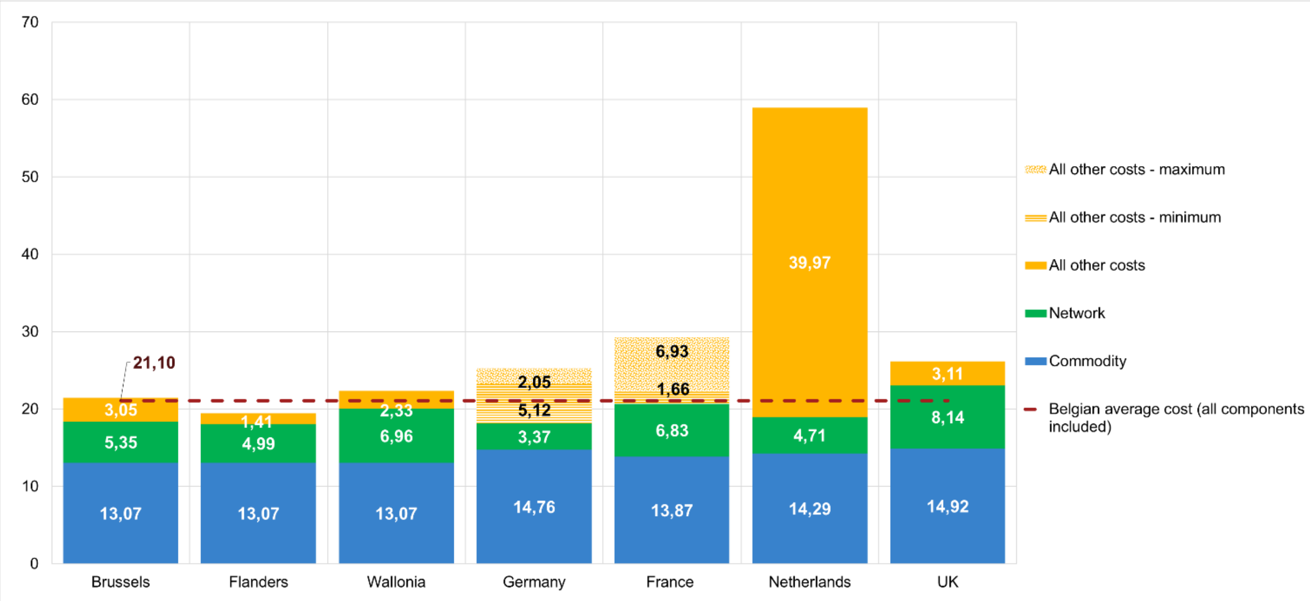


En général, il a été observé que la Belgique s'aligne relativement bien par rapport aux prix de ses pays voisins, principalement en raison de faibles taxes, ce qui constitue une différence remarquable par rapport à l'électricité. Les coûts de la composante énergétique pure (*commodity*) sont assez convergents 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.

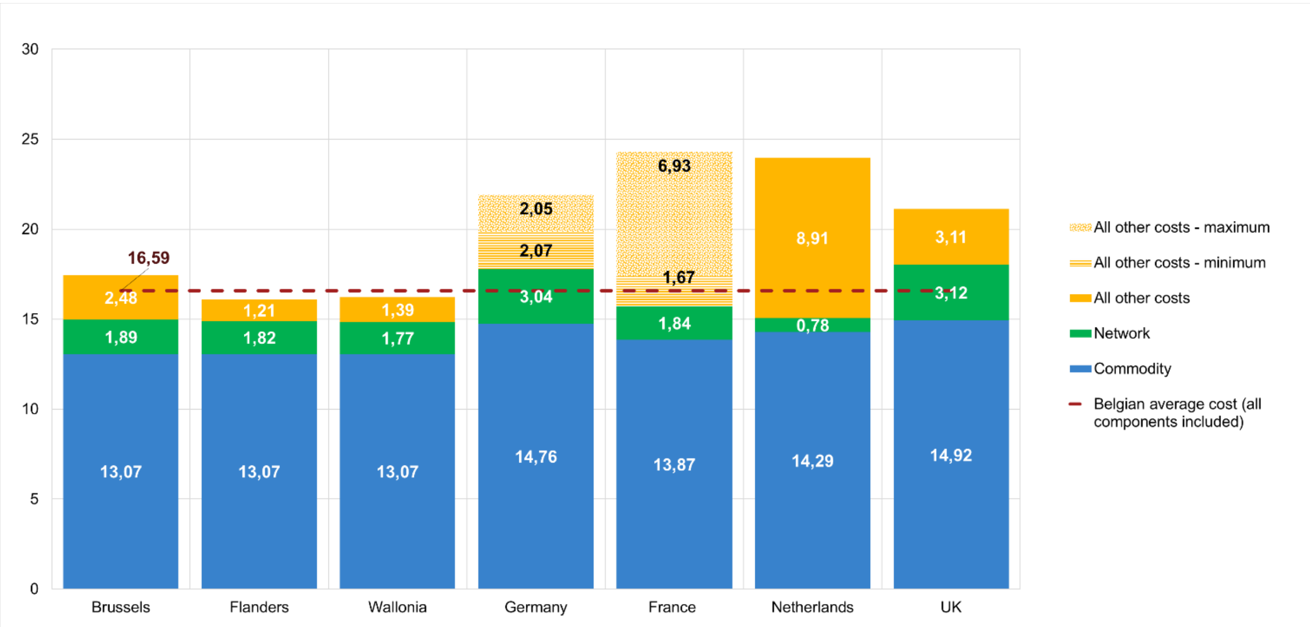
Comparaison des prix du gaz naturel pour les consommateurs industriels

Globalement, la Belgique est très compétitive en matière de gaz naturel. Pour tous les profils industriels (G0, G1 et G2), elle affiche des prix moins élevés que tous les autres pays étudiés. Si les coûts de la composante énergétique pure (*commodity*) sont similaires d'un pays à l'autre, les écarts de prix tiennent aux différences qui existent dans les coûts de réseau - dans une certaine mesure - et, surtout, dans les niveaux de taxation. Ainsi, la Belgique affiche le plus souvent les prix les plus bas pour les deux catégories de composants. En Belgique, Bruxelles est la région la moins compétitive - à l'exception de G0. En outre, des prix meilleurs marchés peuvent être trouvés en France ou aux Pays-Bas pour le profil G2. En ce qui concerne la Flandre et la Wallonie, les différences de prix sont marginales pour les profils G1 et G2.

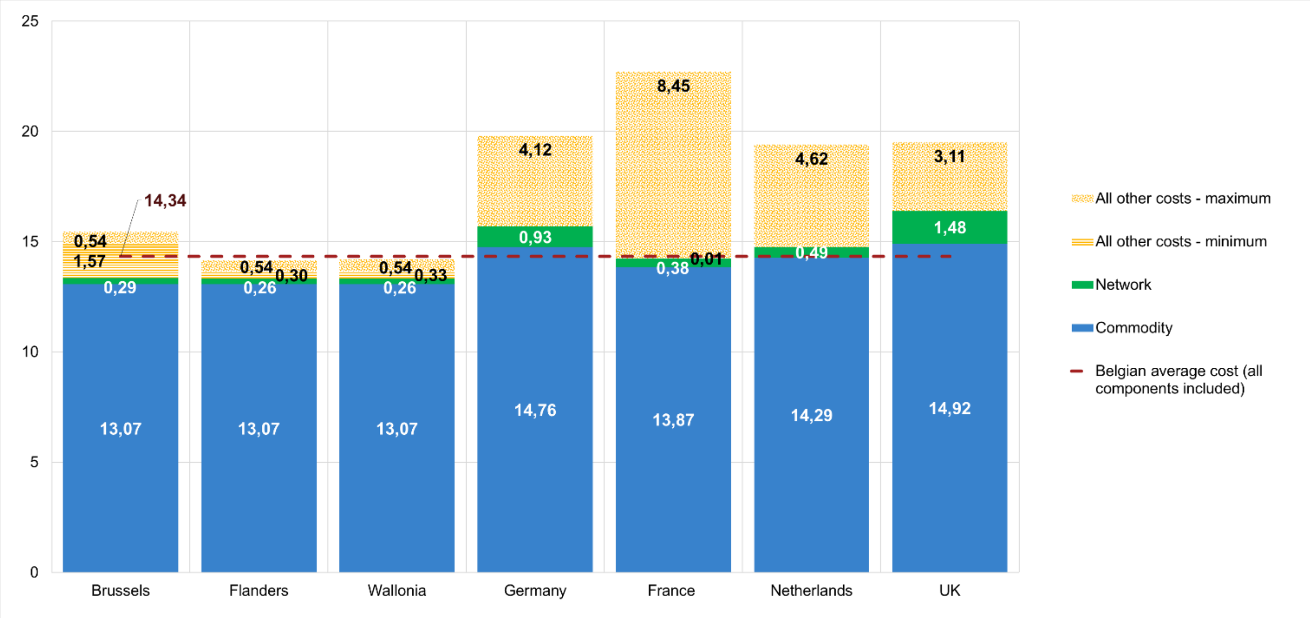
Coût du gaz naturel par composante en EUR/MWh (profil G0)



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



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



En ce qui concerne le gaz naturel, l'intervention des pouvoirs publics en matière de coûts de réseau et de taxes est moins courante et beaucoup moins complexe même si des réductions ou des exonérations existent (par exemple, des exonérations pour les consommateurs utilisant le gaz naturel comme matière première ou *feedstock consumers*).

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. 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, c'est à Bruxelles que les prix de l'électricité sont les plus bas en Belgique, tandis que la Flandre est la région belge la moins chère pour le gaz naturel. La Flandre facture même le gaz naturel le moins cher de tous les pays. À l'exception du profil E-SSME, la Wallonie est la région belge la plus chère, quelle que soit l'énergie considérée. Sur une base agrégée (c'est-à-dire en additionnant les factures annuelles d'électricité et de gaz naturel), les consommateurs résidentiels de Bruxelles et de Flandre ont des prix similaires, s'alignant sur ceux du pays le plus compétitif, le Royaume-Uni. Même si la Wallonie est confrontée à des tarifs plus élevés que les deux autres régions belges, sa position concurrentielle relative reste alignée sur ces dernières.

Comparaison de la facture totale pour les consommateurs industriels

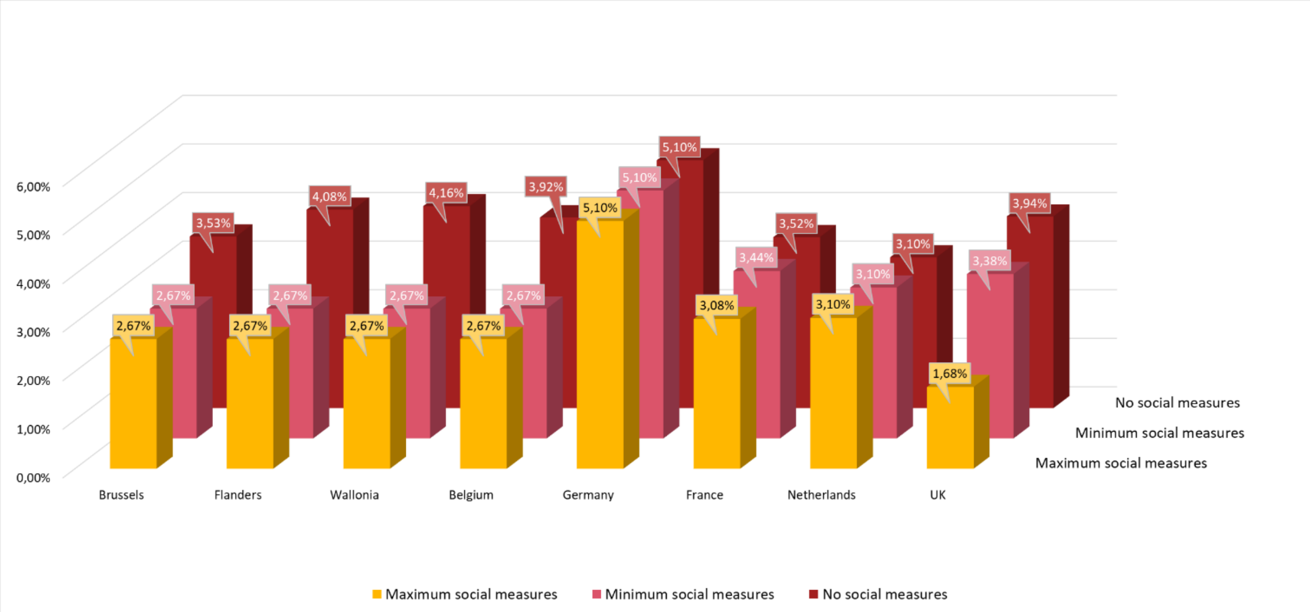
Le coût la composante énergétique pure (*commodity*) représente une plus grande partie de la facture de gaz naturel que de celle d'électricité, mais son impact sur les différences entre pays est plus important pour l'électricité que pour le gaz naturel. Sur le plan national, l'Allemagne bénéficie d'un avantage concurrentiel considérable sur les autres pays en termes de coût de la composante énergétique pure pour l'électricité. Outre les produits de base, la facture d'électricité est principalement déterminée par les taxes, pour lesquelles de nombreux pays ont mis en place des mécanismes visant à réduire la charge financière des consommateurs electro-intensifs. Étant donné que seule la Flandre dispose de ce type de mécanisme, la Belgique est confrontée à un désavantage concurrentiel pour ces consommateurs. En ce qui concerne le gaz naturel, la Belgique affiche les tarifs les plus bas pour la composante énergétique pure ainsi que des niveaux de taxation relativement bas, ce qui a une influence substantielle sur la bonne compétitivité de la Belgique. Pour les consommateurs industriels de gaz naturel, la Belgique offre le coût le plus bas de tous les pays étudiés même en comparant les *feedstock consumers* aux Pays-Bas et de la France (profil G2). Cette différence pourrait toutefois être moins importante voire nulle car environ la moitié des contrats industriels belges sont indexés sur les prix TTF néerlandais, alors que cette étude n'a pris en compte que le ZTP belge pour estimer les coûts belges de la composante énergétique pure.

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

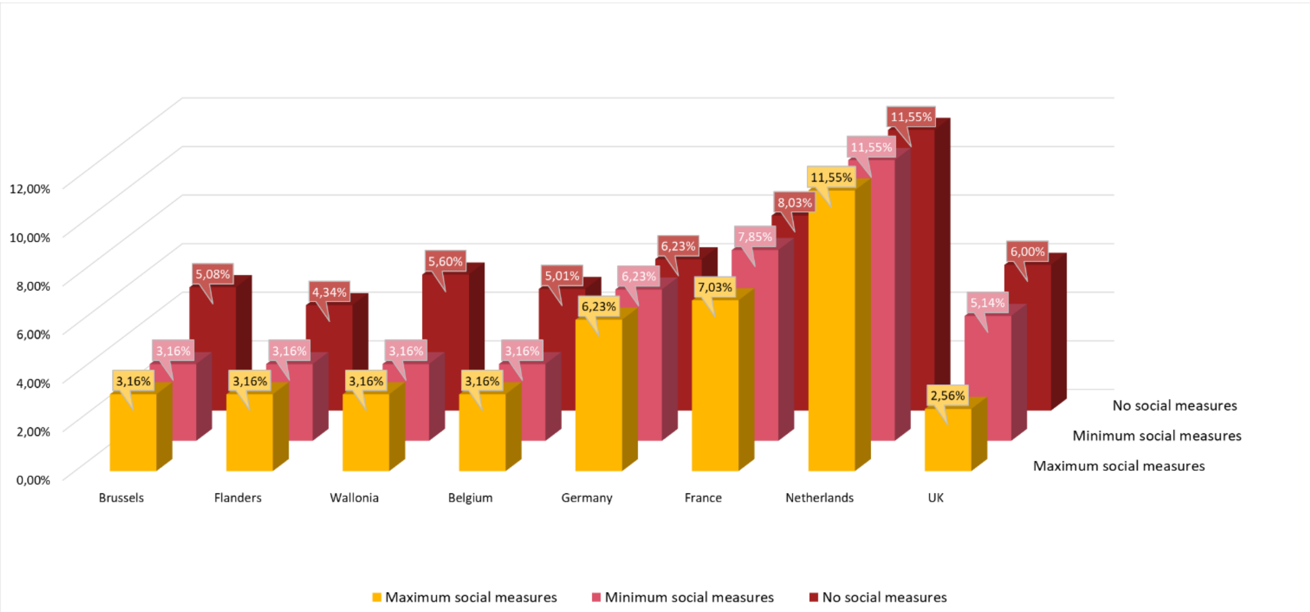
Le chapitre 8 évalue les différences d'efforts financiers consentis par les consommateurs vulnérables pour payer leurs factures d'électricité et/ou de gaz naturel en fonction de leurs revenus. Au sein des pays étudiés, les consommateurs sont confrontés à des outils gouvernementaux très divers pour réduire 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 les niveaux de revenus belges sont relativement (bien) alignés face aux pays voisins pour les consommateurs résidentiels vulnérables et offre des réductions significatives sur les prix de l'énergie par le biais de tarifs sociaux. 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 %)



Niveau d'effort pour le gaz naturel par rapport au revenu disponible (en %)



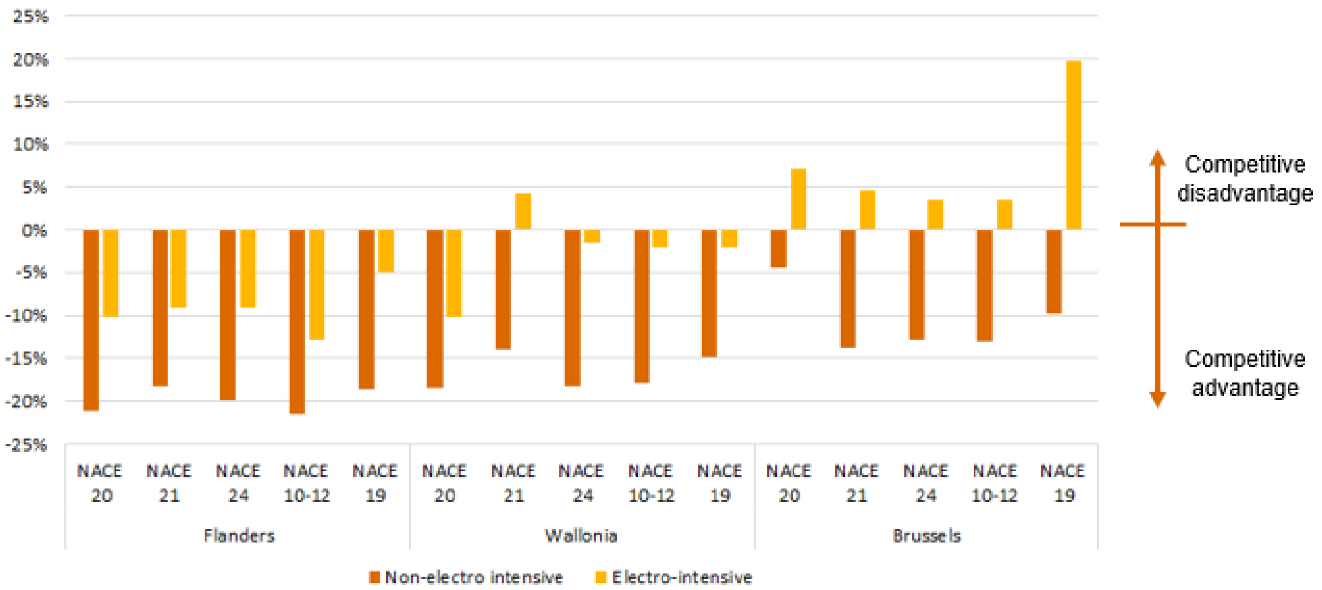
Évaluation de la compétitivité des industries belges

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 homologues voisins. 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].

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

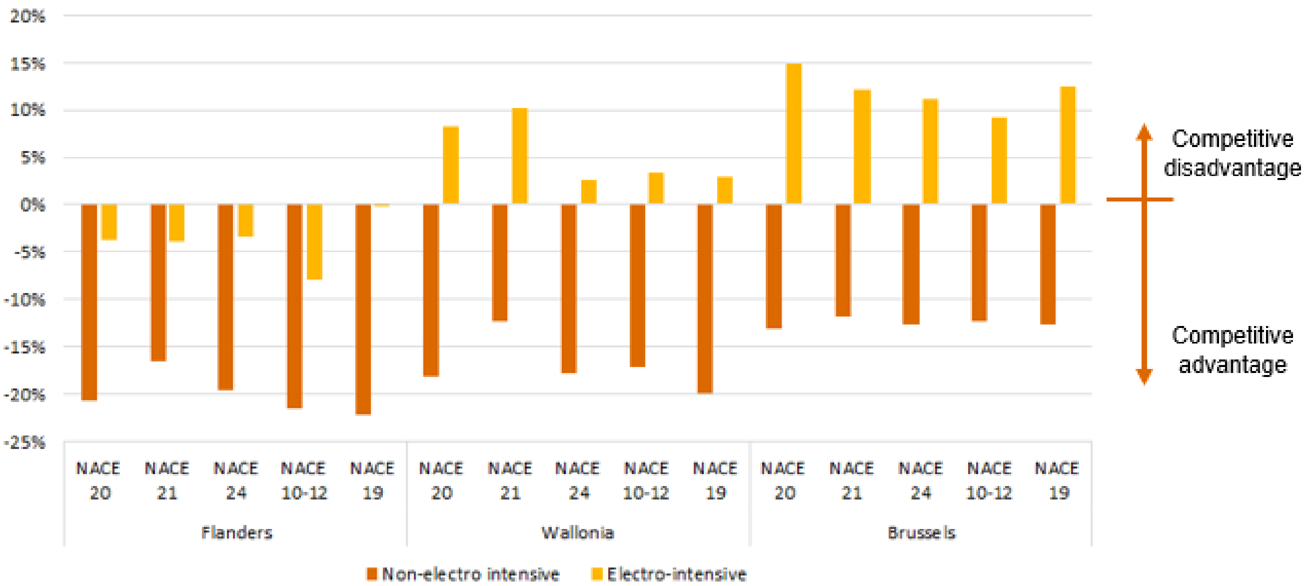
Etant donné que le Royaume-Uni affiche des prix particulièrement élevés, en particulier dans le cas des consommateurs électro-intensifs, les résultats ont été différenciés en fonction de son inclusion ou non dans la comparaison. Il ressort que les consommateurs industriels belges en concurrence avec 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 la figure ci-dessous. En revanche, la situation des consommateurs électro-intensifs varie selon l'inclusion du Royaume-Uni. Lorsque ce dernier est inclus, la Flandre et la Wallonie (sauf NACE 21) affichent tous deux des avantages concurrentiels par rapport aux pays voisins. Bruxelles est la seule région belge à être confrontée à des désavantages concurrentiels importants, bien que moins pertinents car peu de consommateurs industriels sont présents sur son territoire.

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 le financement des énergies renouvelables en 2018.

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' essential 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 first 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 2020. In addition to this price analysis, the purpose of this study further investigates the impact of energy price differences on two peculiar consumers groups: on the one hand, this report estimates the effort made by vulnerable residential consumers to pay for their energy bills. On the other hand, this analysis assesses the impact of the observed price differences on 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. In terms of methodology, a bottom-up approach was employed to build up the energy cost. 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 study. 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 residential consumers' efforts made to pay for their energy bills. This section particularly focuses on identifying social measures that are implemented by national governments, which are then quantified to derive the financial importance of one's energy consumption over its revenues. Through this, it is 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

[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.

the industry in the three Belgian regions. Particular attention is brought to the total energy cost for the industry on a macro-economic basis where the aggregation of electricity and natural gas prices make up for 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, with regards to industries from neighbouring countries, at a national and regional level. Finally, considering this report's insights, several general conclusions are drawn, together with recommendations based on these conclusions.

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 2020.* This study gives an overview of the price as of January 2020.

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.* All commodity prices market data is provided by the CREG, except for the commodity price in the UK, which was filled by PwC based on Bloomberg market indices.

5. *Electricity/Natural gas sales margin.* 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 given the 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 2020 average exchange rate to convert Pound Sterling to Euro[9] (0,850 GBP/EUR or 1,176 EUR/GBP for 2020). The commodity cost formula was entirely computed in Pound Sterling, hereafter converted in Euro at the January 2020 exchange rate.

8. *VAT*. We consider that VAT – or Value Added Tax – is deductible for professionals and is thus not taken into account in this study except for residential consumers. Besides, as the VAT is considered as a separate component for residential consumers – only profile for which it is considered -, all prices reported in this document either exclude VAT or specifically mention its inclusion.

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

[9] European Central Bank

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 2020	January 2020	January 2020	January 2020	January 2020	January 2020	January 2020	January 2020
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 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);

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

- **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.

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 2020	January 2020	January 2020	January 2020	January 2020
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	-	-	3000	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 10m³(n)/h	T2	G4	Consumption band < 73.200 kWh
G-PRO	T3	T3	T3	G25: 25 t/m 40m³(n)/h	T2	G40	73.200 < Consumption band < 732.000 kWh
G0	T4	T4	T4	G100: 40 t/m 65 m³(n)/h	T3	G100	Consumption band ≥ 732.000 kWh
G1	T6	T6	T6	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 following macro-economic analysis carried out in this study intents 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 for this natural gas and electricity price comparison are determined.

We identify two crucial objectives justifying this selection of sectors for which this price comparison is particularly of interest. The first of the two goals is to ensure consistency between the selected profiles and the active industrial sectors as observed. The second goal is the use of 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.

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.

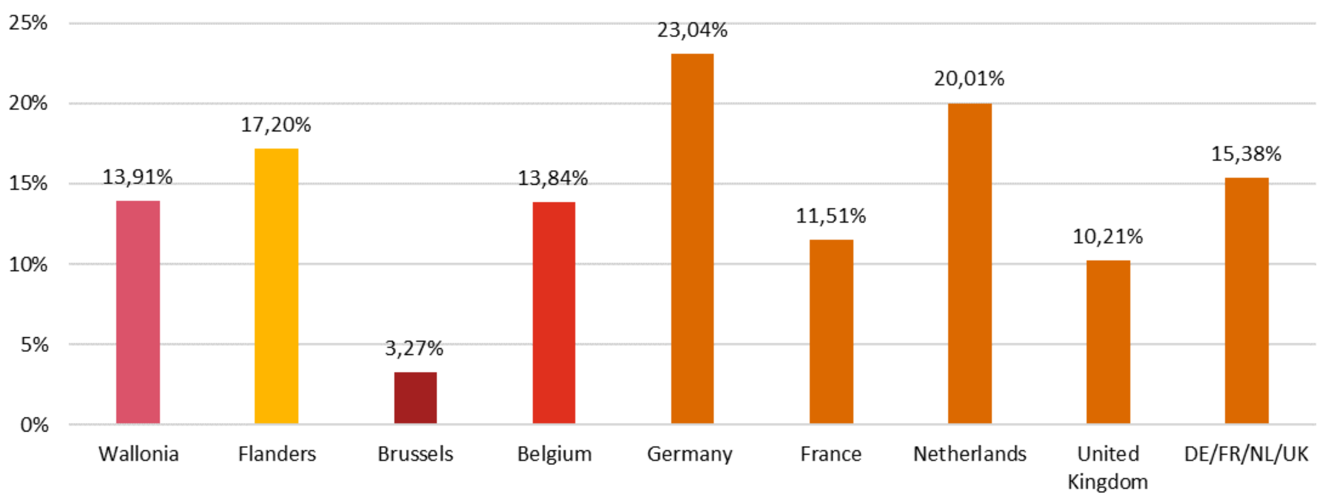
National accounts aggregated per industry coming from Eurostat dataset and the National Belgian Bank (NBB) serve as the basis for the analysis. The most recent and comprehensive datasets are from 2016.

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 an economy, regionally or nationally. 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 the 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)

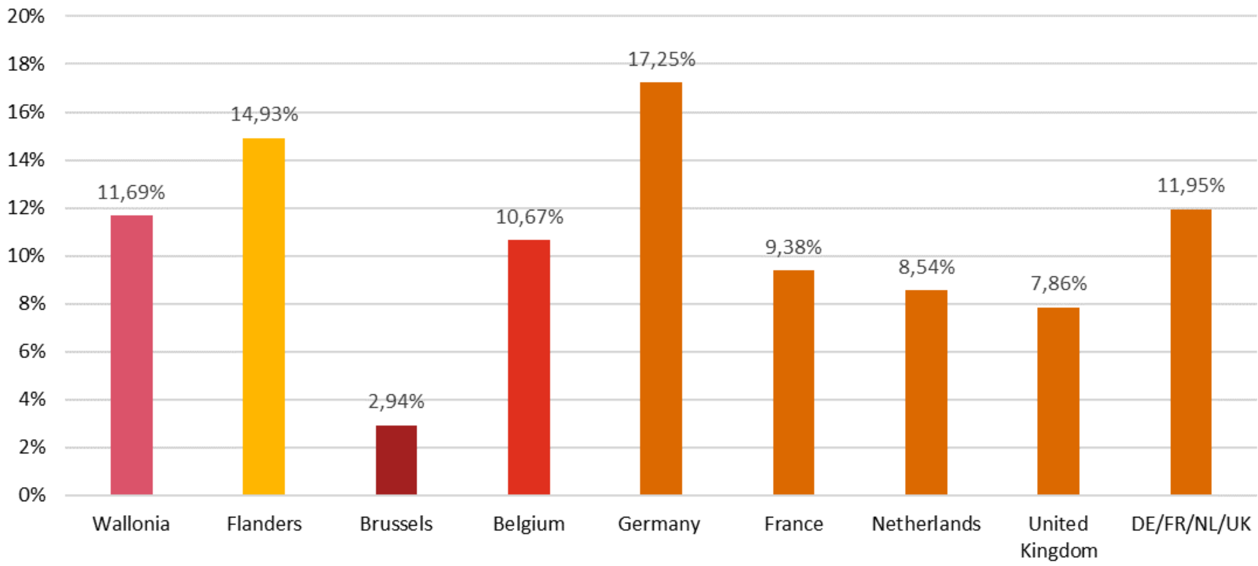
The importance of the manufacturing industry based on employment

The second analysis of this section intents 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.

This analysis is conducted at a national and a regional level for Belgium. When examining the relative weight of industrial employment between zones, similar results are obtained to those of the previous analysis of the relative importance of manufacturing industry in terms of value-added. The only difference is that, when considering manufacturing industry, the Wallonia is slightly above the Belgian average in terms of relative employment (the 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)

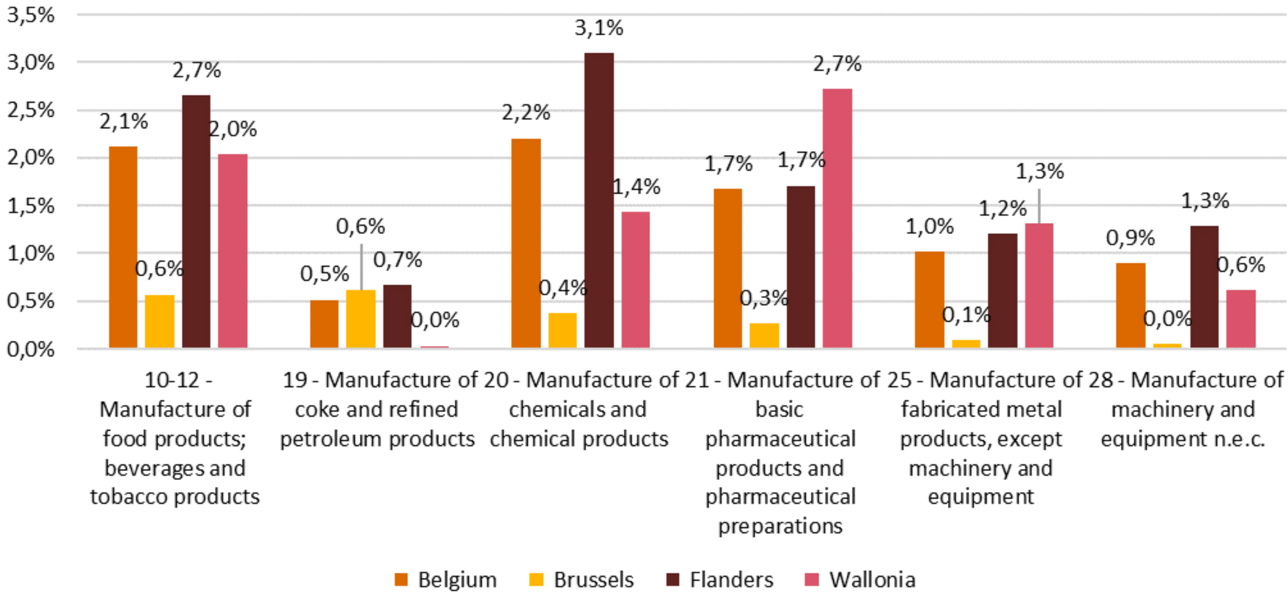
The identification of the most important manufacturing sectors based on value added

The next analysis aims at defining 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 absent 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

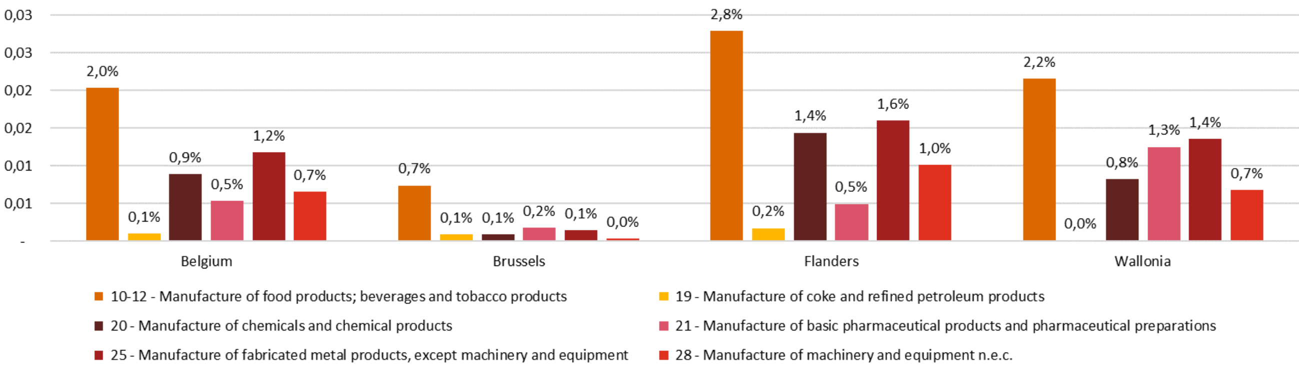


Source: Eurostat (2016 data), NBB (2016 data)

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. Figure 4 (NACE 10-33), the food sector (NACE 10-12) is the largest in terms of relative employment, followed by the metalworking sector (NACE 25), at both national and regional levels (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



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

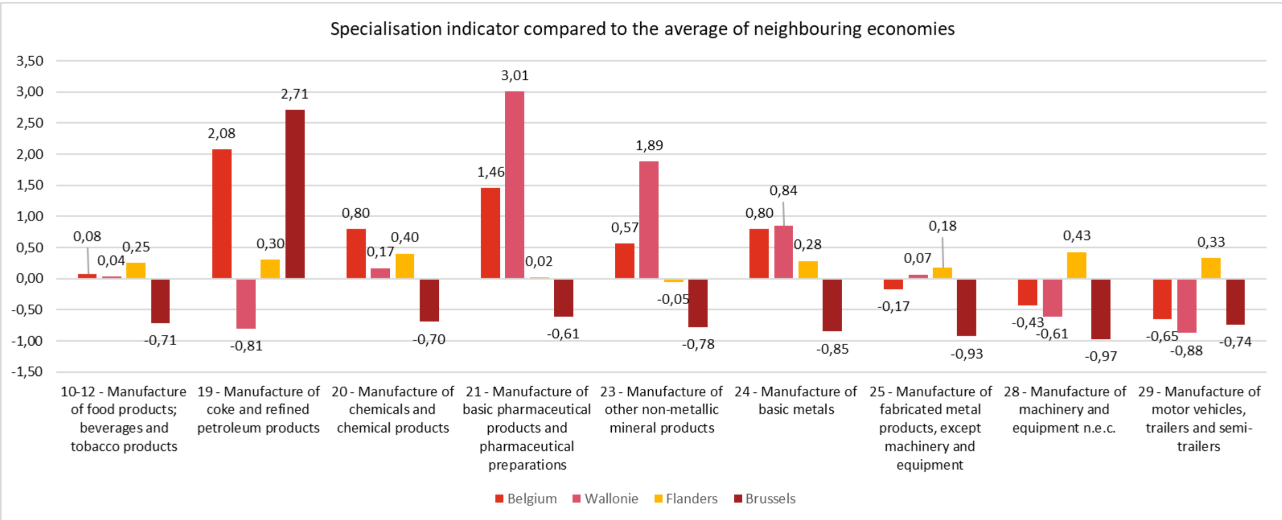
The relative specialisation of Belgian manufacturing sectors compared to neighbouring countries

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:

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

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)

---

[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).

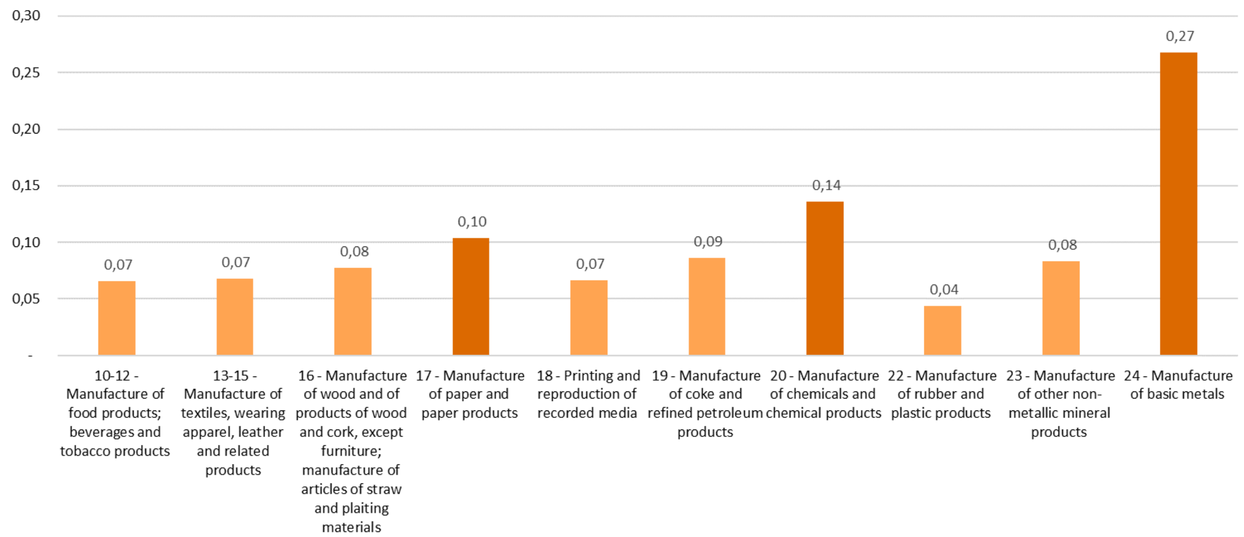
[16] The European average throughout this section refers to the average of the neighbouring countries under scope in this report: Germany, France, the Netherlands and the United Kingdom.

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.

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 for 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 a share of total value added of more than 5%. 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

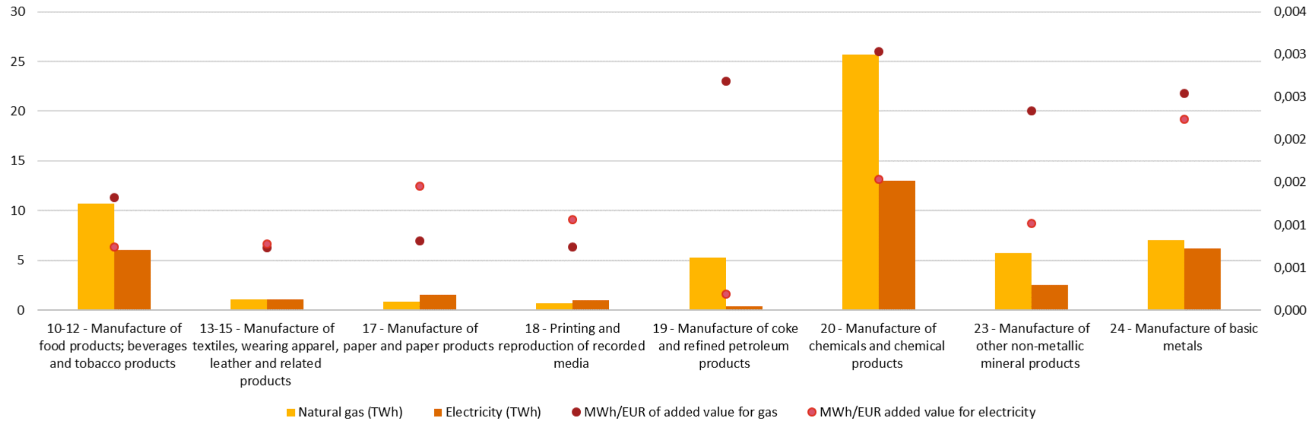


The second analysis consists of identifying the most energy-intensive sectors of the Belgian economy, based on a product approach. Energy intensity is the result of dividing the energy consumption (in MWh) of each sector by its value added (in EUR). The data on the value added of each sector come from 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) 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 sectors (NACE 20) followed by the manufacture of coke (NACE 19) for natural gas 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.

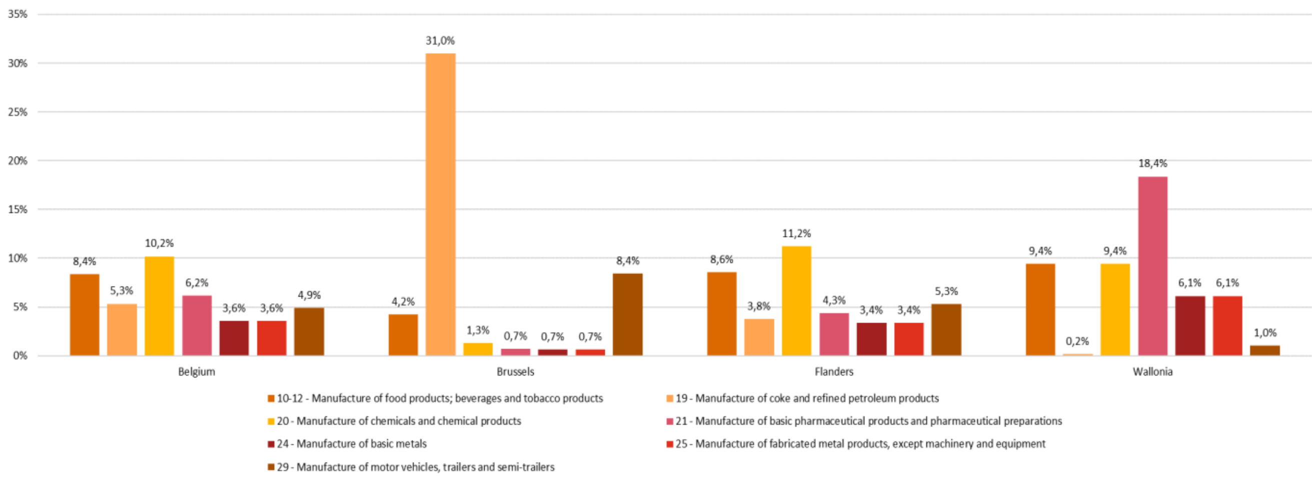
Most industrial sectors have a higher natural gas intensity than electricity intensity. The only exceptions to this observation are the textiles (NACE 13-15), paper (NACE 17) and printing (NACE 18) industries, which have a higher electricity intensity than natural gas.

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]. Indeed, 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.

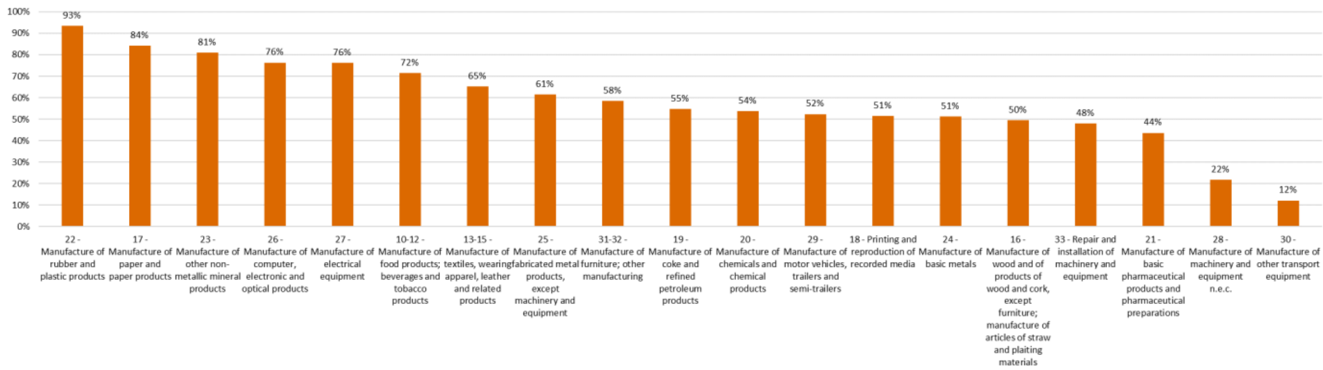
The chart below shows that the sectors of Belgian manufacturing industry with the highest "exports to gross output" ratios are the plastics (NACE 22), the manufacture of paper (NACE 17), the manufacture of other non-metallic mineral products (NACE 23), the manufacture of electronic products (NACE 26), 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 offshoring. 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, no 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

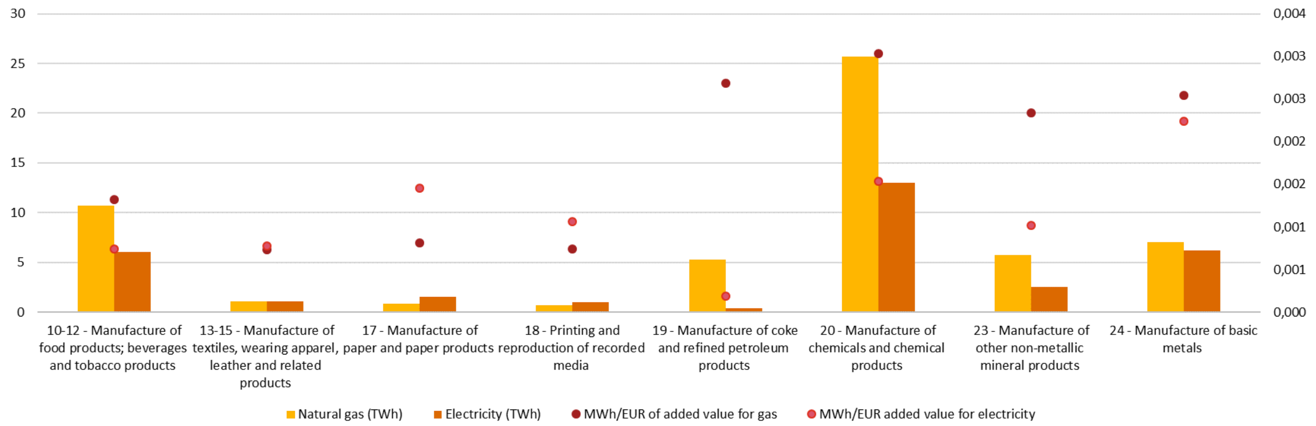


Figure 11 and Figure 12 show that most Belgian sectors have the potential for improvement in terms of energy efficiency (electricity and natural gas) when compared with the weighted average of neighbouring countries (Germany, the Netherlands and France). This is the case for the food and drink (NACE 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, 25 codes, which respectively represent the wood, the paper, the chemical, and the fabricated metal manufactures. For the NACE 17 and 23 codes, electricity and natural gas are both consumed more efficiently in Belgium than in neighbouring countries. 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

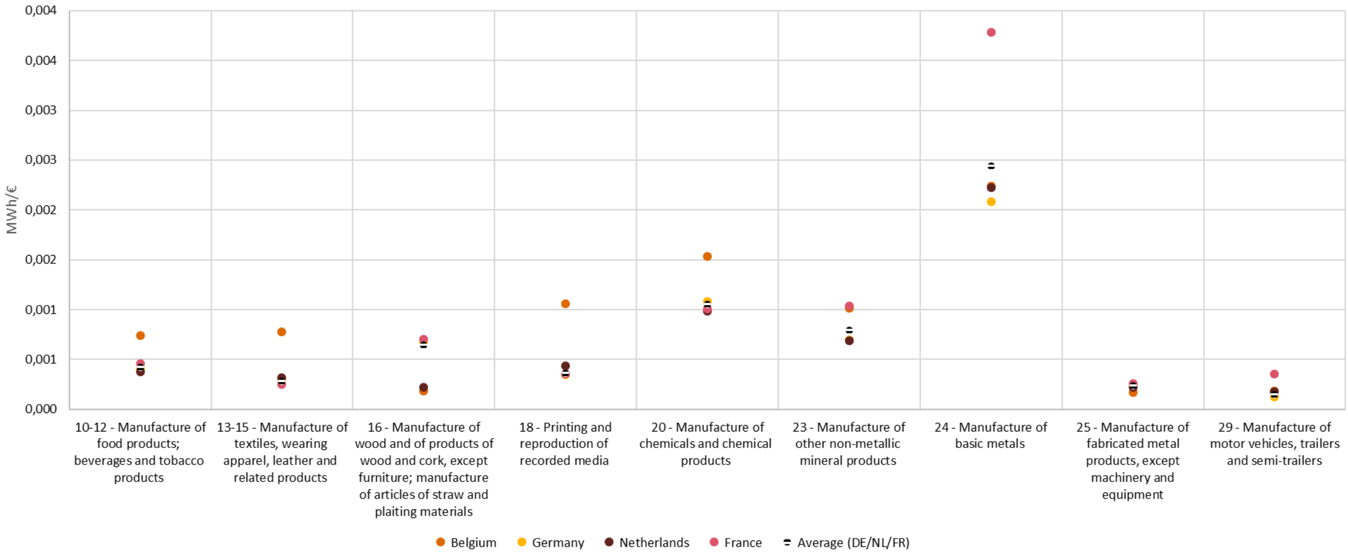
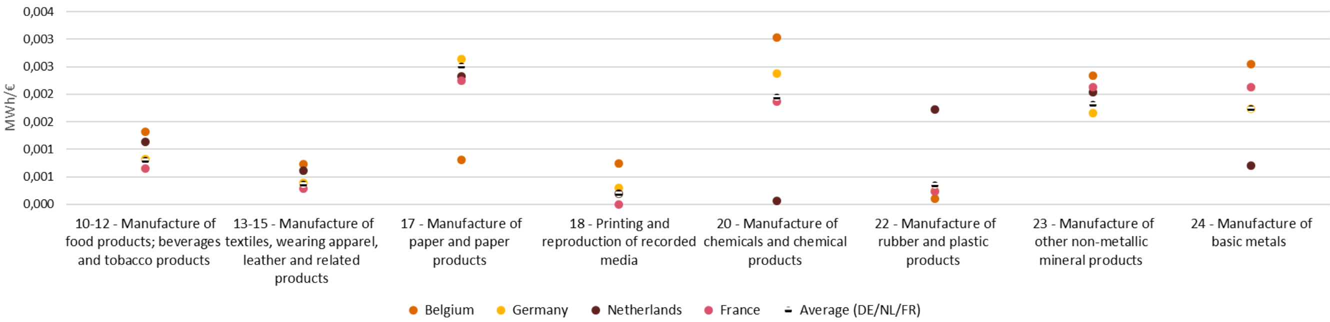


Figure 12: Natural gas consumption compared to the value added creation



Selection of the most important sectors for our analysis

This section concludes our economic analysis by presenting a selection of the most important sectors for discussing 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 take 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.

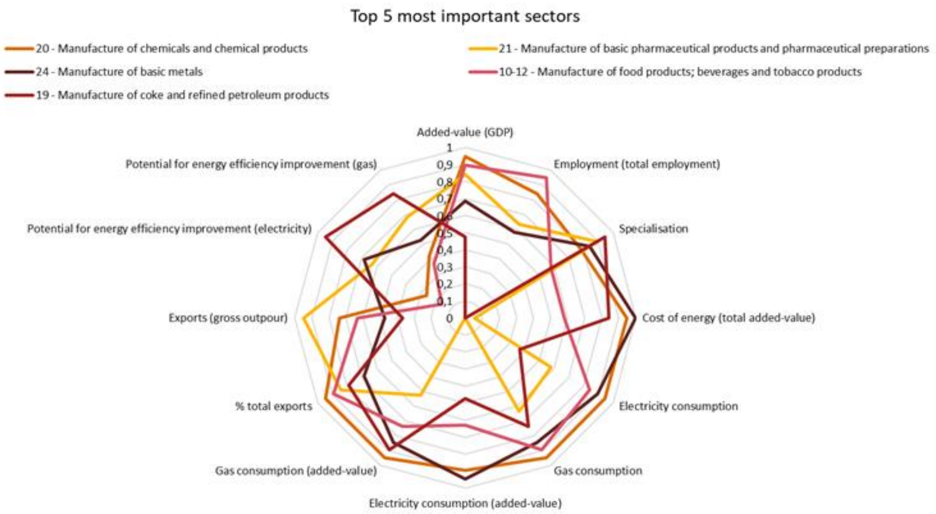
Finally, the calculation of the average score of all analyses is based on a simple average. No particular weight was given to any particular analysis, as all analyses were considered important in determining the most important sectors.

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 this 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 sectors ranks in each of the analyses in this chapter.

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



The above radar chart depicts the ranking of the top five sectors, which we will later deeper analyse. 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.

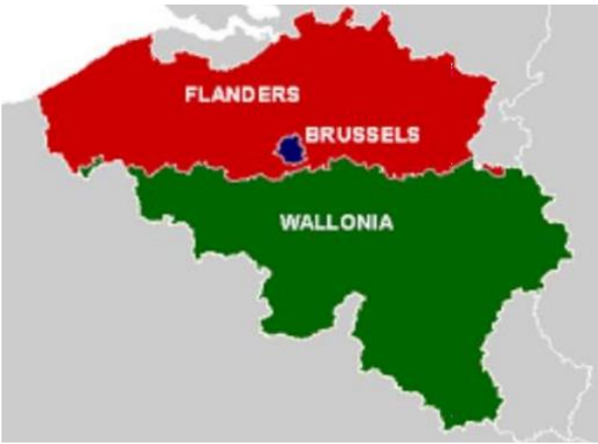
Electricity: Countries/Zone(s) identified

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

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

Figure 14: Belgium national electricity market



Belgium's transmission grid is run by a unique operator, Elia, which therefore covers the entire territory. While most charges imposed by Elia 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 under 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 shares. Flanders counts 10 inter-municipal utility companies for electricity which are operated by Fluvius. Since 2019, Imea's, Iveg's and parts of Iveka's activities were transferred to a unique DSO known as Fluvius Antwerpen[22] whereas Fluvius Limburg and Fluvius West respectively replace former DSOs Inter-Energa[23] and Infrax West.

[22] Iveka's activities were partially transferred to Fluvius Antwerpen. The following municipalities changed to Fluvius Antwerpen: Aartselaar, Boom, Borsbeek, Brecht, Edegem, Hove, Kontich, Lier, Lint, Rumst, Schelle, Schilde, Schoten, Stabroek en Wijnegem. As tariffs remain the same for these municipalities though, it has been decided, for computation matters, to keep Iveka's market shares including the mentioned municipalities. Iveka's market shares are thus slightly overevaluated compared to Fluvius Antwerpen's, which are slightly undervalued.

[23] Inter-aqua and Inter-media were also part of the merger to become Fluvius Limburg (Fluvius, 2020)..

Table 8: Electricity distributed and market share for each Flemish DSO (electricity)[24]

DSO	Number of EAN connections (2019)	Market share (%)
Imewo	614.668	17,78%
Iverlek	537.034	15,53%
Gaselwest	458.249	13,25%
Fluvius Limburg	432.819	12,52%
Fluvius Antwerpen	413.468	11,96%
Iveka	393.833	11,39%
Intergem	314.027	9,08%
Fluvius West	137.381	3,97%
PBE	92.432	2,67%
Sibelgas	63.472	1,84%
Total	**3.457.382**	**100%**

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[25]. 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[26] 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 (2019)	Market share (%)[27]
Ores Hainaut	578.391	31,08%
RESA	444.596	23,89%
Ores Namur	237,676	12,77%
Ores Brabant Wallon	191.380	10,29%
Ores Luxembourg	155.363	8,35%
Ores Verviers	80.124	4,31%
Ores Est	57.949	3,11%
Ores Mouscron	51.617	2,77%
AIEG	24.629	1,32%
AIESH	20.971	1,13%
Régie de Wavre	18.034	0,97%
Total	**1.860.730**	**100%**

[24] (VREG, 2019)
[25] (CWaPE, 2018) – Bilan de la situation du marché de l'électricité pour l'année 2018
[26] See Glossary, p.14.
[27] Data received from the CWaPE

Brussels

The DSO for electricity in Brussels is Sibelga, therefore accounting for 100% of the region's market shares. In 2020, Sibelga supplies 717.638 EAN connection points with electricity.[28]

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 in the 3 regions
> 70 kV	Transmission System Operator (TSO)	Elia (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).

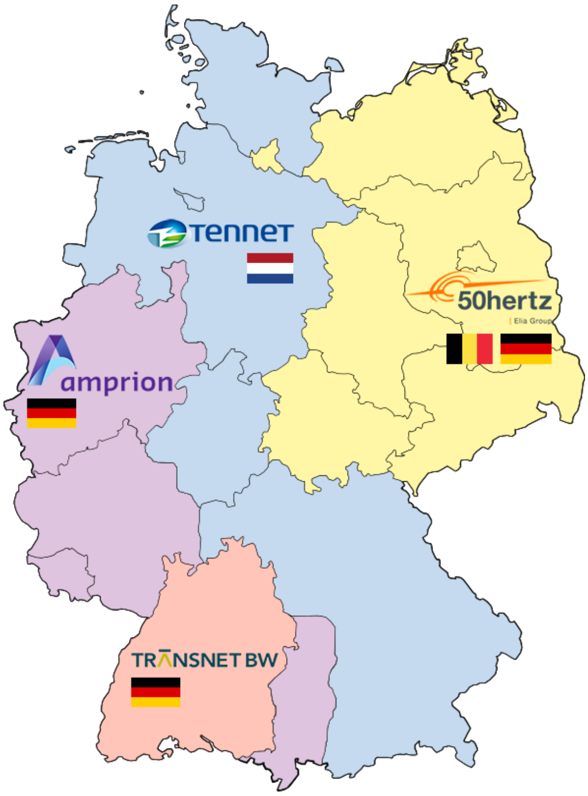
Germany

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.

[28] (Sibelga, 2020)

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.115) and "Component 2 – network costs" for the industrial profiles (p.153). These four transmission zones appear to be the most accurate analysis regarding Germany as the country counts around 883 distribution system operators[29]. 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.

[29] (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%**

As regards taxes, levies and certificate schemes, we observe no regional differences for electricity consumers, nor even local taxes[30].

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%[31] (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.

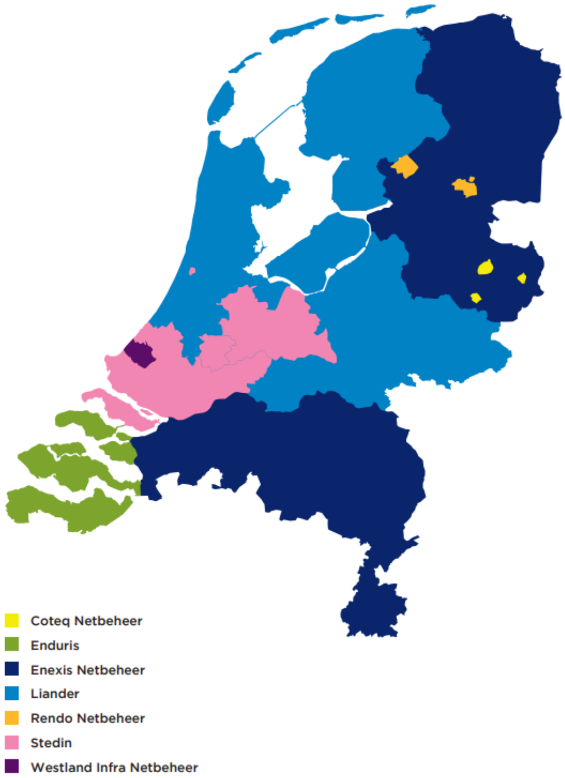
The Netherlands counts only one TSO – TenneT. For this reason, the same pricing methodology is applied throughout the national transmission grid. The network cost for the two most significant consumer profiles – E3 and E4 – encompasses the transmission tariffs appointed by TenneT. Contrastingly, the 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.

[30] 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.

[31] (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[32] (%)
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 investigated 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

[32] The market share was given to PwC by the CREG

(SPT). In addition to these TSOs, six distribution system operators are currently functioning[33]. 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

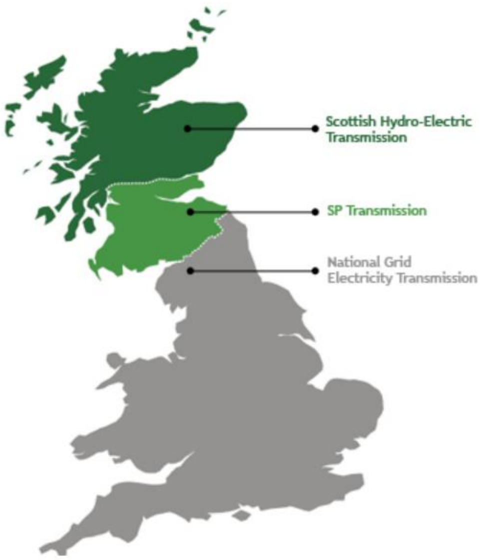


Table 13: TSOs and DSOs in the United Kingdom zones

<table>
<tr><th>TSO</th><th>DSO</th><th>Zones</th></tr>
<tr><td>3</td><td>6</td><td>14</td></tr>
<tr><td rowspan="2">Scottish Hydro Electricity Transmission (SHE)</td><td rowspan="2">Scottish and Southern Energy Power Distribution</td><td>Northern Ireland</td></tr>
<tr><td>Scotland</td></tr>
<tr><td rowspan="2">Scottish Power Transmission (SPT)</td><td rowspan="2">SP Energy Networks</td><td>Southern Scotland</td></tr>
<tr><td>North Wales & Mersey</td></tr>
<tr><td rowspan="10">National Grid Electricity Transmission (NGET)</td><td>Electricity North West</td><td>North West</td></tr>
<tr><td rowspan="2">Northern Power Grid</td><td>Northern</td></tr>
<tr><td>Yorkshire</td></tr>
<tr><td rowspan="3">UK Power Network</td><td>Eastern</td></tr>
<tr><td>London</td></tr>
<tr><td>South East</td></tr>
<tr><td rowspan="4">Western Power Network</td><td>East Midlands</td></tr>
<tr><td>Midlands</td></tr>
<tr><td>South Wales</td></tr>
<tr><td>South Western</td></tr>
</table>

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.

[33] 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 14: Market shares of the United Kingdom electricity DSOs

DSO	Number of connections[34] (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.

[34] (OFGEM, 2019)

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.

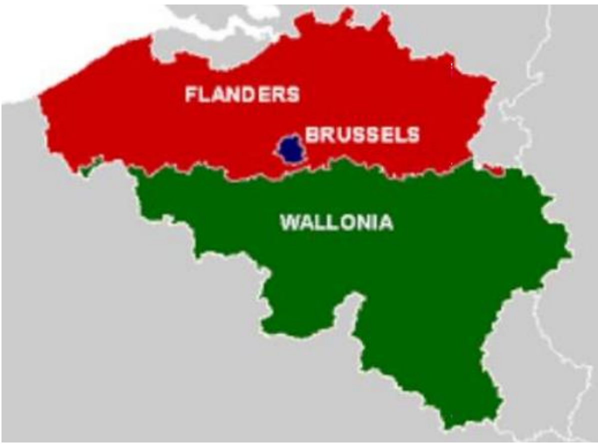
Belgium

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[35].

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, Fluvius and one by Enexis operate 9[36]. Again, in this case, we present the distribution tariffs through an average value in each region based on the number of EAN connections for natural gas.

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

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

Table 15: Market shares of Flemish natural gas DSOs[37]

DSO	Number of EAN connections (2019)	Market share (%)
Imewo	403.371	18,54%
Iverlek	345.956	15,90%
Fluvius Antwerpen	316.391	14,54%
Gaselwest	299.102	13,75%
Iveka[38]	266.518	12,25%
Fluvius Limburg	243.971	11,21%
Intergem	198.948	9,14%
Fluvius West	54.535	2,51%
Sibelgas	45.833	2,11%
Total	**2.174.625**	**100%**

Wallonia

Wallonia counts 6 DSOs which are operated by ORES and RESA[39]. 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 (2019)	Market share (%)
Ores Hainaut	307.034	42,96%
RESA	238.574	33,38%
Ores Brabant Wallon	89.003	12,45%
Ores Namur	41.811	5,85%
Ores Mouscron	27.167	3,80%
Ores Luxembourg	11.047	1,55%
Total	**714.636**	**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 2020, Sibelga supplies 510.050 EAN connection points with natural gas.[40]

Germany

Respecting commodity costs, we distinguish two market areas in Germany[41]: 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.

[37] (VREG, 2019)

[38] Iveka's activities were partially transferred to Fluvius Antwerpen. The following municipalities changed to Fluvius Antwerpen: Aartselaar, Boom, Borsbeek, Brecht, Edegem, Hove, Kontich, Lier, Lint, Rumst, Schelle, Schilde, Schoten, Stabroek en Wijnegem. As tariffs remain the same for these municipalities though, it has been decided, for computation matters, to keep Iveka's market shares including the mentioned municipalities. Iveka's market shares are thus slightly overevaluated compared to Fluvius Antwerpen's, which are slightly undervalued.

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

[40] (Sibelga, 2020)

[41] (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[42], we consider a single result for the German natural gas analysis. The upcoming areas merger supports this choice[43]. 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 industrials 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[44] within the country, we once again present a weighted average of the distribution tariffs of a large rural and a large urban DSO from each of the four previously defined market areas, similar to what has been done for the electricity market, which is weighted based on their respective normalised market shares. The below table presents the selected[45] DSOs to calculate the network cost and their market shares.

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

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

[44](European Commission, 2019)

[45] 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%**

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 November 2018 and the merger of former market areas PEG Nord and TRS. Consequently, French results are presented as a 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[46] 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%[47] 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.

[46] TIGF became TEREGA in April 2018.

[47] (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[48]. 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)[49].

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[50]. 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.

[48] (Selectra, 2020)

[49] Ibidem

[50] 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

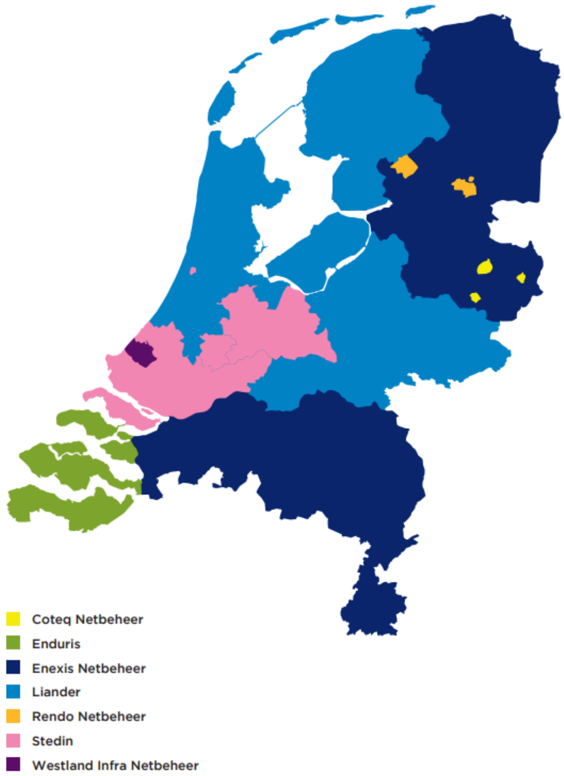


Figure 23: Market shares of Dutch natural gas DSOs

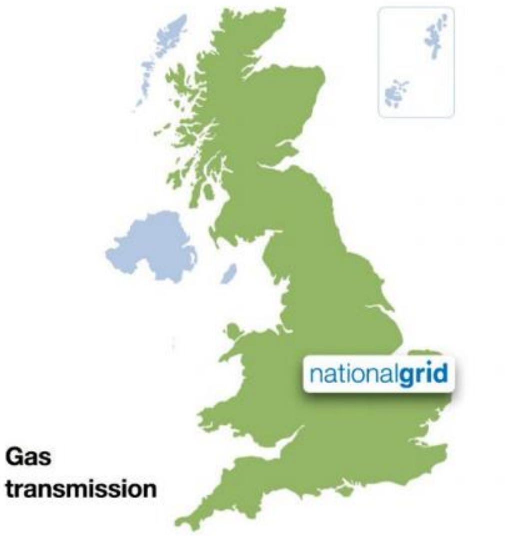
DSOs	Market share[51] (%)
Liander	34,42%
Enexis	31,62%
Stedin	27,19%
Enduris	2,63%
Cogas Infra & Beh	1,96%
Rendo	1,44%
Westland Infra	0,74%
Total	**100%**

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*.

[51] The market shares were given to PwC by the CREG.

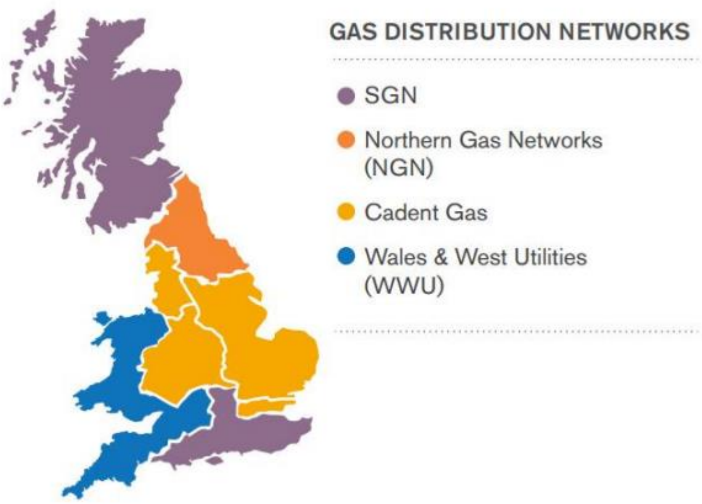
Figure 24: The United Kingdom national natural gas market



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[52] 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[53])	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**

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

[53] 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

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

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[54].

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.

[54] (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)

Selection of products portfolio

Again, based on the country-specific HHI-index for each utility, we determine several products to be selected. Before detailing the followed methodology, it is essential to define the following 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 common product from the market incumbent.[55] 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[56] 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[57] is used to fetch the most affordable product in each region[58];
- 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[59];
- 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[60].
    - 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)[61] .

[55] 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.

[56] 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.

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

[58] 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.

[59] 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

[60] 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%.

[61] 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'

- 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)[62,63].

- 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[64].

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)[65]
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 becomes the end cost.

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.

(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%.)

[62] 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%

[63] 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.

[64] 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.

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

Table 21: Profile weights depending on the Belgian product

Product	Weight E-RES	Weight E-SSME
Standard product of market incumbent	40,50%	39,20%
Cheapest product on the market	19,00%	21,60%
Cheapest product of the market incumbent	40,50%	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 MEGA – Super Variable 1 an ENGIE – Electrabel Direct Fixed	50,00 0 22,60	133,20 91,85 105,13	99,71 78,38 85,29
Wallonia	ENGIE – Electrabel Easy Indexed Octa+ – Activ ENGIE – Electrabel Direct Fixed	50,00 16,53 22,60	133,20 66,37 105,13	99,71 78,82 85,29
Flanders	ENGIE – Electrabel Easy Indexed Octa+ – Activ ENGIE – Electrabel Direct Fixed	50,00 16,53 22,60	133,20 66,37 105,14	99,71 78,82 85,30

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 Octa+ – Activ ENGIE – Electrabel Direct Fixed pro	48,50 41,32 14,81	1.509,61 761,48 1.207,98	692,25 507,65 553,20
Wallonia	ENGIE – Electrabel Easy Pro Indexed Octa+ – Activ ENGIE – Electrabel Direct Fixed Pro	48,50 16,53 14,81	1.509,61 754,50 1.207,98	692,25 503,00 553,20
Flanders	ENGIE – Electrabel Easy Pro Indexed Octa+ – Activ ENGIE – Electrabel Direct Fixed Pro	48,50 16,53 14,81	1.509,61 754,50 1.207,98	692,25 503,00 553,20

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.[66] Commodity prices computation rests on market prices and describes the cost of electricity for industrials as of January 2020. 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.

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

Where:

	Explanation
CAL Y_{-1}	Average year ahead forward price in 2019
CAL Y_{-2}	Average two years ahead forward price in 2018
CAL Y_{-3}	Average three years ahead forward price in 2017
Qi_{-1}	Average quarter ahead forward price in the fourth quarter of 2019
Mi_{-1}	Average month ahead forward price in December 2019

Component 2 – network costs

Transmission cost

All residential profiles under 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[67]	-	2. Tariffs for network losses[68]

Transmission costs must be here separated into two groups: on the one hand, the charges imposed by the regional DSOs and, on the other hand, the network losses estimated based on Elia's tariffs.

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:

[66] 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 2020, ratios used in the formula were determined as being the average coefficients over three years (2016 to 2018).

[67] 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.

[68] See footnote 67.

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

Adoption of new tariffs by local regulators	Transmission
VREG	1 April 2020[69]
BRUGEL	1 January 2020
CWaPE	1 March 2020

This study analyses the tariffs in January 2020. Therefore, transmission tariffs for Wallonia and Flanders are taken at their 2019 level as they remain valid, respectively, until the end of February 2020 and end of March 2020. In Wallonia only, the similar reasoning holds with regards to the Federal contribution (see "Belgium Component 3 – all other costs", p.109).

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 add up to the transmission tariffs mentioned above. Similarly to transmission costs charged by regional DSOs, each DSO publishes their tariff sheets from which fares 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[70]
Metering costs	Metering costs	Regulatory balances
-	Tariff for system services	-
	Network losses	

[69] Exceptionally, the new transmission tariffs for 2020 are adopted in April 2020 whereas it usually is in March.

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

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[71] per DSO. For Flanders and Wallonia, all operating DSOs are taken into account, representing 100% of the EAN connections (at their 2018 level). 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 have to 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

All regions	Profiles
Federal Public Service Obligations (Federal PSOs) on transmission[72]	
a. Financing for the connection of offshore wind turbine parks (0,1188 EUR/MWh); b. Financing for green certificates (federal)[73] (9,10141 EUR/MWh); c. Financing for strategic reserves (0 EUR/MWh);	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] (3,1428 EUR/MWh)[76]; b. Energy contribution[77] (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

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

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

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

[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] Rate for Wallonia is of 3,3494 EUR/MWh as the 2019 federal contribution is considered up to end of February 2020.

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

automatically applied. The sectoral agreement scheme does not exist in Brussels, which is why the degressivity is automatically applied to all consumers.

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

Brussels	Flanders	Wallonia	Profiles
Regional Public Service Obligations (Regional PSOs)			
Regional PSOs on transmission			
a. Financing of regional energy policies[78] (expressed in EUR/month)	a. Financing of support measures for energy and cogeneration (expressed in EUR/MWh)	a. Funding of support measures for renewable energy[79] (expressed in EUR/MWh)	All
-	b. Financing measures for the promotion of rational energy use (expressed in EUR/MWh)	-	
Taxes and levies on the regional level			
Regional taxes and levies on distribution			
a. Charges on non-capitalised pensions (expressed in EUR/MWh)	a. Charges on non-capitalised pensions (expressed in EUR/MWh)	a. Levy for occupying road network (expressed in EUR/MWh)	All
b. Levy for occupying road network (expressed in EUR/MWh)	b. Contribution for the energy fund[80](expressed in EUR/MWh)	b. Corporate income tax (expressed in EUR/MWh)	
c. Corporate income tax and other taxes (expressed in EUR/MWh)	c. Other local, provincial, regional and federal taxes, Charges, Surcharges, Fees and contributions (expressed in EUR/MWh)	c. Other local, provincial, regional and federal taxes, Charges, Surcharges, Fees and contributions (expressed in EUR/MWh)	
Regional taxes and levies on transmission			
-	a. Levy for the taxes pylons and trenches in Flanders (expressed in EUR/MWh)	a. Connection fee (expressed in EUR/MWh)	All
-	-	b. Levy for the use of the public domain (expressed in 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 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].

[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)

[81] See explanation in section 0 Electricity: Detailed description of the prices, price components and assumptions (p.103)

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.

[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
Bayernwerk	E.ON - Grundversorgung Strom HH Doppeltarif	135,35	427,16	412,25	-	44,90%
	GW Waging – Versorgungtarif NT	117,96	381,98	318,37	-	10,20%
	E.ON – Strom Pur	115,51	-	-	814,10	44,90%
SWM Infrastruktur Stammgebiet	SWM – Grund- und Ersatzversorgung	123,68	384,27	391,82		62,00%
	MAINGAU – Stromregio	30,25	-	-	791,47	10,20%
	Vattenfall – Easy Strom	94,79	-	-	766,68	27,80%
E-DIS	E.ON – Grundversorgung Strom HH Doppeltarif	141,65	434,02	501,34		44,90%
	Havelstrom Zehdenick – Zehdenicker Nachtstrom	65,00	-	-	660,45	10,20%
	E.ON – Strom Pur	110,61	-	-	872,55	44,90%
Stromnetz Berlin	Vattenfall – Tarif Berlin Basis Privatstrom	106,89	420,97	370,90		41,70%
	Stadtwerke Löbau – SW-L SIX-Berlin-Haushalt	90,00	-	-	689,50	10,20%
	E.ON – Heizstrom Nord	96,05	-	-	697,05	48,10%
Westnetz	EW Aach - Komfort HH	106,80	-	-	882,00	44,90%
	EV Gera – Regio-6-Privat Online	75,63	-	-	751,47	10,20%
	EW Aach – AktivPrivat NT	127,32	398,39	425,34		44,90%
RNG-Netz 2-Köln	RheinEnergie – FairRegio Strom Basis	157,30	-	-	775,25	44,90%
	EV HALLE – REGIO+	74,72	-	-	749,41	10,20%
	RHEINENERGIE – FairRegio Strom plus Online-Option Konstant 2020 XL-Option	150,10	-	-	759,50	44,90%
Netze BW	EnBW – Komfort Haushalt	106,80	-	-	882,00	44,90%
	EV GERA – Regio-6-Privat Online	75,63	-	-	751,47	10,20%
	Vattenfall – Easy Strom	94,79	-	-	822,68	44,90%
Stuttgart Netze	EnBW – Komfort Haushalt	106,80	-	-	882,00	44,90%
	Stadtwerke – Iserlohn SauerlandPowerStrom 3.0	9,57	-	-	812,70	10,20%
	Vattenfall – Easy Strom	64,54	-	-	812,18	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 – UnternehmerStrom Fix 12	112,70	-	-	6.579,00	46,80%
	EV Sömmerda – Sömstrom-Online-12 G	104,67	-	-	6234,60	12,70%
	Vattenfall – Profil Strom	94,79	-	-	6.879,83	40,50%
SWM Infrastruktur Stammgebiet	SWM – M-Ökostrom business Vario DT	108,93	4.226,22	2.412,10	-	60,30%
	WERTACH – ClassicRegioGewerbe	111,96	-	-	6.399,00	12,70%
	Vattenfall – Profil Strom	76,84	-	-	6.809,24	27, 00%
E-DIS	E.ON – UnternehmerStrom Fix 12	107,61	-	-	7.194,00	46,80%
	Havelstrom – Zehdenick Zehdenicker Nachtstrom	65,00	-	-	5.661,00	12,70%
	Vattenfall – Profil Strom	112,84	-	-	7.336,13	40,50%
Stromnetz Berlin	Vattenfall – Profil Strom	105,00	-	-	7.025,40	43,70%
	EV Sömmerda – Sömstrom-Online-12 G	69,98	-	-	6.285,00	12,70%
	Vattenfall – Profi12 Tag-Nacht Strom	141,00	4.245,88	2.230,59	-	43,70%
Westnetz	Ew Aach – Ersatzversorgung Gewerbekunden NT	106,80	5.008,24	3.338,82	-	43,70%
	Stadtwerke Walldürn – SWW Aktiv 19 Zweitarifzähler	140,64	4.091,60	2.235,63	-	12,70%
	EW Aach – AktivProfi NT	123,96	4.692,10	2.695,46	-	43,70%
RNG-Netz 2-Köln	RHEINENERGIE – TradeRegio Strom basis	174,00	-	-	6.876,00	43,70%
	GGEW – Strom Vario	156,56	-	-	5.958,00	12,70%
	RHEINENERGIE – Gewerbestrom plus	150,10	-	-	6510,00	43,70%
Netze BW	ENQU – Sira Eco Business	149,41	4.286,72	2.771,09	-	43,70%
	Stadtwerke Walldürn – SWW Aktiv 19 Zweitarifzähler	140,64	4.091,60	2.235,63	-	12,70%
	ENQU – Oslo business	134,19	4.292,77	2.771,09	-	43,70%
Stuttgart Netze	ENQU – Sira Eco Business	117,84	4.347,23	2.684,37	-	43,70%
	Stadtwerke Stuttgart -stuttgart Energie Ökostrom Doppeltarif	82,69	3.970,59	2.420,17	-	12,70%
	ENQU – Oslo Business	86,84	4.356,30	2.684,37	-	43,70%

[87] Labour price (variable)

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[88]. 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 2020, ratios used in the formula were determined as being the average coefficients over three years (2016 to 2018).

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

Where:

	Explanation
CAL Y_{-1}	Average year ahead forward price in 2019
CAL Y_{-2}	Average two years ahead forward price in 2018
CAL Y_{-3}	Average three years ahead forward price in 2017
Qi_{-1}	Average quarter ahead forward price in the fourth quarter of 2019
Mi_{-1}	Average month ahead forward price in December 2019

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[89], 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 5.1. Component 2 – network costs” (p.153). 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.

[88] 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.

[89] (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 (2,26 EUR/MWh) applies to E-RES, E-SSME and E-BSME[90].
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 (3,58 EUR/MWh) applies to E-RES, E-SSME and E-BSME[91].
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 (4,16 EUR/MWh) for all profiles[92].
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 (67,56 EUR/MWh) is used[93].
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[94].
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[95], 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 (0,07 EUR/MWh) used to offset compensation payments made by transmission system operators to demand-side response (DSR) service providers[96].

Component 4 – VAT

Germany imposes a 19% rate VAT on electricity consumption for residential consumers[97].

France

Component 1 – the commodity price

The HHI of the retail market in France is over 5.000 in 2018[98], 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. Since the most inexpensive product of the market is the most economical product of the market incumbent for profile E-SSME, the cheapest product from the second-largest supplier, Engie, is taken.[99] In 2016, the switching

[90] (Netztransparenz.de, 2020).
[91] (Netztransparenz.de, 2020).
[92] (Netztransparenz.de, 2020).
[93] (Netztransparenz.de, 2020).
[94] (Bundesamt für Justiz, 2020).
[95] We distinguish the basic contract, or "*Grundversorgung*", and the other types of contracts.
[96] (Netztransparenz.de, 2020).
[97] VAT or "Mehrwertsteuer" (MwST) in Germany is 19% on electricity. (Smart Rechner, 2019)
[98] (CEER, 2018)
[99] (Selectra, 2020)

rate for household products in France was 5,4%, and the switching-rate for non-household consumers was 9,7%.[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	73,00%	73,00%
Cheapest product on the market	5,40%	9,70%
Cheapest product of the market incumbent/2nd largest supplier	21,60%	17,30%
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	124,78	228,13	209,16
	Mint energie – Online & green	153,63	198,00	183,98
	EDF – Digiwatt	153,63	219,33	201,88

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)	338,36	2.526,00	1331,00
	Alterna – Idéa élec	353,89	2.196,00	1.284,00
	Engie – Electricité ActiVert 3ans	378,77	2.172,00	1.108,00

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.159).

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

[100] (CRE, 2018)
[101] (Enedis, 2019)

réseau public d'électricité' (TURPE). TURPE 5 was implemented in 2017 and is designed to last until 2020. This distribution cost consists of 3 components.

Table 38: Distribution costs in France

<table>
<tr><th colspan="4">Network costs</th></tr>
<tr><th>Component</th><th>French labelling</th><th colspan="2">Explanation</th></tr>
<tr><td>Management component[102]</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 profiles E-RES and E-SSME opted for exclusive contracts.</td></tr>
<tr><td rowspan="7">Component for taking off electricity</td><td rowspan="7">Composante annuelle de soutirage</td><td colspan="2">Multiple prices options exist varying depending on a utilisation length and temporal differentiators capacity and consumption components. The prices options are:</td></tr>
<tr><td>Consumers < 36 kVA (E-RES)</td><td>Consumers ≥ 36 kVA (E-SSME)</td></tr>
<tr><td>1. Short use (CU)</td><td>1. Short use (CU)</td></tr>
<tr><td>2. Short use with 4 temporal classes (CU4)</td><td>2. Long use (LU)</td></tr>
<tr><td>3. Medium use with a temporal differentiation between peak and off-peak hours (MUDT)</td><td></td></tr>
<tr><td>4. Medium use with 4 temporal classes (MU4)</td><td></td></tr>
<tr><td>5. Long use (LU)</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 all three profiles (E-RES, E-SSME and E-BSME) do not own their meters.</td></tr>
</table>

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[103]. 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.

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:

[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] (Selectra, 2020)

- 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 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 only due on the fixed part of the network tariffs.[104] 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 2020, the default tax is set on 0,77 EUR/MWh[105]. 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[106]. Almost 80% of the municipalities set a coefficient of 8,5, leading to a tax of 6,545 EUR/MWh, while nearly 90% of all departments set a 4,25 factor, leading to a tax of 3,2725 EUR/MWh.[107] Therefore, we use these factors since they are the most representative.
Contribution au service public d'électricité (CSPE) [66,67]	The CSPE is a surcharge that finances expenses related to public service missions in the electricity sector. This surcharge is, for example, used to support the costs 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.	In 2020, the tax amounts to 22,5 EUR/kVA for residential and small professionals. For small professionals, this tax can reach a minimum of 0,50 EUR/kVA. 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.[108] As a result of CTA potential variance, a range of possible VAT is also presented in final results.

[104] (CRE, 2019)
[105] (Collectivités locales (gouv.fr), 2020)
[106] 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.
[107] (Ministère des Finances (France), 2020)
[108] (Selectra, 2020)

The Netherlands

Component 1 – the commodity price

In the Netherlands, the HHI-index was between 1,500 and 2,000 in 2018.[109] 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[110]. 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[111]. 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[112]
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%-15,1%)*56,36%/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%

[109] (CEER, 2018)

[110] (European Commission, 2017)

[111] 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.

[112] A more detailed explanation of the need of this normalised market share to compute commodity prices can be found under the section 0Residential and small professional consumers' commodity computation methodology - Weight of each product within the product portfolio (p.62).

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	59,40	112,31	109,05
	Fenor – Vaste Prijs Groene Stroom 2jr	39,00	80,81	95,96
	Essent – Essent ZekerheidsGarantie Groen 3jr.	59,40	98,23	105,56
	Eneco – Europese Wind 1 jaar vast	59,40	103,21	96,65

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

Regio (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	59,40	1.272,60	688,80
	NLE- Variabele Stroom	69,36	1.047,06	552,24
	Essent – Stroom Variabel Groen 1jr.	59,40	1.252,80	681,60
	Eneco – Europese Wind 1 jaar vast	59,40	1.161,00	610,44

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 industrials 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.[113]

$$\text{Commodity price}$$

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

Where:

	Explanation
CAL Y_{-1}	Average year ahead forward price in 2019
CAL Y_{-2}	Average two years ahead forward price in 2018
CAL Y_{-3}	Average three years ahead forward price in 2017
Qi_{-1}	Average quarter ahead forward price in the fourth quarter of 2019
Mi_{-1}	Average month ahead forward price in December 2019

[113] 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[114]. 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 435,68 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 2020 are displayed in the table below:

Table 47: Electricity Energy Tax and ODE bands (Netherlands)[115]

Band	Consumption	Energy Tax (EUR/MWh)	ODE (EUR/MWh)
A	Up to 10.000 kWh	97,70	27,20
B	10.000-50.000 kWh	50,83	37,50
C	50.000-10.000.000 kWh	13,53	20,50
D	> 10.000.000 kWh (residential)	1,11	0,40
E	> 10.000.000 kWh (professional)	0,55	0,40

[114] (ACM, 2020)

[115] (Belastingdienst Nederland, 2020)

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.

Component 4 – VAT

The VAT on electricity is 21% for residential consumers[116].

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[117] 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 1000 and 2000 in the United Kingdom.[118] 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 SSE) 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[119]	Normalised market shares
British Gas	19,00%	59,40%
SSE	13,00%	40,60%

[116] (Energie Leveranciers, 2020)
[117] (OFGEM, 2015)
[118] (CEER, 2018)
[119] (OFGEM, 2020)

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[120]. The normalised market shares of British Gas set out above is the result of the following calculation: 19%/(19%+13%)=59,40%. Similarly, SSE's market shares normalisation results in 40,60%.

For E-RES, the products of the market incumbent thus weight (100%-19,1%)*59,4%/2 = 24,00%. About E-SSME, the results is as follows: (100%-19,3%)*59,4%/2= 24,00%. The cheapest product of the 2nd largest energy supplier is thus (100%-19,1%)*40,60%=32,9% for E-RES and (100%-19,4%)*40,6%=32,70% for E-SSME. The weights are set out in the table below.

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

Product	Weight E-RES	Weight E-SSME
Standard product of the market incumbent	24,00%	24,00%
Cheapest product on the market	19,10%	19,30%
Cheapest product of the market incumbent	24,00%	24,00%
Cheapest product of the second largest player	32,90%	32,70%

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)121	Price for peak consumption (EUR/year)	Price for off-peak consumption (EUR/year)
United Kingdom	British Gas – Standard	86,07	322,08	166,92
	Symbio – Winter monthly plan February 20 v3	69,52	187,60	151,33
	British Gas – HomeEnergy Fix November 2021	87,11	322,09	166,91
	SSE 1 Year Fix v9	77,75	250,88	238,08

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[122]	British Gas – Standard	92,83	3.623,40	1.054,20
	Orbit Energy – Vari-Save extra	86,07	1.932,51	1.019,54
	British Gas – HomeEnergy Fix November 2021	87,11	3.623,49	1.054,17
	SSE – Exclusive 1 year fix v9	77,75	2.822,40	1.503,66

[120] (CEER, 2018)
[121] Pound Sterling is converted to Euro at the January 2020 rate[121] (also see section General assumptions, p.18)
[122] (OFGEM, 2020)

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 industrials as of January 2020. 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[123]. We do not use the weekend hours of APX UK DAM for the E-BSME profile.

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

Where:

	Explanation
CAL Y-1	Average year ahead forward price in 2019
CAL Y-2	Average two years ahead forward price in 2018
CAL Y-3	Average three years ahead forward price in 2017
Qi-1	Average quarter ahead forward price in the fourth quarter of 2019
Mi-1	Average month ahead forward price in December 2019

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.

[123] 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.

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.[124] This methodology encompasses the following components:

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[125]/day
Metering costs[126]	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 20,44% of the electricity bill.[127]
2. The Climate Change Levy (CCL) is a levy payable on electricity, natural gas, fuel, etc. The basic rate (8,47 GBP/MWh or 9,96 EUR/MWh[128]) of the Climate Change Levy is always determined for a year starting on 1 April, in this study in April 2019. Residential consumers are exempted from it.[129]
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 2019 to April 2020, the renewable quota is 0,484 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 48,78 GBP (57,37 EUR). This amounts to 23,61 GBP/MWh (27,77 EUR/MWh) for the residential and small professional profiles[130]

[124] (ENA, 2020)

[125] Meter Point Administration Number

[126] 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.

[127] 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)

[128] With a GBP/EUR exchange rate of 1,176.

[129] (GOV.UK, 2020)

[130] (OFGEM, 2020)

4. The Assistance for Areas with High electricity distribution Costs[131] (AAHEDC) the levy compensates for high distribution costs in the zone of Northern Scotland (1 of the 14 zones) corresponding to 0,2627 GBP/MWh (0,31 EUR/MWh).

Component 4 – VAT

Electricity used for residential and domestic purposes is subject to a 5% VAT in the UK.[132]

[131] (National Grid ESO, 2019)

[132] (GOV.UK, 2020)

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

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%. There is an exception for the Brussels commodity because the cheapest product of the market is a product from the market incumbent. According to the methodology set out above, the weight of the most affordable product is the switching rate, and the remaining percentage splits over the two other products. Since the cheapest product of the market belongs to the market incumbent, the most affordable product of the second-largest supplier (Lampiris) is used for Brussels, for which the weights of the first and third products are thus assigned according to the normalised market shares.

Table 54: Profile weights depending on the products in Belgium

Product	Weight G-RES	Weight G-RES (Brussels)
Standard product of the market incumbent	39,00%	60,00%
Cheapest product on the market	22,00%	22,00%
Cheapest product of the market incumbent	39,00%	18,00%
Total	**100%**	**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[133]. All prices reported are VAT excluded.

133 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	518,32
	ENGIE – Electrabel Direct	15,00	356,13
	Lampiris – Lampiris Online	33,05	397,73
Wallonia	ENGIE – Electrabel Easy Indexed	35,00	518,32
	ESSENT – Variable Avance 1an	0,00	324,49
	ENGIE – Electrabel Direct	15,00	356,13
Flanders	ENGIE – Electrabel Easy Indexed	35,00	518,32
	ESSENT – Variable Avance 1an	0,00	324,49
	ENGIE – Electrabel Direct	15,00	356,13

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 was for the G-Pro profile was not extracted from a comparison site but is based on the prices observed in January 2020 at the Zeebrugge Trading Point (ZTP). However, it is known that the majority of Belgian industrial consumers' contracts are indexed to TTF[134], which represents their most significant component of natural gas bills.[135] 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[136].

Table 56: Transmission cost of Belgian TSO

TSO	Transport cost (cEUR/kWh)
Fluxys	0,15

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);

[134] https://www.creg.be/fr/publications/etude-f1927, (CREG, 2019).

[135] 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.

[136] (Fluxys, 2020)

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 for the measuring activities 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 3.4. Belgium (p.85). 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[137] (0,7423 EUR/MWh); b. Energy contribution[138] (0,9978 EUR/MWh).	All

[137] 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).

[138] 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

Brussels	Flanders	Wallonia	Profiles
Regional Public Service Obligations (Regional PSOs) on transport			
a. Brussels regional public service obligation[139] (expressed in EUR/MWh)	-	-	All
Taxes and levies on the regional level			
Regional taxes and levies on distribution			
a. Charges on non-capitalised pensions (expressed in EUR/MWh)	a. Charges on non-capitalised pensions (expressed in EUR/MWh)	a. Levy for occupying road network (expressed in EUR/MWh)	All
b. Levy for occupying road network (expressed in EUR/MWh)	b. Other local, provincial, regional and federal taxes, Charges, Surcharges, Fees and contributions (expressed in EUR/MWh)	b. Corporate income tax[140] (expressed in EUR/MWh)	
c. Corporate income tax and other taxes [141] (expressed in EUR/MWh)	-	c. Other local, provincial, regional and federal taxes, Charges, Surcharges, Fees and contributions (expressed in EUR/MWh)	
Regional taxes and levies on transport			
-	-	a. Connection fee[142] (expressed 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 tariff 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. This is why 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

[139] Depends on the calibre of the meter being installed. For our residential and small professional consumer, we have assumed the meters process between 6 and 10 m³, for which the annual surcharge amounts to 9,12 EUR/year, on which VAT is due

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

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

[142] For the first 100 kWh consumed a fixed amount of 0,075 EUR is charged.

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, the cheapest product was one of the market incumbent's; a fourth product was used. Similarly to the explanation provided in the electricity commodity section for Germany, the supplier from the list below that offers the cheapest product is assumed to be the second-largest supplier for that region - if it is not the market incumbent. Below-listed market shares are then normalised to distribute the weights of each product for Transnet BW's region.

Table 59: Market shares of German natural gas suppliers

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

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%. For Transnet BW region, EnBW and E.ON are the two identified suppliers who account respectively for 46,4% and 53,6% of market shares. Weights are thus calculated as such for EnBW AG (100%-9,3%)*46,4% = 42,1% and (100%-9,3%)*53,6%=48,6% for E.ON.

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%	42,10%
Cheapest product on the market	9,40%	9,30%
Cheapest product of the market incumbent or the 2nd largest supplier	45,30%	48,60%

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[143] (EUR/year)	Arbeitspreis[144] (EUR/year)
Bayernwerk	E.ON – Grundversorgung Erdgas	192,00	1.216,50
	Montana – garant 12	69,60	930,40
	E.ON – Erdgas Pur	124,37	1.030,42
SWM Infrastruktur Stammgebiet	Stadtwerke München – Grundversorgung	111,60	1.107,18
	Stadtwerke Flensburg – Flensburg eXzellent	123,93	765,25
	Stadtwerke München – M-Erdgas Flex	78,68	946,68
E-DIS	EWE Vertrieb – Erdgas comfort	159,53	1.303,72
	Montana – garant 12	130,08	769,91
	EWE Vertrieb – Erdgas Solo	146,22	1.095,55
Stromnetz Berlin	GASAG – ERDGAS Komfort	156,00	1.174,63
	MAINGAU – GasRegio	50,42	828,76
	GASAG – ERDGAS Smart	160,84	934,31
Westnetz	Thüga Energie – Thüga ClassicGas	120,00	1.365,36
	Montana – garant 12	49,44	883,88
	Thüga Energie – Thüga OnlineGas	120,00	981,57
RNG-Netz 2-Köln	RheinEnergie – FairRegio Erdgas basis	145,00	1.186,26
	Roth – Rothgas 12	0	942,13
	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	84,03	1.033,91
	EW Schönau – EWS Gas	99,83	1.163,00
Karlsruhe Netze	Stadtwerke Karlsruhe – BasisGas	162,00	1.279,24
	Grünwelt energie – Grüngas classic	47,69	951,90
	Stadtwerke Karlsruhe – OnlineGas	144,00	1.023,44

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 2020.

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.

[143] Basic price (fixed)

[144] 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[145], 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[146].
- 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)[147].
    - Natural gas for other purposes (3,05 EUR/MWh): we attribute this usage to SME consumers (G-PRO)[148]. As small professionals fall under reduced rates as the law implemented special rates for companies.

[145] (Bundesamt für Justiz, 2020)
[146] § 54 and § 55 Energiesteuergesetz
[147] (Bundesamt für Justiz, 2020)
[148] (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[149].

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 10,40% for household consumers.[150] 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	44,80%
Cheapest product on the market	10,40%
Cheapest product of the market incumbent	44,80%

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. The closest we could get to the commodity component was the cost without taxes and VAT, but the network costs are still incorporated in the prices presented in the table below.

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	249,10	1.299,20
	Wekiwi – Offre gaz naturel à prix indexé	242,50	1.081,60
	Engie – Energie Garantie Gaz 3 ans	249,40	1.260,70

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:

[149] VAT or "Mehrwertsteuer" (MwST) in German is 19% on natural gas. (Toptarif, 2020)
[150] (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	Residentials and Industrials	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[151] are decomposed as follows:

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)[152], 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 0,845 cEUR/kWh in 2020.

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.

[151] The CREG provided PwC with the data for these two components.
[152] (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.[153] 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[154]
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%[155]. 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.

[153] (CEER, 2018)

[154] A more detailed explanation of the need of this normalised market share to compute commodity prices can be found under the section 0 Residential and small professional consumers' commodity computation methodology - Weight of each product within the product portfolio (p.62).

[155] 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	59,40	683,11
	Greenchoice - Actie Groenmix NL Gas 1jr.	44,63	451,17
	Essent - ZekerheidsGarantie Gas 1jr.	59,40	620,25
	Eneco Gas 1 jaar vast	59,40	598,40

As described in the section "Natural gas: Countries/Zone(s) identified" (p.97), 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[156].

The commodity price for the G-PRO profile is the January 2020 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.

[156] (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 2020 rates for each band of natural gas consumption.

Table 70: Energy tax and ODE 2020 rates in the Netherlands

Band	Consumption	Energy Tax (EUR/m³)	ODE (EUR/m³)
A	Consumption up to 170.000 m3	0,33307	0,0775
B	Consumption between 170.000- 1.000.000 m³	0,06444	0,0214
C	Consumption between 1.000.000- 10.000.000 m³	0,02348	0,0212
D	Consumption above 10.000.000 m³	0,01261	0,0212

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 this is not the case in all the other countries 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[157] 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).

[157] (OFGEM, 2015)

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

Natural gas supplier	Market shares[158]	Normalised market shares
British Gas	28,00%	73,70%
E.ON	10,00%	26,30%

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[159]. The normalised market share of British Gas set out above is the result of the following calculation 28%/(28%+10%)=73,70%. E.ON thus have 26,30% normalised market shares. For G-RES the products of the market incumbent thus have a weight of (100%-19,40%)*73,70%/2 = 29,70%. The cheapest product of the 2nd largest energy supplier is (100%-19,40%)*26,30%=21,20%.

Table 72: Weight for each product in the United Kingdom

Product	Weight G-RES
Standard product of the market incumbent	29,70%
Cheapest product on the market	19,40%
Cheapest product of the market incumbent	29,70%
Cheapest product of the second largest player	21,20%

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	95,05	754,79
	Gulf Home Renewable 12 February 21 v2	66,88	539,17
	British Gas - HomeEnergy Fix February 2021	93,80	792,47
	E.ON - Energy Plan	99,80	792,47

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 2020 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:

158 (OFGEM, 2020)

159 (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[160].

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:

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

Profile	Bands	Threshold (kWh)	Average load factor
G-RES	1	1 – 73.200	34,3%
G-PRO	2	293.001 – 732.000	36,4%

[160] We have used the weighted averages published in the Gas Transmission Transportation Charges of the NGG valid as from the 1st of April 2019, (Nationalgrid, 2019).

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

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

Where,

$$SOQ = annual\ consumption/(365\ days * Load\ Factor)$$ [161]

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 1,6% of the total natural gas invoice.[162]
2. **Climate Change Levy** (CCL) is payable for small professional consumers of natural gas with a standard rate of 3,39 GBP/MWh (3,99 EUR/MWH[163]).[164]

Component 4 – VAT

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

[161] For example, consumer G-RES's SOQ is :(23.260 /(365*34,3%)) = 186
[162] (OFGEM, 2020)
[163] We use the following exchange rate : 1,176 GBP/EUR (see General assumptions, p.22)
[164] (GOV.UK, 2020)

5. Large industrials consumers

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

5. Large industrials 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 industrials as of January 2020. 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 2020, 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 2019
CAL Y_{-2}	Average two years ahead forward price in 2018
CAL Y_{-3}	Average three years ahead forward price in 2017
Qi_{-1}	Average quarter ahead forward price in the fourth quarter of 2019
Mi_{-1}	Average month ahead forward price in December 2019

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 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);[165]
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 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.107) 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.

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

Adoption of new tariffs by regional regulators	Transmission
VREG	1 April 2020[166]
BRUGEL	1 January 2020
CWaPE	1 March 2020

This study analyses the tariffs in January 2020. Therefore, transmission tariffs for Wallonia and Flanders are taken at their 2019 level as they remain valid, respectively, until the end of February 2020 and end of March 2020.

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

[166] Exceptionally, the new transmission tariffs for 2020 are adopted in April 2020 whereas they usually are in March.

In Wallonia only, the similar reasoning holds with regards to the Federal contribution (see "Belgium Component 3 – all other costs", p.149)

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	Metering costs	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[168] 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:

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

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

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[169]	
a. Financing for the connection of offshore wind turbine parks (0,1188 EUR/MWh); b. Financing of green federal certificates (federal)[170] (9,10141 EUR/MWh); c. Financing for strategic reserves (0 EUR/MWh);	All
Regional Public Service Obligations (Regional PSOs)	
Regional PSOs on distribution[171]	
a. A general tariff for regional PSOs (expressed in EUR/MWh)	E0 and E1
Taxes and levies on the federal level	
a. Federal contribution[172] (3,1428 EUR/MWh)[173]	All

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.

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

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

[171] 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).

[172] 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).

[173] Rate for Wallonia is of 3,3494 EUR/MWh as the 2019 federal contribution is considered up to end of February 2020.

Table 82: Regional other costs for industrial electricity consumers

Brussels	Flanders	Wallonia	Profiles
Regional Public Service Obligations (Regional PSOs)			
Regional PSOs on transmission			
a. Financing of regional energy policies[174] (expressed in EUR/month or EUR/kVA) (E0 to E2)	a. Financing of support measures for energy and cogeneration (expressed in EUR/MWh) (only E2)	a. Funding of support measures for renewable energy[175] (expressed in EUR/MWh) (only E2)	E0, E1 and E2
b. Levy compensating for the use of public highways[176] (expressed in EUR/MWh) (from E1)	b. Financing measures for the promotion of rational energy use (expressed in EUR/MWh) (only E2)	-	
Taxes and levies on the regional level			
Regional taxes and levies on distribution			
a. Charges on non-capitalised pensions (expressed in EUR/MWh)	a. Charges on non-capitalised pensions (expressed in EUR/MWh)	a. Levy for occupying road network (expressed in EUR/MWh)	E0 and E1
b. Levy for occupying road network (expressed in EUR/MWh)	b. Contribution for the energy fund[177](expressed in EUR/MWh)	b. Corporate income tax (expressed in EUR/MWh)	
c. Corporate income tax and other taxes (expressed in EUR/MWh)	c. Other local, provincial, regional and federal taxes, Charges, Surcharges, Fees and contributions (expressed in EUR/MWh)	c. Other local, provincial, regional and federal taxes, Charges, Surcharges, Fees and contributions (expressed in EUR/MWh)	
Regional taxes and levies on transmission			
-	a. Levy for the taxes pylons and trenches in Flanders (expressed in EUR/MWh)	a. Connection fee (expressed in EUR/MWh)	All
-	-	b. Levy for the use of the public domain (expressed in EUR/MWh) (E0 and E1)	

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 2020 from 1st of January 2019 until 31st of December 2019, 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.

[174] (Sibelga, 2020)

[175] 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.

[176] (Sibelga, 2020)

[177] (Vlaamse Overheid, sd)

Table 83: Certificate schemes in each Belgian region

Region		
	Average price of certificate schemes	
Flanders (GC)	92,92 EUR/GC	
Wallonia (GC)	66,40 EUR/GC	
Brussels (GC)	93,20 EUR/GC	
Flanders (CHPC)	25,20 EUR/CHPC	
	Certificate schemes	
Brussels	Green certificates	The quota increases every year. As opposed to Flanders and Wallonia, no reduction applies for large industrial consumers in Brussels.
Flanders	Green certificates	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.[178] Discounts for all industrial actors[179] have to be taken into account. In 2018, the following two caps were introduced: i. The amount due for the costs related to the financing of renewable energy 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 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;
	Combined heat/power certificates	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] There are also progressive reductions (up to 45%) that have to be applied to all industrial consumers[181].
Wallonia	Green certificates	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 E1.

Germany

Component 1 – the commodity price

In Germany, commodity prices describe the cost of electricity used by industrial consumers in January 2020, 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.

[178] Art. 7.1.10 § 2 Energiedecreet

[179] 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 as can be seen in section 0 Presentation of figures (Electricity) Profile E0 (Electricity).

[180] Art. 7.1.11 § 2 Energiedecreet

[181] (Elia, 2018)

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 2020, ratios used in the formula were determined as being the average coefficients over three years (2016 to 2018).

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

Where:

	Explanation
CAL Y_{-1}	Average year ahead forward price in 2019
CAL Y_{-2}	Average two year ahead forward price in 2018
CAL Y_{-3}	Average three year ahead forward price in 2017
Qi_{-1}	Average quarter ahead forward price in the fourth quarter of 2019
Mi_{-1}	Average month ahead forward price in December 2019

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 E1 E2	DSO
Un = 110 kV	High voltage	E2 E3	DSO
220 kV < Un ≤ 350 kV	Extra-High voltage	E3 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[182], a weighted average of two DSOs (one rural and one urban) per zone is presented.

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.

[182] (European Commission, 2010)

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)[183] get a reduction of max. 90%. Moreover, users who exceed 7.000 consumption hours[184] 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:

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.

[183] (Bundesamt für Justiz, 2020)

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

Table 87: KWKG-Umlage tax in Germany

Category	Consumer group	Rates
Category A	All other consumers	**2,26EUR/MWh**
Category B	If consumption > 1 GWh / year and electricity cost is: • For an extensive list of industrial sectors (annexe 3 of EEAG)[185]: >17% of gross value added [186]	**0,34 EUR/MWh** (85% reduction) but capped[187] 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	**0,34 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)[188]: between 14 and 17% of gross value added (avg. last three years)	**0,45 EUR/MWh** (80% 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
		0,45 EUR/MWh (80% reduction) but capped[190] 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.157) 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 under 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:

[185] (European Commission, 2014-2020)

[186] 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)

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

[188] (European Commission, 2014-2020).

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

[190] 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	**3,58 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	**4,16 EUR/MWh**
Category B	If consumption > 1 GWh / year and electricity cost is: • For an extensive list of industrial sectors (annexe 3 of EEAG)[191]: >17% of gross value added [192]	**0,624 EUR/MWh** (85% reduction) but capped[193] **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	**0,624 EUR/MWh** (85% reduction) but capped[194] **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)[195]: between 14 and 17% of gross value added (avg. last three years)	**0,832 EUR/MWh** (80% reduction) but capped[196] at 0,5% of gross value added (average last three years) for all consumers with electricity cost > 20% of gross value added
		0,832 EUR/MWh (80% reduction) but capped[197] at 4,0% of gross value added (average last three years) for all consumers with electricity cost < 20% of gross value added

A **bottom rate of 0,30 EUR/MWh** exists that can benefit some consumers of the EEG (see further with EEG-Umlage, p.157) for the Offshore-Netzumlage (Offshore Network Levy).

[191] (European Commission, 2014-2020).

[192] 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)

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

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

[195] (European Commission, 2014-2020).

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

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

Regarding our under 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[198] 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	**67,56 EUR/MWh**
Category B	If consumption > 1 GWh / year and electricity cost is: • For an extensive list of industrial sectors (annexe 3 of EEAG)[199]: >17% of gross value added [200]	**10,13 EUR/MWh** (85% reduction) but capped[201] 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	**10,13 EUR/MWh** (85% reduction) but capped[202] 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)[203]: between 14 and 17% of gross value added (avg. last three years)	**13,51EUR/MWh** (80% reduction) but capped[204] at 0,5% of gross value added (average previous three years) for all consumers with electricity cost >20% of gross value added
		13,51EUR/MWh (80% reduction) but capped[205] at 4,0% of gross value added (average last three years) for all consumers with electricity cost

For both categories B and C, there is a 1 EUR/MWh rate that applies to the industrials 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

[198] 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).
[199] (European Commission, 2014-2020).
[200] 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).
[201] However, these caps are only applicable if the consumer is part of an energy efficiency system improvement program.
[202] However, these caps are only applicable if the consumer is part of an energy efficiency system improvement program.
[203] (European Commission, 2014-2020).
[204] However, these caps are only applicable if the consumer is part of an energy efficiency system improvement program.
[205] However, these caps are only applicable if the consumer is part of an energy efficiency system improvement program.

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 67.56 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[206].

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, 2020). 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[207]. In 2019, 5488, companies benefit from a reduction through this system[208].

   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 industrials users is 1,10 EUR/MWh[209]. 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[210]), 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

[206] (Bundesamtes für Wirtschaft und Ausfuhrko-trolle, 2017); (BDEW, 2018)
[207] (Bundesamt für Justiz, 2019)
[208] Bericht der Bundesregierung über die Entwicklung der Finanzhilfen des Bundes und der Steuervergünstigungen für die Jahre 2015 bis 2018, pg. 98
[209] (Acteno, 2019)
[210] (RGC Manager, 2019)

security.[211] The 2020-rate amounts to 0,07 EUR/MWh with a significant increase compared to the 2019-rate, which amounted to 0,05 EUR/MWh.

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[212]. The access to this regulated rate "ARENH" ("Accès Régulé à l'Electricité Nucléaire Historique")[213] 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[214])
- The distribution of the ARENH among suppliers must be made according to their customers' consumption during the hours of low national consumption.

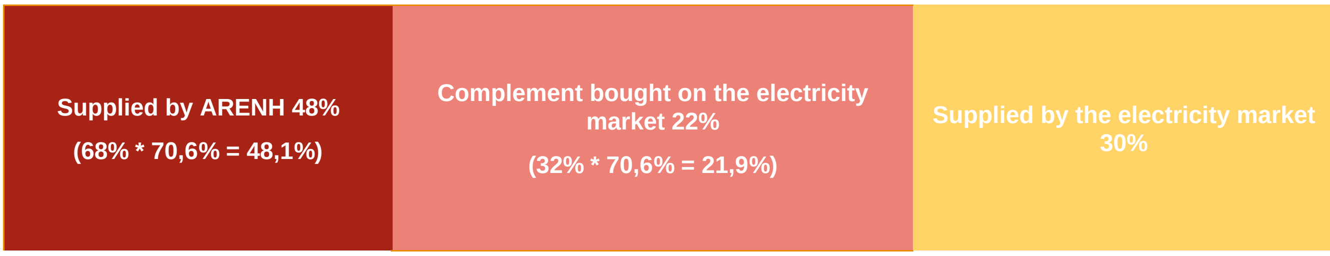
In other words, for each supplier, the amount of electricity supplied by ARENH represents 70%, and the rest is bought in the electricity market (30%).

In 2020, as in 2019, the commodity price is thus a combination of the market price (including capacity certificates) and the regulated price. For the year 2020, the demand amounted to 147 TWh, a higher level than EDF provides

[211] (Netztransparenz.de, 2020)
[212] The price has not changed since 2012 (Selectra, n.d.)
[213] ARENH started in 2011, its termination process will start in 2021 to be definitely stopped in 2025. (CRE, 2019)
[214] (Connaissance des Energies, 2020)

(100 TWh). To reach the capped level, only 68% of the demand for each supplier is fulfilled ('écrêtement' or capping).

Figure 26: Capping in 2020 for the ARENH



Under the ARENH conditions, defined in the French law[215], 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 11,1% of the consumption of profile E-BSME, 27,80% of the consumption of profile E0, 34,80% of the consumption of profiles E1 and E2 is taken into account to allocate nuclear power at regulated prices to its supplier, 59,70% for E3 and 62,10% 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	✓	✗	16,40%	11,10%
Profile E0	✓	✗	40,90%	27,80%
Profile E1	✓	✗	51,20%	34,80%
Profile E2	✓	✗	51,20%	34,80%
Profile E3	✓	✓	87,80%	59,70%
Profile E4	✓	✓	91,30%	62,10%

For 2020, 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:

Commodity price E-BSME

$$= 11{,}1\%\ ARENH + 88{,}9\%\ (36.5\%\ CAL\ Y_{-1} + 27.4\%\ CAL\ Y_{-2} + 21.4\%\ CAL\ Y_{-3} + 8.2\%\ Qi_{-1} + 4.2\%\ Mi_{-1} + 2.3\%\ EPEX\ Spot\ FR)$$

Commodity price E0

$$= 27{,}8\%\ ARENH + 72{,}2\%\ (36.5\%\ CAL\ Y_{-1} + 27.4\%\ CAL\ Y_{-2} + 21.4\%\ CAL\ Y_{-3} + 8.2\%\ Qi_{-1} + 4.2\%\ Mi_{-1} + 2.3\%\ EPEX\ Spot\ FR)$$

Commodity price E1, E2

$$= 34{,}8\%\ ARENH + 65{,}2\%\ (36.5\%\ CAL\ Y_{-1} + 27.4\%\ CAL\ Y_{-2} + 21.4\%\ CAL\ Y_{-3} + 8.2\%\ Qi_{-1} + 4.2\%\ Mi_{-1} + 2.3\%\ EPEX\ Spot\ FR)$$

[215] (Legifrance, 2020)

Commodity price E3

$$= 59{,}7\%\ ARENH + 40{,}3\%\ (36.5\%\ CAL\ Y_{-1} + 27.4\%\ CAL\ Y_{-2} + 21.4\%\ CAL\ Y_{-3} + 8.2\%\ Qi_{-1} + 4.2\%\ Mi_{-1} + 2.3\%\ EPEX\ Spot\ FR)$$

Commodity price E4

$$= 62{,}1\%\ ARENH + 37{,}9\%\ (36.5\%\ CAL\ Y_{-1} + 27.4\%\ CAL\ Y_{-2} + 21.4\%\ CAL\ Y_{-3} + 8.2\%\ Qi_{-1} + 4.2\%\ Mi_{-1} + 2.3\%\ EPEX\ Spot\ FR)$$

Where:

	Explanation
ARENH	Nuclear power at the regulated price of 42 EUR/MWh (since 2012)
CAL Y_{-1}	Average year ahead forward price in 2019
CAL Y_{-2}	Average two year ahead forward price in 2018
CAL Y_{-3}	Average three year ahead forward price in 2017
Qi_{-1}	Average quarter ahead forward price in the fourth quarter of 2019
Mi_{-1}	Average month ahead forward price in December 2019

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.

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[216]</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 withdrawal 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 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.

[216] 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.

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 are detailed as follows:

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 or who are connected to the distribution grid on or above 50 kV (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 part 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 19.458 EUR/MW in 2019. 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 industrials 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 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.

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

Where:

	Explanation
CAL Y_{-1}	Average year ahead forward price in 2019
CAL Y_{-2}	Average two year ahead forward price in 2018
CAL Y_{-3}	Average three year ahead forward price in 2017
Qi_{-1}	Average quarter ahead forward price in the fourth quarter of 2019
Mi_{-1}	Average month ahead forward price in December 2019

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[217].

For all profiles above-mentioned, they involve the same four main components[218]:

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[219]:

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[220].

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

$$Company\ operating\ time\ (in\ \%) = \frac{(Total\ offtake\ during\ offpeak\ hours\ /\ maximum\ capacity)}{(hours\ per\ annum)} * 100$$

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 2020 are as follows:

[217] 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)

[218] (TenneT, 2020)

[219] (Overheid, 2014)

[220] In the Netherlands, offpeak hours are between 11pm-7am in addition to weekends and bank holidays.

Table 99: Energy tax and ODE levy according to the consumption level for electricity (industrials)

Band	Consumption level	Energy Tax (EUR/MWh)	ODE (EUR/MWh)
Band A	0 – 10 MWh	97,70	27,20
Band B	10 – 50 MWh	50,83	37,50
Band C	50- 10.000 MWh	13,53	20,50
Band D	> 10.000 MWh (professional)	0,55	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[221]:
    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[222].

2. Industrials 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).

The United Kingdom

Component 1 – the commodity price

Commodity prices computation rests on market prices and describes the cost of electricity for industrials as of January 2020. 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[223] 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

[221] (Belastingdienst, 2019)

[222] At 2020 level, for profile E2 (consumption of 25 GWh), the tax normally due for both the Energy tax and the ODE amounts to 357.630,7 EUR whereas the tax due on the first 10 GWh equals 343.380,7 EUR and the total consumption taxed at European minimum level reaches 12.500 EUR. Therefore, this profile is paid back 14.250 EUR (= 357.630 - 343.380,7).

[223] 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)

year ahead) to replace CAL Y_{-1}[224], 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 2019
CAL Y_{-2}	Average two year ahead forward price in 2018
CAL Y_{-3}	Average three year ahead forward price in 2017
Qi_{-1}	Average quarter ahead forward price in the fourth quarter of 2019
Mi_{-1}	Average month ahead forward price in December 2019

We computed the commodity price based on the formula mentioned above, entirely in Pound Sterling which has been converted to Euro at the January 2020 rate[225] (also see section "General assumptions", p.66)

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:

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:

[224] 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.

[225] Conversion factor of 1,176 EUR/GBP.

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[226]/day
Metering costs[227]	Cost for use and management of your energy meter in p/day or GBP/year

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:

[226] Meter Point Administration Number

[227] 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.

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[228]	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[229] (CCL) is applicable to electricity. The standard rate for electricity offtake is 0,00847 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[230] for about 7.700 large businesses (>250 employees)[231], we consider that all industrial profiles from this study are part of a sectoral agreement. Besides, a large spectrum of industrial processes[232] 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[233]:

   - 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.

2. The Assistance for Areas with High electricity distribution Costs[234] (AAHEDC) the levy compensates for high distribution costs in the zone of Northern Scotland (1 of the 14 zones) corresponding to 0,02627 p/kWh.

3. The Renewables Obligation (RO) is the cost taken into account for the large-scale renewable subsidy scheme. The renewable quota has augmented to 0,484 Renewable Obligation Certificates (ROC's) per MWh for the period between 1st of April 2019 and 31st March of 2020. To encourage companies to meet the renewables obligation, a fee per missing ROC of 48,78 GBP/ROC. Since the renewable quota is 0,484 ROC/MWh, this ends up in a potential fee of 23,61 GBP/MWh. The obligation period lasts from the

[228] 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.

[229] (GOV.UK, 2020)

[230] (Ecofys and adelphi, 2018)

[231] (Department for Business, Energy & Industrial Strategy, 2020)

[232] Defined in the Appendix A of the Climate Change Agreements Operations Manual.

[233] (GOV.UK, 2020)

[234] (National Grid ESO, 2019)

1st of April until the 31st of March, and we thus take the ROC buy-out price and quota from the year 2019.[235]

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.

[235] (OFGEM, 2020)

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

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 2020 at the Zeebrugge Trading Point (ZTP). However, it is known that the majority of Belgian industrial consumers' contracts are indexed on TTF[236], which represents their largest component of natural gas bills.

The CREG provided all commodity data.

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:[237]

1. Entry capacity fee (border point entry fee);
2. Exit capacity fee (HP-service fee or RPS[238])[239]
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.

---

236 https://www.creg.be/fr/publications/etude-f1927, (CREG, 2019).

237 Since 2020, the "fix/flex" tariff option does no longer exist and therefore cannot be chosen by directly connected consumers (CREG, 2020).

238 RPS stands for Reduced Pressure Service which, since 2020, encompasses both former Medium Pressure (MP) and Pressure-reducing stations (DPRS) services.

239 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 104: 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	0%	-	50%	90%	90%	97,5%
L-gas	100%	-	50%	10%	10%	2,5%

Source: CREG

The transport tariffs for natural gas in Belgium are largely capacity-based and expressed in EUR/kWh/h/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[240], 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 E1 profile.[241] 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 and Flanders also include a tariff for the measuring activities 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

[240] For more information on the Gas Price Reference, please see (Fluxys, 2020)

[241] T5 (and not T6) is the highest category for Sibelga network active in Brussels which we use in the scope of this study.

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 105: 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[242] (0,7423 EUR/MWh)[243]; b. Energy contribution[244] (0,9978 EUR/MWh).	All

Table 106: Other regional costs for industrial natural gas consumers

Brussels	Flanders	Wallonia	Profiles
Regional Public Service Obligations (Regional PSOs) on transport			
a. Brussels regional public service obligation[245] (expressed in EUR/MWh)	-	-	All
Taxes and levies on the regional level			
Regional taxes and levies on distribution			
a. Charges on non-capitalised pensions (expressed in EUR/MWh)	a. Charges on non-capitalised pensions (expressed in EUR/MWh)	a. Levy for occupying road network (expressed in EUR/MWh)	G0 and G1
b. Levy for occupying road network (expressed in EUR/MWh)	b. Other local, provincial, regional and federal taxes, Charges, Surcharges, Fees and contributions (expressed in EUR/MWh)	b. Corporate income tax (expressed in EUR/MWh)	
c. Corporate income tax and other taxes (expressed in EUR/MWh)	-	c. Other local, provincial, regional and federal taxes, Charges, Surcharges, Fees and contributions (expressed in EUR/MWh)	
Regional taxes and levies on transport			
-	-	a. Connection fee[246] (expressed in EUR/MWh)	All

[242] 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).

[243] 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.

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

[245] Depends on the calibre of the meter being installed. For our residential and small professional consumer, we have assumed the meters process between 6 and 10 m³, for which the annual surcharge amounts to 9,12 EUR/year, on which VAT is due

[246] For the first 100 kWh consumed a fixed amount of 0,075 EUR is charged.

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 2020. 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 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 107: 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 108: 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 depends 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 109: 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 0,635 EUR/kWh/h/year in 2020.	All
Market Area Conversion Levy	Marktraumums tellungs-umlage	A burden to balance the conversion costs from L-gas to H-gas, implemented in January 2015. The 2020 levy amounts to 0,5790 EUR/kWh/h/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 industrials, **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) 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)[247][248]. 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[249]. 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.	G-PRO and G0

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

[247] Energiesteuergesetz § 54, Energiesteuergesetz § 55

[248] In very specific cases, further reductions are possible. We have not included these in our report.

[249] Energiesteuergesetz § 27

zone[250]. The commodity price exhibited in this document is the prices collected in January 2020 prices for PEG. The CREG provided all commodity data.

Unlike electricity supply for industrials with a yearly consumption higher than 300 MWh (ARENH), France does not provide a regulated tariff for natural gas supply[251].

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 Terége. Transport costs are computed based on a weighted average of TSOs' annual natural gas offtakes, as set out below:

Table 110: 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 111: 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)

[250] 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).

[251] 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 112: 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 113: Surcharges on natural gas in France

Surcharges	Definition	Amount in 2020	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 2020 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 114: 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/h/year).
Exit capacity fee	Fee depending on the exit point and function of the contracted capacity (expressed in EUR/kWh/h/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/h/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 2020 are as follows:

Table 115: Energy tax and ODE 2020 rates in the Netherlands

Band	Consumption level	Energy Tax (EUR/m³)	ODE (EUR/m³)
Band A	0 – 5.000 m^3	0,33307	0,0775
Band B	5.000 – 170.000 m^3	0,06444	0,0214
Band C	170.000 – 1.000.000 m^3	0,02348	0,0212
Band D	1.000.000 – 10.000.000 m^3	0,01261	0,0212

A lowered tariff also exists for both surcharges, but only for agricultural heating installations.[252] 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+)[253] :

Table 116: 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.

[252] (Belastingsdienst Nederland, 2020)

[253] 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 2020 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 117: 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.[254]

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 118: 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.	
Metering charges	A cost for use and management of your energy meter, which is expressed in GBP/year.	

[254] We have used the weighted averages published in the Gas Transmission Transportation Charges of the NGG valid as from the 1st of April 2019, (Nationalgrid, 2019).

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[255]. 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 119: 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:

$$\text{Annual charge} = (SOQ * 365\ days) * unit\ rate$$

Where,

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

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[256], 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).

[255] 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).

[256] See explanation in section 0 The United Kingdom Component 3 – all other costs (p.124).

6. Presentation and interpretation of results

6. Presentation of results

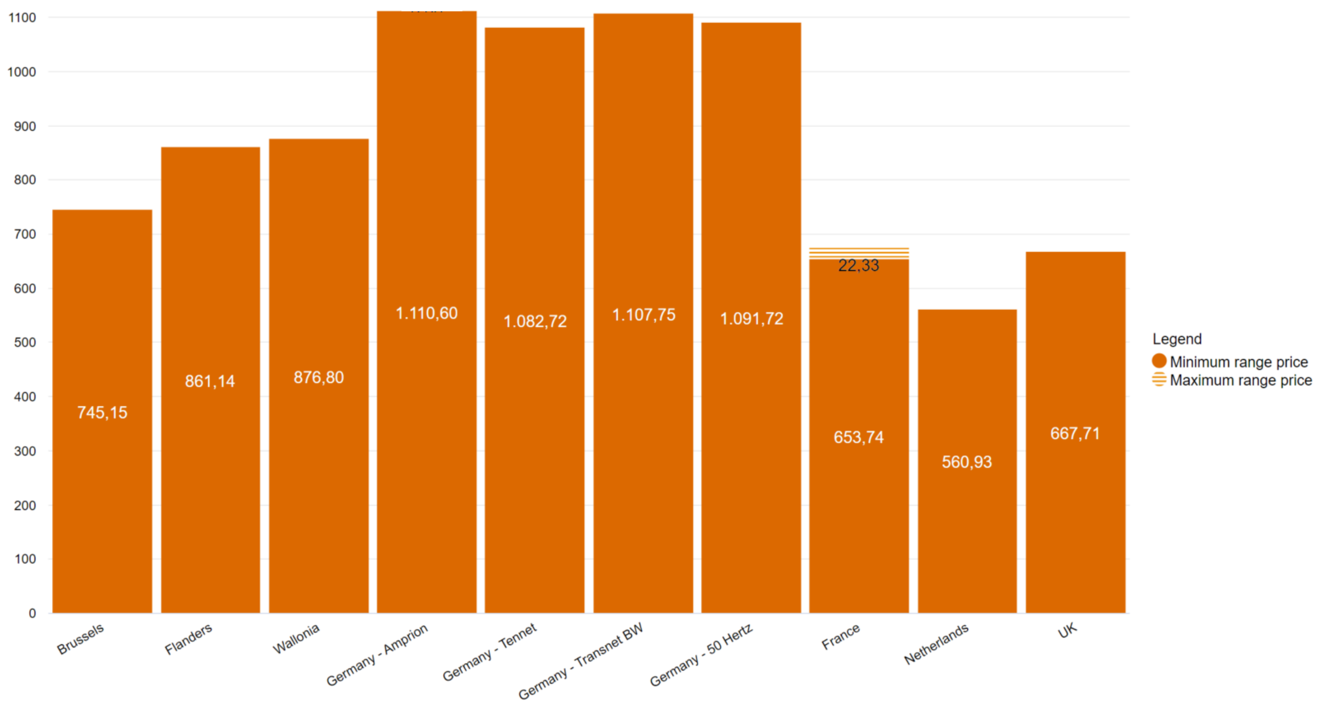
Presentation of figures (Electricity)

Profile E-RES (Electricity)

Total invoice analysis

The below figure 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)



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.

As demonstrated in the figure, Germany represents the highest yearly invoice for residential electricity consumers regardless of the TSO. Following Germany, Wallonia and Flanders display average values for the total yearly invoice. The three Belgian regions show significant variations as for the total invoice amount – about 18% variation between Brussels' and Wallonia's fares for instance – with Brussels being the cheapest. At this profile level, France is the unique country to have a price range, with a minimum of 654 EUR to a maximum of 676 EUR/year. This comes as a consequence of the possibility to opt for either the *CU4* or *MU4* network price option, which also impacts the *CTA* price[257].

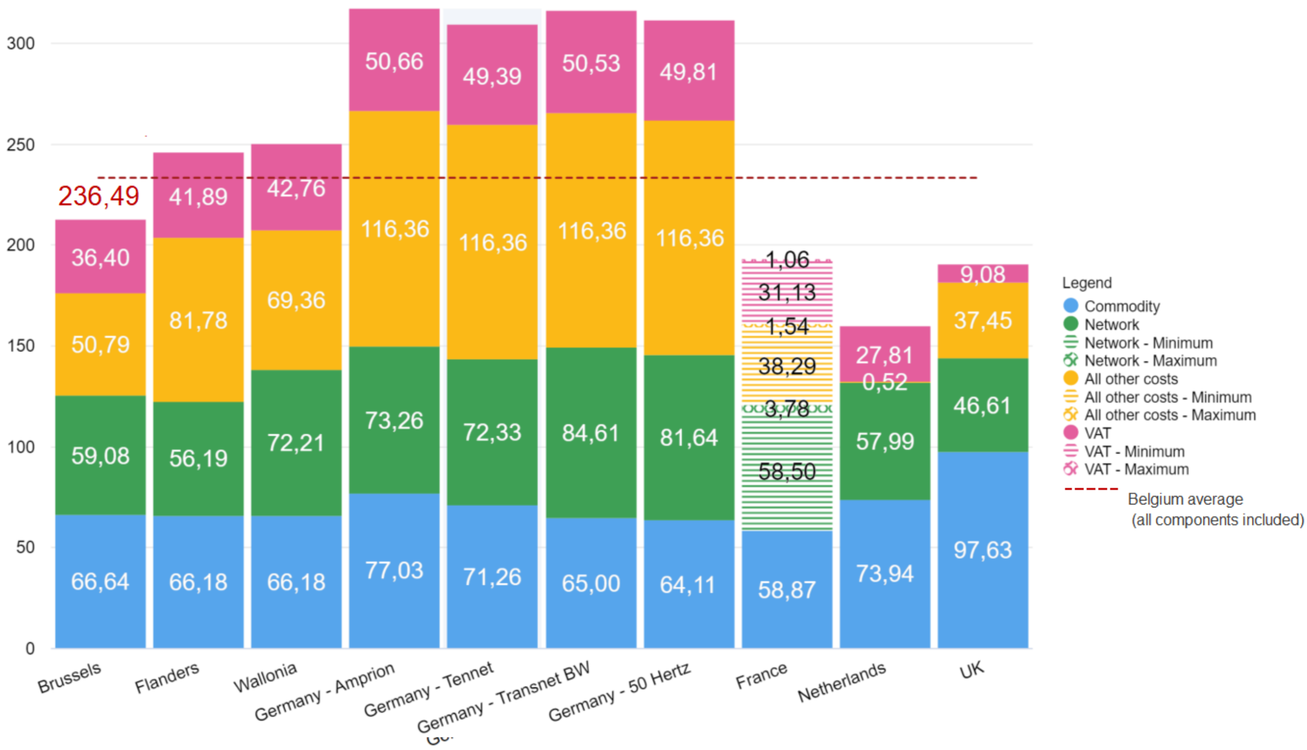
[257] More information on France price options can be found in French residential and small professional consumers' section (p.73).

France and the UK all present close results when it comes to the total annual electricity bill for residential consumers. The Netherlands displays an impressively low total invoice (561 EUR/year) compared to the German invoice (1.111 EUR/year) being nearly twice as high as the Dutch invoice.

Breakdown per component

The previous results are further detailed for profile E-RES by the underneath figure, 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)



The ***commodity component***[258] is the lowest in France (58,87 EUR/MWh). Generally, commodity prices in Belgium account for the lowest (66,18 to 66,64 EUR/MWh) behind France and Germany (50 Hertz and Transnet BW zones). The Netherlands and the remaining two German zones (Amprion and Tennet) follow both countries with an average price. In contrast, the United Kingdom displays a relatively high commodity price (97,63 EUR/MWh). Within Belgium, slightly higher prices are encountered in Brussels as a result of Engie's predominant market shares in the region, driving up prices with more expensive products.

Network costs are relatively similar when comparing the countries even though Germany seems to exhibit higher network costs (from 72,33 EUR/MWh to 84,61 EUR/MWh) in general for residential electricity consumers. Besides, the range of prices in Germany illustrates the significant discrepancies across the country's zones. Conversely, the UK has the lowest prices across studied countries and is well below (about 10 EUR/MWh) the second cheapest, Flanders. While France has a price range depending on the chosen price option, it can be seen that this impact is marginal for E-RES. As for Belgium, Flanders displays the lowest fares even if the difference is relatively small with Brussels. However, Wallonia charges much higher rates (+16 EUR/MWh compared to Flanders).

[258] 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.

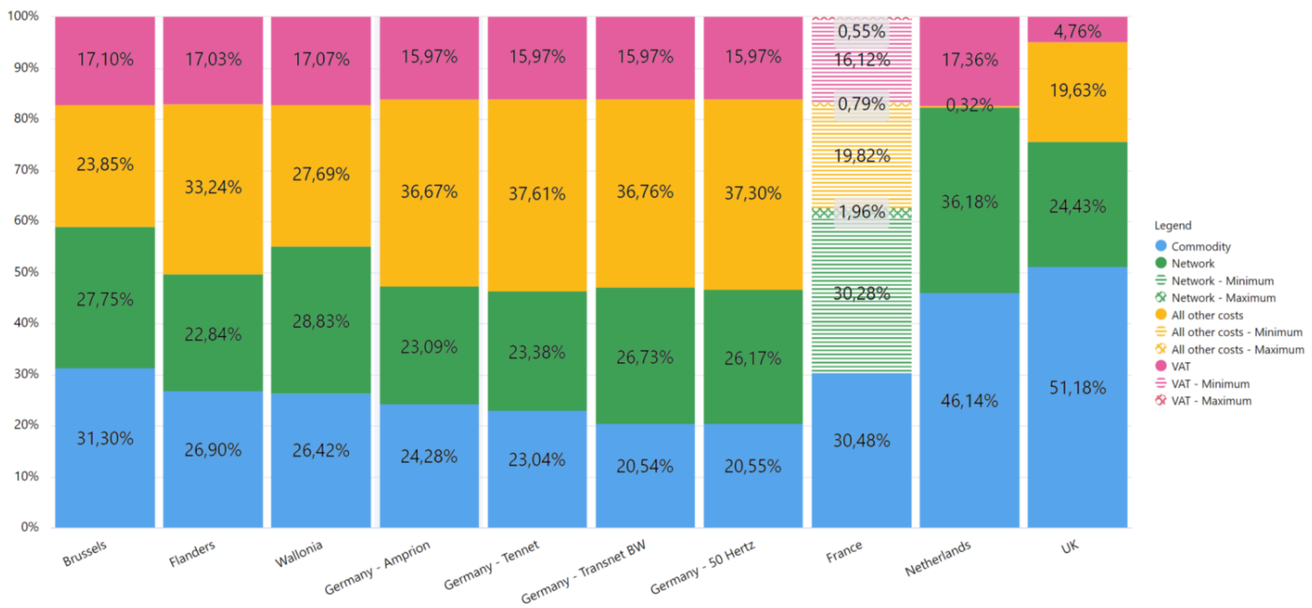
With seven different taxes, Germany is the country with the most important ***all other costs*** component[259] (116,36 EUR/MWh). On the other side, the Netherlands is the country that barely displays taxes given the fact that residential consumers can be refunded (*Belastingvermindering*) of a fixed amount of 435,68 EUR/year. The gap between the two countries makes an important impact on residential consumers, as illustrated in Figure 28. As for the Belgian regions, Brussels charges much less residential consumers compared to the other two regions through lower rates: distribution public service obligations and regional costs of green certificates are significantly higher in Flanders and Wallonia.

When it comes to ***VAT***, the United Kingdom and the Netherlands stand out with smaller VAT amounts. This can be explained as the UK has the lowest VAT rate (5%) while the Netherlands faces a lower global bill. Given the network price options in France, the resulting VAT differs depending on the selected option.

Proportional component analysis

The percentages of the costs for each component can be found in the underneath figure.

Figure 29: Proportional component analysis for electricity (profile E-RES)



When comparing the studied countries, significant differences are revealed: commodity price ranges from 20,54% in Germany (Transnet BW zone) up to 51,18% in the UK. In the Netherlands, it amounts to 46,14%, but this impressive proportion of the commodity price can be easily explained by the quasi-absence of "all other costs" and the low total price leading to a higher proportion in this case.

After a deeper view on the graph, all the different categories show large ranges, whether it is the commodity, the network cost, the taxes and levies or the VAT components. As said before, the Netherlands stands out due to the quasi-absence of other costs. Similarly, the United Kingdom stands out with a minor VAT part representing 4,76% of the total bill.

As for Belgium, Flanders and Wallonia's heaviest component is "all other costs" whereas in Brussels the commodity cost weighs the most.

[259] Taxes, levies and certificates

KEY FINDINGS

The profile of residential consumers (E-RES) suggests the following findings:

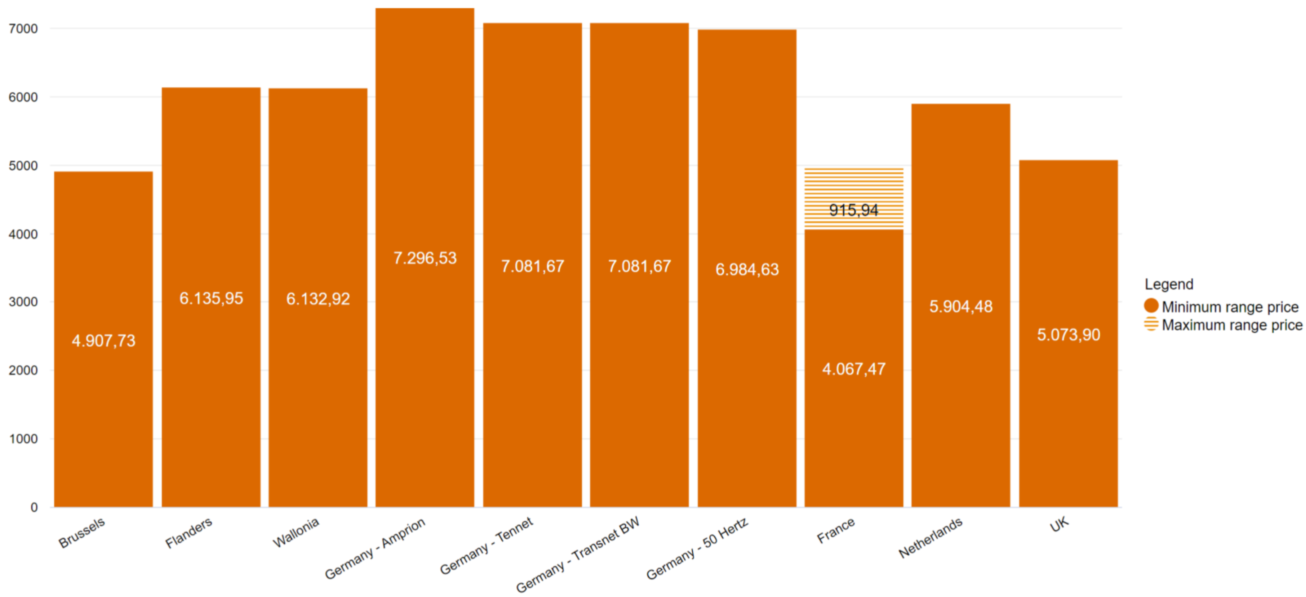
- We observe significant differences between countries that are considered in this study: the total yearly invoice for electricity as a residential consumer ranges from 1.111 (Germany) to 561 EUR/year (the Netherlands), resulting in a 98% difference. The low total invoice in the Netherlands appears to be due to the quasi-absence of other costs (e.g. taxes or levies) since a significant refund (*Belastingvermindering)* can be granted.
- As a whole, Belgium displays relatively average prices while, at the regional level, Brussels offers the lowest yearly bill. This mostly comes as a result of a lower "all other costs" component compared to Flanders and Wallonia.
- ***Commodity costs*** are not the major element of the yearly bill, apart from the UK. The prices are the lowest in France closely followed by Germany (Transnet BW and 50 Hertz regions). While potentially ranging from 21% to 51% in the proportion of the total bill for all countries and regions, in relative terms, commodity weighs the least in Germany before Flanders and Wallonia.
- ***Network costs*** generally account for a noticeable component in the electricity pricing structure even though extensive variations can be observed cross-country. They are comprised of 46,61 EUR/MWh (the UK) to 84,61 EUR/MWh (Germany – Transnet BW). However, in relative terms, Flanders (22,84%) demonstrates particularly lower network costs than any other country or region.
- ***All other costs*** outline a broad price scope, being the topmost in Germany, ensuing Flanders. Comparatively, residential electricity consumers in the Netherlands have an insignificant tax burden compared to any other countries.

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 30: Total yearly invoice in EUR/year (profile E-SSME)



When observing the graph, Germany clearly stands out with the highest total annual invoices– especially Amprion zone with 7.297 EUR/year. However, Germany presents harmonious yearly bills with little variations among its areas – from 6.985 to 7.297 EUR/year. At the national level, Belgium displays relatively average prices compared to other studied countries given its position as the third most expensive country behind Germany and the Netherlands. While the United Kingdom demonstrate comparatively moderate annual bills, France comes as the cheapest country when considering the minimum price option – in the function of the chosen network price option and the resulting *CTA*[260].

Across its regions, Belgium shows disparate results with broad differences, especially between Brussels, on the one hand, and Flanders and Wallonia, on the other hand, with a maximum difference of 25%. Brussels shows the minimum annual account with 4.908 EUR/year. Oppositely, Flanders and Wallonia's total electricity bills are aligned to one another.

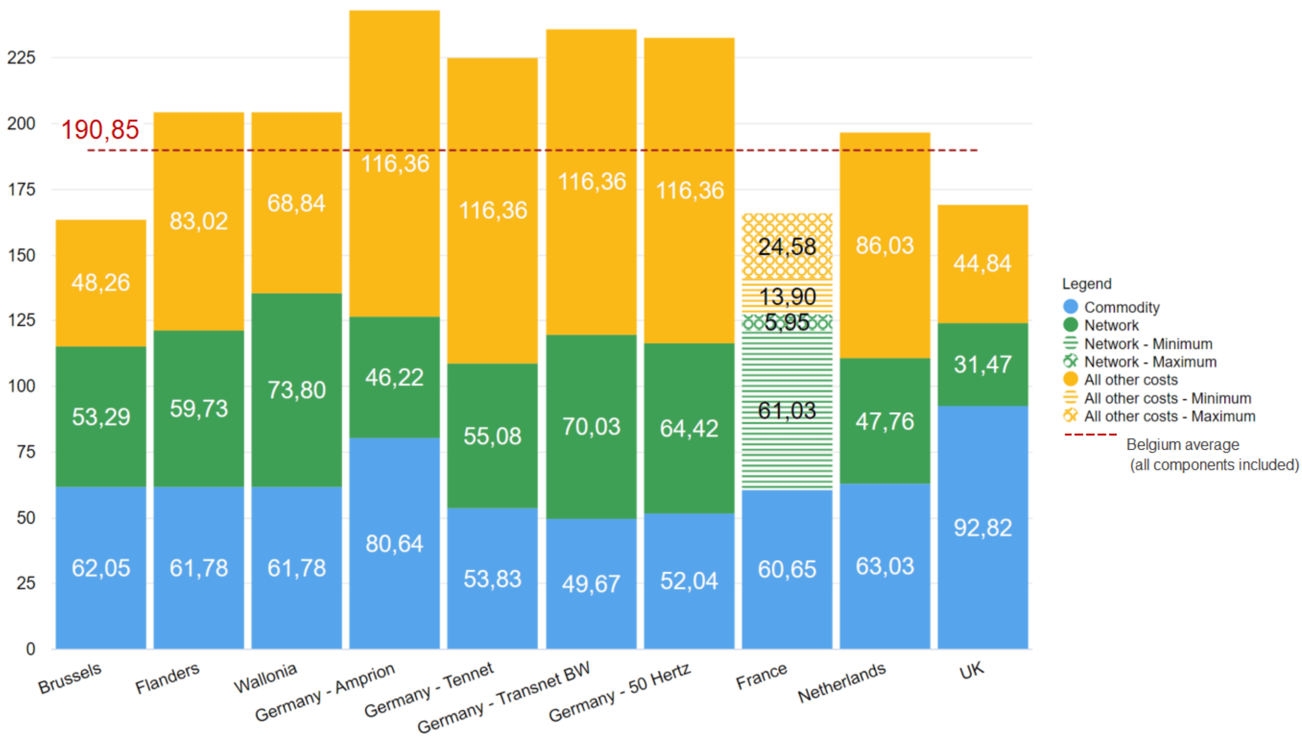
Breakdown per component

The previous results are further detailed for profile E-SSME in the underneath figure, which provides a closer look at the breakdown of the different price components.

[260] More information on France price options can be found in French residential and small professional consumers' section: 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.159).

Component 2 – network costs (p.74).

Figure 31: Electricity price by component in EUR/MWh (profile E-SSME)



In this case, we notice two categories for ***commodity*** prices[261]: on the one hand, similar fares accounting for Belgium, Germany (lowest commodity costs excluding the Amprion zone), the Netherlands and France and ranging from around 49,67 to 63,03 EUR/MWh; on the other hand, the United Kingdom and the German Amprion zone appear as outliers with higher fares than any other country with 80,64 to 92,82 EUR/MWh. Differences observed within Belgium are due to Engie's predominant position in Brussels, which eventually drive up prices with more expensive products.

Globally, there are noticeable variations regarding ***network costs***. While Wallonia and the German Transnet BW zone display the most important network costs (respectively 73,80 EUR/MWh and 70,02 EUR/MWh), Brussels, Flanders, France, Germany (except the Transnet BW zone) and the Netherlands form a group with intermediate network costs ranging from 47,76 EUR/MWh to 66,98 EUR/MWh (maximum French option). As for the UK, it has the lowest price, with 31,47 EUR/MWh. France is the sole country to observe network cost price options.

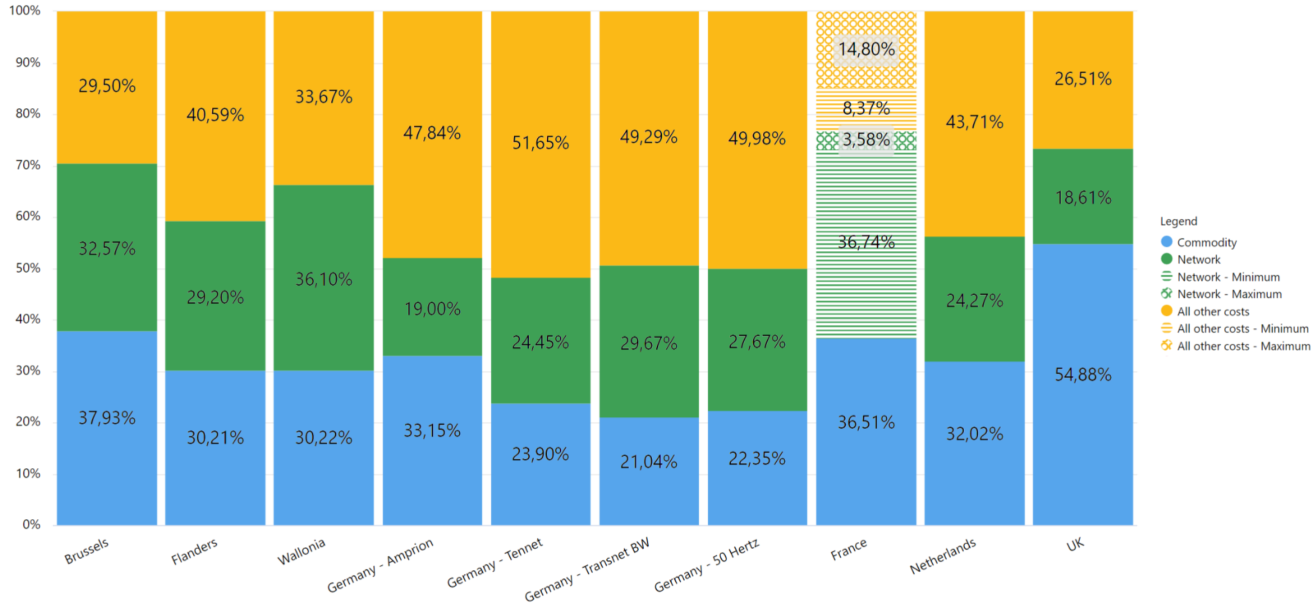
As for ***all other costs*** – being taxes, levies and certificates –, sweeping gaps can be observed among these areas. Germany appears to be the most taxing countries/regions regarding electricity for the profile E-SSME. Among the many taxes charged in Germany, the EEG-umlage stands out as the most expensive tax as it accounts for 87% of the total component. A second group regarding taxing amounts is composed of Flanders, the Netherlands and Wallonia ranging around 68,84 EUR/MWh to 86,03 EUR/MWh. Finally, the least taxing group of countries and regions is made of Brussels, France (maximum taxing option – the highest price for *CTA* and *CSPE*) and the United Kingdom ranging from 13,90 EUR/MWh (minimum French option) up to 48,26 EUR/MWh. If Brussels belongs to the least taxing group, it certainly results from lower tax rates in comparison to the other two Belgian regions: distribution public service obligations and regional costs of green certificates are significantly higher in Flanders and Wallonia.

[261] 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.

Proportional component analysis

The percentages of the costs for each component can be found in the underneath figure.

Figure 32: Proportional component analysis (profile E-SSME)



From Figure 32, it can be observed that ***commodity costs*** have the highest impact on the UK's total energy bill as it accounts for most than half of the bill. Conversely, German's electricity bills, which are aligned across zones except for Amprion, are the least impacted by this component. As for ***network costs***, even if variations are noticeable, their proportion among studied countries remains comparable. They represent the largest component for France being the highest with up to 40% whereas the UK's have the lowest proportion. Besides, ***all other costs*** (i.e. taxes, levies and certificate schemes) account for at least one-quarter of total invoice (excluding France's minimum option), regularly being a dominant feature. They weigh the most in Flanders, Germany, the Netherlands, whereas France shows the lowest tax proportion (maximum 23%).

KEY FINDINGS

The results reported above suggest the ensuing key findings regarding profile E-SSME:

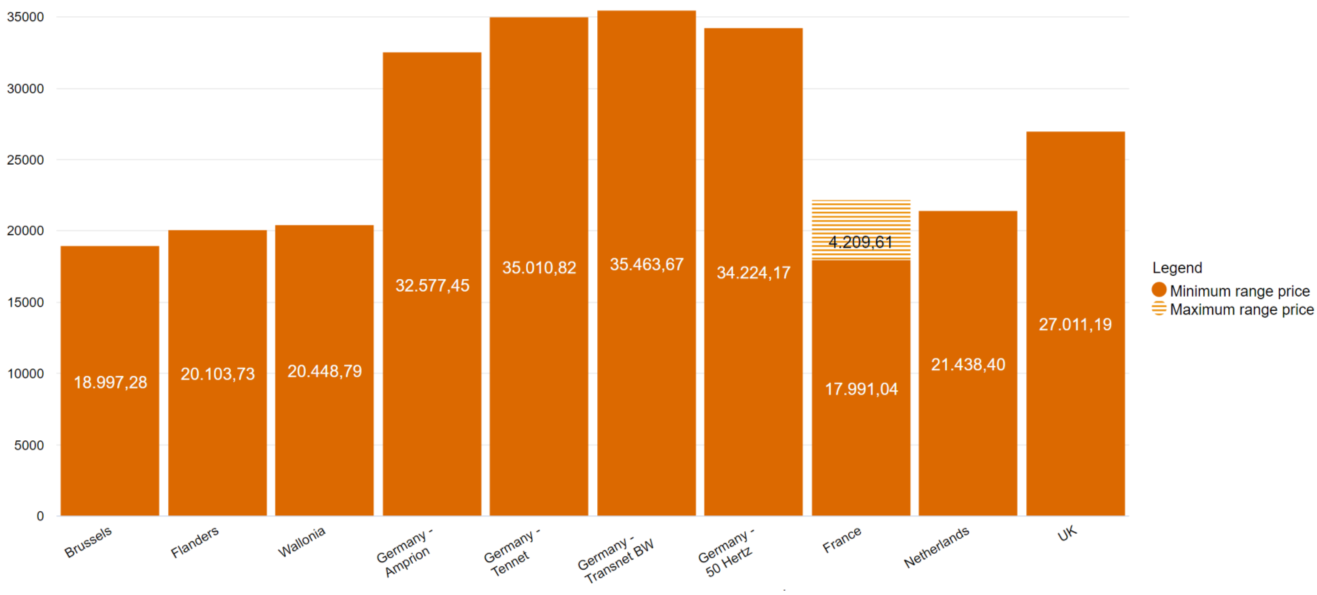
- We observe capital differences between countries that are considered in this study: the total yearly invoice for electricity as a residential consumer ranges from roughly 4.067 EUR/year (French minimum yearly bill) and 7.297 EUR/year (Germany – Amprion Zone). France's "all other costs" component constitutes the determining factor in its cheaper relative position.
- Brussels appears to be far cheaper from all the other countries and region regarding the total yearly electricity invoice for small professional consumers (E-SSME), right after France (when considering minimum option). Compared to Wallonia and Flanders, Brussels' yearly bill is inferior mostly because of lower taxes.
- ***Commodity costs*** are not the major element of the yearly bill – apart from the UK. The prices values are the lowest for Germany except for the Amprion zone even if proportionally it is overwhelmed by the "all other costs" component's weight. Conversely, the UK is the most expensive country when it comes to a commodity which is worth more than half the UK's bill.
- ***Network costs*** generally account for a significant item in the electricity pricing structure even though small variations can be observed cross-country. Yet, the difference between the most competitive country (the UK) and the least competitive region (Wallonia), is of more than a factor 2.
- ***All other costs*** outline a broad price scope as the most important price element in the cost structure, being the topmost in Flanders, Germany and the Netherlands. Comparatively, small professional electricity consumers in Brussels, France and in the UK have a lower tax burden than in other countries.

Profile E-BSME (Electricity)

Total invoice analysis

The below figure provides a comparison of the total yearly invoice paid by a small professional consumer (E-BSME) in the different studied countries and regions. The results are expressed in EUR/year.

Figure 33: Total yearly invoice in EUR/year (profile E-BSME)



Again, Germany is the most expensive country when it comes to small professionals (E-BSME) in terms of yearly electricity bill and is followed by the UK. Then, Brussels, Flanders, Wallonia and the Netherlands form a group of countries with average prices. Finally, France potentially displays the smallest total invoice, which mostly depends on France's tax level. Should French consumers pay the maximum price option, Brussels would be the cheapest region of all.

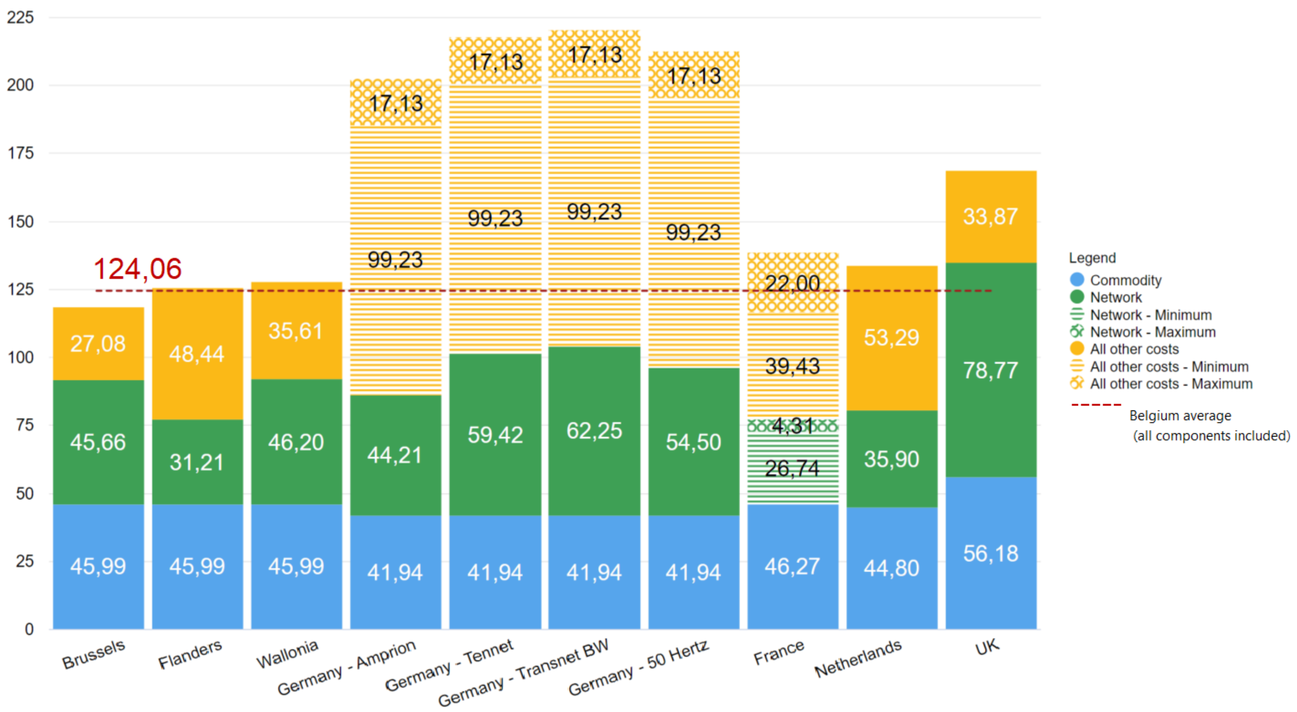
There is an extensive discrepancy among those fares: a 97% difference is flagged between France (minimum option) and Germany. This means that German consumers' invoice (35.464 EUR/year) is nearly twice as big as the French minimum invoice (17.991 EUR/year) regarding this small professional profile (E-BSME).

Between Belgian regions, Brussels is the least expensive region due to lower "all other costs" compared to Flanders and Wallonia, the latter displaying higher network costs as well.

Breakdown per component

The previous results are further detailed for profile E-BSME in the underneath figure, which provides a closer look at the breakdown of the different price components.

Figure 34: Electricity price by component in EUR/MWh (profile E-BSME)



Commodity prices are highly analogous, ranging from 41,94 EUR/MWh to 46,27 EUR/MWh. However, in this context, the United Kingdom's commodity price emerges with a 56,18 EUR/MWh amount, showing up to 34% difference with all the other countries. Lower differences between countries and regions are notably due to the identical formula employed from profile E-BSME to assess commodity prices as referred in the corresponding section (p.105), which also explains the exact same prices for regions within a country as the formula was applied at the national level.

Network costs are, in the case of E-BSME, showing variable results similar to the taxes and levies observations. France presents the lowest cost with up to 31,05 EUR/MWh, right before Flanders. Again, the impact of network price range option in France appears to be minimal, especially since it already constitutes the lowest cost. Lagging behind the other areas is the United Kingdom with respectively 78,77 EUR/MWh. Within Belgium, Flanders seems to offer much lower network costs and most specifically with regards to distribution costs compared to Brussels and Wallonia.

As shown in Figure 34 and similarly to what we observed for the residential and small professional (E-RES and E-SSME) consumers profile, Germany is the most taxing country among those we studied with regards to ***all other costs***. It represents most of the time twice the values demonstrated by other countries – even when considering the minimum tax prices option. The latter comes from the possibility for consumers to benefit from a reduction of the *Konzessionsabgabe* starting from a consumption level above 30 MWh. The most important gap is between Germany (116,36 EUR/MWh[262]) and Brussels (27,08 EUR/MWh), the latter being the minimum taxing region displayed. Besides Germany, France is the only country at this stage to have price ranges for this

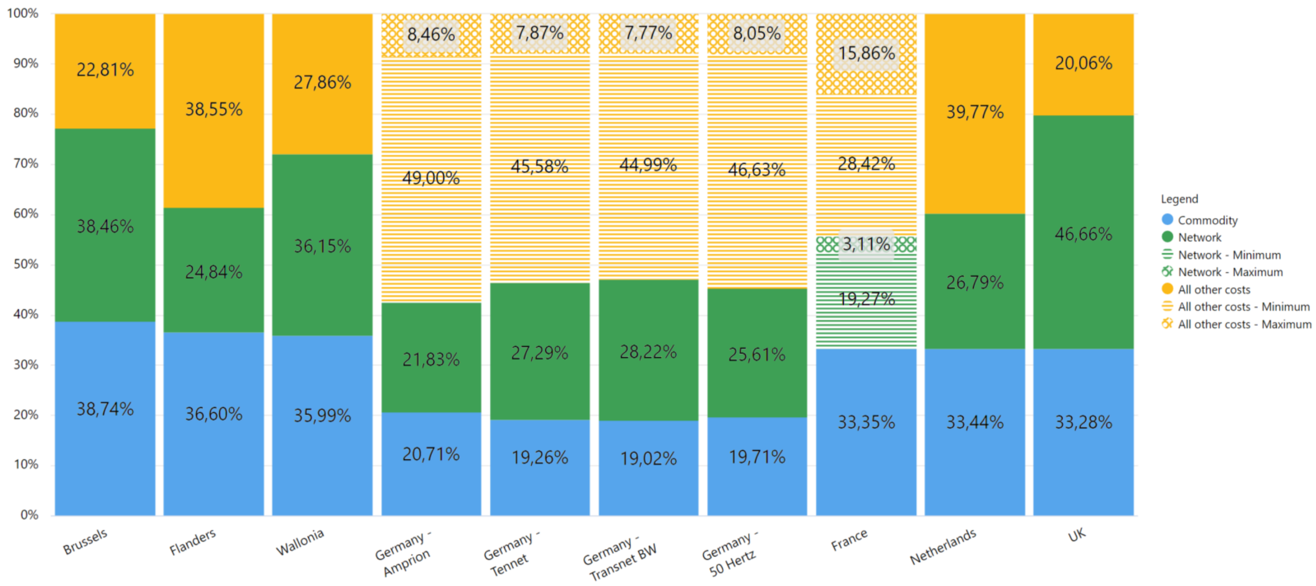
[262] 116,36 EUR/MWh is obtained by summing the minimum tax price option (99,23 EUR/MWh) with the difference between the maximum tax price option and the maximum tax price option (17,13 EUR/MWh).

component as both the *CTA* and *CSPE* may vary for professional consumers. In Belgium, it must be noted that the composition of this component largely differs for this consumer profile compared to profile E-RES. While E-BSME's "all other costs" component is largely determined by the cost of green certificates (both federal and regional level), the regional public service obligations on distribution account for (one of) the most predominant taxes and levies of profile E-RES.

Proportional component analysis

The percentages of the costs for each component can be found in the underneath figure.

Figure 35: Proportional component analysis (profile E-BSME)



The ***commodity prices*** do not represent the same proportion for each country. For instance, France's commodity component weighs much but this has to be counterbalanced with a rather low global invoice. Should the minimum network and "all other costs" prices options be at the minimum level, the commodity price might represent up to 41% of the total bill. After France, Brussels appears to be the most impacted region by the commodity, while Germany benefits from far smaller commodity costs.

Far-reaching gaps prevailed on this graph regarding the ***network cost*** component: France shows the lowest potential network proportion, as opposed to the United Kingdom, Brussels and Wallonia with important network cost proportions. Flanders, Germany and the Netherlands show relatively low network cost proportion consequent to much higher shares of taxes, levies and certificate schemes.

Similar to what has been flagged in the previous profiles (E-RES and E-SSME), we notice that Germany represents the country with the highest tax proportion of ***all other costs*** on its final yearly account. This component might rise up to 57,46% of the total bill, more than half of what is paid, depending on the level of the *Konzessionsabgabe*. As opposed to Germany, the United Kingdom has the smallest tax proportion with only 20,06% of the total bill being accounted to this component.

KEY FINDINGS

As for the E-BSME profile, the results demonstrate the ensuing key findings:

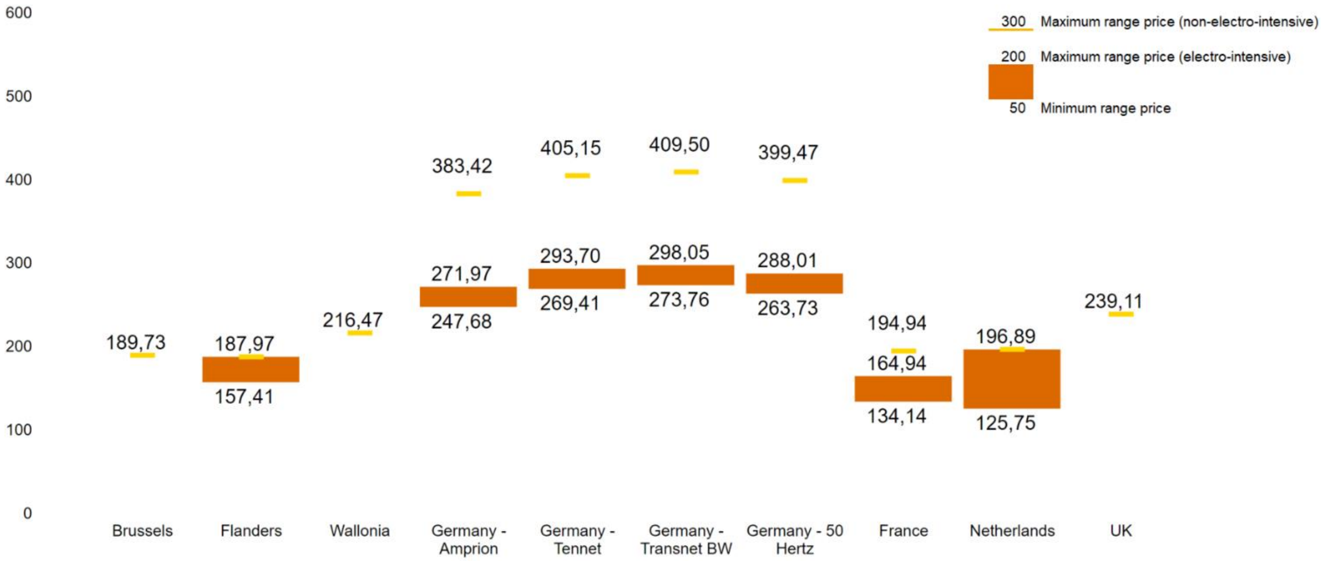
- We observe important differences between countries that are considered in this study: the total yearly invoice for electricity as a small professional consumer (E-BSME) ranges from 17.991 EUR/year (France's minimum option) to 35.464 EUR/year (Germany), a 97%-difference. Brussels and France (minimum price option) appear to be the most advantageous countries when it comes to the annual electricity invoice for the E-BSME profile.
- In Belgium, Brussels is the least expensive region with prices driven down by comparatively lower "all other costs" than in Flanders and Wallonia.
- ***Commodity costs*** are not the major element of the yearly bill. The prices are very analogous across all countries (between 42 and 46 EUR/MWh), except for the United Kingdom that displays a 56 EUR/MWh fare.
- ***Network costs*** generally account for a significant item in the electricity pricing structure even though extensive variations can be observed cross-country. We noticed three price groups from 19% of the total bill up to nearly 47%. Along with the UK, this component weighs the most on the total electricity bill in Brussels and Wallonia. In terms of cost, Flanders displays the cheapest component after France.
- ***All other costs*** outline a broad price scope, being the topmost in Germany, potentially followed from afar by France in case of the maximum tax level. The E-BSME electricity consumers in Brussels have the lowest tax burden, followed by the UK whose results are in line with the low fares that have been noticed for the other small professional (E-SSME) and residential profiles (E-RES). In general, this component comes as the most determining factor in a country's relative competitivity in terms of electricity prices.

Profile E0 (Electricity)

Total invoice analysis

The below figure provides a comparison of the total yearly invoice paid by an industrial profile E0 in the different studied countries and regions. The results are expressed in kEUR/year.

Figure 36: 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.

Figure 37: Total yearly invoice comparison in % (profile E0; Belgium Average 2020 = 100)

Price differences between Belgian regions are significant, with Wallonia being the most expensive region (+14% compared to Brussels and +15% compared to maximum price in Flanders). Among the three regions, Flanders is the only one to display a price range resulting from the cap on the financing of renewable energy implemented in 2018 (see further explanation about Flanders' cap in "Chapter 5.1. Component 3 – all other costs", p.149). Depending on the consumer's electro-intensity and sector, Flanders may limit consumers' taxes, thereby becoming the most competitive region in Belgium. The results of this cap are discussed below in section "Impact of Flanders' cap on profile E0". Belgium as a whole is more competitive than Germany and the UK. However, Wallonia is less competitive than France and the Netherlands. The same cannot be said about Brussels and Flanders as prices might either be lower or higher than in both France and the Netherlands.

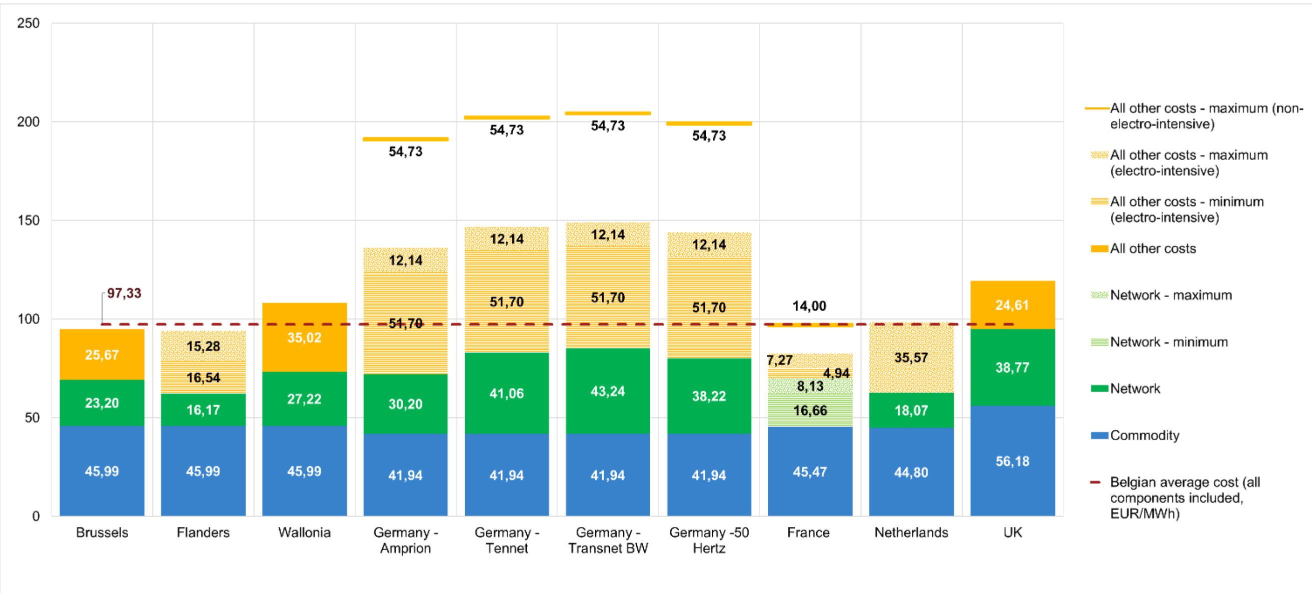
The Netherlands can either be more or less competitive than France. This variance is the result of a possible exemption, depending on how the electricity is used, on the Energy tax and ODE. Overall the Netherlands and France are the most competitive but with a greater variance in the Netherlands. On the other hand, the French competitiveness is, partly, the result of the reductions applicable to the *CSPE* for consumers that are classified as (very) electro-intensive. Maximum prices for non-electro-intensive consumers may add up to an additional 30 kEUR in France. When comparing to the Belgian average, the minimum total annual invoice in France and the Netherlands is respectively about 29% or 33% lower.

When looking at the maximal options, the lower competitiveness of Germany regarding the electricity costs seems to be very apparent but should be assessed carefully. The variance mainly depends on the relative size of power costs in their 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. Maximum prices for non-electro-intensive consumers may add up to an additional 111 kEUR in Germany.

Breakdown per component

The previous results are further detailed for profile E0 in the underneath figure, which provides a closer look at the breakdown of the different price components.

Figure 38: Electricity price by component in EUR/MWh (profile E0)



Commodity costs are relatively well aligned between countries with one exception: the UK displays the highest cost with a significant price gap (+10 EUR/MWh) with the second most expensive commodity costs (Belgium). Belgium's commodity cost is actually similar to France's and the Netherlands'. As for Germany, even though it is potentially the least competitive country overall (non-electro-intensive consumers), they do have the lowest commodity cost (-14 EUR/MWh compared to the UK).

Differences regarding the ***network costs*** across the Belgian regions are identified. Flanders has the cheapest network costs within Belgium before Brussels and Wallonia. In addition to Flanders, the most competitive countries are France (considering the minimum option) and the Netherlands. Overall, Germany displays the most important network costs but faces some significant discrepancies across zones: network costs in Amprion zone amount for 30,20 EUR/MWh where, on the opposite, Transnet BW zone has a cost of 43,24 EUR/MWh. We display a price range in France as network costs depend on the selected price option (i.e. CU fixed peak, CU mobile peak, LU fixed peak or LU mobile peak), which appears to be significative as a difference of 8,13 EUR/MWh may exist between the cheapest and most expensive option (see French industrial consumers section on "Component 2 – network costs", p.161).

Lastly, the ***all other costs***[263] component differs the most between countries and thus has the most important impact on the overall competitiveness. In Belgium, the most expensive region is Wallonia, whereas Flanders may benefit from its cap on the financing of renewable energy to potentially display the lowest prices for this component in Belgium. Even without taking the non-electro intensive consumers into account, the total annual invoice is the highest in Germany whose tax levels are identical between zones as taxes are imposed at the federal level. For this profile, the UK presents a relatively low taxes level, making them more competitive regarding this component than any country or region except France or Flanders when consumers benefit from reductions due to electro-intensity.

Impact of Flanders' 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. 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:

- **Case 1:** Undertakings belonging to sectors listed in annexe 3 or 5 of the EEAG[264] with an electro-intensity above 20%, the amount due for the costs related to the financing of renewable energy 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 is capped at 4% of 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 green certificates).

The cost of the green certificate scheme is easily computed by multiplying the average yearly consumption by the average market price of the certificates weighted by the quota (21,50% for Flanders in 2020). A reduction on quota is also taken into account (47% from 1 to 20 GWh, 80% from 20 to 250 GWh and 98% above 250 GWh). For Profile E0, this green certificate total cost amounts to 30.563,80 EUR.

[263] This cost includes taxes, levies and certificate schemes

[264] (European Commission, 2014-2020)

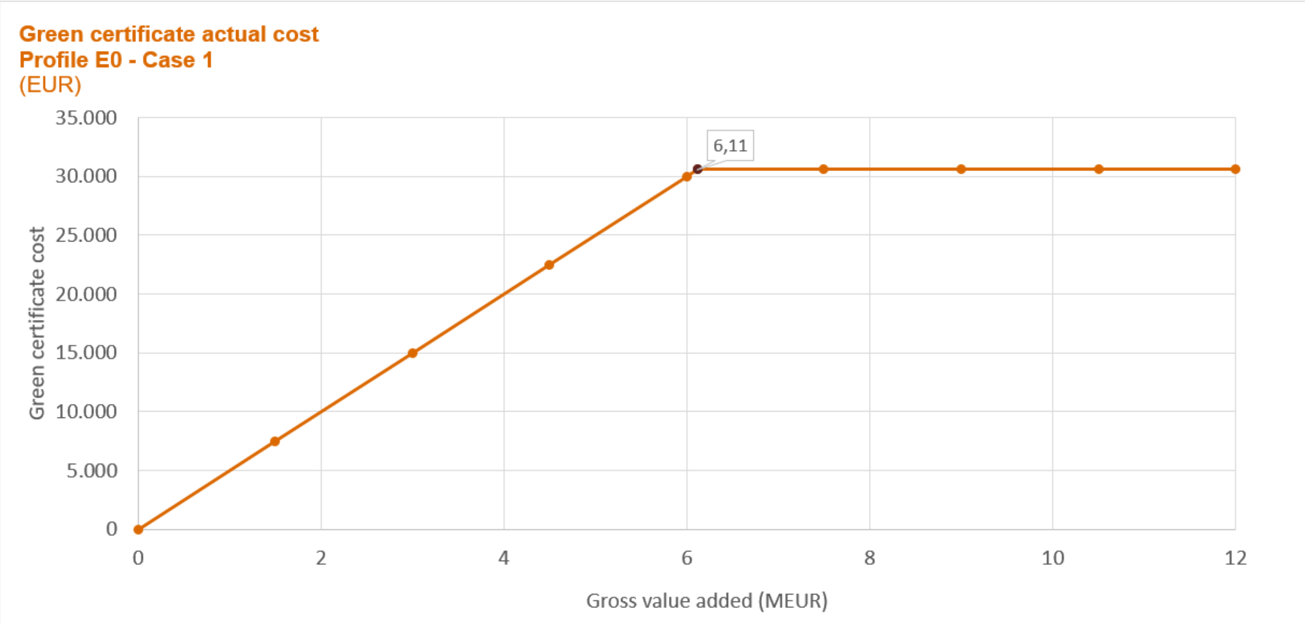
The results for E0[265] are synthesized in the following table:

Table 120: Flanders' cap on profile E0

	Case 1	Case 2
NACE codes	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)	30.564 EUR	
Maximum gross value added to benefit from the cap	6 MEUR	764 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 6.112.768 EUR.

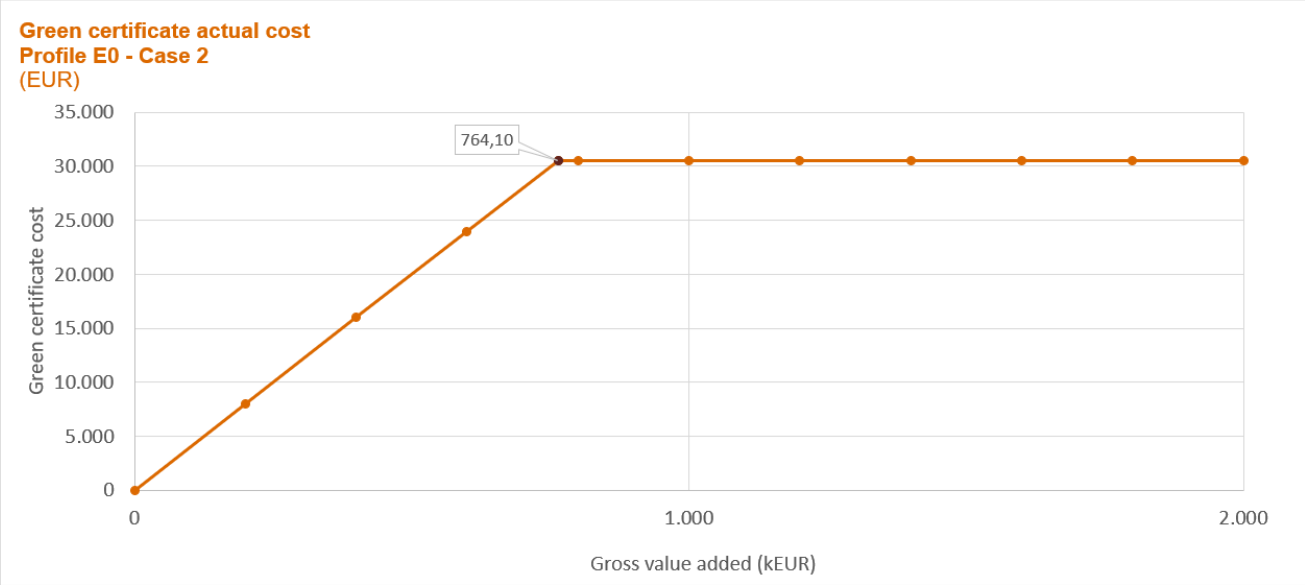
Figure 39: Green certificate actual cost for E0 profile (Case 1)



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 764.096 EUR.

265 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.

Figure 40: Green certificate actual cost for E0 profile (Case 2)



KEY FINDINGS

The analysis of the E0 profile leads us to the following findings:

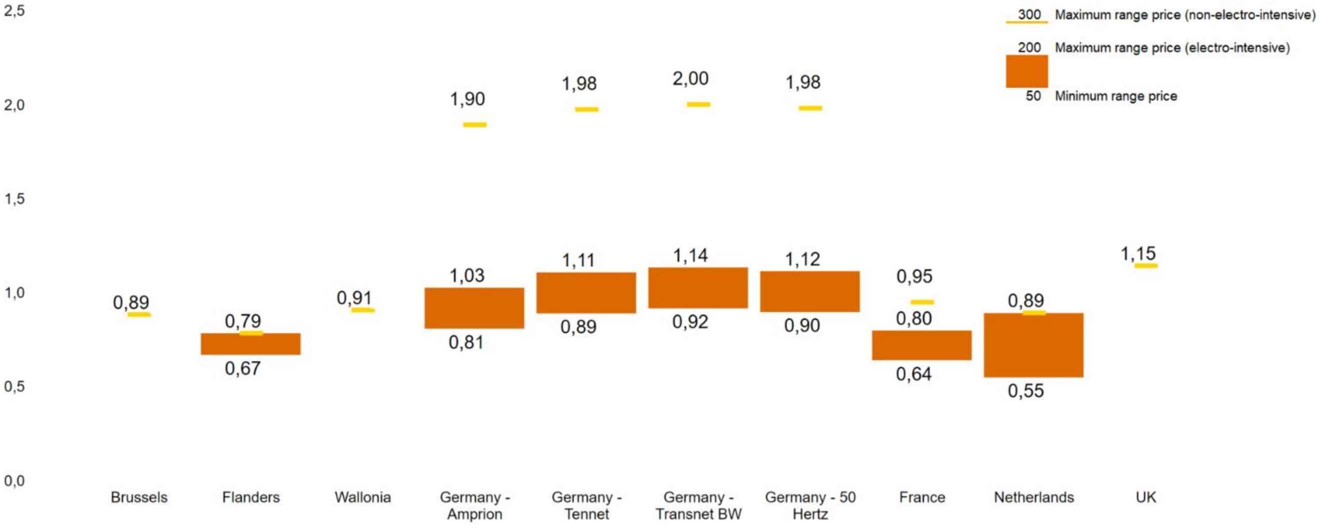
- Important differences emerge between countries regarding the total (potential) invoices. The total amount can vary between 126 kEUR and 410 kEUR depending on the country/region and the specific situation of the consumer. On average, Belgium can either display a lower or higher yearly total bill than France and the Netherlands but always remains cheaper than Germany and the UK.
- Flanders appears as the cheapest region within Belgium for both electro- and non-electro-intensive consumers with the network costs and the taxes, levies and certificate schemes mostly leading price differences between the Belgian region. The cap on the financing of renewable energy implemented back in 2018 enables Flanders to limit tax costs for electro-intensive consumers.
- The ***commodity costs*** between countries are quite similar – with the exception of the UK - and consequently do not seem to be the main driver regarding the competitiveness of a country with regards to electricity costs.
- The ***network costs*** are the highest in Germany and the UK, while Belgian network costs are close to the average of the reviewed countries. Flanders, France, the unique country to display a price range, and the Netherlands are the most competitive countries and regions for this component. Furthermore, we notice important differences between the network costs of the Belgian regions, Flanders being the most competitive.
- The ***all other costs*** component varies greatly between countries and has a great influence on a country's competitiveness as prices are relatively similar before adding these costs. While France and Germany both make a distinction for electro-intensive and non-electro-intensive consumers, the taxation levels are way higher in Germany.

Profile E1 (Electricity)

Total invoice analysis

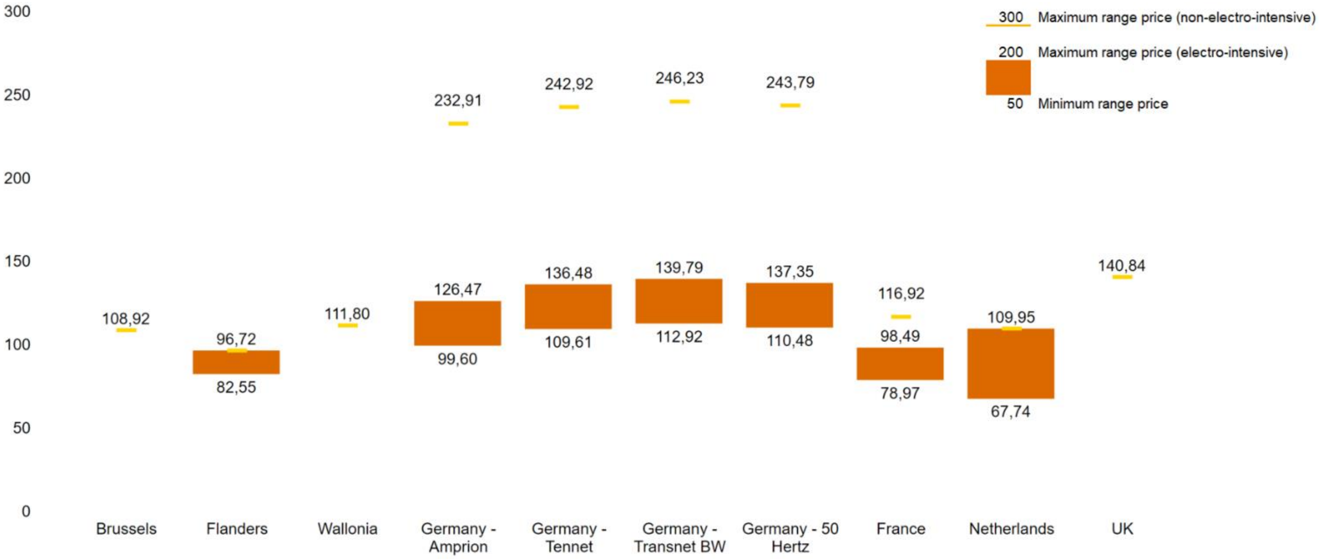
The first figure below provides a comparison of the total yearly invoice paid by an industrial profile E1 in the different studied countries and regions. The results are expressed in MEUR/year. The second figure gives the Belgian average of 100% to easily compare the percentual price differences with other countries.

Figure 41: Total yearly invoice in MEUR/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 42: Total yearly invoice comparison in % (profile E1; Belgium Average 2020 = 100)



There are important differences between the Belgian regions, and mainly two things stand out. Firstly, Flanders is largely more competitive than Brussels and Wallonia. Secondly, the caps on the financing of renewable energy for electro-intensive consumers in Flanders can lower one's bill up to more than 115 kEUR for profile E1, potentially making Flanders even more competitive than it already is without the cap (see further explanation about Flanders' cap in "Chapter 5.1. Component 3 – all other costs", p.149).

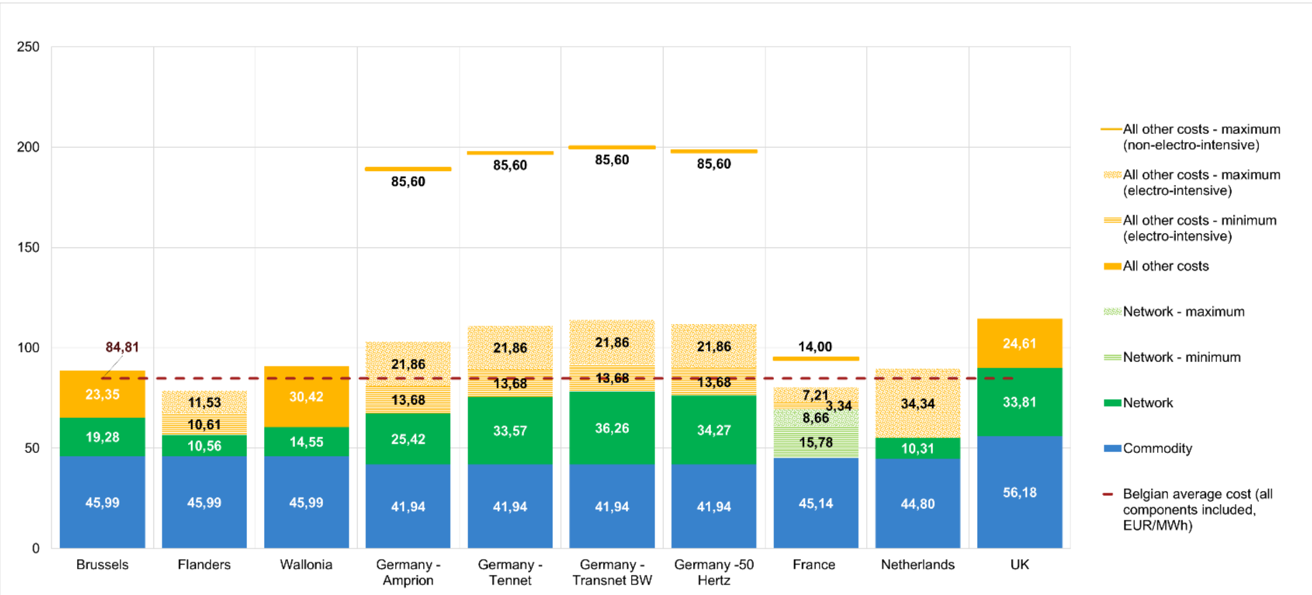
Providing that one benefits from the lowest fares (on *Energy* and/or *ODE* taxes), the Netherlands is the most competitive country overall with a minimum yearly bill of 551.167 EUR. Nonetheless, Flanders (cap), as well as France (network prices options and/or CSPE), can be as (or more) competitive depending on specific economic criteria varying between these countries. In a similar fashion, Germany's total invoice range from a minimum of 810.411 EUR to a maximum for non-electro-intensive consumers of 2 MEUR. That being said, while Germany is still one of the least competitive overall, certainly for non-electro intensive consumers, they seem to be closing the price gap with the other countries/regions compared to profile E0. Because of the variance of their prices, there is a possibility to be more competitive than Brussels, Wallonia, France and the Netherlands. On the opposite, the UK comes as an outlier with the maximum possible amount – excluding Germany's prices for non-electro-intensive consumers.

An important observation is that for the profile E0 the total annual prices in France and the Netherlands could respectively be about 29% or 33% cheaper than the Belgian average, but for the E1 profile this is approximately 21% and 32%, meaning that the gap is closing as the consumer becomes larger – at least compared to France.

Breakdown per component

The previous results are further detailed for profile E1 in the underneath figure, which provides a closer look at the breakdown of the different price components.

Figure 43: Electricity price by component in EUR/MWh (profile E1)



Identically to E0, ***commodity costs*** do not greatly vary across countries, except in the UK. While Germany relies on the cheapest commodity, all other countries - but the UK - closely follow with a maximum extra price of approximately 4 EUR/MWh (Belgian regions).

Network costs estimated in all countries/regions encounter discrepancies that can amount up to about a third of a country's network costs. With this regard, the Netherlands (10,31 EUR/MWh) has the lowest network costs of the reviewed countries closely followed by Flanders (10,56 EUR/MWh). Brussels, Wallonia and France (depending on possible reductions) form the second group of countries and regions with relatively low network fares as opposed to Germany and the UK.

Concerning the ***all other costs***[266] component, Germany strikes as a great change compared to the situation for profile E0. Electro-intensive consumers might face a minimum amount as competitive as most other countries taxing levels, with the exception of Flanders' and most notably France' minimum. However, non-electro-intensive consumers remain significantly charged as they see applied the highest fares within the considered countries. Generally speaking, countries and regions (Flanders, Germany, France) that have implemented mechanisms to reduce taxes' burden on electro-intensive consumers present the lowest potential taxing prices. Other countries tend to have globally high taxing levels even if far from reaching the great amounts for non-electro-intensive consumers in Germany.

Impact of Flanders' 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 in proportion to the Gross Value Added (GVA) of the company and thus vary from company to company. As 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 121: Flanders' cap on profile E1

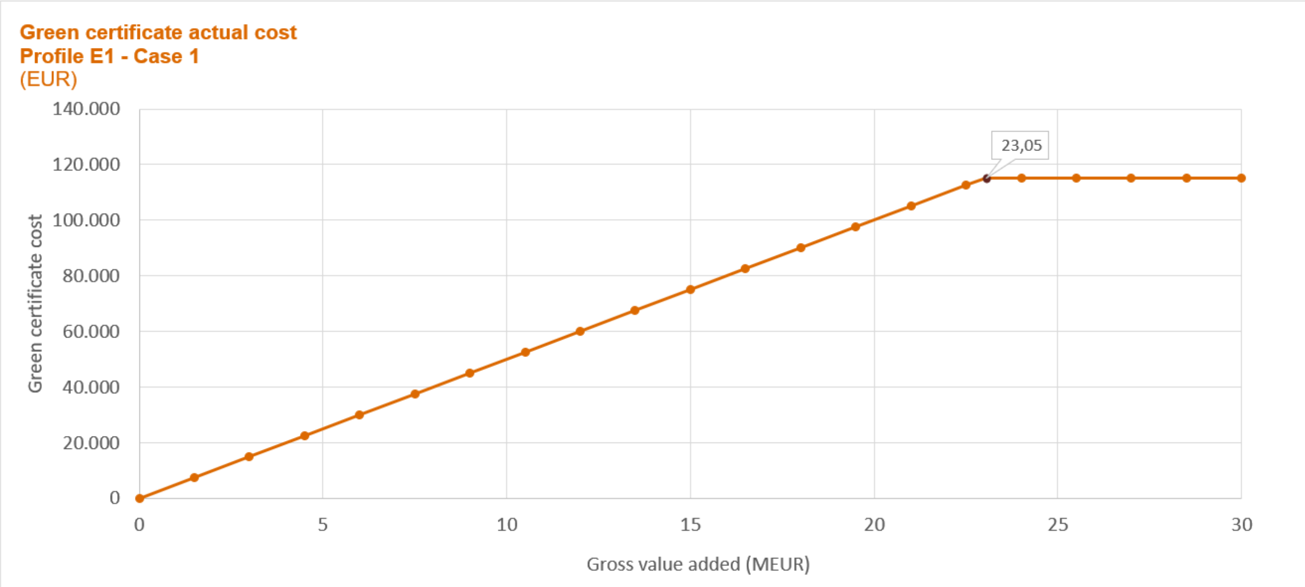
	Case 1	Case 2
NACE codes	Annexe 3 or 5 EEAG[267]	Annexe 3 EEAG
Electro-intensity	> 20%	No threshold
Cap (% of GVA)	0,50%	4%
Average yearly consumption (E1)	10 GWh	
Scheme cost (without cap)	115.264 EUR	
Maximum gross value added to benefit from the cap	23 MEUR	3 MEUR

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 23.052.727,10 EUR.

[266] This cost includes taxes, levies and certificate schemes

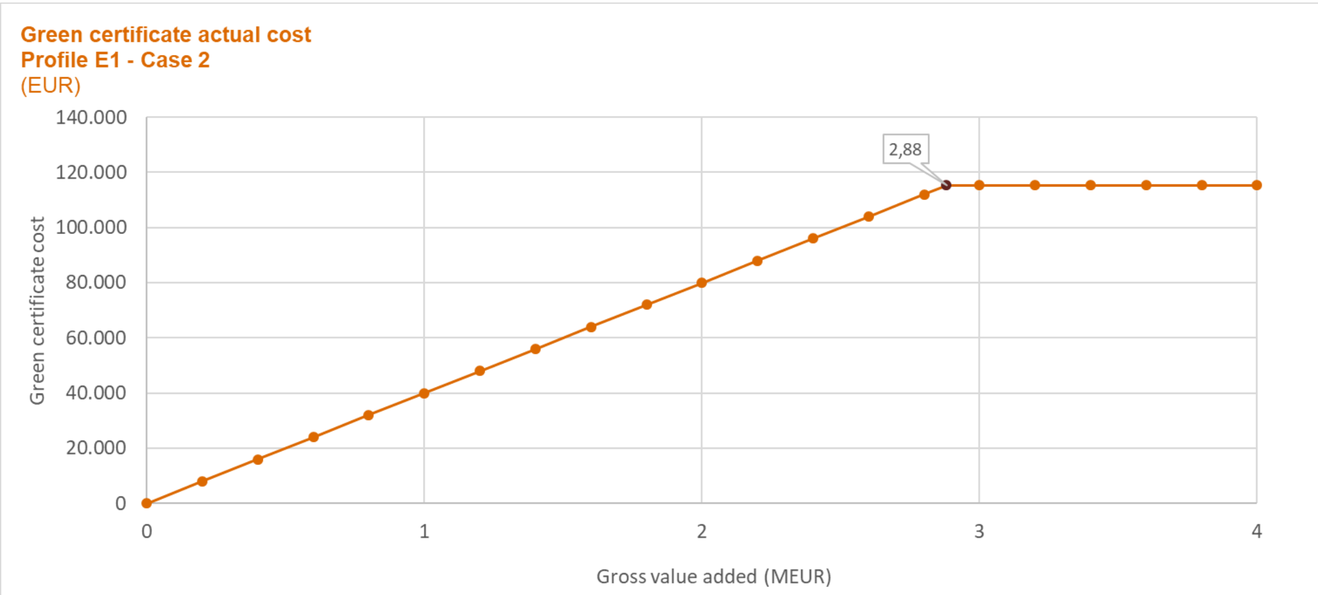
[267] (European Commission, 2014-2020)

Figure 44: Green certificate 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 2.881.591 EUR.

Figure 45: Green certificate actual cost for E1 profile (Case 2)



KEY FINDINGS

The analysis of the E1 profile leads us to the following findings:

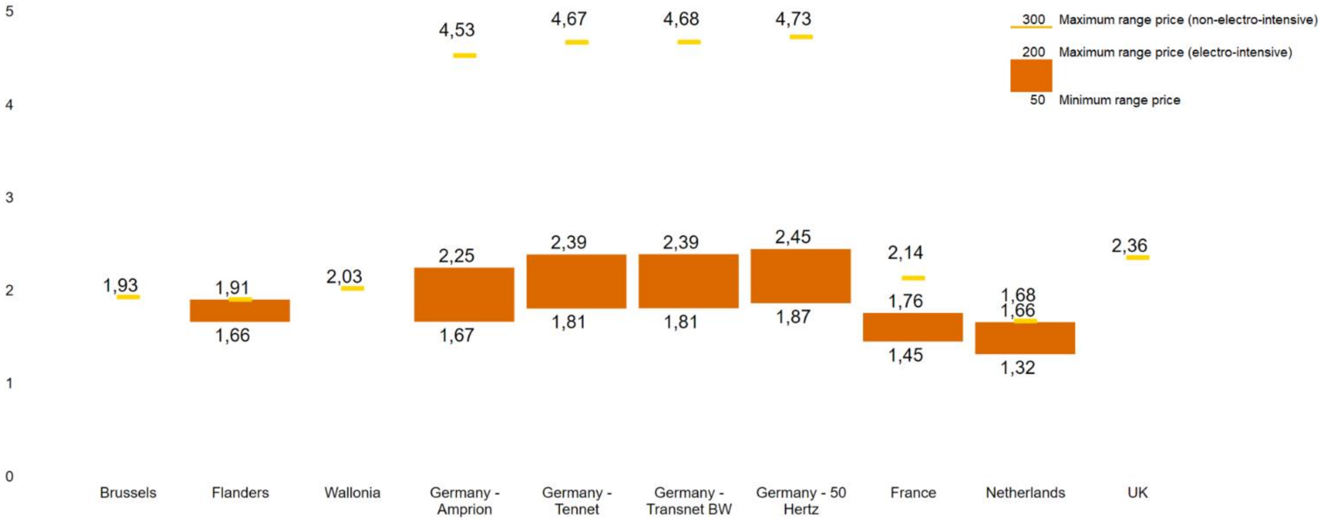
- A very important observation is the differences between the countries regarding the total (potential) invoices. The total invoice can vary between 551 kEUR and 2 MEUR depending on the country/region and the specific economic conditions of the consumer.
- Within Belgium, Flanders comes undoubtedly as the cheapest region for profile E1. Regardless of the application of the cap, Flanders always offers lower fares than Brussels or Wallonia. The “all other costs” component is the most determining factor when it comes to assessing the relative prices across the Belgian regions.
- The ***commodity cost*** between countries are quite similar – with the exception of the UK - and consequently do not seem to be the main driver regarding the competitiveness of a country with regards to electricity costs.
- The ***network costs*** are the highest in Germany and the UK. While Flanders ranks as the most competitive region after the Netherlands, Brussels and Wallonia offer comparatively average prices. France is the only country to have network range prices as a consequence of the selected network price option.
- The ***all other costs*** component remains characterised by large variances. Compared to previous consumption profiles, Germany’s competitive position improved when considering electro-intensive consumers who may benefit from large reductions (up to more than 6 times compared to the maximum price range). Similarly, France and Flanders further strengthen their competitiveness based on such reduction for electro-intensive consumers. Other countries and regions display relatively similar prices ranges for this component.

Profile E2 (Electricity)

Total invoice analysis

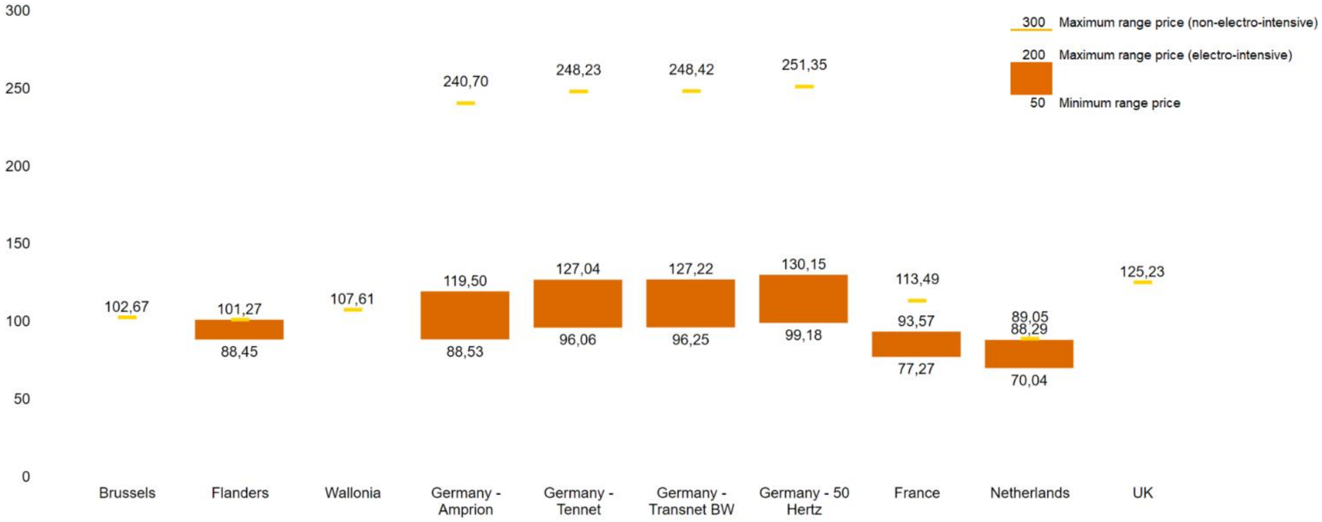
The below figure provides a comparison of the total yearly invoice paid by an industrial profile E2 in the different studied countries and regions. The results are expressed in MEUR/year. The second figure gives the Belgian average of 100% to easily compare the percentual price differences with other countries.

Figure 46: 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 47: Total yearly invoice comparison in % (profile E2; Belgium Average 2020 = 100)



On the Belgian level, two main observations hold. Firstly, Flanders remains the most competitive region. If Wallonia has slightly closed the gap compared to Flanders (minimum +6%) for profile E1, as Brussels did, it is still the most expensive Belgian region. Secondly, the cap in Flanders can lead to a bill decrease of about 245 kEUR for electro-intensive consumers, thereby reinforcing Flanders' competitiveness in Belgium given the fact that it is the only Belgian region that has developed such mechanism (see further explanation about Flanders' cap in Chapter 5.1. Component 3 – all other costs, p.149).

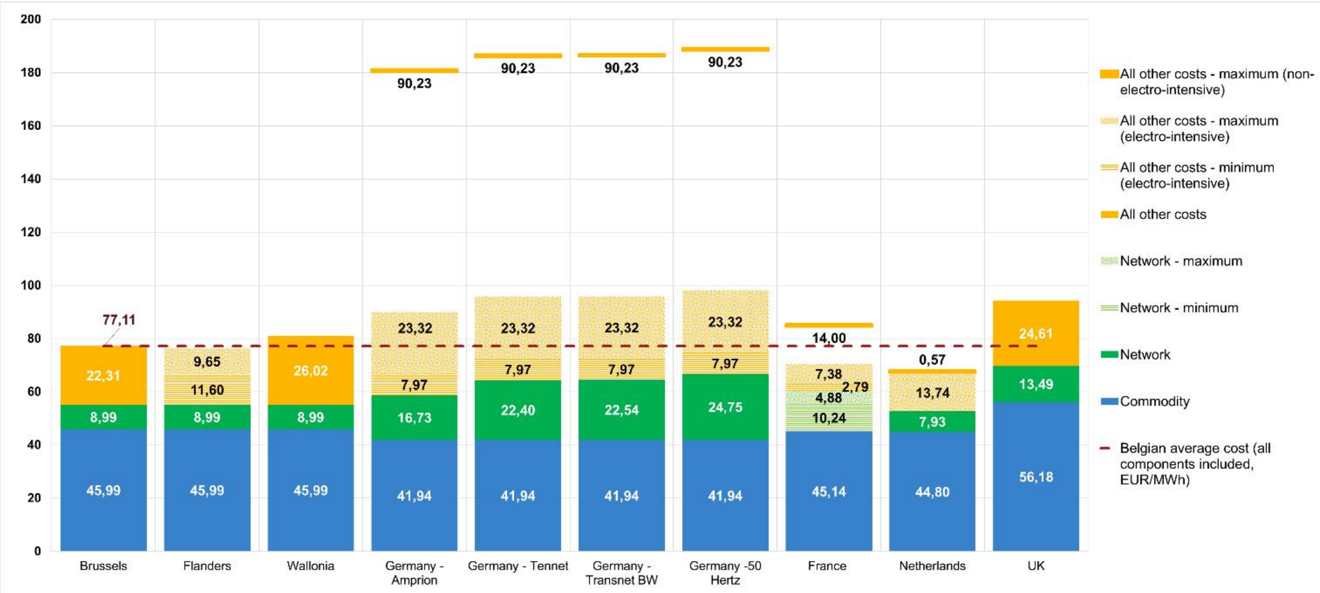
On a global perspective, the Netherlands is potentially the most competitive country overall with a minimum yearly bill of 1,32 MEUR. Conversely to previous consumer profiles, the Netherlands applies for refunds on taxes, limiting the maximum price for consumers with consumption above 10 GWh/year. Therefore, three pricing options appear, further strengthening their competitive position. However, this was represented as a global range as consumers may either be totally exempted to paying the full tax rate. Compared to other countries, France keeps up with relatively low yearly bills with a clear sign of its support to electro-intensive consumers while all three Belgian regions display comparable prices – except for lower rates to electro-intensive consumers offered in Flanders.

Again, large variances in Germany mainly depends on the relative size of power costs in their gross value added.[268] Inevitably, any industrial consumer with an average annual electricity cost over the last three years of less than 14% of the gross value added, would pay the maximum rate. In the latter case, fares are far more significant and undermine consumers' competitivity. In the case of the UK, it no longer comes as an outlier given the fact that, even if it accounts for high yearly bills, it may potentially be as competitive as German's electro-intensive prices. This tends to confirm the observation that the gaps between regions/countries become thinner as the consumer becomes larger. The gaps between the Belgian average and the lowest possible prices in France and the Netherlands for E2 are now respectively about 22% and 30%.

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



Compared to previous consumer profiles, the ***commodity cost*** does not change as E2 has the same load profile (not operating on weekends) as E-BSME, E0 and E1; it thus has the same price per MWh. In most cases, the commodity costs make up for the largest part of the bill. Again, Germany remains the lowest, whereas the UK is still remarkedly higher than in other countries.

Network costs represent a variable proportion of profile E2's total bill. In Belgium, the network costs have significantly plummeted compared to previous profiles as E2 is no longer connected to the distribution grid. As a consequence, it is no longer charged with distribution costs, which leads to the harmonisation of prices across

[268] According to the EEAG they also have to belong to a certain sector. If they the consumer is not active in this sector, they inevitably pay the maximum price (European Commission, 2014-2020)

regions. Except for the Netherlands (7,93 EUR/MWh), Belgium displays the lowest network costs (8,99 EUR/MWh) for all considered countries. Even if this decrease in network costs can be observed in all panel countries, Germany keeps being the least competitive country with regards to network costs and even faces significant variations within its zones (Amprion is about 8 EUR/MWh less expensive than 50 Hertz).

As for ***all other costs***[269] component**,** countries apply varying tax pricing, which may affect consumers differently, especially given their (non-)electro-intensive nature. In this perspective, the Netherlands appears as having the potentially lowest tax levels possible for electro-intensive consumers as exemptions may be granted for some specific consumers. When exemptions do not apply, the Dutch reductions that may be granted on the ODE and Energy taxes do not enable electro-intensive consumers to reach tax levels as low as in France for instance. This is because these consumers do not see the European minimum tax level (0,50 EUR/MWh) yet applied at their consumption level. As observed previously, Flanders, Germany and France have all three implanted policies that enable electro-intensive consumers to benefit from significant reductions with France being potentially the most competitive amongst these three countries and regions. It is interesting to note that Brussels has a lower tax level than Wallonia even though the latter provides quota reductions on green certificates that do not exist in Brussels.

Impact of Flanders' 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 in proportion to the Gross Value Added (GVA) of the company and thus vary from company to company. As 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 122: Flanders' cap on profile E2

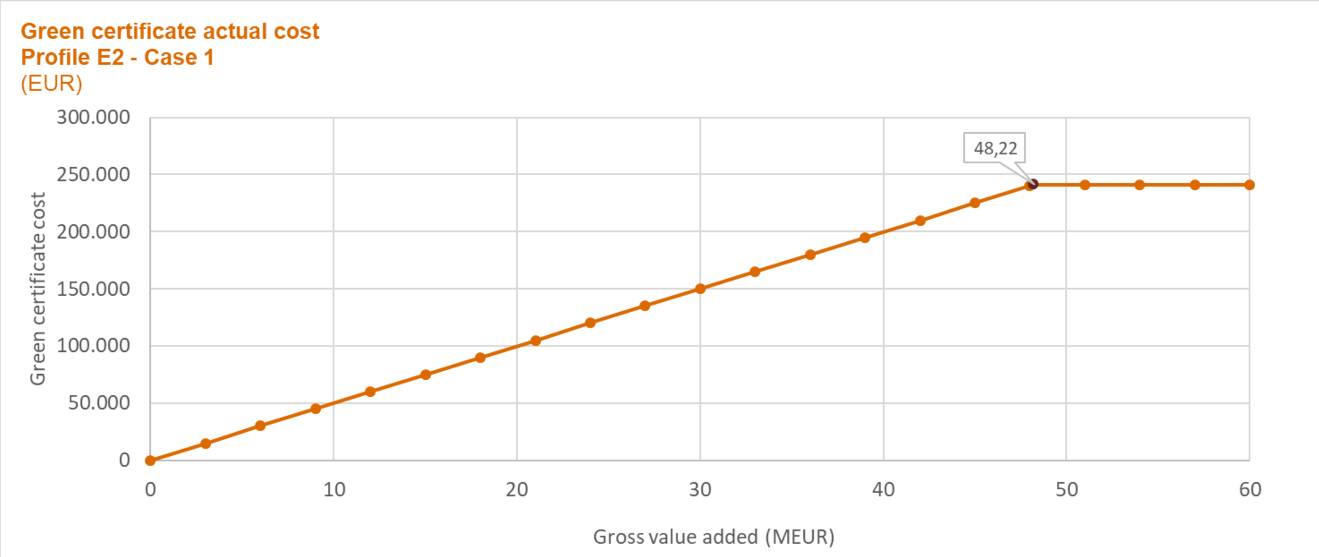
	Case 1	Case 2
NACE codes	Annexe 3 or 5 EEAG[270]	Annexe 3 EEAG
Electro-intensity	> 20%	No threshold
Cap (% of GVA)	0,50%	4%
Average yearly consumption (E2)	25 GWh	
Scheme cost (without cap)	241.115 EUR	
Maximum gross value added to benefit from the cap	48 MEUR	6 MEUR

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 48.222.949 EUR.

[269] This cost includes taxes, levies and certificate schemes

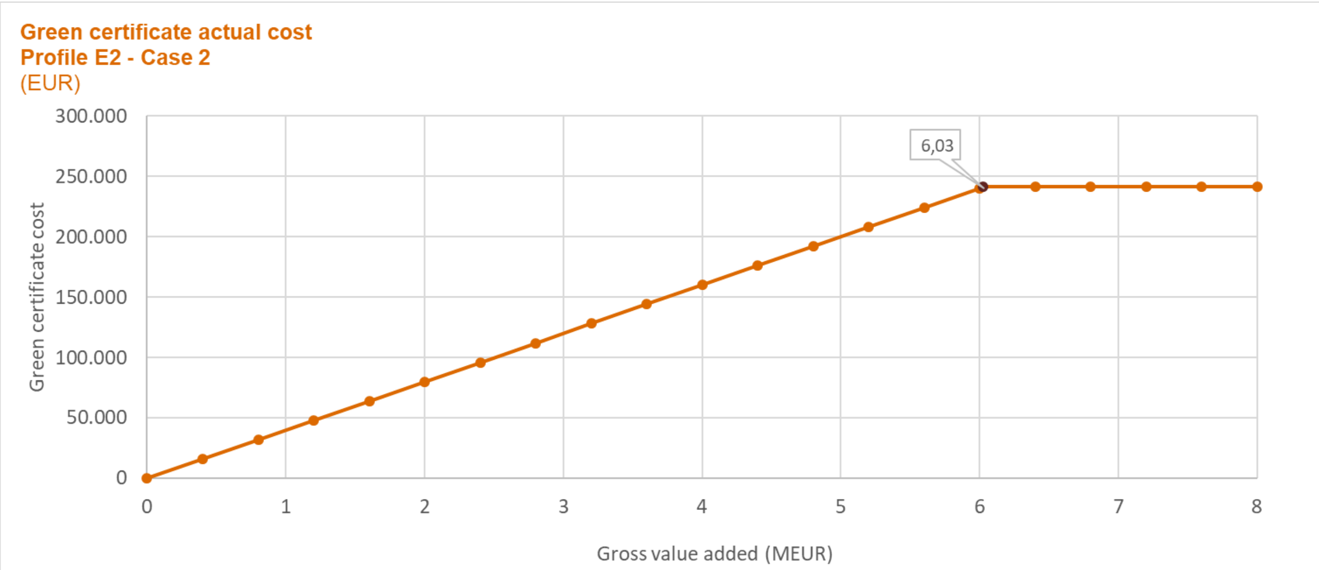
[270] (European Commission, 2014-2020)

Figure 49: Green certificate 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 6.027.869 EUR.

Figure 50: Green certificate actual cost for E2 profile (Case 2)



KEY FINDINGS

The analysis of the E2 profile leads us to the following findings:

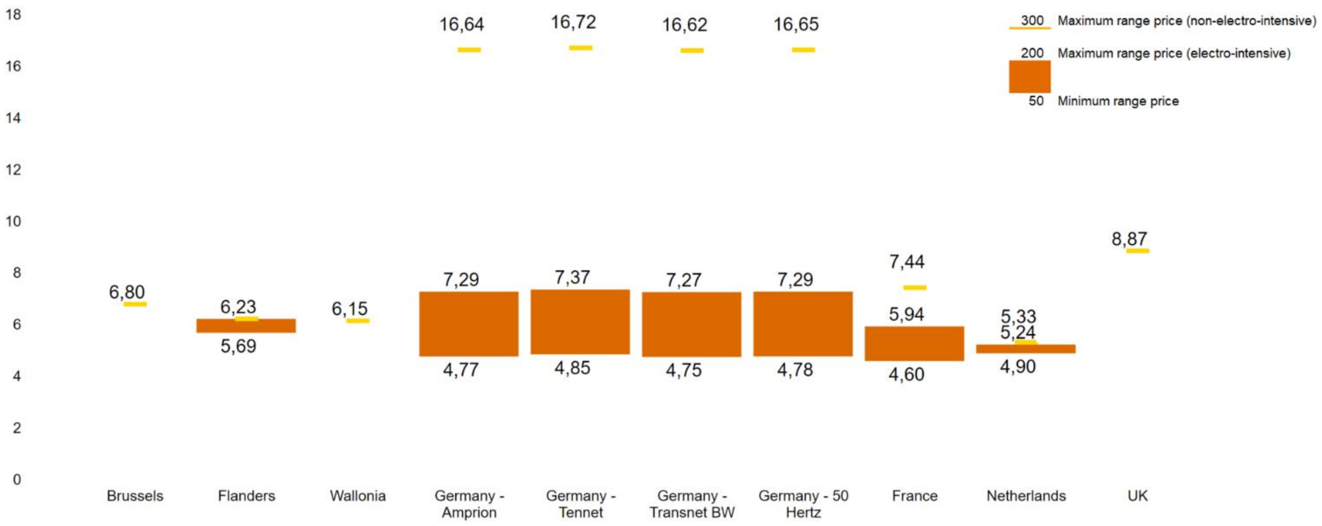
- A very important observation is the differences between the countries regarding the total (potential) invoices. The total invoice can vary between 1,32 MEUR and 4,73 MEUR depending on the country/region and the specific situation of the consumer.
- Flanders remains the cheapest region in Belgium, even when considering non-electro-intensive consumers, before Brussels and then Wallonia.
- ***Commodity costs*** play a significant role, which was not the case in the previous industrial consumption profiles, in one consumer's final bill. Germany counts the lowest prices for this component while the UK is largely the most expensive country as per the commodity cost of electricity.
- As opposed to the other two components, ***network costs*** usually represent a lower part of the invoice. Since our consumer profile is no longer connected to the distribution grid, network costs in Belgium decrease and are identical across regions. Belgium is strongly competitive and keeps up with the Netherlands, whereas Germany faces significantly high network costs, which turn different depending on the zone considered.
- ***All other costs*** demonstrate important differences depending on which country is considered. Several countries such as France, the Netherlands, Germany and Flanders support electro-intensive consumers by offering fares reductions. Yet, paying the high-end tax range may be extremely costly as it is the case in Germany (up to three times more) for non-electro-intensive consumers.

Profile E3 (Electricity)

Total invoice analysis

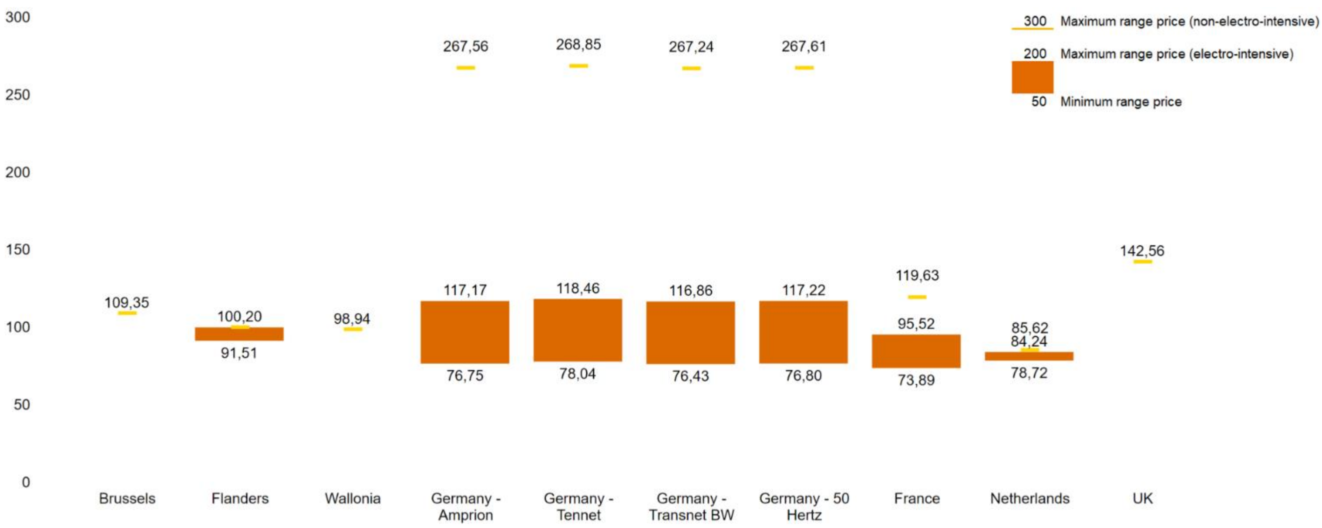
The below figure provides a comparison of the total yearly invoice paid by an industrial profile E3 in the different studied countries and regions. The results are expressed in MEUR/year. The second figure gives the Belgian average of 100% to easily compare the percentual price differences with other countries.

Figure 51: Total yearly invoice in MEUR/year (profile 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 52: Total yearly invoice comparison in % (profile E3; Belgium Average 2020 = 100)



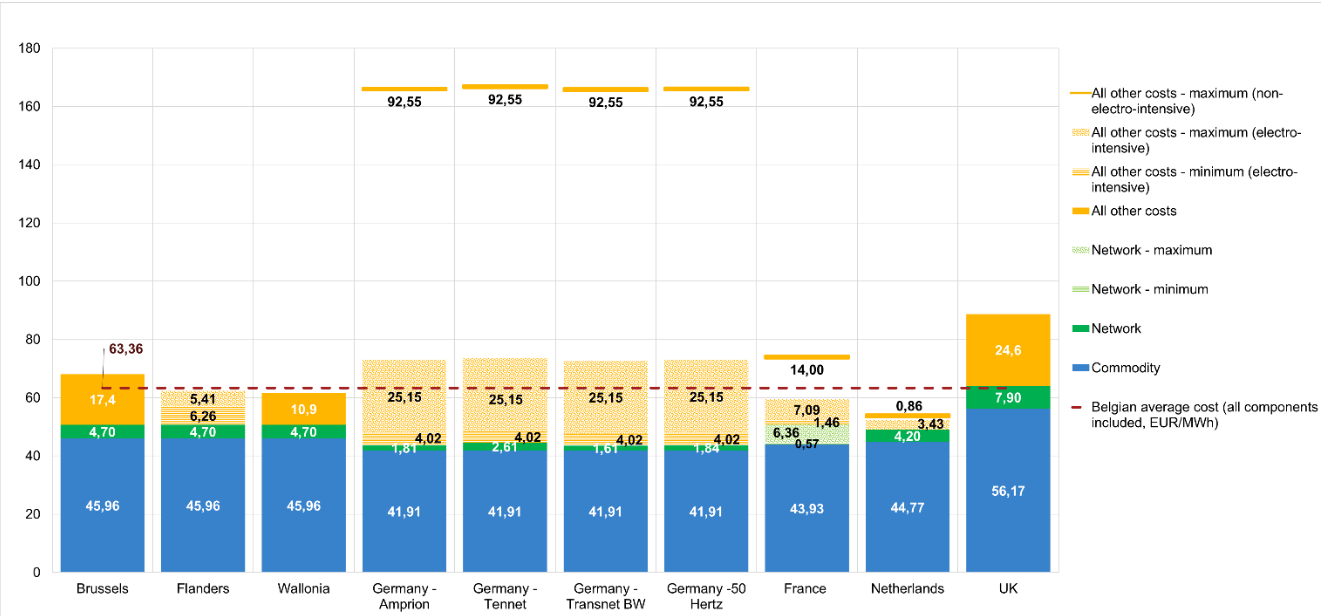
As a whole, we observe that all three Belgian regions are potentially less competitive than all other countries except for the UK, which is undoubtedly an outlier amongst the countries under study. While it is certain than Belgium is strictly less competitive than the Netherlands, it is less obvious for the other countries. Again, the reason lies in the application of reductions on taxes for electro-intensive consumers. When compared to non-electro-intensive consumers, Belgium is globally cheaper than Germany, France and the UK. Within Belgium, the Flemish cap for electro-intensive consumers definitely contributes significantly to lowering the electricity bill. Nevertheless, Wallonia also grants reductions on green certificates, which releases the financial burden on consumers. Brussels displays much higher rates compared to the other two Belgian regions.

The larger the consumer profiles, the larger the influence of reductions on German's fares as it becomes clearer that the minimum bill's range decreases in comparison to other countries. Consequently, this bolsters the country's electricity prices competitive position against others. However, this statement does not hold for non-electro-intensive consumers. In this regard, Flanders and France keep up with their support mechanisms to electro-intensive consumers. For the latter, reductions granted on the *CSPE* keep on driving down tax levels along with the global bill. The latter further varies depending on the selected price option (i.e. CU, MU or LU) as described in the French industrial section "Component 2 – network costs" (p.161). Interestingly, France and Germany may now potentially be cheaper than the Netherlands when considering the minimum option. When comparing to the Belgian average, the German and French prices can undercut the annual invoice by, respectively, 23% and 26%.

Breakdown per component

The previous results are further detailed for profile E3 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 E3)



In comparison to previous consumer profiles, load profile 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 above figure even if it sure has an impact on consumers' final bill. Globally, a similar situation is encountered across countries with the lowest cost in Germany closely followed by France. In opposite, the UK has the most expensive commodity cost.

More certainly than for previous profiles, **network costs** only represent a limited proportion of the final bill. Like in Belgium (from profile E2), German network costs have shrunk and harmonised across regions. As profile E3 is assumed to be directly connected to the transmission grid, TSOs' prices are in force for this profile. Undoubtedly, German network costs converged and are now comparable, yet nearly insignificant as part of the total bill. Besides, important varying reductions on transmission costs exist in several countries studied, which greatly affects countries' competitiveness. Among such countries are Germany (85% reduction), France (from 10 to 85% reduction) and the Netherlands (36% reduction).[271] 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.

While ***all other costs***[272] component can have varying importance among countries, it is again mainly dependent on the (non-)electro-intensive nature of consumers. When no exemptions apply, important reductions granted on taxes paid for consumption above 10 GWh make of the Netherlands the country with the potentially lowest possible tax level with France. Nonetheless, electro-intensive consumers do not see the European minimum tax level (0,50 EUR/MWh) yet applied at their consumption level. 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 countries and regions regarding this component.

Impact of Flanders' 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 in proportion to the Gross Value Added (GVA) of the company and thus vary from company to company. As 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 123: Flanders' cap on profile E3

	Case 1	Case 2
NACE codes	Annexe 3 or 5 EEAG[273]	Annexe 3 EEAG
Electro-intensity	> 20%	No threshold
Cap (% of GVA)	0,50%	4%
Average yearly consumption (E3)	100 GWh	
Scheme cost (without cap)	540.760,2 EUR	
Maximum gross value added to benefit from the cap	108,2 MEUR	13,5 MEUR

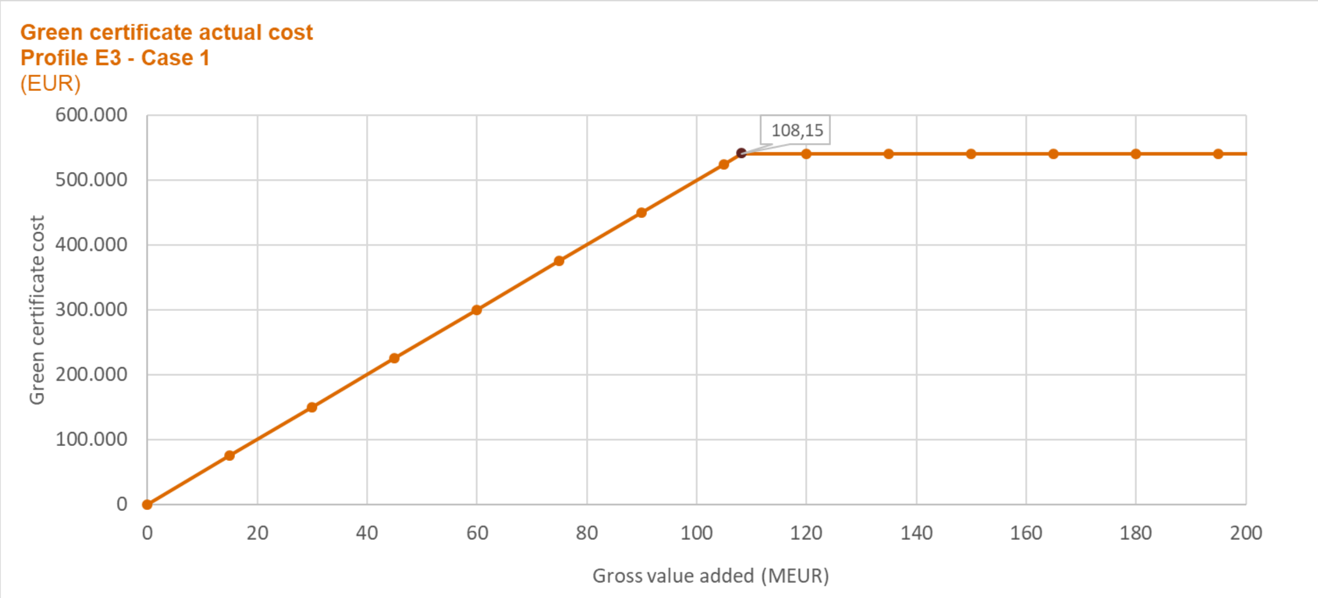
Considering only Profile E3 companies with NACE codes from Annexe 3 or 5 from the EEAG and with an electro-intensity above 20% (case 1), a company benefits from the application of the cap as long as its gross value added is less than 108.152.049,10 EUR.

[271] This is respectively detailed in the following sections : Component 2 – network costs Germany, Component 2 – network costs France and Component 2 – network costs the Netherlands.

[272] This cost includes : taxes, levies and certificate schemes

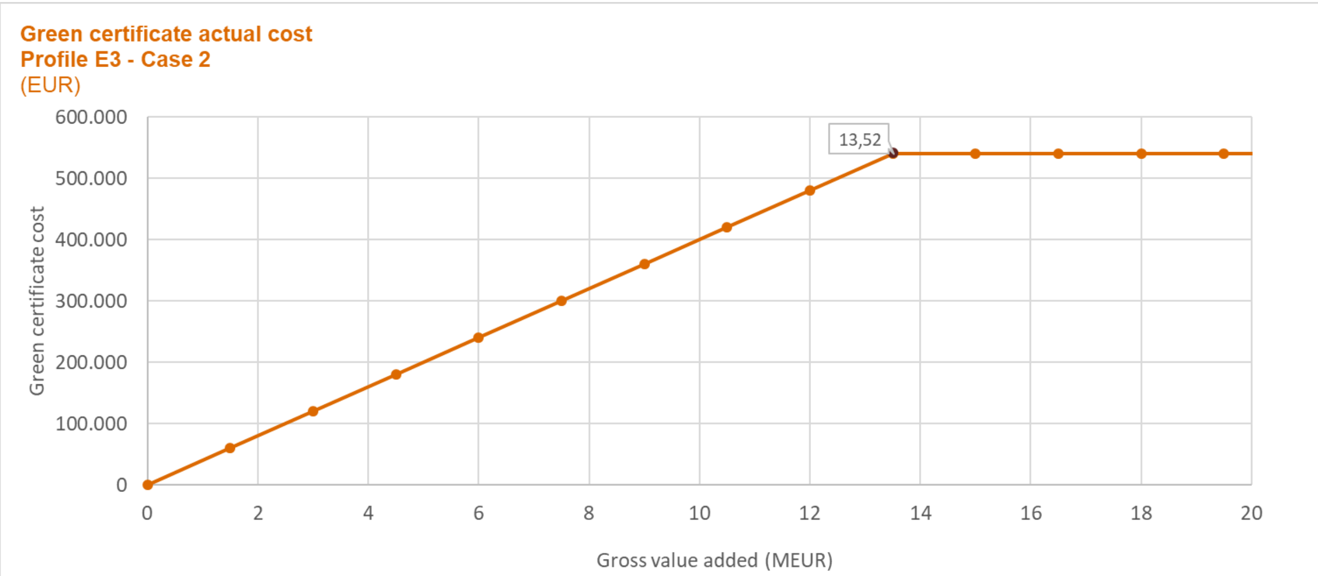
[273] (European Commission, 2014-2020)

Figure 54: Green certificate 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 13.519.006,1 EUR.

Figure 55: Green certificate actual cost for profile E3 (Case 2)



KEY FINDINGS

The analysis of the E3 profile leads us to the following findings:

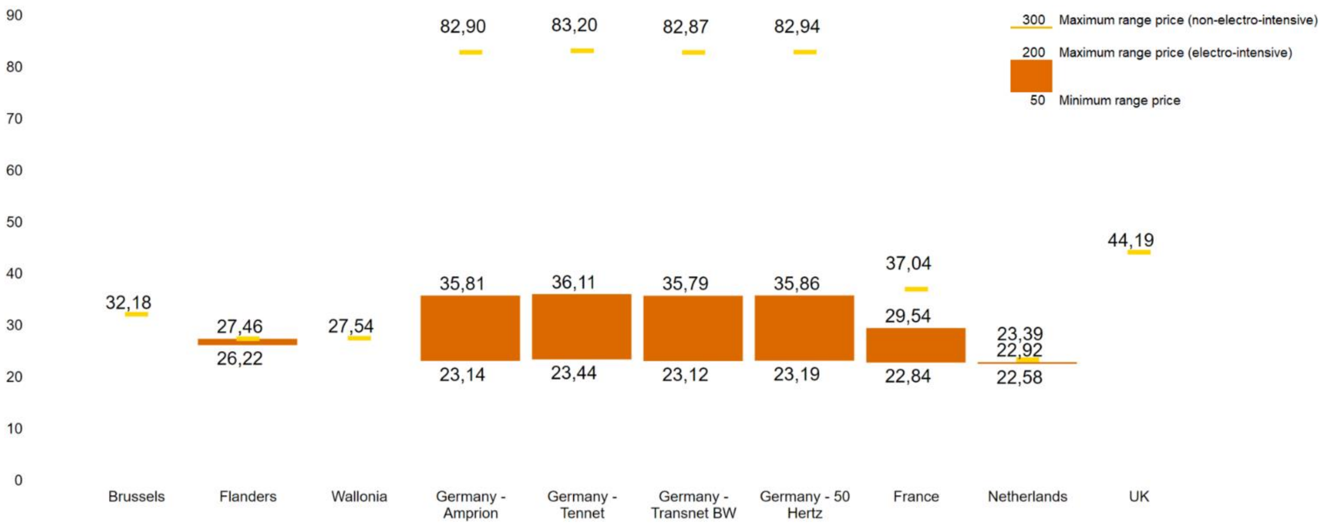
- A very important observation is the differences between the countries regarding the total (potential) invoices. The total invoice can vary between 4,60 MEUR and 16,72 MEUR depending on the country/region and the specific situation of the consumer.
- From profile E3, it cannot be said that Flanders is cheaper than Wallonia as the latter may offer lower fares. Brussels is the most expensive region within Belgium for this consumer.
- ***Commodity costs*** represent the most significant component in one consumer's final bill – excepted for non-electro-intensive consumers in Germany. The latter counts the lowest prices for the commodity, whereas the UK is largely the most expensive country with regards to the commodity price.
- ***Network costs*** represent a low part of the invoice, which is even more true since countries such as Germany, France and the Netherlands grant reductions, based either on electro-intensity or consumption criteria, on transmission costs for consumers. 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 before Germany, the Netherlands and Belgium. However, this component remains potentially the lowest of all in terms of proportion in the total bill.
- ***All other costs*** demonstrate important differences depending on which country is considered. While taxes levels appear to be high in the UK, their share in the global invoice lowers in Belgium while being much lower in France and in the Netherlands. In the latter case, non-electro-intensive consumers also face relatively low taxes levels compared to Germany or France - to some extent - where tax reduction schemes are rather designed to support electro-intensive consumers.

Profile E4 (Electricity)

Total invoice analysis

The below figure provides a comparison of the total yearly invoice paid by an industrial profile E4 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 56: 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 57: Total yearly invoice comparison in % (profile E4; Belgium Average 2020 = 100)

As it stands, Belgium is clearly less competitive than the Netherlands but more competitive than the UK. When comparing to other countries, the situation depends on electro-intensity of consumers. In this regard, all three Belgian regions may face situations when they can be as competitive as France – with Flanders and Wallonia potentially as competitive when it comes to electro-intensive consumers. This reasoning holds for the comparison with Germany, with the sole difference that Brussels can also be as competitive for electro-intensive consumers. Within Belgium, the gap widens between Brussels and Wallonia under the influence of green certificate quota reductions that do not exist in Brussels. As for Flanders, the cap on the financing of renewable energies enable the region to display the lowest potential price range in Belgium.

In terms of electricity prices, the Netherlands is still the most competitive overall for profile E4 but can be undercut by Germany and France. The maximum and minimum price for electro-intensive consumers in the Netherlands almost overlap for the E4 profile and are ca. 17 to 20% lower than the Belgian average. Dutch prices can be partly explained by the existing tax refund schemes applicable to companies that have signed a multiple-year agreement as described in Dutch industrial section "Component 3 – all other costs" (p.166).

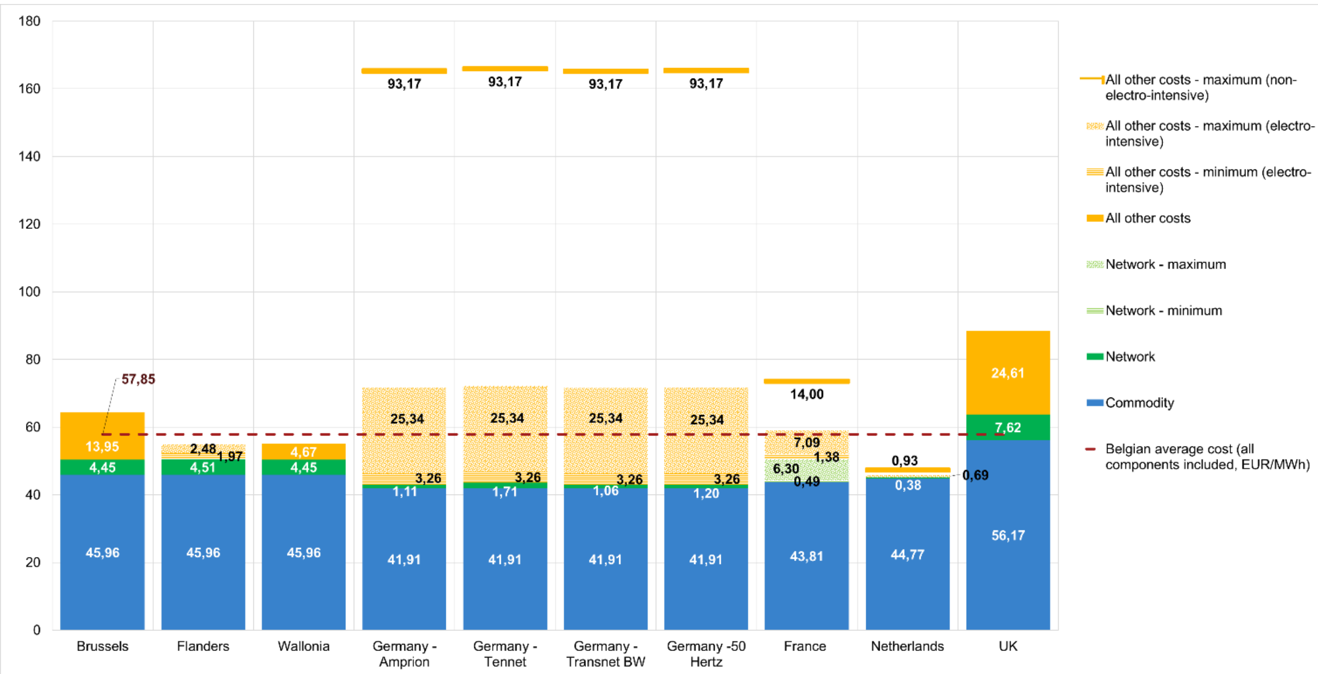
With regards to the presumably lower competitiveness of Germany, for electricity costs, one should evaluate the situation carefully. The existing variance comes as a result of the relative size of power costs in the consumer's gross value added.[274] When the average annual electricity cost over the 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. It is still possible if the consumer does not fall under the listed sectors of the EEAG or has a very high value added and is part of a sector listed on annexe 5 of the EEAG.[275]

Breakdown per component

The previous results are further detailed for profile E4 in the underneath figure, which provides a closer look at the breakdown of the different price components.

Figure 58: Electricity price by component in EUR/MWh (profile E4)



Again, **commodity costs** are identical to costs displayed for E3. As a consequence, an identical situation is met across countries as the lowest cost is found in Germany closely followed by France. Conversely, the UK comes as an outlier where the commodity composes a significant portion of the final bill.

---

[274] The consumer must also be active in the limited sector list of the EEAG, (European Commission, 2014-2020).

[275] (European Commission, 2014-2020)

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.

While the **all other costs**[276] component can have varying importance among countries, it is again mainly dependent on the (non-)electro-intensive nature of consumers. Significant reductions potentially granted on taxes through a refund scheme make of 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. 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 countries and regions when it comes to this component. 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.

Impact of Flanders' 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 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.

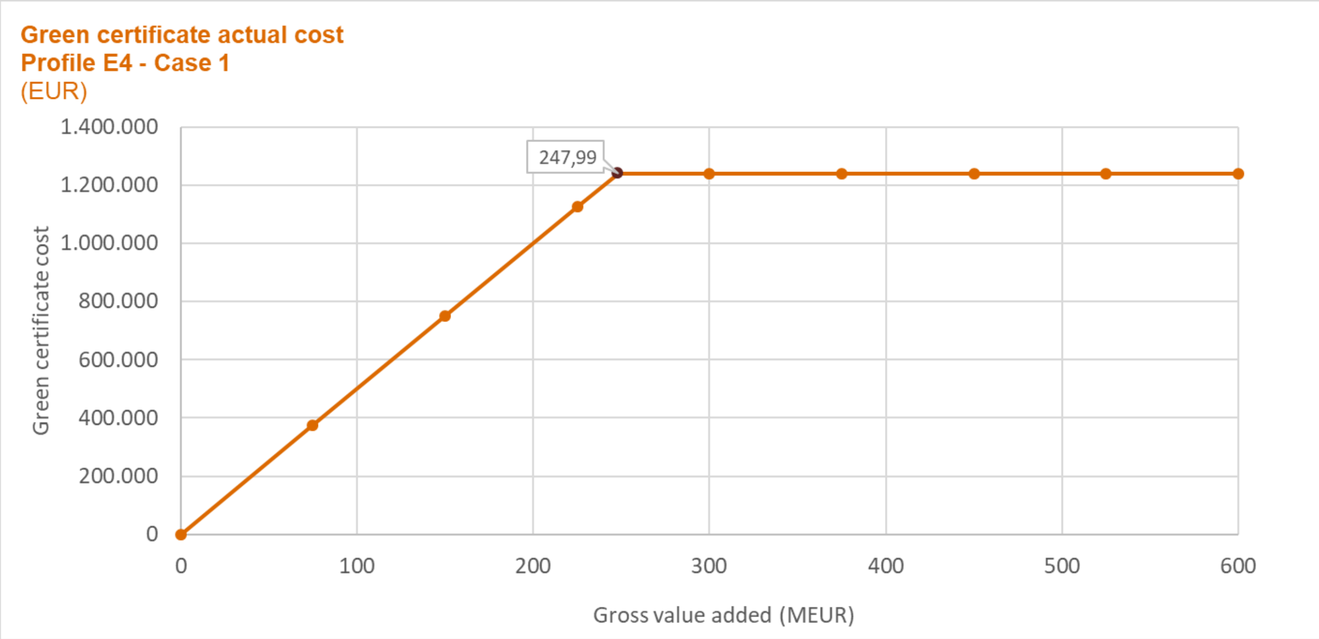
Table 124: Flanders' cap on profile E4

	Case 1	Case 2
NACE codes	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)	1.239.933 EUR	
Maximum gross value added to benefit from the cap	248 MEUR	31 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 247.986.615,8 EUR.

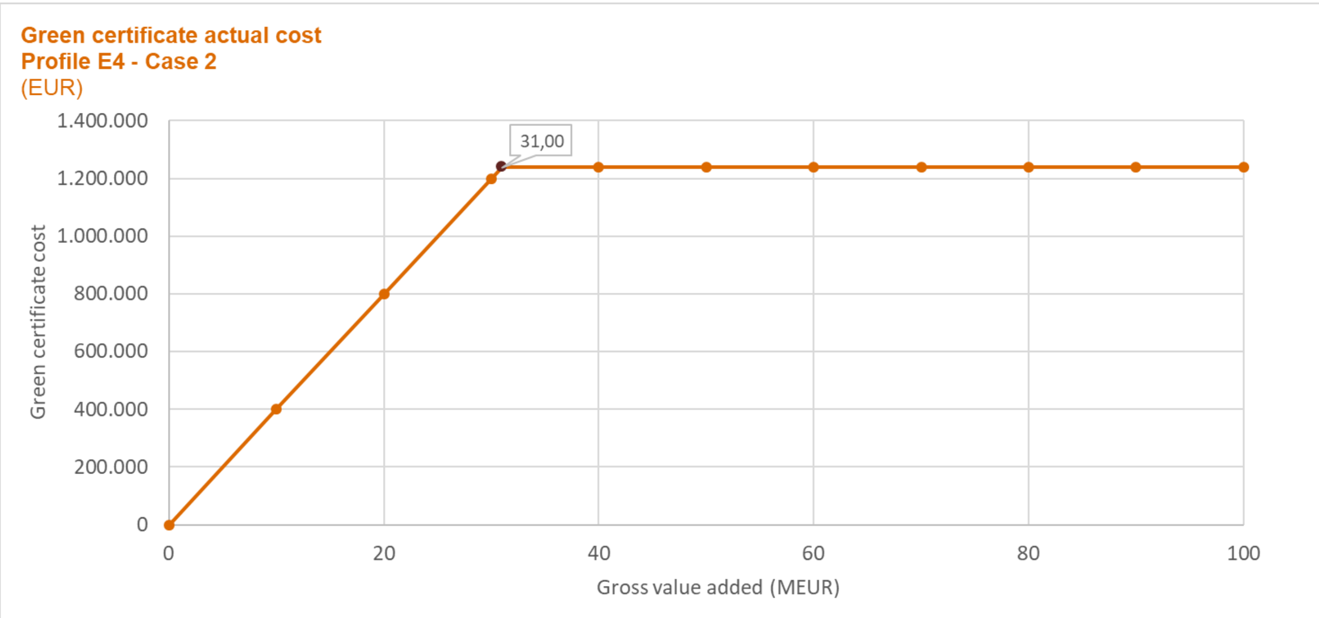
[276] This cost includes taxes, levies and certificate schemes

Figure 59: Green certificate 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 30.998.327 EUR.

Figure 60: Green certificate actual cost for profile E4 (Case 2)



KEY FINDINGS

The analysis of the E4 profile leads us to the following findings:

- A very important observation is the differences between the countries regarding the total (potential) invoices. The total invoice can vary between 22,56 MEUR and 83,20 MEUR depending on the country/region and the specific situation of the consumer.
- Across the three Belgian regions, Flanders is again the most competitive region before Wallonia and Brussels.
- ***Commodity costs*** represent the most significant component in E4 consumers' final bill – excepted for non-electro-intensive consumers in Germany. While Germany has the lowest fares for the commodity in front of France, 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. This reasoning holds even though the later countries already display relatively low network costs.
- ***All other costs*** span a vast range of potential levels all very different across countries. However, specific attention is born by Flanders, Germany, France and the Netherlands to electro-intensive consumers who 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 limit tax level variations between those different types of consumers.

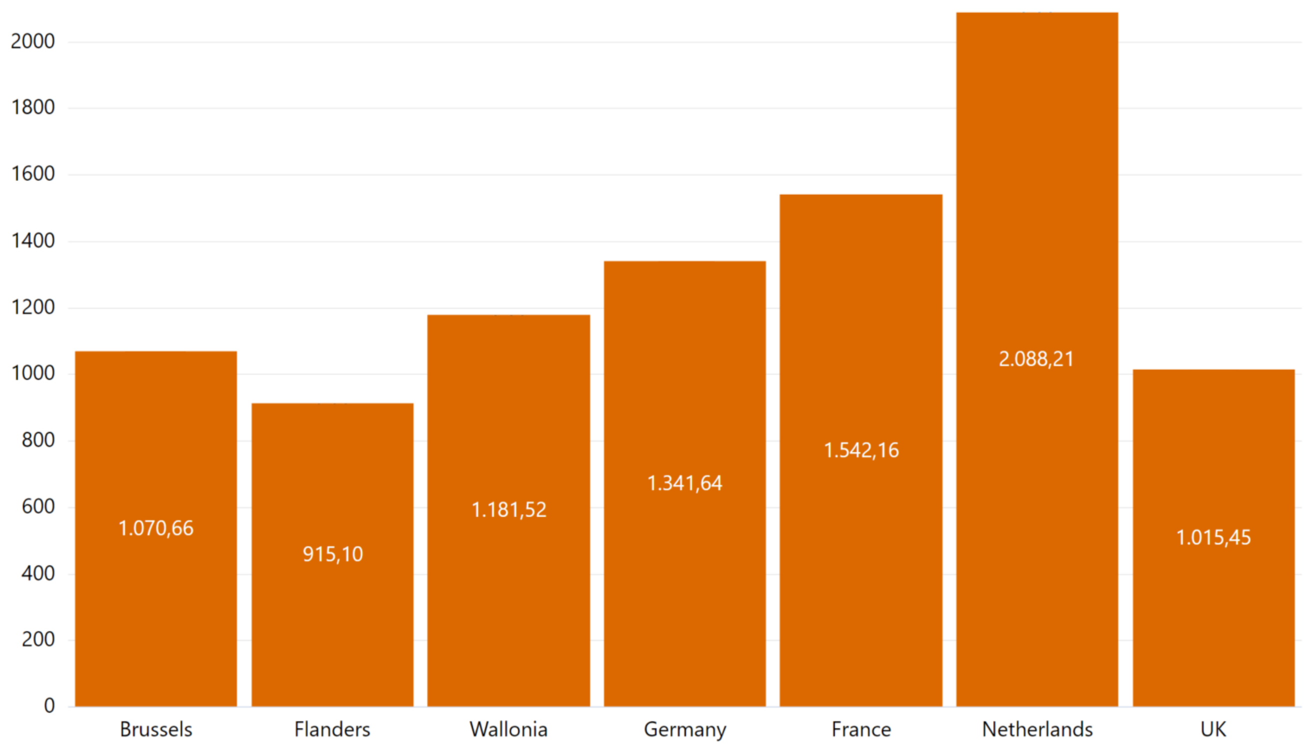
Presentation of figures (Natural gas)

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 countries and regions. The results are expressed in EUR/year.

Figure 61: Total annual invoice in EUR/year (profile G-RES)



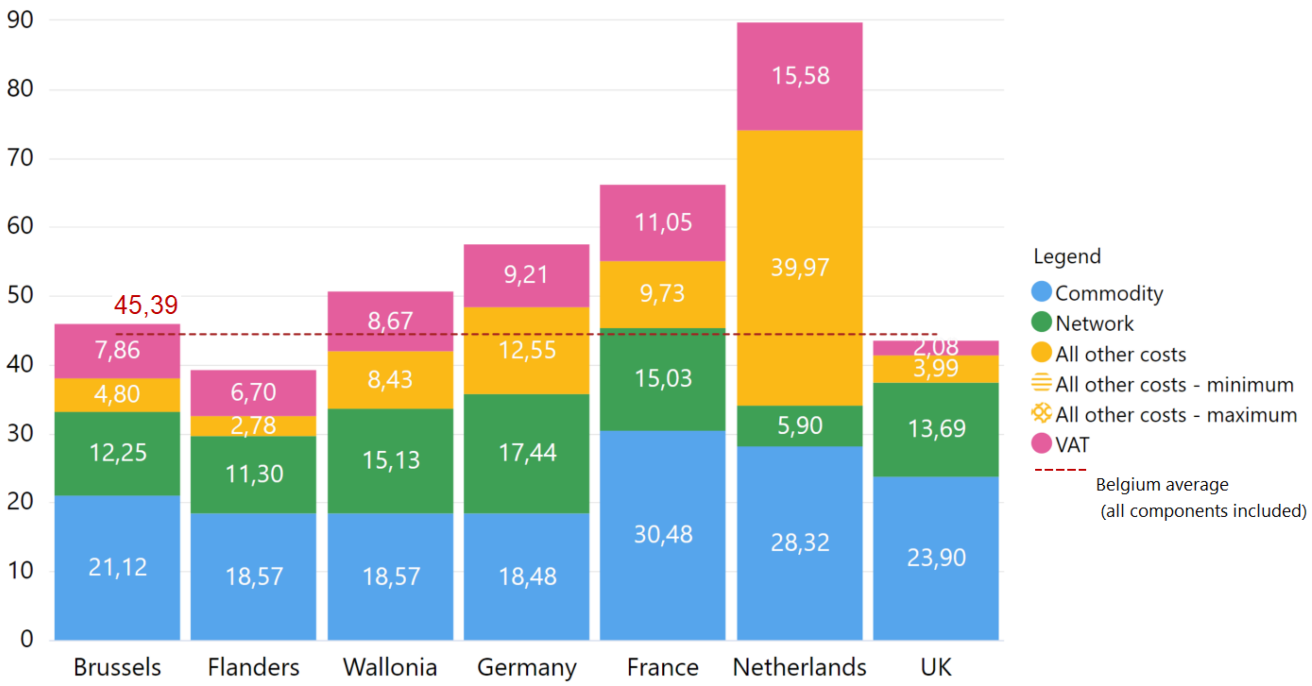
Similar to the electricity analysis, Belgium is split into three regions due to the existence of regional differences. While we have also taken regional differences into account for the other countries, only one weighted average cost is presented in the table.

As can be seen, Belgium displays relatively low residential natural gas prices, with Flanders (915 EUR/year) being the cheapest region - both within Belgium and all countries-wide before the UK (1.015 EUR/year) and Brussels. Furthermore, the total invoice across all Belgian regions is lower than in Germany, France and the Netherlands. The figure above undeniably illustrates that the Netherlands is the most expensive country when it comes to residential natural gas consumption with a total invoice twice as high as in the UK and Belgium.

Breakdown per component

The previous results are further detailed for profile G-RES in the underneath figure, which provides a closer look at the breakdown of the different price components.

Figure 62: Natural gas price per component in EUR/MWh (profile G-RES)



The first component that is observed is the ***commodity*** component[277], which reaches the lowest level in Germany but with all the Belgian regions close behind – especially Flanders and Wallonia. Belgium as a whole is less expensive than the UK, the Netherlands and France respectively in ascending price order. These countries lag behind with gaps from a minimum level of about +3 EUR/MWh (compared to Brussels) to a maximum level of approximately +12 EUR/MWh (compared to Flanders or Wallonia). The difference in commodity costs between Brussels and the other two Belgian regions comes from Engie's predominant market shares in the region, driving up prices with more expensive products. Apart from the cost for the pure commodity, these prices also include the supplier's margin, which tends to be relatively higher in the Netherlands and in France than in any other studied country.

For most considered countries, ***network costs*** represent the second-largest component of one's bill. Except for the Netherlands where such costs are negligible, all other countries have prices ranging from 11,30 EUR/MWh to 17,44 EUR/MWh. The Netherlands displays particularly low fares that are actually either fixed on an annual basis or depending on the consumer's connection. Therefore, they do not depend on the level of consumption. Within Belgium, Flanders appears as the cheapest region as opposed to Wallonia (nearly +4 EUR/MWh compared to Flanders). Besides, Brussels and Flanders both have the cheapest network costs compared to all other countries except for the Netherlands.

Considering the ***all other costs*** component, the Netherlands particularly stands out with tax levels about 4 times bigger than in Germany, the second highest taxing country. The reason behind such important prices is the Dutch Energy tax and ODE levies whose rates have greatly increased in recent years. The Belgian regions' taxes levels significantly vary, and it can be understood from Flanders' fares, which are about 3 times lower than in Wallonia,

[277] 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.

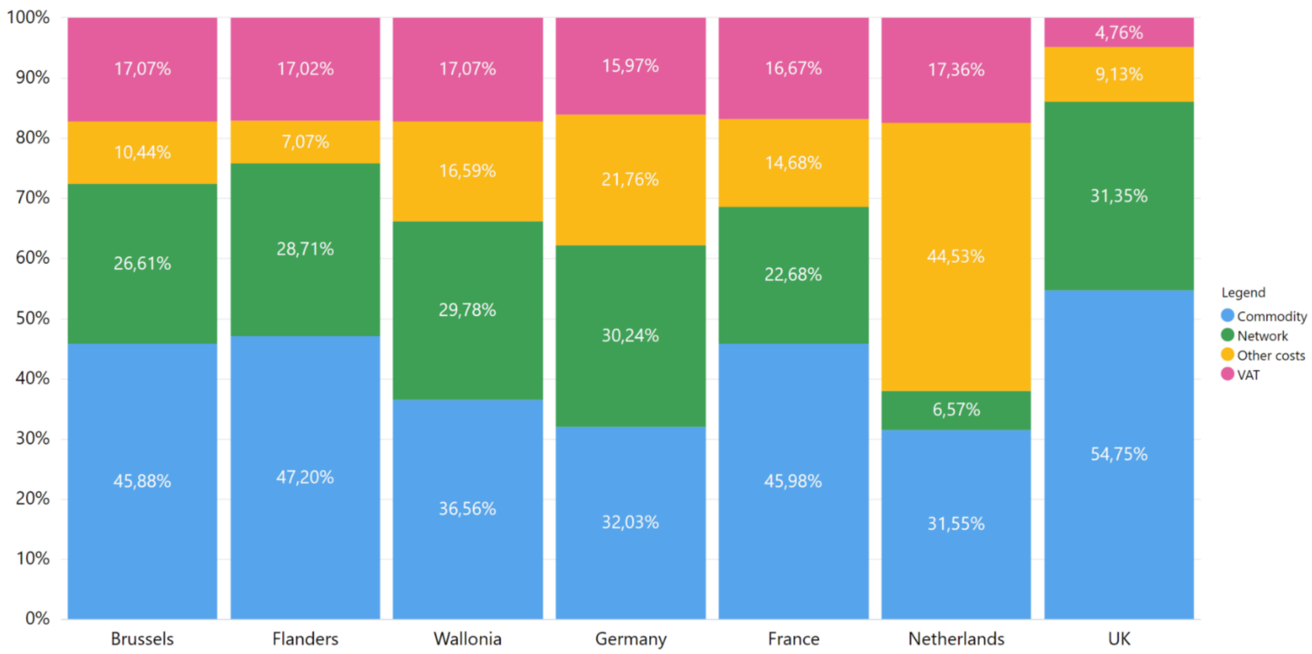
the most expensive Belgian region. This is mostly due to much higher surcharges and regional public service obligations fares in Wallonia.

Lastly, the ***VAT*** component jumps out in the Netherlands, given the fact that the taxable base is much larger than in other countries. On the other side, it is almost negligible in the UK due to the particularly low tax rate (5%). The proportion of this component is quite stable in Belgium, Germany and France whose rates vary between 19 and 21% VAT rate – although France imposes a 5% VAT rate on the consumer's subscription and CTA.

Proportional component analysis

The percentages of the costs for each component can be found in the underneath figure.

Figure 63: Proportional component analysis (profile G-RES)



The ***commodity*** component clearly has the biggest impact across all countries/regions, except in the Netherlands, where the taxes and levies component is the most important. That being said, the commodity component is responsible for 32,03% to 54,75% of the natural gas bill.

Furthermore, we can also deduct from the figure that the ***network costs*** are similarly important between Belgium, Germany and the UK, namely between 26,61% and 31,35% of the total price. This component is less consequent in France, with slightly more than a fifth of the final invoice and is almost negligible in the Netherlands.

The biggest variance between countries/regions is observed at the ***all other costs***[278] component level, which varies between 7,07% (Flanders) and 44,53% (the Netherlands). The latter country largely overruns countries under review as the comparative proportion is more than doubled in relation to the second-highest country's proportion (Germany). Since all the previously discussed components are very similar, the variation of this component might be the main driver of the lowest price of the country/region.

Lastly, the ***VAT*** tends to represent a comparable share in all countries' final invoice, except for the UK, where the low tax rate reduces its proportion (4,76%).

[278] This component consists of taxes and levies

KEY FINDINGS

The results reported above suggest the ensuing key findings regarding profile G-RES:

- The Netherlands has the highest annual invoice, being thus the most expensive country with regard to our G-RES profile. On the other hand, Flanders displays the lowest annual invoice but is closely followed by the UK. Across all regions, the biggest difference between Belgium and the UK are the taxes and levies as well as the VAT components.
- Flanders is clearly the cheapest Belgian region, followed by Brussels. This is mainly due to the lower network and taxes and levies components.
- ***Commodity costs*** constitute the major element of all countries for the residential natural gas bill of G-RES profile, except in the Netherlands. The highest prices are found in France and the Netherlands, whereas Germany, Flanders and Wallonia appear to be the cheapest for this component.
- Except for the Netherlands, ***network costs*** tend to be the second-largest component of residential consumers' invoice. While shares are relatively similar in Belgium, Germany and the UK (from 27 to 31%), this component is almost negligible in the Netherlands.
- The ***all other costs*** component varies the most between countries and regions and can be considered as the main driver for the total G-RES bill. This is illustrated by the significantly higher proportion taxes constitute in the Netherlands whereas the lowest annual invoice of UK is mainly due to the low ***VAT*** rate in force.

Profile G-PRO (Natural gas)

Total invoice analysis

The below figure provides a comparison of the total yearly invoice paid by a residential profile G-PRO in the different studied countries and regions. The results are expressed in EUR/year.

Figure 64: Total annual invoice in EUR/year (profile G-PRO)

For small professional profile G-PRO, Belgian regions occupy different comparative positions. Taken independently, Flanders and Brussels are the most competitive compared to all the other reviewed countries and regions, whereas Wallonia is only outperformed by the UK. Conversely, Germany, France and most especially the Netherlands are the most expensive countries.

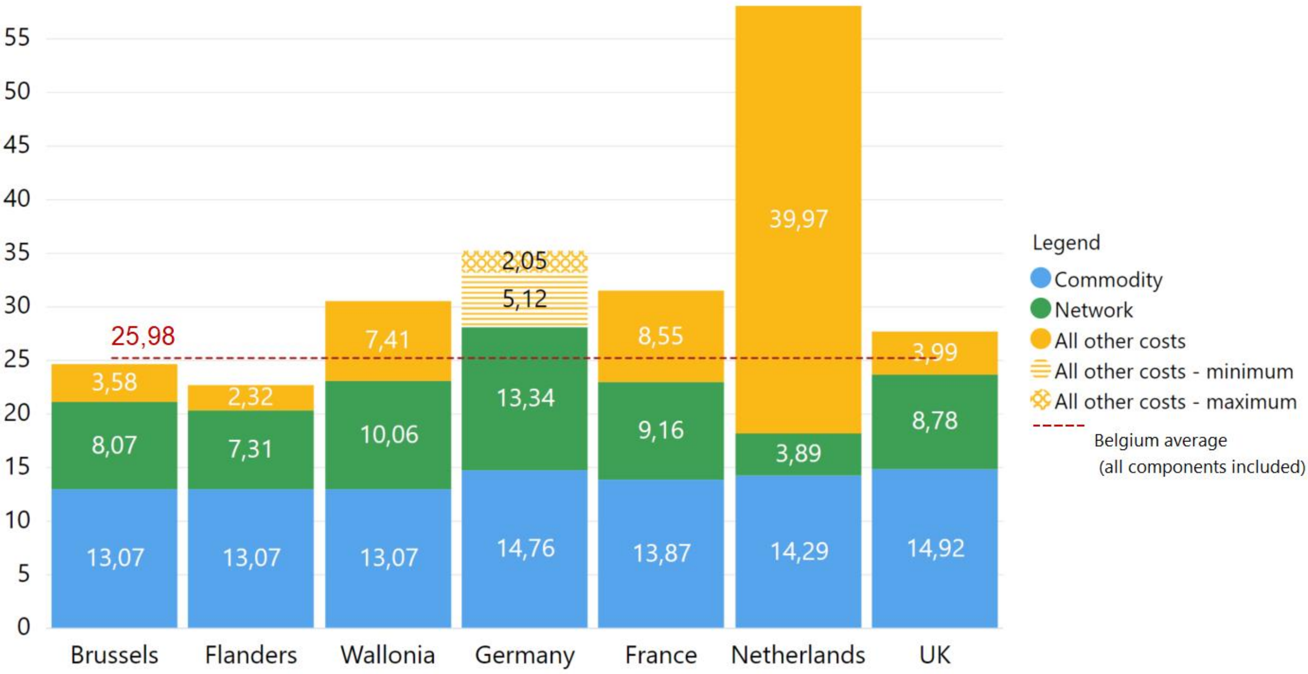
Three additional observations are to be drawn: firstly, regional variances in Belgium outlines peculiarities of each region where natural gas' bill is truly dependent on regional policies. Secondly, alike for G-RES profile, the Netherlands remains an outlier for G-PRO consequently too much higher taxing levels. Thirdly, Germany's price range comes from the potential reduction consumers may be granted on the *Energiesteuer*[279], as explained in our Natural gas section for Germany in "Component 3 – all other costs" (p.136). Regardless of that reduction, Germany remains the second most expensive country for this profile.

Breakdown per component

The previous results are further detailed for profile G-PRO in the underneath figure, which provides a closer look at the breakdown of the different price components.

[279] Conditions applying for consumers to benefit from such reductions are detailed in the corresponding section, Component 3 – all other costs, for Germany.

Figure 65: Natural gas price per component in EUR/MWh (profile G-PRO)



The first component that is observed is the ***commodity*** component, which is the cheapest in Belgium[280]. Nonetheless, differences between countries are very small with a maximum variation of 1,85 EUR/MWh between Belgium and the UK.

The ***network costs*** are negligible in the Netherlands and vary slightly more between countries and regions. In Belgium, the network costs are the lowest in Flanders and the most expensive in Wallonia (+3 EUR/MWh). Furthermore, the Belgian average network cost is lower than all the reviewed countries other than the Netherlands, reinforcing the Belgian global competitiveness. Since this difference in network costs was already observed for G-RES, comparative positions of the Netherlands again result in them being the most competitive country with regards to network costs. Interestingly, the Netherlands provides flat tariffs as they do not vary on the consumption level. As such, the higher the consumption, the more diluted the network costs. Conversely, Germany has the highest network costs from our panel of studied countries and regions.

The ***all other costs***[281] component spans the most significant differences across regions as observed for G-RES. Within Belgium, taxes levels demonstrate extensive discrepancies as Flanders displays about 3 times lower tax prices than Wallonia, the most expensive Belgian region. This is notably due to far more important surcharges and regional public service obligations fares in Wallonia. On another note, potential reductions applicable to the *Energiesteuer* in Germany explain encountered multiple possible end-prices for this component. However, this does not enable Germany to be as competitive as Flanders, the cheapest country taxes-wise, Brussels or the UK. The Netherlands displays particularly important taxes levels what undermines its global competitiveness.

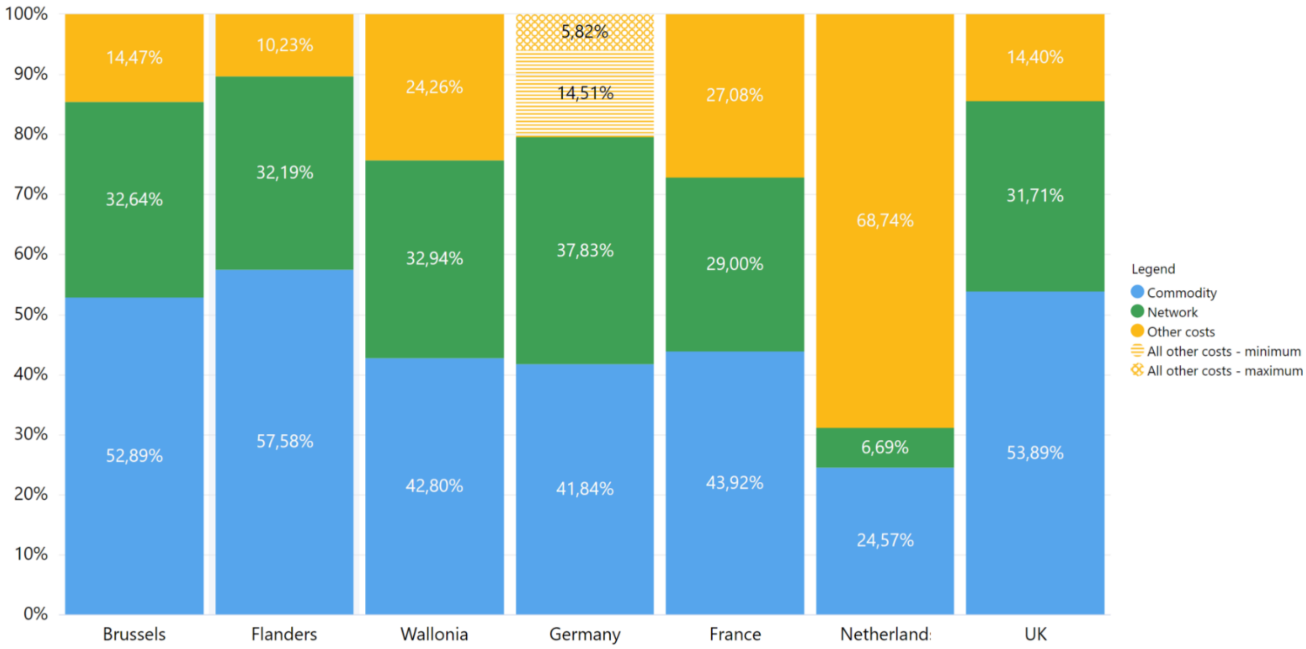
Proportional component analysis

The percentages of the costs for each component can be found in the underneath figure.

[280] This study estimated the Belgian commodity costs based on prices from the Zeebrugge trading hub. However, an analysis from the CREG highlights that about half (51,5%) of the Belgian industrial consumers' contracts use the TTF's (the Dutch trading hub) quotations, 26% use the Zeebrugge's quotations, 21% are fixed price contracts while only 1% of contracts use an oil-based (Brent) quotation (CREG, 2019).

[281] This component consists of taxes and levies

Figure 66: Proportional component analysis (profile G-PRO)



By far, the ***commodity component*** clearly weighs the most on G-PRO's final invoice as it is responsible for 41,84% to 57,58% of the total natural gas bill, except in the Netherlands (24,57%). In Brussels, Flanders, and the UK, commodity accounts for more than half of the total natural gas price.

Leaving the Netherlands out of the picture, ***network costs*** are very similar in total bill's proportion between countries/regions spanning from 29% to 37,83% of the final invoice – again, except for the Netherlands. For these countries, it makes up to around a third of the total annual bill. With 6,69%, the Netherlands displays the lowest network costs, strengthening thereby its competitive position.

The ***all other cost***[282] component varies significantly between countries and regions. On the Belgian level, we clearly observe that this component is the lowest in Flanders and the highest in Wallonia (more than two times higher) while Brussels displays the average price level. The figure above depicts the potential impact of taxes reductions that may apply in Germany as this component could represent either 14,51% or 20,33% of the global invoice. Due to particularly low network costs, taxes levels occupy a far more proportional share of the Dutch G-PRO profiles given the fact that commodity component is similar to other countries and regions when considered in EUR/MWh.

[282] This component consists of taxes and levies

KEY FINDINGS

The results reported above suggest the ensuing key findings regarding profile G-PRO:

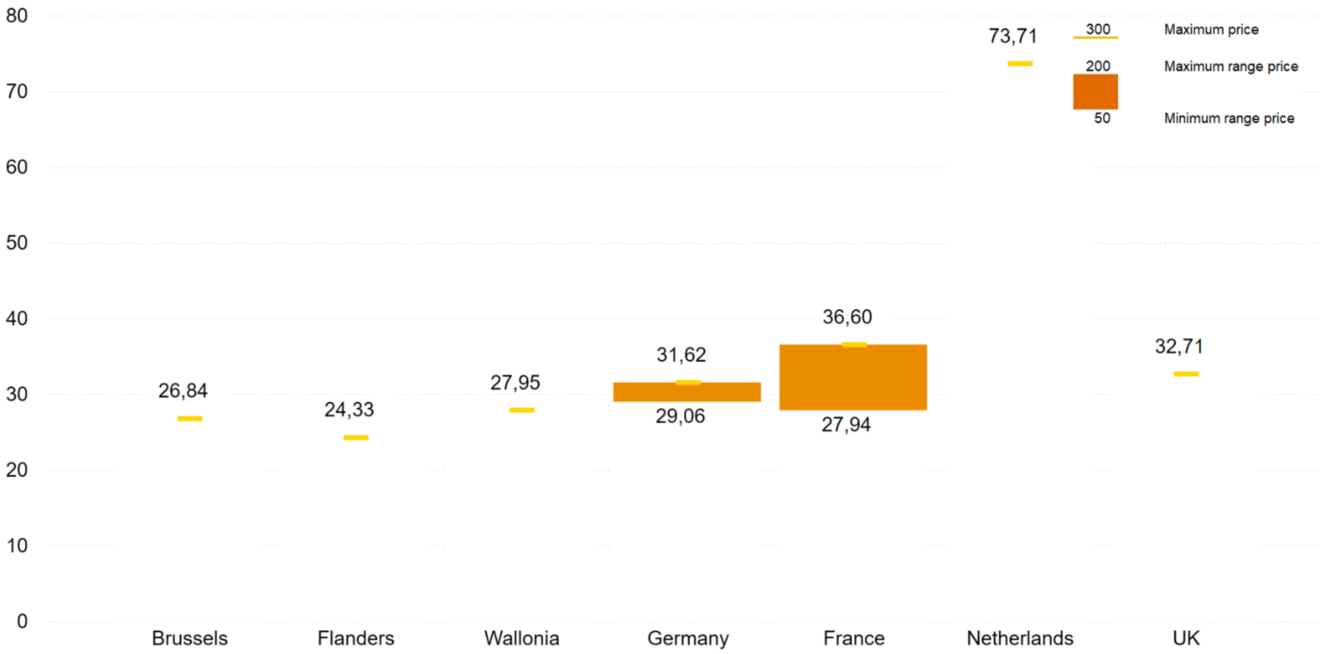
- The Netherlands has the highest annual invoice, which makes them the least competitive country with regard to natural gas prices for our G-PRO profile. On the other hand, Flanders has the lowest annual invoice, closely followed by other Belgian regions. This is mainly due to the differences in network and "all other costs" between regions.
- ***Commodity costs*** are the major element of the annual invoice in all studied countries, except the Netherlands. In Brussels, Flanders, UK, this has a weight above 50% of the final invoice.
- ***Network costs*** are relatively similar across all countries/regions, except in the Netherlands, and represents around a third of the annual invoice. The Netherlands displays relatively small network prices compared to the other countries of this panel.
- The ***all other costs*** component greatly differs amongst most countries and regions and can be considered as a driver with regards to price levels and competitiveness. Considering the results collected, Flanders' taxes pricing is the lowest within countries and regions under study. This enables the region to outperform other countries and turn into the most competitive region regarding natural gas prices for G-PRO profile. On the other hand, the Netherlands does not benefit from its low network costs to increase overall competitiveness as it counts extremely high taxes levels in comparison with other countries under review.

Profile G0 (Natural gas)

Total invoice analysis

The below figure provides a comparison of the total yearly invoice paid by an industrial profile G0 in the different studied countries and regions. The results are expressed in kEUR/year.

Figure 67: Total yearly invoice in kEUR/year for industrial consumers (profile G0)



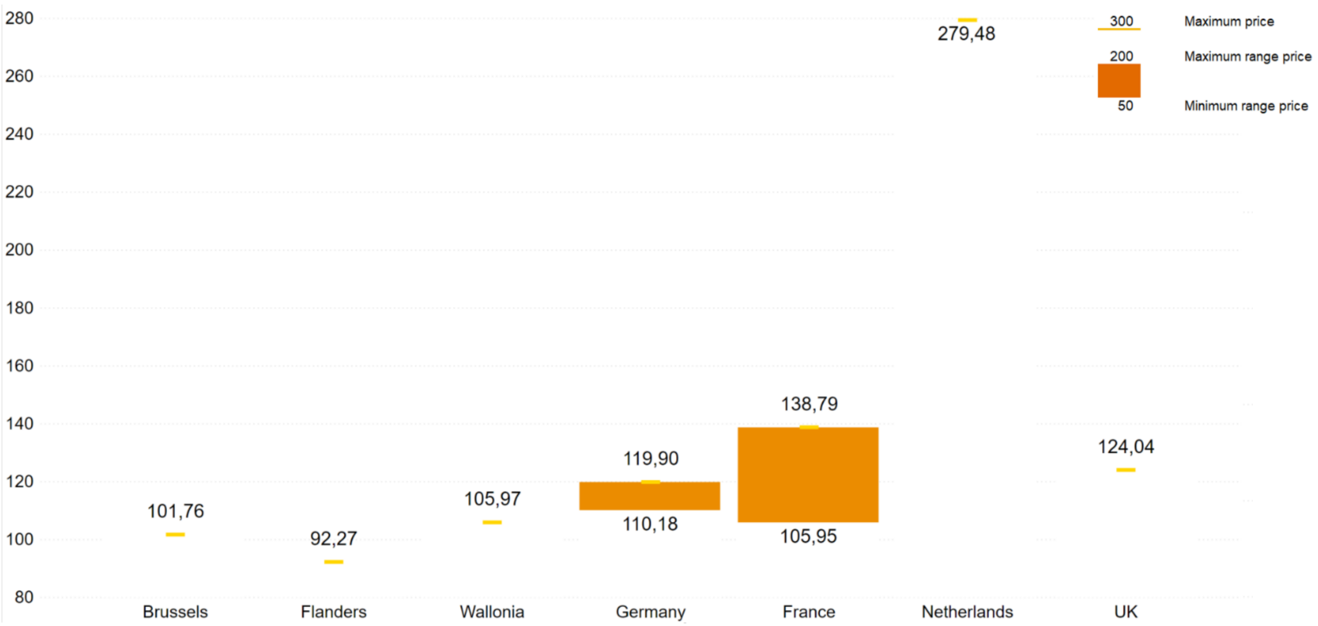
The above figure demonstrates that Brussels, Flanders and Wallonia present relatively low results compared to the other areas. France (except compared to Wallonia), Germany and the UK present slightly above average results while the Netherlands displays well beyond average with the highest rate of the studied regions at 73.600 EUR/year. This represents about 3 times Flanders' yearly bill, the cheapest among all studied countries and regions.

The Netherlands displays high prices because of significant taxation levels on natural gas consumption apply: the energy and ODE taxes both have rates that significantly increased in the past years. France demonstrates a range from 28 kEUR to 37 kEUR/year, potentially making it the second most expensive country.

Within the Belgian regions, Flanders certainly is the least expensive before Brussels (+10%) and Wallonia (+15%).

The second figure gives the Belgian average natural gas invoice. This figure aims at further easing the percentual price differences with other countries. 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.

Figure 68: Total yearly invoice comparison in % (profile G0; Belgium average 2020 = 100)

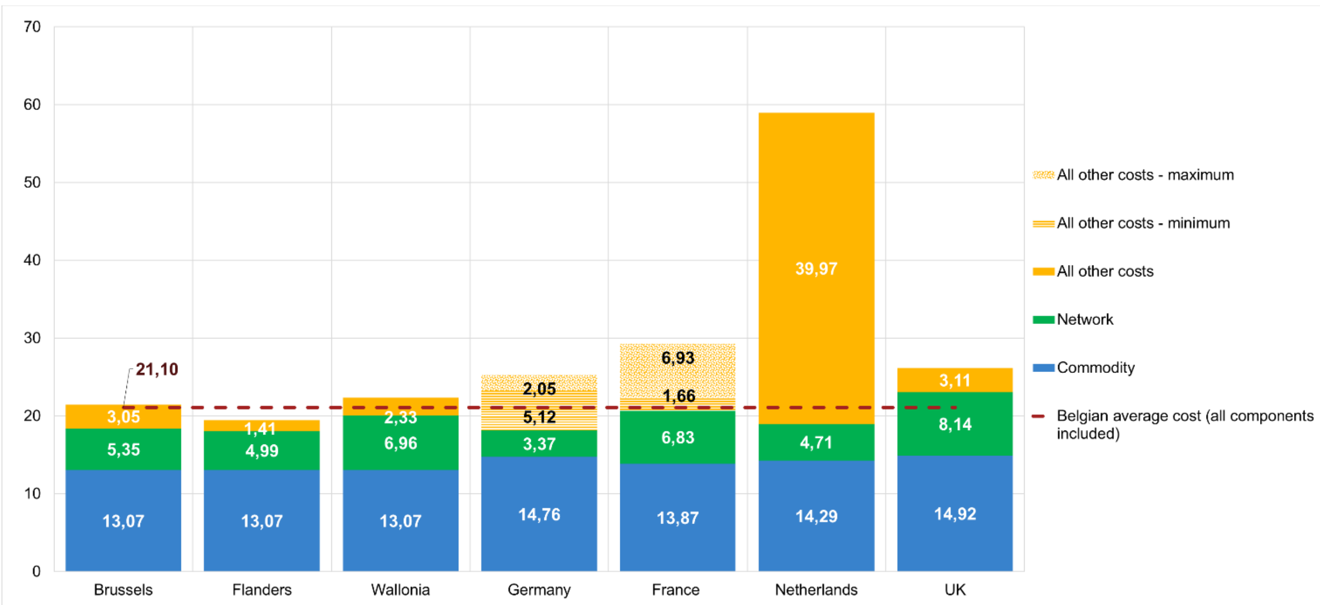


The above graph depicts some results mentioned previously. The yearly invoice in Flanders is 8% under the Belgian average, making it the cheapest region. The graph depicts more clearly the impressive invoice amount in the Netherlands: the Dutch invoice is 2,79 times higher than the Belgian average, whereas the maximum French price is 39% above the Belgian average and the minimum price is 6% above. Belgium is still the most competitive country for the G0 consumer and is followed by France (minimum option, Germany and the UK.

Breakdown by component

The previous results are further detailed for profile G0 in the underneath figure, which provides a closer look at the breakdown of the different price components.

Figure 69: Natural gas price by component in EUR/MWh (profile G0)



In this figure, the ***commodity price*** is the most critical cost component in the pricing structure, revealing no significant variations among areas. Belgium provides the lowest commodity price, whereas the UK, closely followed by Germany, displays the highest prices for the commodity[283].

Regarding ***network costs***, we notice two pricing groups: the Netherlands and Germany with values around 4 EUR/MWh and the other group – Brussels, Flanders, Wallonia, France and the UK – presenting a range from 4,99 EUR/MWh up to 8,14 EUR/MWh, the highest price being held by the UK.

When it comes to the ***all other costs*** component[284] consequential disparities are noticeable: from Flanders with solely 1,41 EUR/MWh up to the tremendous rate of 39,97 EUR/MWh in the Netherlands (*ODE* and the *energy tax*), far ahead from France when considering the maximum taxing option (8,59 EUR/MWh) due to the *TICGN* (that presents significantly reduced tariff resulting in a broad range when considering the maximum option) and the *CTA*. Germany is also eye-catching regarding this price component while all other areas show low taxes and levies rates.

KEY FINDINGS

The first industrial natural gas profile (G0) analysis leads to the following findings:

- The Netherlands distinctly appears as the least competitive country regarding the total invoice of natural gas for this type of profile, due to an impressive tax and levies burden (40 EUR/MWh). While Belgium is certainly the most competitive country, it is closely followed by France (minimum price option), Germany and the UK.
- Flanders is the cheapest region in Belgium before Brussels and Wallonia. This relative position is essentially due to lower taxes and levies, especially compared to Brussels.
- The ***commodity cost*** is a consistent cost element for all regions. Belgium displays the lowest fares before France. Conversely, the UK is the most expensive country in terms of commodity cost.
- ***Network costs*** seem to differ between regions and countries, but because of their weight in the total invoice, this tends to have a relatively lower impact compared to the “all other costs” component. German’s network costs are the lowest within the studied countries where the UK has the higher rates.
- The Netherlands, France and Germany display a relatively high ***all other costs*** component, lowering their competitive position. This component appears to be a significant differentiator for G0 consumption profile. In this regard, Wallonia and especially Flanders both indicate particularly low fares compared to other countries.

[283] The study estimated the Belgian commodity costs based on prices from the Zeebrugge trading hub. However, an analysis from the CREG highlights that about half (51,5%) of the Belgian industrial consumers’ contracts use the TTF’s (the Dutch trading hub) quotations, 26% use the Zeebrugge’s quotations, 21% are fixed price contracts while only 1% of contracts use an oil-based (Brent) quotation. (CREG, 2019).

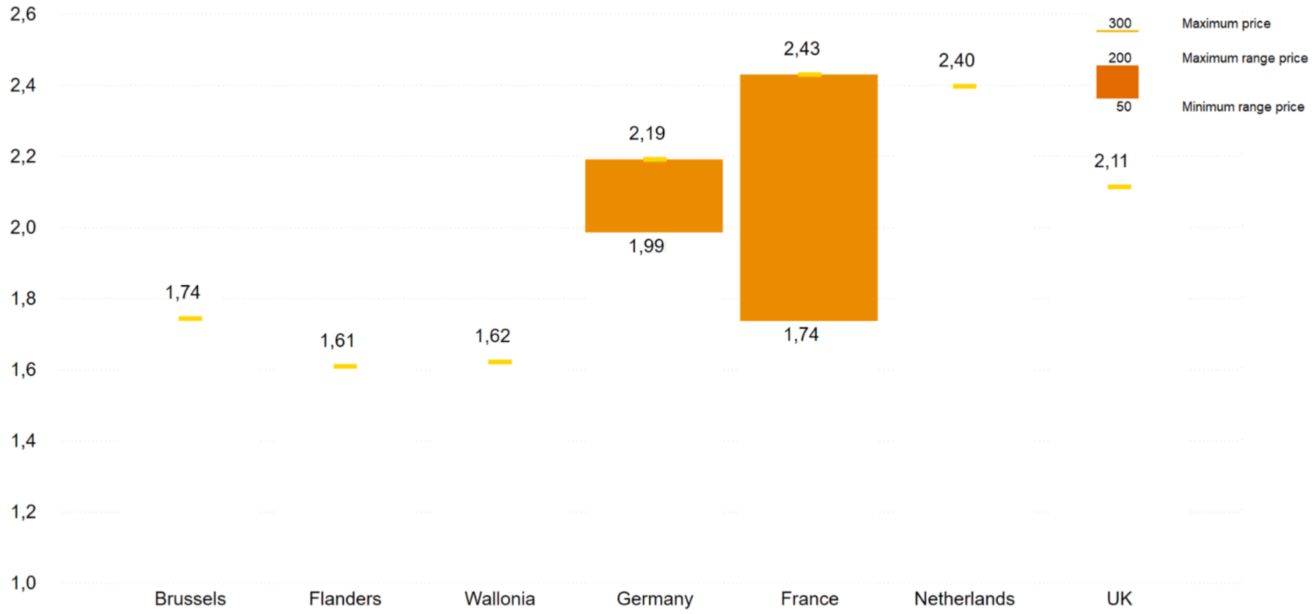
[284] This component consists of taxes and levies

Profile G1 (Natural gas)

Total invoice analysis

The below figure provides a comparison of the total yearly invoice paid by a residential profile G1 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.

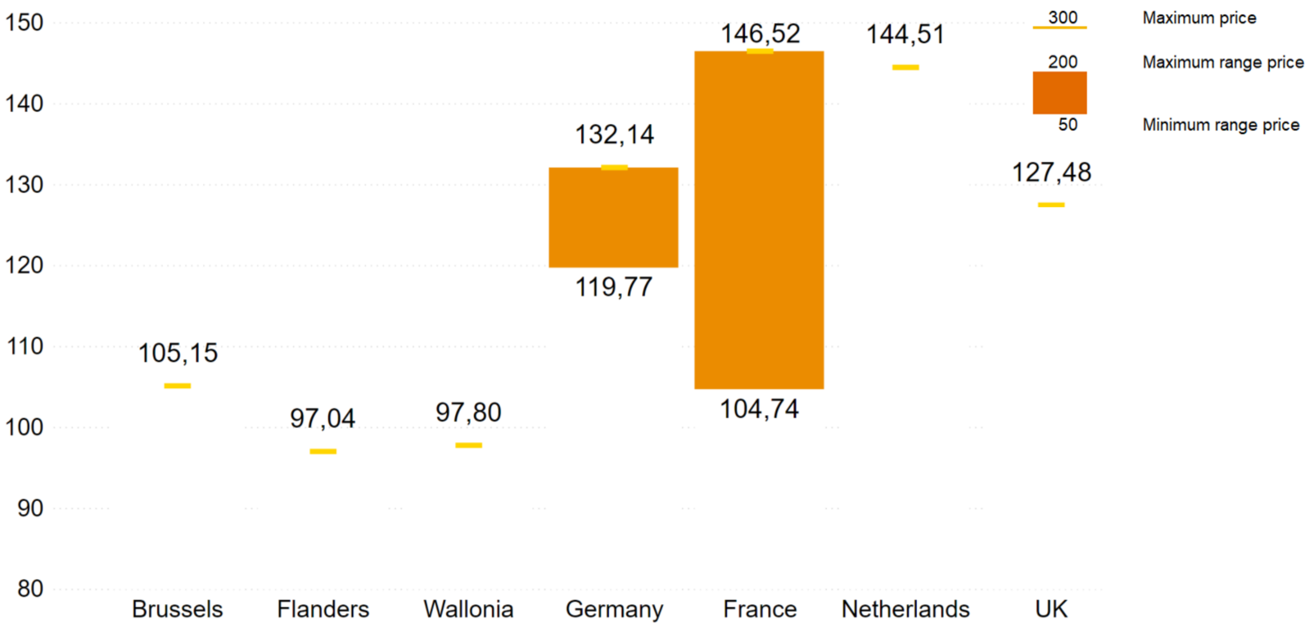
Figure 70: Total yearly invoice in MEUR/year for industrial consumers (profile G1)



Compared to the G0 profile, this consumption profile shows a more aggregated range of prices for the total annual invoice: there is apparently no outliers at first sight. The French range is very broad, and the maximum yearly invoice coincides with the Dutch price. Apart from France and the Netherlands ranges, all countries depict similar yearly invoice for this type of industrial consumer. For instance, Flanders and Wallonia present the lowest bill adjacent to Brussels' bill, respectively 1,61 MEUR/year (both Flanders and Wallonia) and 1,74 MEUR/year. As explained for G0, price ranges in France are due to variation in *TICGN* taxes depending on consumers' participation to sectors to carbon leaking for instance whereas, in Germany, this results from possible reductions on *Energiesteuer* depending on the use of natural gas.

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.

Figure 71: Total yearly invoice comparison in % (profile G1; Belgium average 2020 = 100)

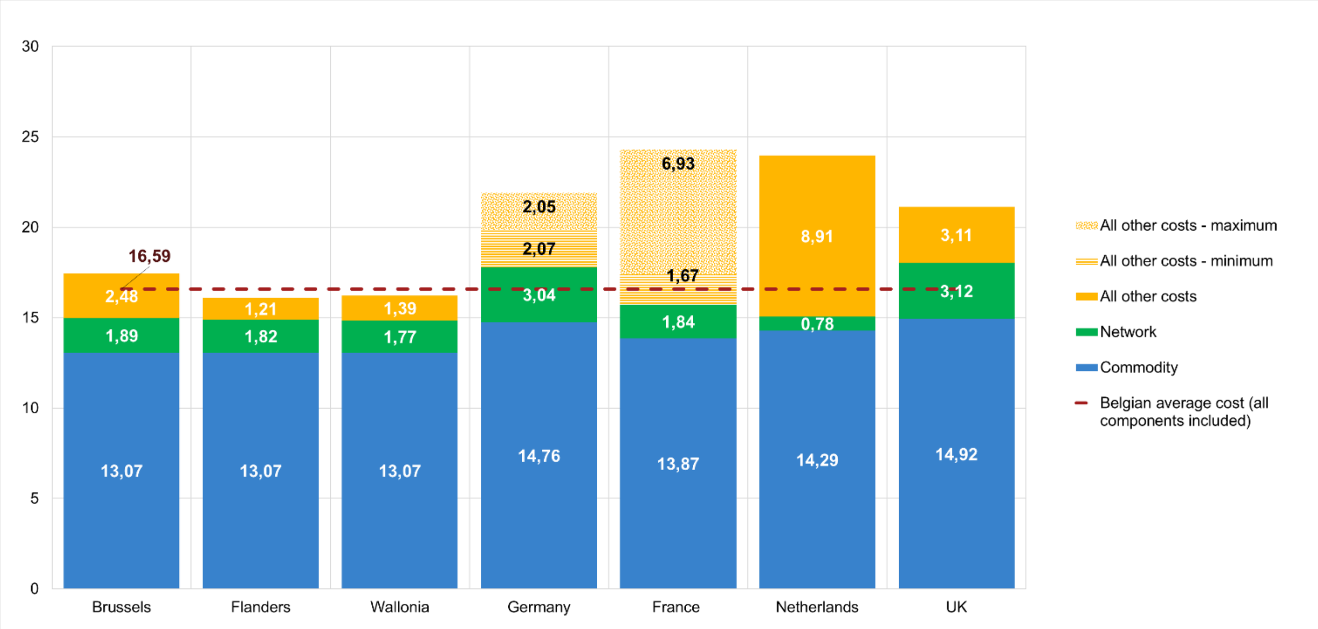


In a coherent manner with the previous graph, we observe that most of the countries lie above the Belgian average, by 4,74% to 46,52%. In this regard, Flanders and Wallonia are both cheaper in terms of a yearly natural gas invoice for profile G1. The same cannot be said for Brussels as France displays a minimum possible price that lies below Brussels' results. France's prices range may also make of the country the most expensive one compared to others slightly above the Netherlands, which used to be an outlier. From profile G1, consumers in the Netherlands start benefitting from the degressive nature of the Energy and ODE taxes. This is illustrated in the better relative position the country holds. Germany and the UK both displays average results compared to the Netherlands and France.

Breakdown by component

The previous results are further detailed for profile G1 in the underneath figure, which provides a closer look at the breakdown of the different price components.

Figure 72: Natural gas price by component in EUR/MWh (profile G1)



Similarly to what has been observed for the profile G0, ***commodity price*** is globally by far the essential component of the natural gas bill structure, being consistent across areas. Prices tend to converge between countries, although a difference of 1,85 EUR/MWh is estimated between the cheapest (Belgium) and the most expensive (UK) country in terms of commodity costs[285]. It can be observed that overall Belgium has a comparatively low commodity cost with all other countries.

In terms of impact on the total bill, ***network costs*** are proportionally less impactful for profile G1 compared to G0 and actually tend to be relatively low compared to the other cost components. However, these costs do present discrepancies among all studied areas as the lowest (in the Netherlands) are four times smaller than the highest costs (in the UK). Belgium displays relatively average network costs, with Wallonia being the cheapest.

As for the ***all other costs component***[286], substantial changes are notable as regards to the Netherlands, which display significant amounts related to this cost element with 8,91 EUR/MWh. Nonetheless, tax levels have largely decreased compared to the situation for profile G0. As for Germany and France, possible reductions on this cost element can greatly benefit consumers who apply for these reductions as it respectively halves or lowers by more than five times tax prices. Flanders and Wallonia both display the lowest tax levels, driving down natural gas prices.

[285] This study estimated the Belgian commodity costs based on prices from the Zeebrugge trading hub. However, an analysis from the CREG highlights that about half (51,5%) of the Belgian industrial consumers' contracts use the TTF's (the Dutch trading hub) quotations, 26% use the Zeebrugge's quotations, 21% are fixed price contracts while only 1% of contracts use an oil-based (Brent) quotation (CREG, 2019).

[286] This component includes taxes and levies.

KEY FINDINGS

The second industrial natural gas profile (G1) analysis leads to the following findings:

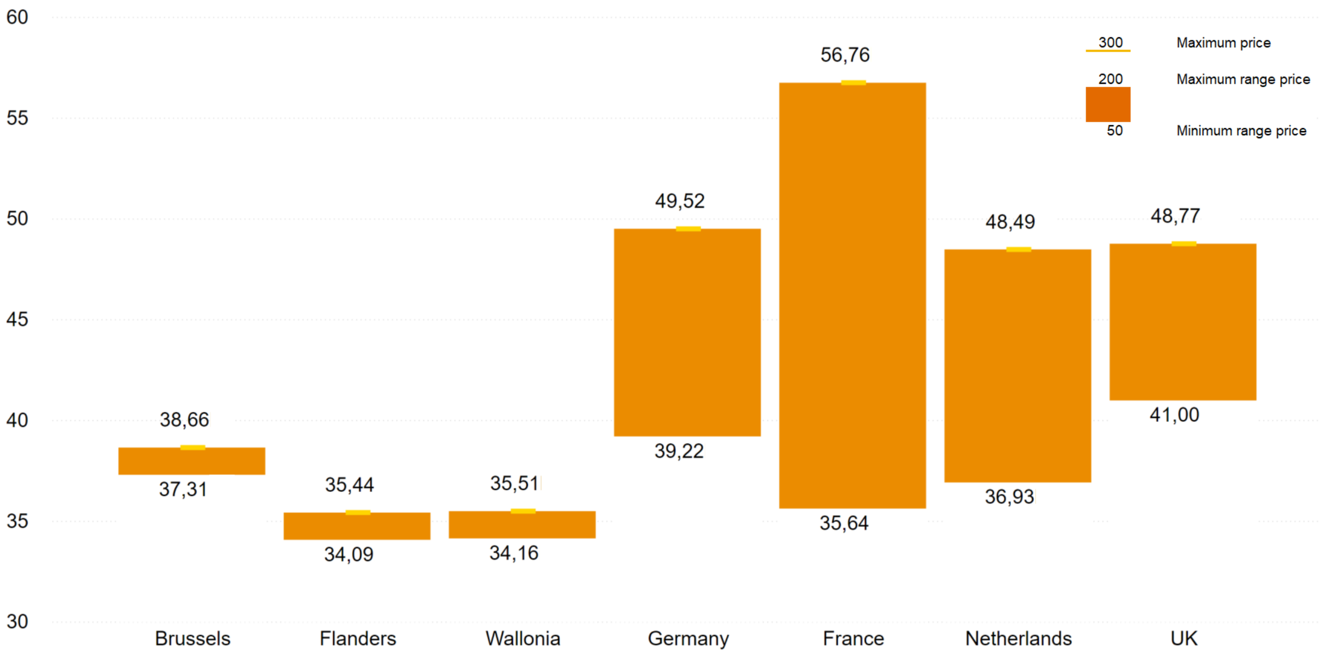
- Flanders and Wallonia distinctly appear as the most competitive country regarding the total invoice of natural gas price for this type of profile, this is the result of the amount of other costs charged in the other reviewed regions.
- Within Belgium, the global yearly bill is closely similar between Flanders and Wallonia. The gap is neater, though when comparing with Brussels.
- The ***commodity cost*** is certainly the most important cost component for all countries/regions. Together with the important share of **commodity cost**, price convergence on the commodity market in the UK, France, Germany and the Netherlands make for relatively small differences for countries/regions under review. Belgium displays the lowest fare for this component.
- ***Network costs*** appear to have a lesser impact in EUR/MWh when the highest values being worn by Germany and the UK is of about 3 EUR/MWh. Conversely, the Netherlands is the most competitive country in terms of network costs.
- ***All other costs*** component tends to have limited impacts on countries such as Belgium, the UK and Germany to some extent. Nonetheless, this component still determines the positioning position of a country or region regarding the total bill. In this perspective, the Netherlands and France – potentially – are the most likely to suffer from high tax levels.

Profile G2 (Natural gas)

Total invoice analysis

The below figure provides a comparison of the total yearly invoice paid by a residential profile G2 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 73: Total yearly invoice in MEUR/year for industrial consumers (profile G2)

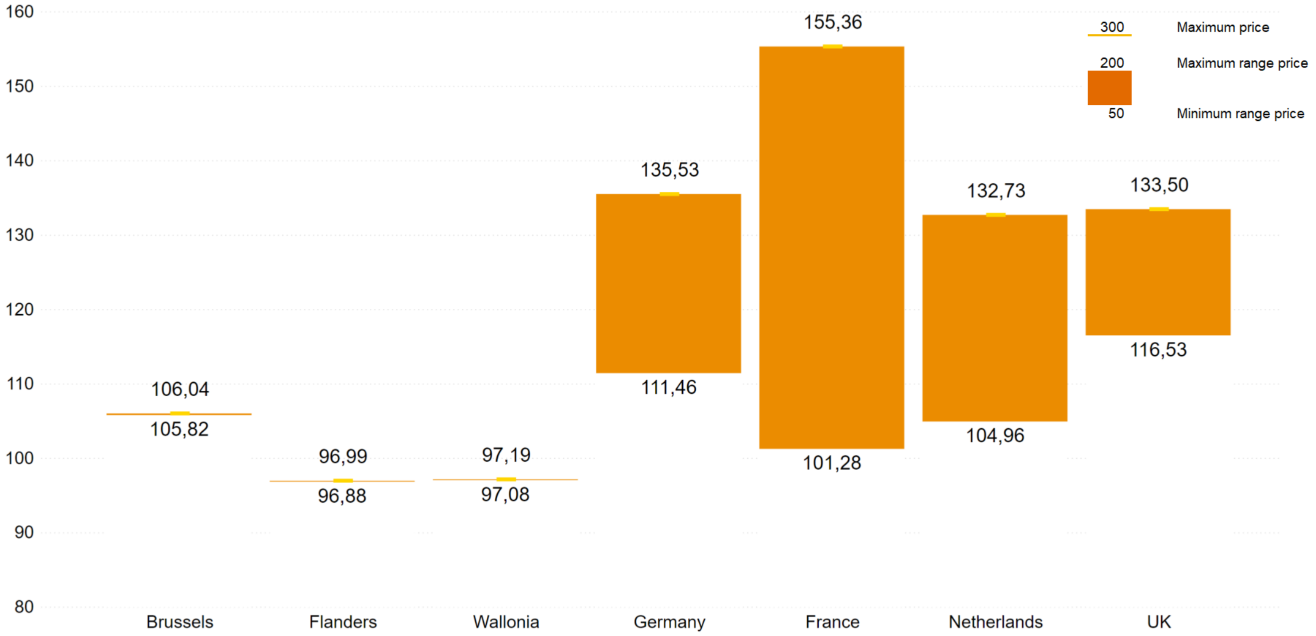


Similarly, to findings for lower consumer profiles, Flanders and Wallonia display the lowest prices for G2 consumers' annual bill. France (lowest option) and the Netherlands eminently display analogous values which vary between 35,64 MEUR (France) and 36,93 MEUR (the Netherlands). The ranges displayed by Germany, France, the Netherlands, and the UK are noteworthy, which is less the case in Wallonia, Flanders and Brussel.

A general conclusion can be drawn from this analysis. Price ranges are now presented in all countries and regions as they all grant the possibility for feedstock consumers to be exempted from specific taxes. In consequence, a global decrease in relative bills can be expected for these consumers while enlarging ranges in countries where reductions already applied for other profiles.

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.

Figure 74: Total yearly invoice comparison in % (profile G2; Belgium average 2020 = 100)

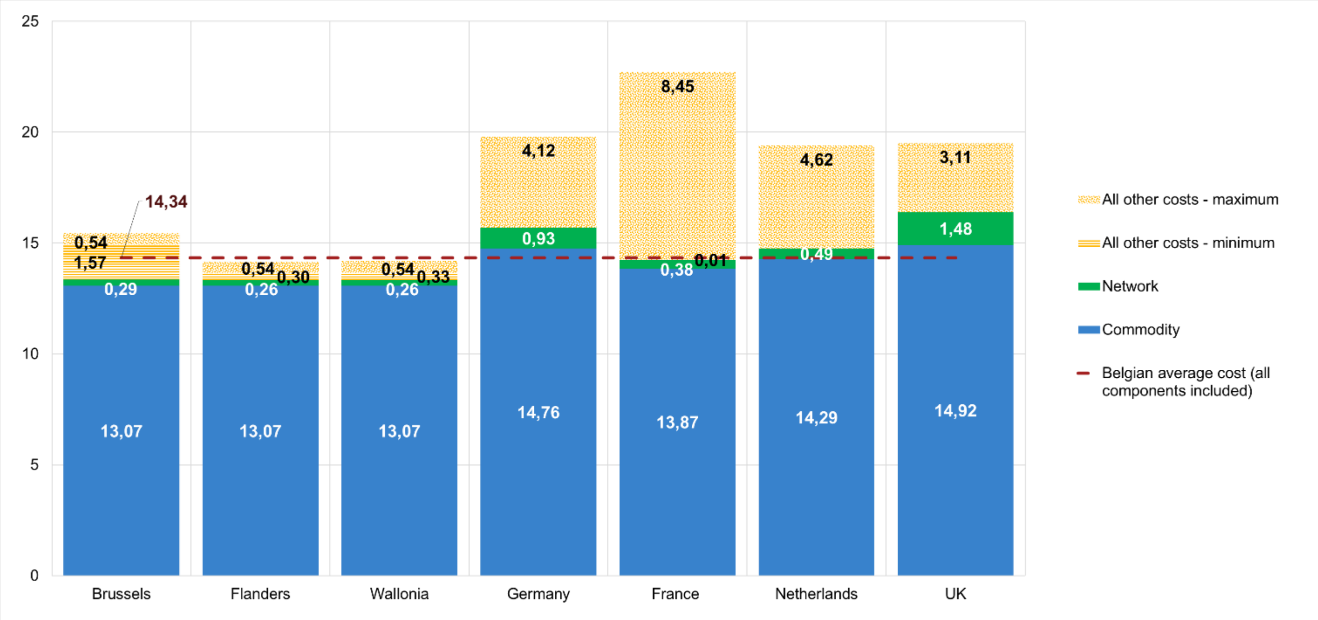


Flanders and Wallonia are strictly more competitive than other considered countries and regions when talking about natural gas total invoice even for feedstock consumers. Depending on possible exemptions in France and the Netherlands, the same statement cannot hold for Brussels where taxes have deteriorated their relative position compared to other Belgian regions. As mentioned above, France has a very broad 53% range difference between its maximum and its minimum invoice. Consequently, feedstock consumers might benefit from substantial taxes reduction as opposed to other consumers. The UK's, Germany's and the Netherlands' maximum invoice are all around 33 to 36% above the Belgian average. Again, Dutch large natural gas consumers benefit from the degressive nature of the Energy and ODE taxes whose impact lowers with higher consumption levels. Besides, feedstock consumers may be granted a complete exemption on taxes. This is illustrated in the better relative position the country holds. Yet, this does not make it up to obtain lower prices than in Belgium as a result of higher commodity and network costs.

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 75: Natural gas price by component in EUR/MWh (profile G2)



Commodity costs keep constituting the most critical bill component regardless of the country considered. Indeed, it might represent more than 90% of the total cost structure, e.g. for Brussels, Wallonia and Flanders. Furthermore, prices tend to converge between countries, although a maximum difference of 1,85 EUR/MWh is estimated between the cheapest (Belgium) and the most expensive (UK) country. Overall Belgium has the lowest commodity costs across all countries[287].

Networks costs have a relatively negligible impact on the total invoice in each region. Again, all three Belgian regions display the lowest prices for network costs, which may further reinforce Belgium's competitiveness in terms of natural gas prices for G2 profiles, given their substantial consumption levels. The difference in network prices in Belgium even though we assume consumers are directly connected to the TSO Fluxys lies in the difference in the type of natural gas used. Given that prices are charged differently according to the type of natural gas (L-gas and H-gas), this impacts the final amount. The highest network costs are to be found in Germany and the UK.

The ***all other costs***[288] component has a far more important contribution to consumers' bill depending on the country scrutinised. Globally speaking, all three Belgian regions have relatively low tax levels. However, they all have displayed an incompressible minimum tax amount. This results from the Belgian federal contribution (*cotisation fédérale*) from which no exoneration may be granted even though it is capped at 750.000 EUR/year. Besides, Wallonia (*redevance de raccordement*) and Brussels (*redevance de voirie*) both have additional taxes where minimum tax rates apply. Only France and Germany – as considerably low that it cannot be represented on this chart - also face such a situation even though minimum tax levels are much lower than the Belgian ones. As for the Netherlands and the UK, feedstock consumers may be totally exempted from taxes. If these exemptions tend to ease the tax burden on feedstock consumers, other consumers potentially face large taxes levels – especially in Germany (8,45 EUR/MWh).

[287] This study estimated the Belgian commodity costs based on prices from the Zeebrugge trading hub. However, an analysis from the CREG highlights that about half (51,5%) of the Belgian industrial consumers' contracts use the TTF's (the Dutch trading hub) quotations, 26% use the Zeebrugge's quotations, 21% are fixed price contracts while only 1% of contracts use an oil-based (Brent) quotation (CREG, 2019).

[288] This component includes taxes and levies.

KEY FINDINGS

The biggest industrial natural gas profile (G2) analysis leads to the following findings:

- Flanders and Wallonia distinctly appear as the most competitive regions regarding the global bill of natural gas price for this type of profile. Respective minimum and maximum price differences might range from about +4% to +60% when comparing both Belgian regions to other countries. These lower total bills come even if other countries provide complete tax exemptions for feedstock consumers.
- Differences are marginal when it comes to comparing Flanders' and Wallonia's yearly bills as both display quasi identical fares, making them both the cheapest regions in Belgium.
- The ***commodity cost*** is certainly the most important cost element for all regions, accounting for up to more than 90% of the total invoice for the G2 profile. Belgium displays the lowest commodity costs among all studied countries whereas, although higher, price convergence on the commodity market in the UK, France, Germany and the Netherlands make for relatively small differences.
- ***Network costs*** appear to have a relatively lower impact for most countries and regions. However, Germany and the UK appear as outliers with regards to this component with higher fares. Conversely, Belgium displays the lowest prices.
- ***All other costs*** may lead to significant variations, potentially being a decisive factor in determining a country's competitiveness in terms of natural gas prices. While all countries integrate exemptions on specific taxes for feedstock consumers, only the Netherlands and the UK allow for complete tax-free invoices. Considering the high levels that can be displayed by countries such as Germany or France, non-feedstock consumers are far more impacted by national taxing regimes.

7. Energy prices: Conclusions

7. Energy prices: Conclusions

In general, large differences are observed in the total invoices between countries as well as between the electricity and natural gas invoices. Here below, we present conclusions, for electricity and natural gas, that can be drawn from the results observed previously. At last, we synthesize results from chapter 6 through the use of scorecards in order to ease the comparison of prices across countries and for all studied profiles.

Electricity

Residential and small professional consumers

1. The electricity prices for all three profiles investigated are relatively high in Belgium. This can be explained by significant network costs and/or high taxes. While Wallonia is the most expensive region in Belgium for profiles E-RES and E-BSME, Flanders is the most expensive with regards to E-SSME. While Wallonia's higher prices are driven by the network costs, Flanders' higher taxes, levies and surcharges (both public service obligations on the local transmission grid and the distribution grid) are responsible for the regions' greater prices. Conversely, Brussels is always the cheapest region of all three due to a lower "all other costs" component.
2. Significant differences in electricity prices can be found amongst the studied countries. Residential consumers in Germany pay the most for electricity. They actually pay nearly twice as much as residential consumers in the Netherlands do. Albeit a smaller difference than for residential profiles, both small professional consumers profiles in Germany pay more than in any other countries or regions.
3. Analysing the cost per MWh leads to the understanding that small professional consumers usually pay less than residential users. This can be partly explained by the VAT, which is not considered for professional users in this study. However, in Belgium, the voltage level also plays a role as E-RES and E-SSME are connected to the same voltage level and display similar fares whereas E-BSME has lower rates and is connected to a different voltage level. In most regions, the higher the profile (i.e. E-BSME is considered the highest), the cheaper the commodity component. Residential consumers thus pay the most per MWh. Globally speaking, this statement also holds for the network costs that are also lower with the higher-profile - except for Brussels and the UK - although to a more limited extent.

Industrial consumers

1. Commodity cost comes as a very important component – even the most predominant from profile E0 except for Germany. Apart from the UK, Belgium displays the most expensive commodity prices in 2020. Conversely, German industrial consumers benefit from the lowest commodity prices before France. Network costs constitute the lowest share of consumers' bills. Reductions granted on network costs for electro-intensive consumers lower consumer's bills and strengthen countries' competitive positions as Germany passes from the most expensive country (E0 to E2) to the least expensive country (E3 and E4). Other countries (France and the Netherlands) applying these reductions also reinforce their competitive position even though they already had relatively low network costs. Belgium is competitive but gets outperformed by countries where reductions apply. The "all other costs" component accounts for a significant part of consumers' final bills. The higher the profile, the lower the tax burden even if this applies disproportionally depending on the consumer's electro-intensity. As such, countries and regions (Flanders, France, Germany and the Netherlands) that have designed a mechanism to support electro-intensive consumers display lower fares, the cheapest being France and the Netherlands. While Belgium

is in line with other countries when it comes to non-electro-intensive consumers, Brussels and Wallonia are potentially not as competitive as Flanders concerning electro-intensive consumers. Nonetheless, this gap shrinks as the consumer profile gets bigger.

2. In terms of overall competitiveness, all countries under review (except the UK) can offer lower total prices than the three Belgian regions for four out of five consumer profiles. This only applies when considering electro-intensive consumers in Germany and France; profile E0 remains the sole profile for which Germany certainly displays higher prices than Belgium. However, Flanders can offer lower prices than Germany for two out of five profiles (E0 and E1) for electro-intensive consumers thanks to its cap on the financing of renewable energy. Belgium – with Flanders frequently being the cheapest region - is more competitive when it comes to non-electro-intensive consumers given that only the Netherlands can always offer lower prices. Besides, prices in Belgium for very large baseload consumers (profile E4) are comparatively more competitive than for smaller consumers (profile E1). In other words, the higher the electricity consumption is for a company in Belgium, the more competitive the prices on the Belgian market are, which holds for other studied countries.

3. Aside from profile E0 and E2, the United Kingdom represents an outlier for total electricity prices for industrial profiles as it displays the higher prices (German non-electro-intensive prices excluded). This essentially – but not entirely - comes as a result of higher commodity prices. To a lesser extent, the other two components (network costs and taxes, levies and certificate schemes) also play a role in undermining the UK's relative competitivity in terms of electricity prices.

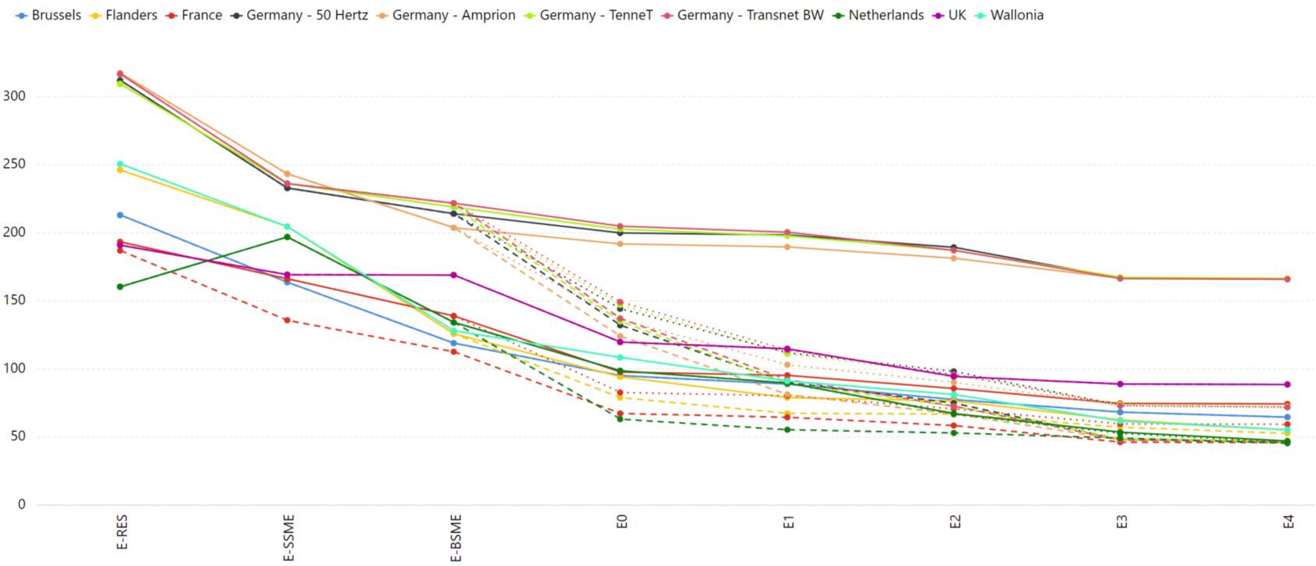
   Every government from all countries under study intervene to lower the electricity cost for some categories of large industrial consumers. These interventions mainly occur on three components: commodity (France), transmission (Germany, France and the Netherlands) and most importantly taxes, levies and certificate schemes (Belgium, UK, Germany, France and the Netherlands). In the case of France, high market prices led to an intervention on commodity prices (ARENH), unique country to do this in our panel.

Summary

The below figure depicts the global trend followed by yearly electricity bills once considered across all countries and regions simultaneously. In Figure 76, solid lines may represent three different kind of prices depending on countries[289]: 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.

[289] 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 76: Electricity yearly bill in EUR/MWh per profile



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. This reflects a cost burden transfer from large consumers to small consumers. The only exception lies in the Dutch E-SSME profile whose fares are higher than residential consumers'. Then, as identified by the splitting of lines (i.e. multiple pricing possibilities) from profile E0, taxing mechanisms 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 prices from most studied countries and regions. Overall, France is the only country to differentiate all profiles as prices differ on selected pricing options as of consumer E-RES.

Natural gas

Residential and small professional consumers

1. Commodity costs represent a very significant part of the natural gas invoice, and their relative importance is larger than for electricity. Proportionally, network costs usually constitute the second-largest component of consumers' bills after commodity costs – except in the Netherlands where it is the smallest. Germany displays the most expensive fares. Belgium has average prices, and Flanders is the cheapest Belgian region. As for taxes, the Netherlands offers particularly high fares compared to other studied countries. Globally speaking, Belgium offers relatively low fares – Flanders being the cheapest region of all. One can observe that, in comparison with electricity prices, taxes on natural gas are particularly low.
2. The natural gas prices for all three profiles investigated are relatively low in Belgium compared to other countries. This can essentially be explained by the low commodity prices – specifically for residential consumers (G-RES) - and low taxes – regarding small professionals (G-PRO). Significant differences are to be noticed between the Belgian regions. Flanders comes as the least expensive region for natural gas in Belgium, followed by Brussels and then Wallonia. These differences are mostly due to variances network costs and taxes between the regions.
3. Large differences in natural gas prices also reside across countries under review. British residential consumers pay about twice less than similar consumers do in the Netherlands. While the average price per unit of energy consumed (i.e. EUR/MWh) diminishes from residential to small professional

consumers, the price difference between the average Belgium price and neighbouring countries – excepting France – widens.

4. When comparing the costs per MWh, small professional users generally pay less than residential users. This is partly explained by the VAT, which is not a real cost for professional users. Besides, all countries display a lower commodity component for professional users than for residential users, even though the differences are smaller than for electricity. While the network costs are also generally lower per MWh for small professional consumers, the taxes - excluding VAT - are similar for both considered profiles.

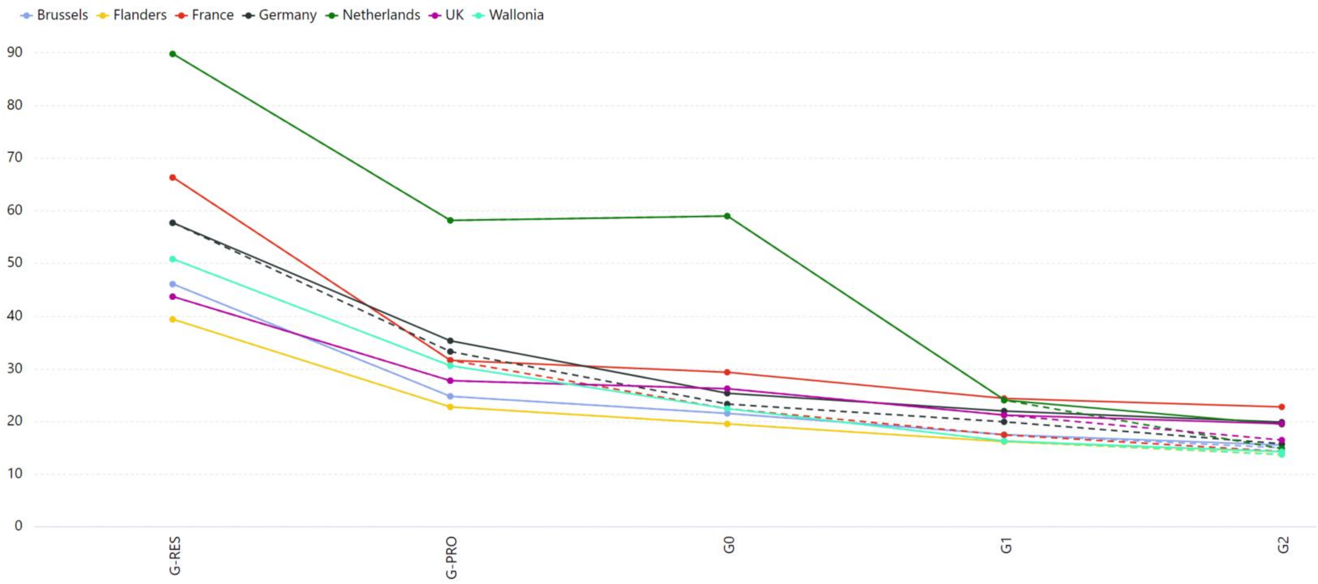
Industrial consumers

1. As for residential profiles, the commodity component makes up for a significant share of the total natural gas bill. Yet, prices in Belgium, France, Germany, the Netherlands and the UK makes for relatively small differences between the countries and regions considered. In 2020, Belgium displays the cheapest commodity costs amongst the countries under review. However, the differences in commodity prices observed are, in any case, not as significant compared to electricity. In terms of network costs, Germany (except for G0) and the UK are rather expensive compared to other countries whereas the Netherlands is the cheapest country – except for G2 where Belgium has the lowest fares. Taxes' contribution to consumers' yearly bills is variable across countries: Belgium usually has the smallest costs, whereas the Netherlands offers the highest fares compared to neighbouring countries. Yet, profiles G1 (Germany and France) and G2 (all countries) can observe significant tax reductions or even exemptions that drastically lowers the tax burden. Again, tax levels on natural gas are much smaller than those observed on electricity.
2. For industrial consumers not using natural gas as raw material, regardless whether they are large or very large consumers, Flanders and Wallonia offer the most competitive total prices when it comes to profiles G1 and G2. As for G0, Flanders remains the least expensive region across all countries and regions considered. Concerning very large feedstock consumers using natural gas as a raw material (profile G2), small competitive advantage against competitors from studied countries can be spotted for Flanders and Wallonia as they display lower total prices for these consumers before France and the Netherlands even though Belgium does not exempt feedstock consumers from all taxes as opposed to the Netherlands. However, this advantage could be limited given the convergence of the natural gas commodity cost in Northwest Europe but also because most industrial natural gas consumers in Belgium use the TTF-quotation. Yet, the competitive position of Belgium for all three profiles relies on the lowest commodity costs, competitive network costs, and a relatively low level of taxes and levies.

Summary

Similarly to electricity, the below figure 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 77: 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 lower 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. If Germany is the only country to offer different pricing options for all consumers, France starts as well from G-PRO.

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 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 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.

When looking at the national level, Belgium's competitiveness is relatively good, except for E-RES profile whose prices are frequently worse than for the countries under review. Regardless of the residential or small professional consumer profile (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 gets improved: considering E-SSME, Belgium is cheaper than Germany and the UK given that Belgian prices are driven down by Brussels; 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.

On the regional level, the prices are approximately similar even though Brussels is always the cheapest region within Belgium. This mainly results from the "all other costs" component, which is the lowest in Brussels and therefore makes for the biggest impact on the competitiveness when comparing between Belgian regions.

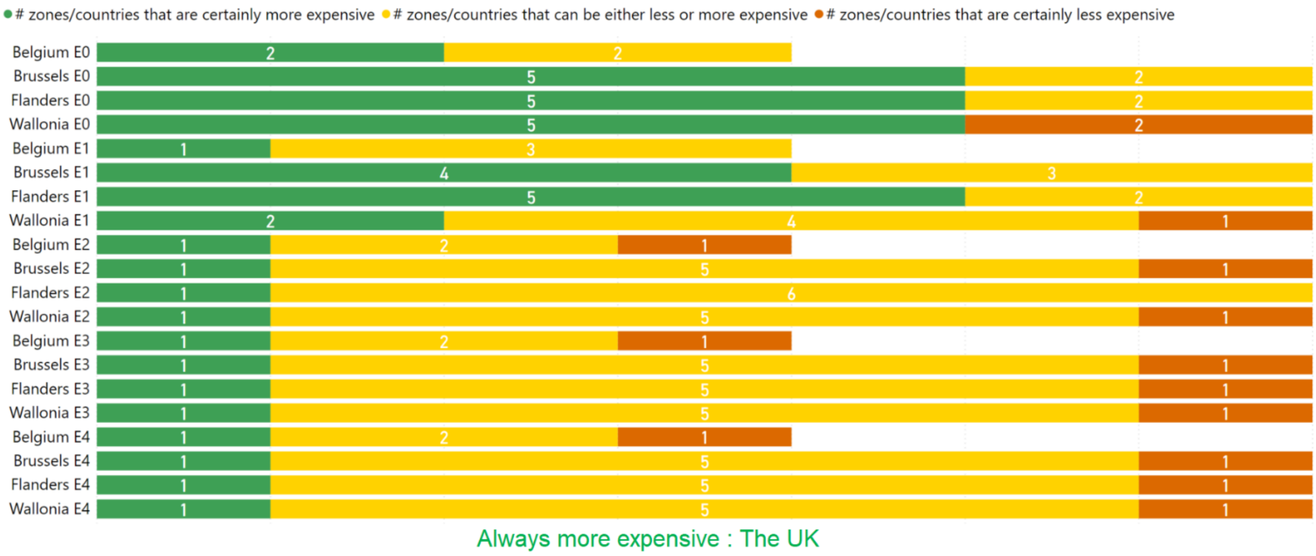
Figure 78: Competitiveness scorecard for residential and small professional electricity consumers (profile E-RES, E-SSME and E-BSME)

Always more expensive : Germany

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. When comparing the residential and industrial scorecards, the relative competitiveness positions are more complex to grasp for our industrial profiles, the competitiveness of a country cannot always be determined in a binary approach (certainly less or more expensive).

Figure 79: Competitiveness scorecard for industrial electricity consumers (profiles E0 – E4)



From Figure 79, we observe that Belgium is always more competitive than at least one country, the UK. Profiles E0 in Belgium also gets to be more competitive than Germany. This leaves France and the Netherlands as competitive countries from our panel with regards to electricity prices – particularly with regards to Wallonia which is always more expensive than both countries for profile E0 and the Netherlands for profile E1. On a national level, the Netherlands is always more competitive than Belgium except for the profiles E0 and E1.

On a regional perspective, the Belgian regions tend to display a relatively competitive position for the E0 profile, but the competitiveness becomes more ambiguous for larger profiles. Considering profile E0, all Belgian regions are certainly less expensive than 5 other regions and countries. Yet, Wallonia is certainly more expensive than France and the Netherlands. This is more ambiguous when it comes to Flanders and Brussels as the regions could be either more or less expensive than France and the Netherlands. In the case of Flanders, the latter reasoning holds up to profile E2 included as no countries can be said to be certainly more competitive, which results from the cap implemented in Flanders back in 2018. Brussels and Wallonia always remain more expensive than the Netherlands. From E3 profile onwards, competitiveness is the same across all Belgian regions. Where the Netherlands still is the most competitive country under review, the UK constitutes an outlier with the highest prices. Within Belgium, Flanders usually holds a better competitive position than the two other Belgian regions. However, this statement is not always true as we find Wallonia to be potentially cheaper than Flanders for profile E3.

The above-mentioned analysis gives an overall overview of the competitiveness of all the countries/regions under review. We can conclude that the competitive position of Belgium and its regions is ambiguous, but Flanders is the most competitive Belgian region. From profile E2 onwards the Netherlands is always the most competitive country except compared to Flanders for profile E2.

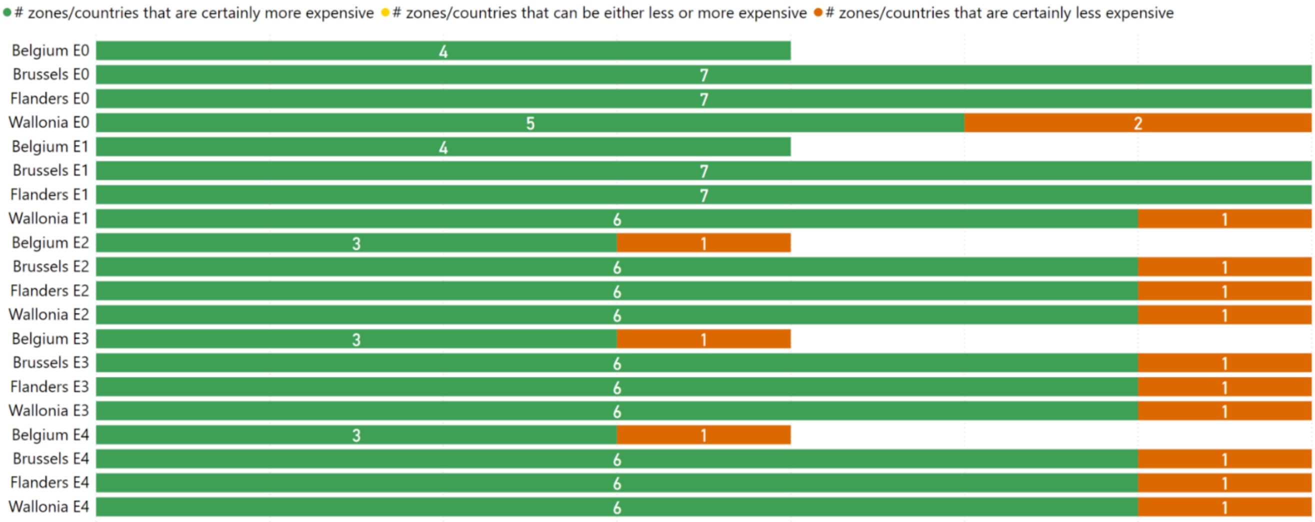
Below we discuss the complexity of the energy schemes for industrial consumers, which is reflected in the large yellow zones in the figures. Most of the profiles find themselves in the yellow zone, except for the E0 profile, and their cost greatly differs depending on how they are qualified in the country, namely as electro- or non-electro-intensive consumer. The importance of this qualification as electro- or non-electro-intensive consumer is made clear by the figures below.

Compared to other countries, Belgium is relatively highly competitive regarding non-electro-intensive consumers, as shown in Figure 80. If the Netherlands is the cheapest region for profiles E2 to E4, Belgium is always the most competitive for non-electro-intensive consumers for profiles E0 and E1. Oppositely, Germany, France and the

UK are always more expensive than the Belgian average. On a regional level, Wallonia is the only Belgian region to be outperformed for profiles E0 and E1.

The discontinuity of the E0 and E1 profile is the result of the Dutch reduction system on the “all other costs” component which depends on certain consumption thresholds. The E0 and E1 profiles only reach the lower price of the third threshold while the bigger profiles benefit from the even lower prices in the fourth threshold. This allowed Belgium to momentarily catch up and make the superior competitive position of the Netherlands less certain.

Figure 80: Competitiveness scorecard for industrial non-electro-intensive consumers (profiles E0 – E4)

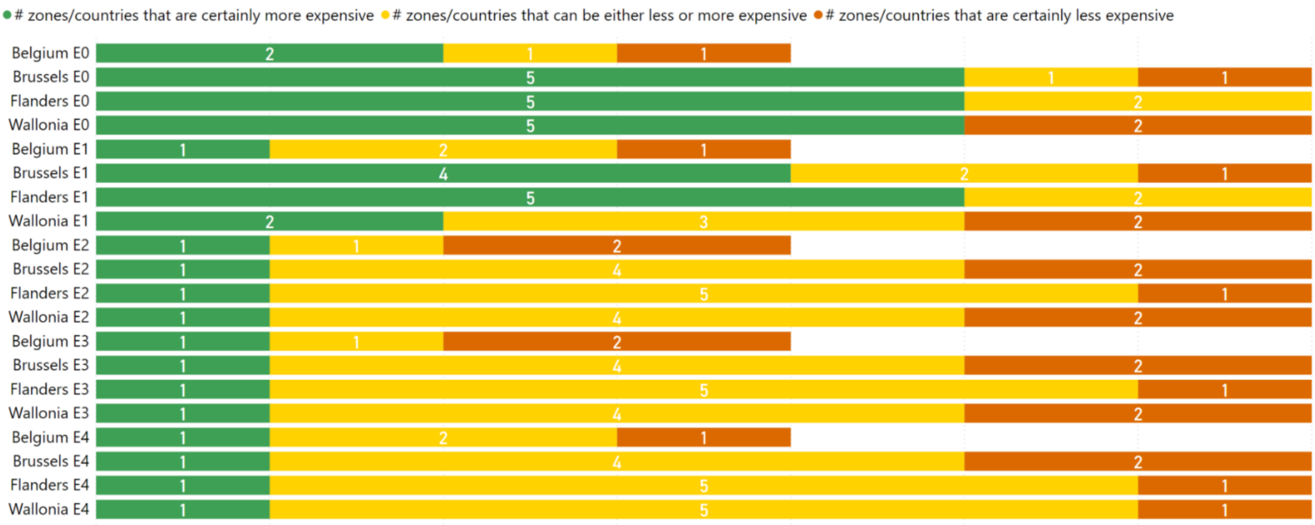


Always more expensive : Germany, France and the UK

On the other hand, the Belgian competitive position deteriorates when it comes to electro-intensive consumers as depicted by Figure 81. This can be easily understood, given that no specific schemes exist to support electro-intensive consumers in Wallonia and Brussels. As we have previously discussed, Flanders introduced a cap that limits the costs of the financing of renewable energies. Germany and France offer reductions and exemptions to electro-intensive consumers, undercutting the Belgian prices.

Therefore, it is striking to notice that Belgium’s relative competitiveness in terms of electricity prices is far more unclear for electro-intensive consumers. Compared to Brussels and Wallonia, France and the Netherlands are always more competitive – except for profiles E0 and E1 with Brussels and profile E4 with Wallonia - when strictly looking at electro-intensive consumers. This leaves Germany and its four zones as the sole country with potentially higher prices (in addition to the UK that is certainly more expensive). For all profiles from E0 to E4 (except Wallonia for E3), Flanders displays lower prices than Brussels and Wallonia, leading the region to perform better compared to foreign countries and regions. The competitive position of Belgium from the electro-intensive perspective is quite ambiguous, as the figure below illustrates.

Figure 81: Competitiveness scorecard for industrial electro-intensive consumers (profile E0 – E4)



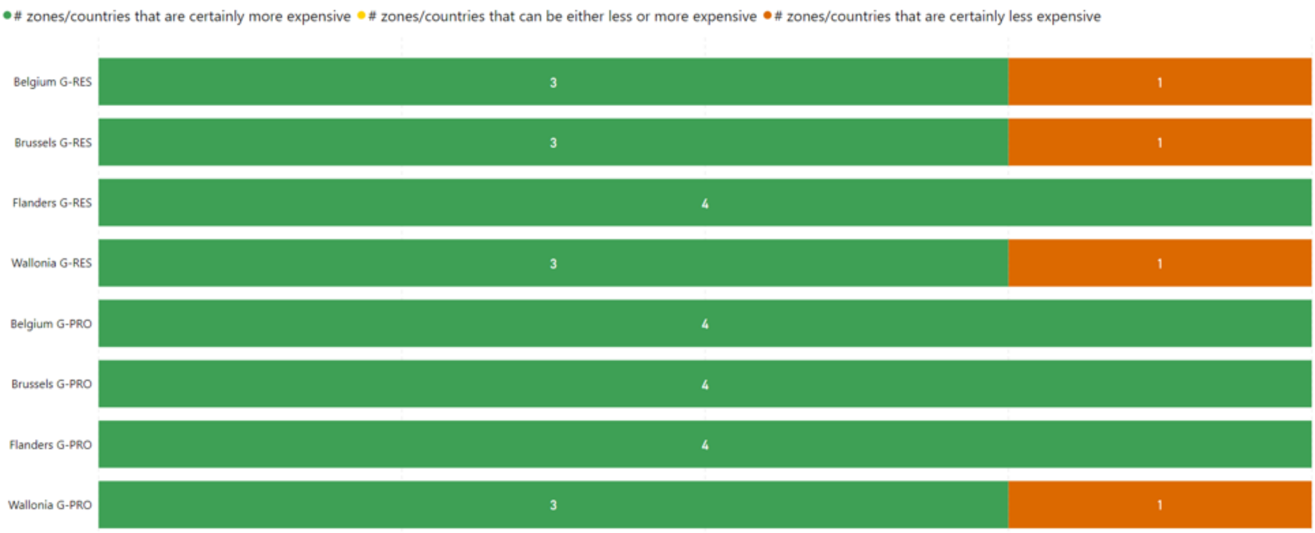
Always more expensive : The UK

Natural Gas

Residential and small professional consumers

Figure 82 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 is the most competitive region within Belgium and compared to all other countries, for both profiles.

Figure 82: Competitiveness scorecard for residential and small professional natural gas consumers (profile G-RES and G-PRO)



Always more expensive: Germany, the Netherlands and France

Large industrial consumers

When it comes to industrial consumers of natural gas, Belgium is highly competitive as they remain more competitive than all the countries under review for all profiles, apart from Brussels (G1 and G2) and Wallonia

(G0). When it comes to G0, France offers reductions that might reduce its prices sufficiently to outperform Wallonia. For the G1 and G2 profiles, the Netherlands and France offer reductions that might undermine Brussels' overall competitive position. Reductions and/or exemptions targeting feedstock consumers directly on specific taxes underpin the Netherlands and France's relatively good competitive position. However, this does not seem sufficient to undermine Belgium's competitive position when considered at a national level. While the UK and Germany are always more expensive than Belgium and their maximum price is similar, it is important to note that Germany has a reduced tariff for all profiles while the UK only offers a reduced tariff for the large natural gas consumer (G2). It is also important to note that the highest maximum price for the G2 profile is in France, which has a very large price range.

At the regional level, Brussels' competitiveness is lower than the other Belgian regions (except for Wallonia in G0) because of the levy for occupying road in Brussels ("Redevance de voirie").

Figure 83: 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

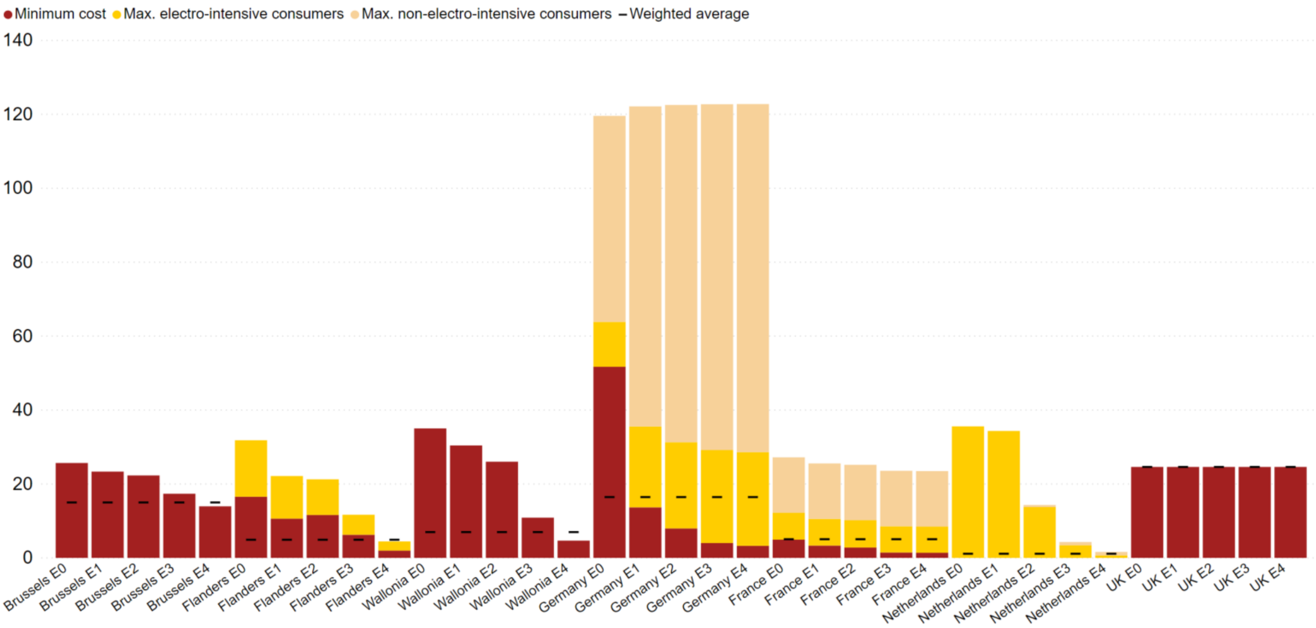
The "all other costs" component bears a significant importance on residential and small professional consumers' bills, and great variances can be observed across countries. The general trend seems to indicate that the larger the consumer, the lower the tax rate. If reductions apply in certain countries (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 countries whether one country introduced electro-intensity criteria to lower industrial consumers' tax burden. Given that Belgium decided, up until now, to apply a uniform tax regime for all industrial consumers, it is interesting to compare the variations of this component across countries from our studied panel.

In the below figure, 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 minimum-maximum cost range for non-electro intensive consumers. This last bar is only applicable in Germany, France and the Netherlands. For each country/region, a black line was added to represent the weighted average tax burden of the five consumer profiles of a specific country or region[290].

Figure 84: 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

[290] The weighted average is computed based on prices for electro-intensive ranges in UK, FR and NL and weighted based on volume of consumed electricity.

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[291]. This holds for Flanders as well as long as non-electro-intensive consumers are considered. This tends to emphasize that regional strategies largely support the financing of renewable energies through taxes. While Brussels' *Levy for occupying road network* is one of the two most important components for profile E3 and E4, Flanders' WKK[292] occupies the second-highest component before the federal PSO, 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[293].

Natural gas

Residential and small professional consumers

Taxes' weight on residential and small professional consumers' natural gas yearly invoice is, by far, less important than on electricity's annual bill. Excluding the Netherlands, which appears as an outlier, other countries face natural gas tax rates that are 6 to 9 times lower than electricity tax rates. Besides, Germany is the only country to have designed reductions on natural gas taxes depending on the use made of natural gas. 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

Similarly 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.

[291] See 5.1 Electricity: Detailed description of the prices, price components and assumptions Belgium Component 3 – all other costs (p.103).
[292] *Ibid*.
[293] *Ibid*.

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

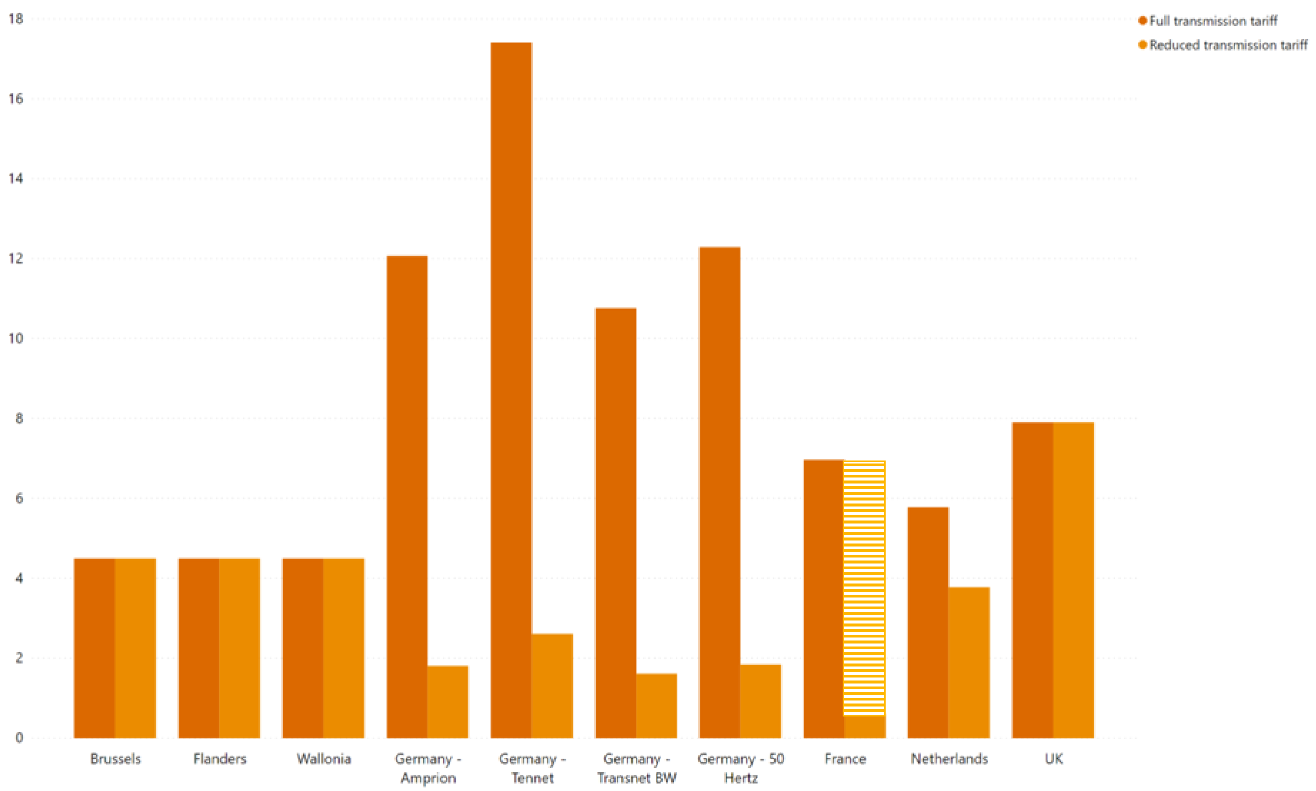
There is no reduction in force on network costs for electricity residential and small professional consumers.

Large industrial consumers

The figures below set out the reductions that can be granted in the countries/regions under the review and which might affect their global competitiveness. The dark orange bar represents the full transmission tariff while the lighter orange 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 orange.

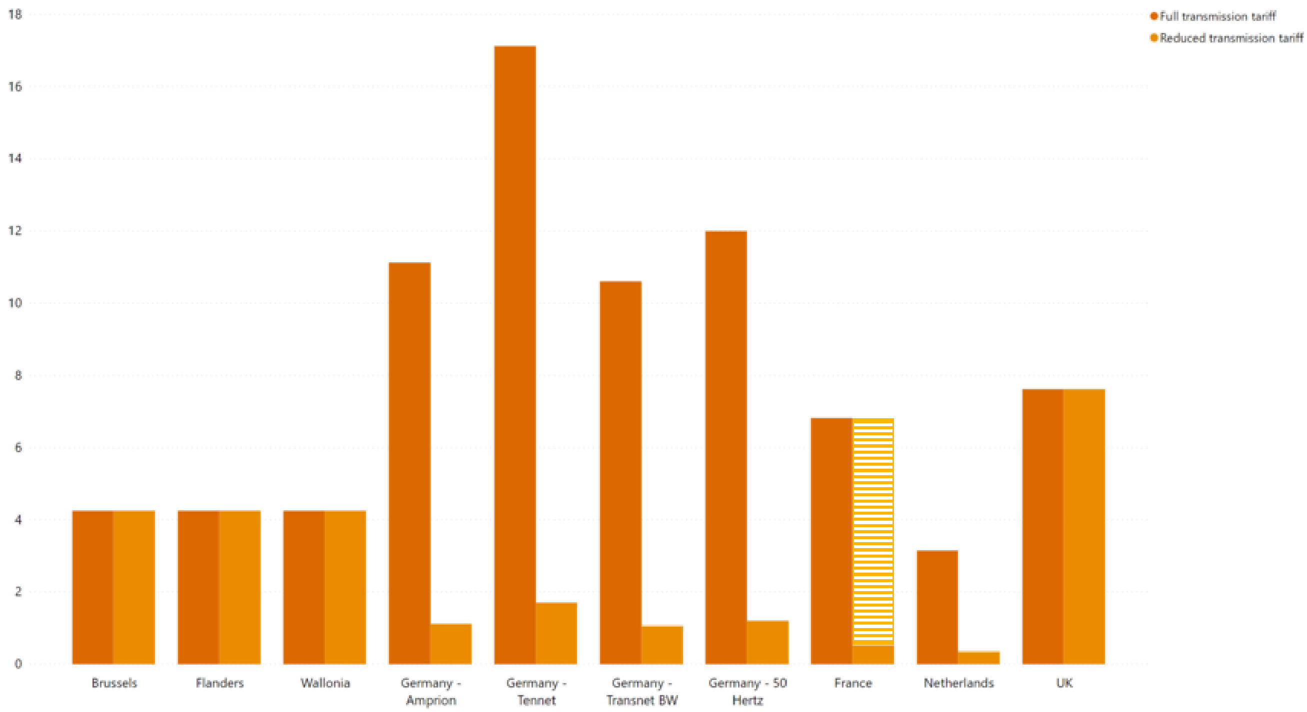
Belgium and the UK do not offer any reduction on the network cost component, but in the other countries under review, large baseload consumers such as E3 and E4 from this study can benefit from a transmission tariff reduction up to 90% (Germany). It should be clear from the figures below that these reductions have a significant impact on the network costs eventually paid by industrial consumers.

Figure 85: Network costs reduction in EUR/MWh (profile E3)[294]



[294] The hatched bar in France represents the range of prices for the network costs following reductions.

Figure 86: Network costs reduction in EUR/MWh (profile E4)[295]



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 Tennet region in Germany is significantly more expensive than the other region.

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.

[295] 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"[296]. 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[297,298]. This can be understood as a household's energy effort rate[299]. 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 were extracted from Eurostat at the national level and are figures for 2018 – 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 vary. To limit the extent of this exercise, two hypotheses are taken. Firstly, it is assumed that households

[296] (European Commission, 2020)

[297] 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".

[298] 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.

[299] In France, the ONPE defines the energy effort rate as the "share of total energy expenditure in the household's disposable income". (ONPE, 2020)

have a maximum of two children[300]. 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 2020.

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[301]. 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)[302] :
  - 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 2**: 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;
  - Social integration allowance;
  - Allowance for third party assistance;
  - Additional family allowances for children suffering from a physical or mental disability of at least 66%.
- **Category 3**: households benefitting from one of the below allocations from the Federal Pension Service:

[300] In most countries, specific allowances are granted based on the number of children, for which limits do not necessarily apply.

[301] (CREG, 2018)

[302] Centre public d'action sociale (CPAS) / Openbaar Centrum voor Maatschappelijk Welzijn (OCMW)

- 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.

Common social measures that apply at the federal level are detailed below:

Table 125: 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 six months, we consider the social tariff in force for January 2020. Note, however, that the social tariff will be determined every three months from July 2020. 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 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 lower one's bill or reduce one's energy consumption, etc.	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.

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. Then, they can benefit from the below-listed measures:

Table 126: 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 six months, we consider the social tariff in force for January 2020. Note, however, that the social tariff will be determined every three months from July 2020. 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 the DSOs' 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.

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. Besides, households facing financial difficulties may be granted the below-listed measures:

Table 127: Flanders social measures

Flanders Social Measures		
Measures	**Explanation**	**Eligibility criteria/Conditions of application**
Pre-paid meters[303]	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)[304]; • Costs related to reminders or notices of default.	Meeting federal protected consumers conditions.

Should consumers in payment default and supplied by the DSO – instead of traditional suppliers - while not meeting the federal protected consumer status, they would also pay a different price computed based on a market average.

303 (Vlaamse overheid, 2020)

304 (Vlaamse Overheid, 2020)

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;
- Collective debt settlement.

Table 128: 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[305]. 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 six months, we consider the social tariff in force for January 2020. Note, however, that the social tariff will be determined every three months from July 2020. 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 the DSOs' 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.

[305] As detailed previously, 4 households categories exist. The 4th category can only benefit from the social tariff on natural gas.

		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[306]. 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 2018 reached 25.911 EUR. This value is used to weigh energy's relative share in a residential consumer's income. As Eurostat uses Belgium as reference country to determine Purchasing Power Parities (PPP), which is worth 1 and hence, has a neutral effect on disposable income. From the latter, 18,6% are dedicated to housing that is deducted, resulting in a corrected gross disposable income of 21.092 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.

The amount of this living wage varies depending on one's conditions as presented below:

[306] 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.

- **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 1270,51 EUR (category 3)[307] 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[308]**: for a two-children household, allowances for both children would reach a minimum of 443,33 EUR/month[309] to a maximum of 1.633,49 EUR/month[310]. For Brussels, we thus use a range from a monthly minimum of 1.713,84 EUR to a monthly maximum of 2.904 EUR.
- **Flanders**: for a two-children household, allowances for both children would reach a minimum of 700,40 EUR/month[311] to a maximum of 1.786,72 EUR/month[312]. For Flanders, we thus use a range from a monthly minimum of 1.970,91 EUR to a monthly maximum of 3.057,23 EUR.
- **Wallonia[313]**: for a two-children household, allowances for both children would reach a minimum of 423,33 EUR/month[314] to a maximum of 1.571,57 EUR/month[315]. 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.

[307] Allocation for a couple in charge of minimum one minor child.

[308] (KidsLife, 2020)

[309] This situation is a minimum situation when the children are between 0-11 years old following higher education (+150 EUR/month per child). Plus, if parents have gross yearly revenues <31 kEUR, extra allowances are granted (70 EUR/month per child between 0 and 11). Finally, an additional age allowance is granted yearly and reaches 20 EUR/year per child between 0 and 5. Allowances for large households are not considered as this starts from 3 children.

[310] This situation is a maximum situation when the children are between 18-24 years old following higher education (+170 EUR/month per child). Plus, if parents have gross yearly revenues <31 kEUR, extra allowances are granted (80 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 (560,08 EUR/month per child). Finally, an additional age allowance is granted yearly and reaches 80 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.

[311] Considering the 2020 system, this situation is a minimum situation when the children and above 18 (93,93 EUR/month for the first child and 173,8 EUR/month for the second). This basic amount is increased by 16,36 and 32,63 EUR respectively for the first and second child as additional year complement. Plus, if parents have gross yearly revenues <31 kEUR, extra allowances are granted (47,81 EUR/month for the first child and 29,64 EUR/month for the second child). An additional 20,4 EUR/year per child is granted if child goes to school as well as an extra 103,7 EUR/year per child if (s)he goes to kindergarten school.

[312] Considering the 2020 system, this situation is a maximum situation when the children are born before 2019 and above 18 (93,93 EUR/month for the first child and 173,8 EUR/month for the second). This basic amount is increased by 28,72 and 63,4 EUR respectively for the first and second child as additional year complement. Plus, if parents have gross yearly revenues <31 kEUR, extra allowances are granted (102,88 EUR/month for the first child and 29,64 EUR/month for the second 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 61,2 EUR/year per child is granted if child goes to school as well as an extra 1132,07 EUR/year per child if (s)he is 3rd year of technical secondary education.

[313] (Agence pour une Vie de Qualité (AVIQ), 2020)

[314] 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.

[315] 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[316]:

- 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 treatment 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 29.258 EUR in 2018. Following the methodology previously explained, the gross adjusted disposable income is divided by 1,004, German's PPP for 2018, in order to correct it for cross-countries comparisons. As housing costs are estimated to be 26,10% of Germany's disposable income, we obtain a corrected gross disposable income of 21.536 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[317]. 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 389 EUR for adults living with a partner[318].

The minimum amount that can be claimed by a household of this type is 1.278 EUR whereas the maximum amount reaches 2.849,36 EUR[319]. 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.

---

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.

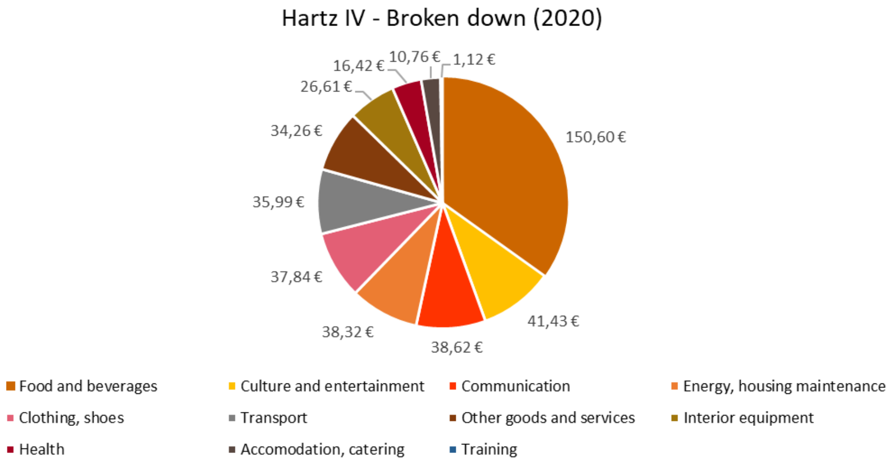
[316] (Betanet.de, 2019)

[317] (Bundesministerium für Arbeit und Soziales, 2020)

[318] (Bundesministerium für Arbeit und Soziales, 2020)

[319] In very particular case, this allocation can be more important but specific amounts are not defined in the German law.

Figure 87: Computation of 2020 maximum living income (432 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[320].

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 EUR up to 328 EUR per child, depending on their age, on a monthly basis.

Besides, additional financial supports can be granted under certain circumstances[321]. 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: 148,63 EUR;
- Grant towards insurance contributions for private health and long-term care insurance in accordance with § 26 SGB II – max: 363,28 EUR;

[320] (Bundesministerium für Arbeit und Soziales, 2020)

[321] 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.

- 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: 148,40 EUR;
- 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: 8,47 EUR;
- 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: 38,90 EUR;

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”[322]. 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;
    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 (m^2) 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

322 (Ministère de la Transition écologique et solidaire, 2020)

10.700 EUR per consumption unit[323] (CU) is automatically granted this energy voucher. The table below depicts the amount perceived in 2020.

Table 129: 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)[324].

Disposable income and living wage

The ***gross adjusted disposable income*** for France was of 25.358 EUR in 2018. As explained in the methodology, the gross adjusted disposable income is corrected by dividing it with France's PPP for 2018 (1,089). Furthermore, we deduct housing costs that are deemed to be 17,50% of France's disposable income. Therefore, we estimate a corrected gross disposable income of 19.211 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:

- 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 1.175,45 EUR/month. In addition, France also grants children allowances[325] to all

[323] 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

[324] Where we assume a family composed of 2 adults and 2 children (CU= 1+0,5+0,3+0,3=2,1).

[325] (Centre des liaisons européennes et internationales de sécurité sociale, 2020)

households with a minimum of two children, which according to one's situation can rise from 131,55 EUR/month[326] to 2.508,28 EUR/month[327].

In France, we thus present a living wage ranging from a maximum monthly amount of 3.683,73 EUR to a minimum monthly amount of 1.307 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.123**) from this study, a reduction of the energy tax (435,68 EUR for 2020), 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 25.648 EUR for 2018. With a PPP amounting to 1,087 along with a 23,40% share of disposable income for housing costs, the Netherlands has a corrected gross disposable income of 18.074 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:

1. **Housing allowance ("*huurtoeslag*")[328]**: 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 737,14 EUR (for people >23 years old or with a child) or 432,51 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 30.846 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.

[326] Only allowances perceived would be the basic family allowance for two children.

[327] 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).

[328] (Belastingdienst, 2020)

Depending on one's conditions and its children's', this allowance may range from a minimum of 2 EUR/month to a maximum of 377 EUR/month.

2. **Care allowance *("Zorgtoeslag")***[329]: 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 < 30.481 EUR (lone person) or < 38.945 EUR (partners);
   d. Have the Dutch nationality or a valid residence permit;
   e. Have a maximum (combined) assets of 116.613 EUR (147.459 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 199 EUR.[330]

3. **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 189 EUR/month to a maximum amount of 254 EUR/month can be reached if regular children allowances ("*kinderbijslag*") are granted.

In addition, the Netherlands provides regular children allowances ("*kinderbijslag*") that can be of minimum 221,49 (children between 0 to 5 years) or maximum 316,41 EUR (children aged between 12 to 17 years old) per child and per quarter[331]. In case of disability and the need for serious care, this allowance can be doubled, reaching a maximum amount of 632,82 EUR/month per child and per quarter.

It is to be noted that the Dutch government introduced a social minimum ("*sociaal minimum*")[332] 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[333] for low-income people to make up for the social minimum. As the minimum amount for these allowances is above the social minimum for partners (1.653,65 EUR/month), we consider a living wage ranging from a minimum of 2.161,92 EUR/month to a maximum of 5.888,24 EUR/month.

The United Kingdom

Social measures

In the UK, in 2017, 2,53 million households (or 10,9% of the total population)[334] are considered to be energy poor, which happens when[335] :

[329] (Belastingdiesnt, 2020)
[330] This figure comes from the potential amount of 199 EUR/month per couple divided by 2.
[331] (Sociale Verzekeringsbank, 2020)
[332] (Rijksoverheid, 2020)
[333] Toeslagenwet.
[334] (Department for Business, Energy & Industrial Strategy, 2019)
[335] 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.

- Energy costs are above average (> national median level)[336];
- If that amount was to be spent, households would be left with a residual income[337] 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[338]. This amounted to 321 GBP in 2017.

Several measures exist in the UK to support households in a situation of energy poverty. The table below lists the existing measures.

Table 130: 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[339], i.e.: o People have reached State Pension age (66 or 67 depending on birth date); o People over State Pension age are getting Universal Credit (help to pay for living costs[340]). • Broad group households at risk of energy poverty. Five cases determine a person/household's belonging to the broad group[341]: 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

336 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).

337 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.

338 (Department for Business, Energy & Industrial Strategy, 2019)

339 (UK Government, 2020)

340 (UK Government, 2020)

341 (OFGEM, 2018)

		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 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[342].
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 24.721 EUR in 2018. Based on the methodology detailed at the beginning of this section, the UK's PPP, which was of 1,082 for 2018, is used to correct the gross adjusted disposable income. Besides, housing costs, that were of 25,90% of the UK's disposable income are deducted. Consequently, we assess a corrected gross disposable income of 16.930 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[343]:

- Have either no income or a low income, with a maximum of 16.000 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;

342 (Government, 2020)

343 (UK Government, 2020)

- 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;
    - 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 GBP/week for couples below 18 with children to 116,8 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[344].

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[345] are granted to UK's households with, for a two-children household, a maximum of 35 GBP/week[346]. In case children are recognised as disabled, they can benefit from an additional allowance (Disability Living Allowance) of up to 151,4 GBP/week[347].

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 88 and Figure 89) look closer at the weight of electricity and natural gas bill in a household's disposable income. The following two charts (Figure 90 and Figure 91) analyse the same effort rates

[344] 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)

[345] 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)

[346] Computed as 21,05 GBP for the first child and 13,95 GBP for second child multiplied by the conversion factor of 1 GBP=1,176 EUR. See General assumptions, p.18.

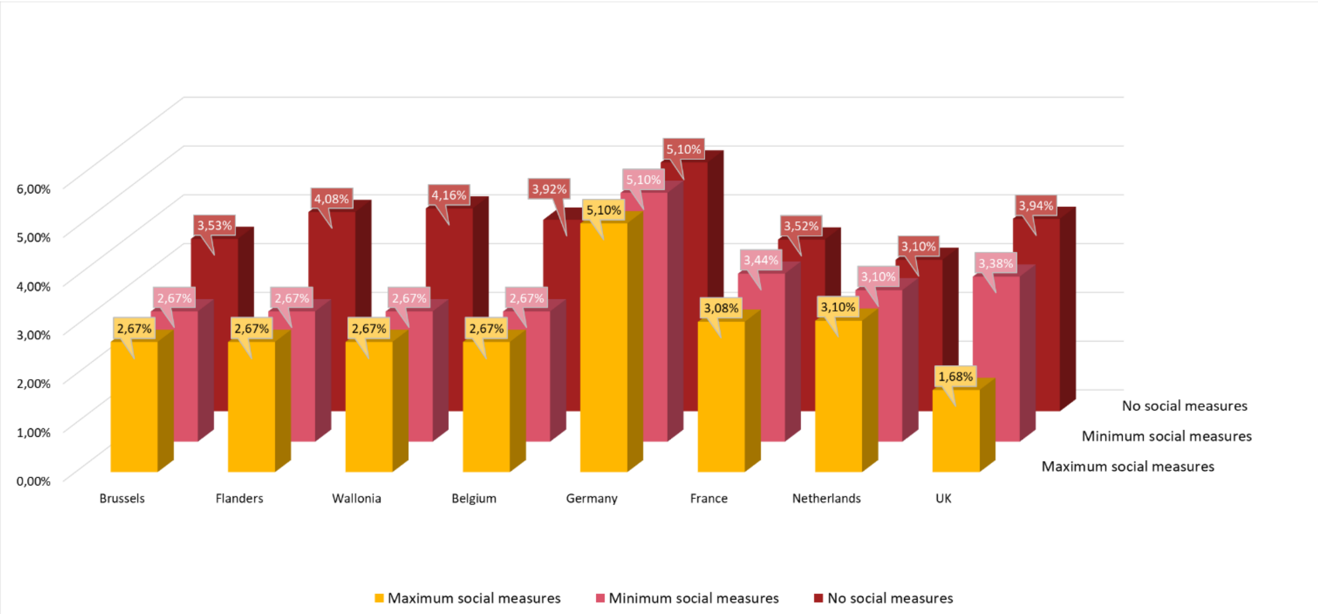
[347] Computed as the sum of the highest rates of the care (89,15 GBP/week) and mobility components (62,25 GBP/week). (UK Government , 2020)

in comparison with the maximum living income whereas the last two charts (Figure 92 and Figure 93) 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

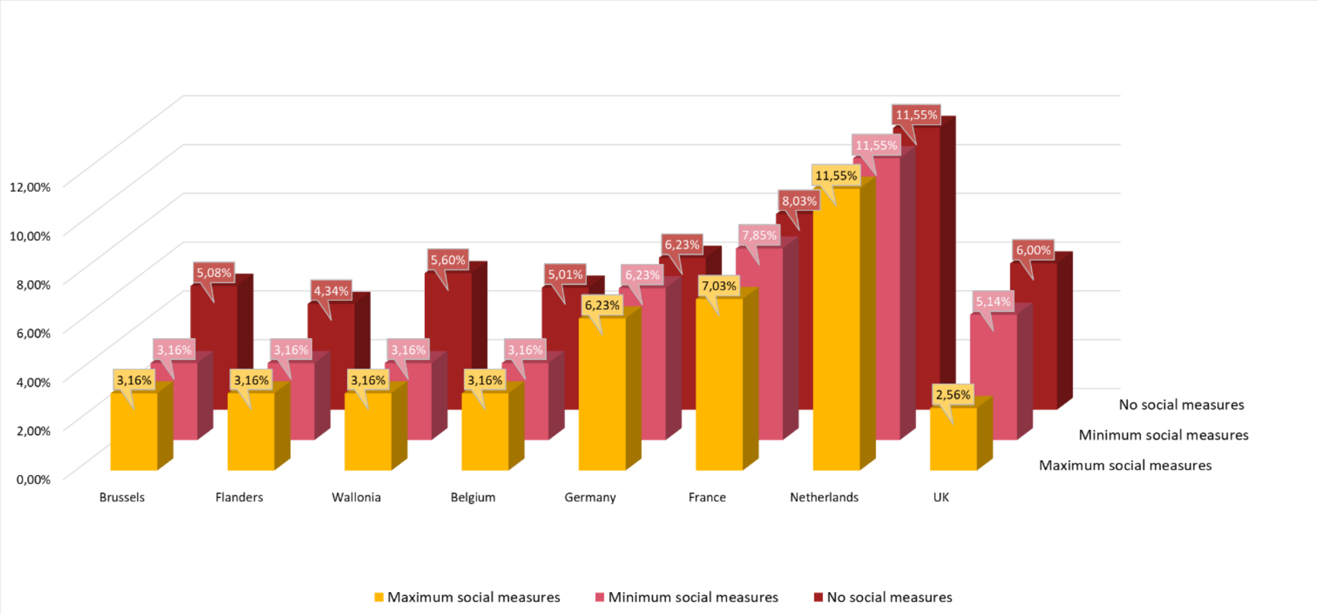
As previously mentioned, the disposable income reflects the purchasing power of households and their ability to invest in goods and services or save for the future, by accounting for taxes and social contributions and monetary, in-kind social benefits. In this case, the share of housing costs was retrieved for disposable income.

Figure 88: Electricity effort rate compared to disposable income



Wallonia and Flanders observe the second and third highest effort rate, respectively, when considering that no social measures apply to our consumer profile. Only Germany faces greater effort rates – especially given that no specific, quantifiable social measures aiming at reducing electricity and/or natural gas bill could be considered (as for the Netherlands). As for Brussels, it has the lowest effort rate from all three Belgian regions when no social measures apply and even comes as second least demanding position, co-shared with France. However, the overall change in position is significant once social measures enter into action. Through the offering of a social tariff, all three Belgian regions display a similar effort rate (2,67%) and are only outperformed by the UK where one's effort rate is susceptible to oscillate between 1,68% (benefiting from maximum reductions possible, thus paying a minimum) and 3,38% (benefiting from minimum reductions possible, thus paying a maximum). Besides, the UK also provide the largest possible reduction magnitude with a 2,26% decrease in effort rate when considering both extreme situations. As a whole, Belgians' households often face the lowest electricity effort rate when social tariff applies.

Figure 89: Natural gas effort rate compared to disposable income



Globally, natural gas' effort rate is much more significant with regards to disposable income than electricity's. Belgium's position is even less disputed than for electricity as it is the least demanding country except when considering the minimum possible (i.e. maximum social measures). Again, the UK is the least demanding country in that configuration. As social tariff neutralises differences across Belgian regions, discrepancies only appear when no social measures apply, making Flanders' effort rate (4,34%) the lowest followed by Brussels (5,08%) and Wallonia (5,6%). Overall, the Netherlands (11,55%) and France (from 7,03% to 8,03%) are the most demanding country about natural gas.

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. In terms of electricity, Belgian households benefit from leveraging social measures as effort rates lower by 1,26% 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 either the least (when no social measures or minimum social measures) or the second least (maximum social measures) 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 90: Electricity effort rate compared to a maximum living income

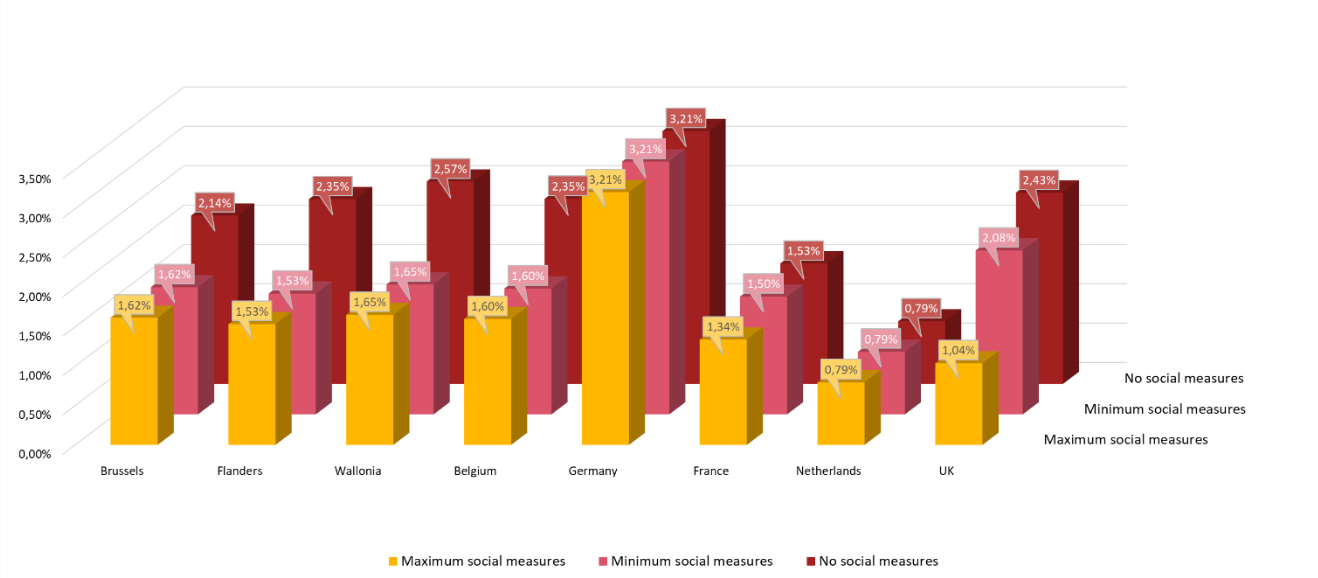
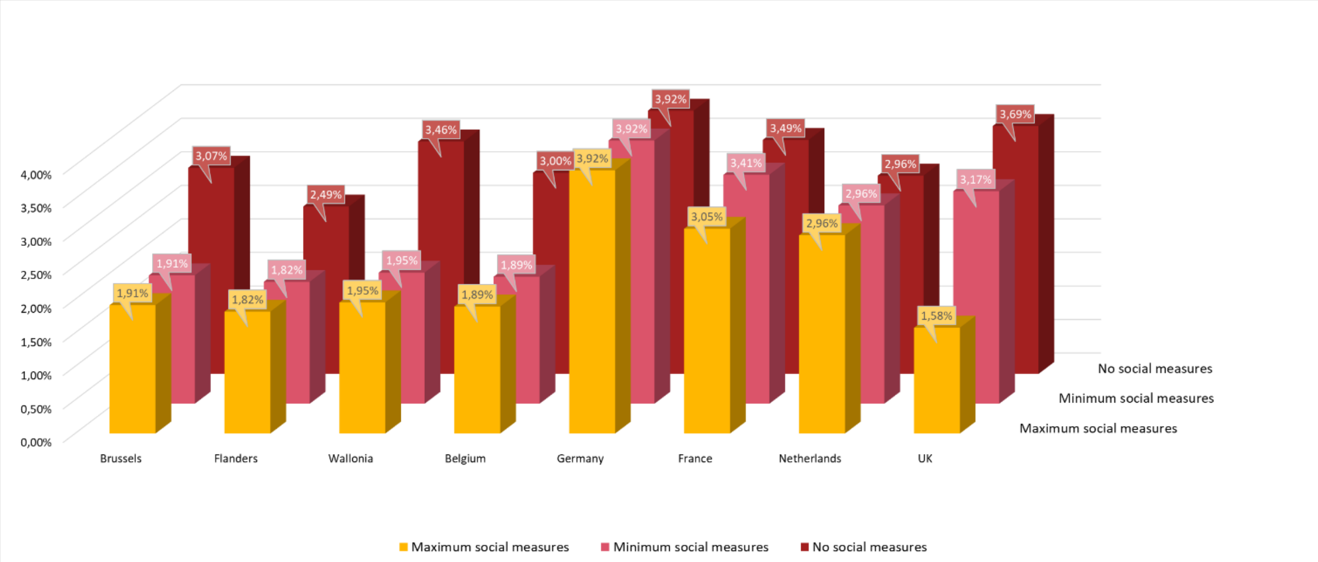


Figure 90 depicts the effort rate compared to the maximum living income one can be granted depending on its conditions. These figures are closely aligned to those observed in comparison with the disposable income. Effort rates appear to be lower than when considering the disposable income. This can be understood as the maximum living wage considered is a maximum potentially obtained under severe and difficult circumstances, which might not represent many cases.

Discrepancies can be observed between the Belgian regions as allowances and amounts granted vary between regions. Within Belgium, when no social measures apply, consumers from Brussels (closely followed by Flanders') are the least impacted by the electricity bill with 2,14% whereas Walloons (2,57%) are the most impacted. Once social measures apply, Flemish consumers (1,53%) are slightly better off than consumers in Brussels and Wallonia that both equivalent display results (1,62 to 1,65%).

In terms of relative position with other countries, great variability is observed: the Netherlands and France are respectively the least (0,79%) and second least (1,53%) demanding countries when no social measures are in force. They do remain the least demanding countries even when social measures apply even if the UK comes in-between both when maximum social measures are in force (thus paying a minimum). While Belgium (1,6%) becomes the third least demanding country when minimum social measures apply (thus paying a maximum), it is the second most demanding country where maximum social measures apply (thus paying a minimum).

Figure 91: Natural gas effort rate compared to a maximum living income



Again, natural gas bills tend to occupy a larger share of one's living income, regardless of the country. Whereas Belgian regions globally indicate similar effort rates (except when no social measures apply), countries such as France or the Netherlands do observe natural gas prices that are much more impactful on residential consumers' wallets compared to electricity even though Germany (and the UK in case no social measures apply) is the most demanding country. Considering Belgium as a whole, it displays the least important effort rates with the exception of when maximum social measures apply (thus paying a minimum) where the UK (1,58%) is slightly better performing. Except in the latter case, Belgium appears to face effort rates that are approximately 1,5 (the Netherlands and France) to 2 times (in comparison to Germany) smaller.

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 gap shrinks, once social measures are granted, Belgium remains the third most (or closely aligned) demanding country for electricity. This statement certainly does not hold for natural gas effort rate as Belgium is unrivalled by any other country but the UK when considering the application of maximum social measures.

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 92: Electricity effort rate compared to a minimum living income

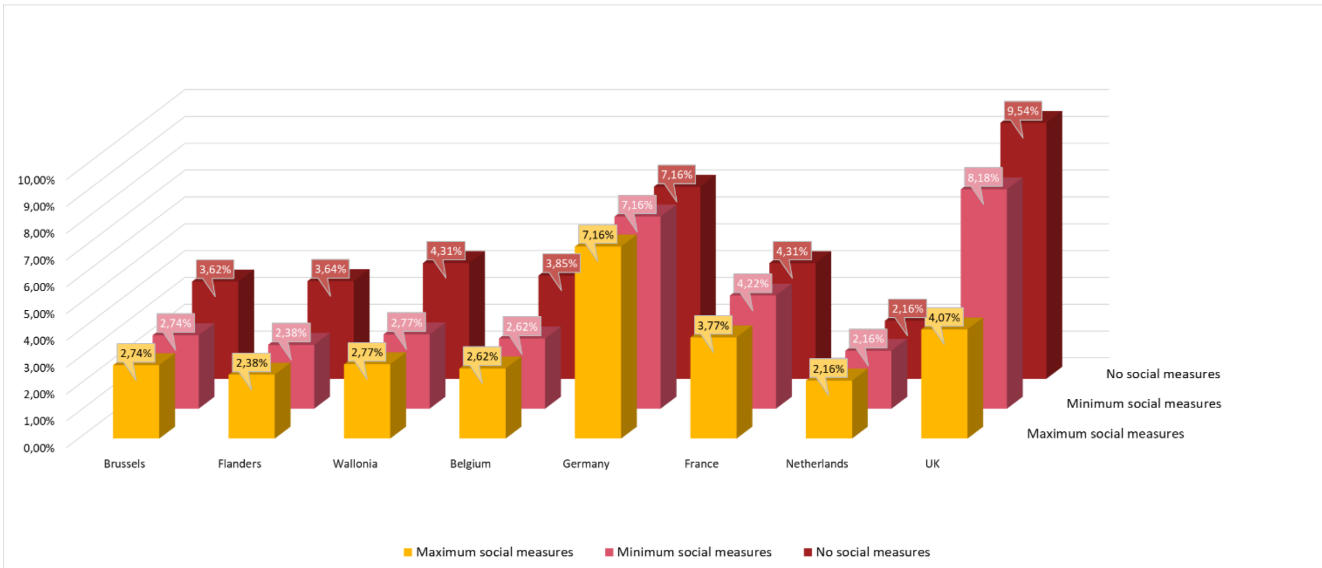
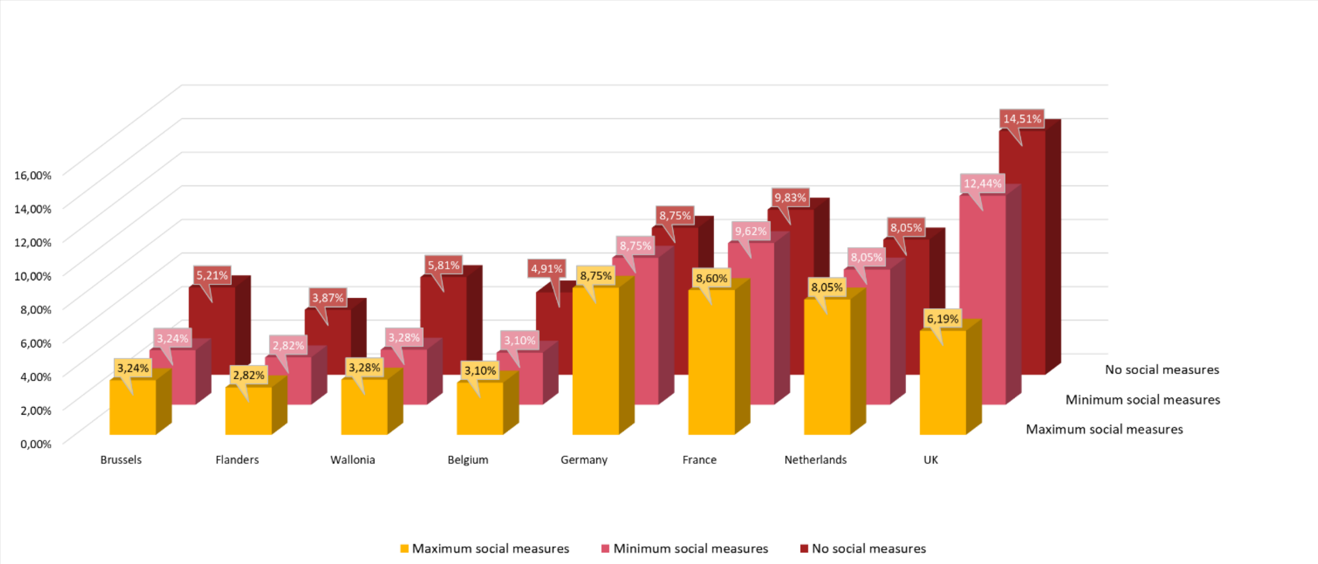


Figure 92 depicts electricity effort rates compared to the minimum living wage one can be granted. In this context, effort rates appear to have a much larger significance on one's living income, especially in Germany and in the UK. The greater variability across countries certainly comes from the large discrepancies in allowances that can be granted to financially support people in need. For Germany, as no specific, quantifiable social measures designed to reduce the electricity or natural gas bills could be considered, the potential for reduction of effort rates is therefore limited. As the minimum living wage that one can benefit is the second lowest (after the UK) for studied countries, electricity bill has a more significant impact (7,16%). The same situation is overserved at first for the UK. However, social measures do apply, hence limiting electricity financial burden on residential consumers' shoulders (ranging from a minimum of 4,07% to a maximum of 9,54%).

With regards to electricity effort rate, Belgium certainly comes as the least demanding country regardless of the application of social measures. Belgium from (2,62% to 3,85%) comes after the Netherlands (2,16%) even if no social measures to lower electricity and/or natural gas bills could be considered and before France (from 3,77% to 4,31%). In case no social measures would apply, variability is observed between the Belgian regions where Brussels comes as the least demanding region (3,62%) before Flanders (3,64%) and Wallonia (4,31%). The situation changes with Flanders becoming the least demanding region when social measures apply due to potentially higher children allowances.

Figure 93: Natural gas effort rate compared to a minimum living income



Like previously observed results, natural gas effort rates are on average larger than the electricity ones. By far, Belgium as a whole faces the lowest effort rates (3,1%) with a minimum difference of 3,09% compared to the UK when maximum social measures apply (thus paying a minimum). If this is partially due to the fact that Belgium displays the second-highest minimum living income, it further finds its reason in the low Belgian natural gas bills. When no social measures apply, Flanders (3,87%) displays the lowest effort rates before Brussels (5,21%) and Wallonia (5,81%). It is interesting to note that the UK is the country that offers the highest reduction in effort rate (8,32%) from a situation with no social measures (14,51%) to the application of a maximum of social measures (6,19%).

Again, social measures play a great role in reducing Belgian household's natural gas effort rates as the country becomes relatively much less demanding than other countries when they apply. However, it stands out clearly that even if no social measure were to apply, Belgian households' natural gas expenses remain the lowest in comparison with their minimum living income. While natural gas represents a much higher share of the minimum living income than electricity, Belgium is without contest the country with the lowest effort rates.

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. Conversely, Germany always displays the highest effort rate for electricity – with the exception when comparing to the minimum living income - whose origin might lie in the absence of quantifiable direct financial support for energy costs. The situation is much more variable when it comes to natural gas as Germany, the Netherlands of the UK may all be the most demanding countries in natural gas effort rate depending on the income considered and the application (or not) of social measures. 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.

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[348] to do so.

[348] (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

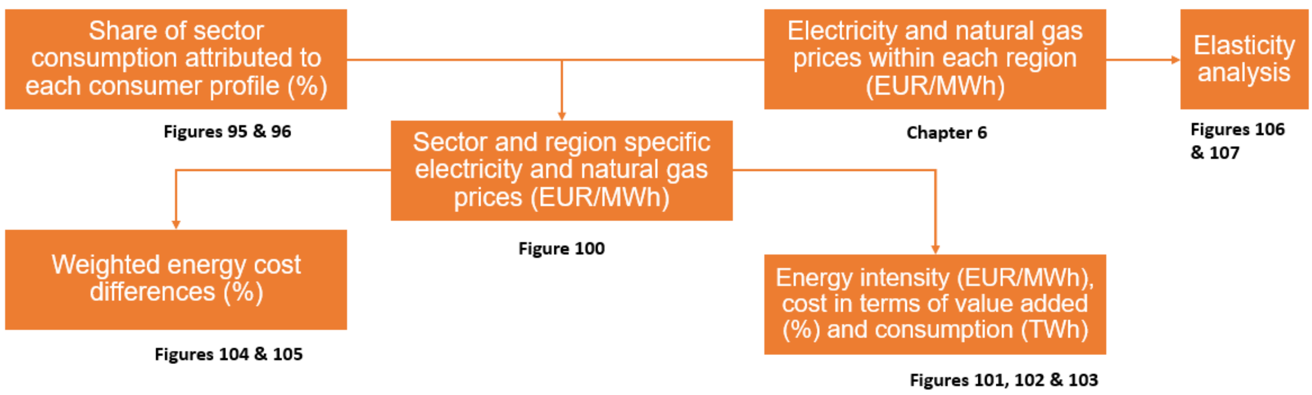
Competitiveness analysis

Methodology

In Table 7, the five most prominent industrial sectors in Belgium (as part of an energy price comparison) were shortlisted[349] : the chemicals (NACE 20), the pharmaceuticals (NACE 21), the basic metals (NACE 24). the food and beverages (NACE 10-12), and the coke and petroleum products (NACE 19). In the previous chapters of this report, natural gas and electricity prices were compared with those of Belgium's neighbouring countries: Germany, France, the Netherlands and the United Kingdom.

In this final chapter, the information gathered in the previous chapters is combined to analyse the competitiveness of the five main sectors in Belgium and its regions. The reasoning behind the analysis of competitiveness is presented in the following figure.

Figure 94: Methodology flow chart



As shown in the flow chart, first the electricity and natural gas prices in Flanders, Wallonia and Brussels are combined with the breakdown of the various consumer profiles in the CREG's sample of billing data on the 5 main sectors, resulting in the sector- and region-specific electricity and natural gas prices. In a second step, these prices are used to calculate two important variables via two separate channels. The first method calculates a weighted energy cost difference, which combines the electricity and natural gas prices in a single measure that makes it possible to compare the energy prices of a certain sector (in a certain region) with those of the European average[350], while the second method focuses on energy intensity, which expresses the energy cost (electricity and natural gas) of a certain sector and a certain region in terms of value added. Ultimately, we further assess the competitiveness of countries based on their price elasticity of demand. This helps us understand how

[349] In this section we will use this order to present the results. It resembles the order of the importance of the sectors exhibited in the sectoral analysis.

[350] 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

sensitive our industrial consumer profiles are to price changes and, consequently, at risk of relocating in another country.

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 sectoral level. That is done by combining the regional electricity and natural gas prices with the breakdown of consumer profiles by sector (see Table 131 and Table 132). They are based on data provided by the CREG and show how the consumer profiles are broken down by sector[351], 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[352,353] and dividing it by the total consumption per sector[354]) is presented in the tables below. As 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 132 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 underneath table refers to absolute frequencies (#), while the second column, for each profile, of the same table refers to relative frequencies weighted by consumption profiles (%).

[351] 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.

[352] The data in both Table 131 and Table 132 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.

[353] For electricity – E0: 2GWh, E1: 10GWh, E2: 25 GWh, E3: 100GWh, E4: 500GWh

For natural gas – G0: 1,25GWh, G1: 100GWh, G2: 250GWh

[354] Based on the PEFA data of the Federal Planning Bureau of 2017.

Table 131: Distribution of electric consumer profiles per sector

Code NACE-Sector	E0 (2-10 GWh/year)[355]		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	313	9,9%	27	5,7%	26	14,8%	11	22,2%	3	47,4%
NACE 21 - Manufacture of basic pharmaceutical products and pharmaceutical preparations	42	14,9%	1	2,9%	5	21,1%	3	61,1%	0	0,0%
NACE 24 - Manufacture of basic metals	135	9,3%	6	3,0%	11	11,7%	10	61,3%	2	14,7%
NACE 10-12 - Manufacture of food products; beverages and tobacco products	504	12,6%	47	7,6%	41	15,6%	13	20,4%	7	43,8%
NACE 19 - Manufacture of coke and refined petroleum products	28	4,4%	1	1,1%	2	5,3%	3	89,3%	0	0,0%

Source: CREG (2017), PwC Computations

Table 132: Distribution of natural gas consumer profiles per sector

Code NACE-Sector	G0 (1,25-10 GWh/year)		G1 (10-1.000 GWh/year)		G2 (>1.000 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%

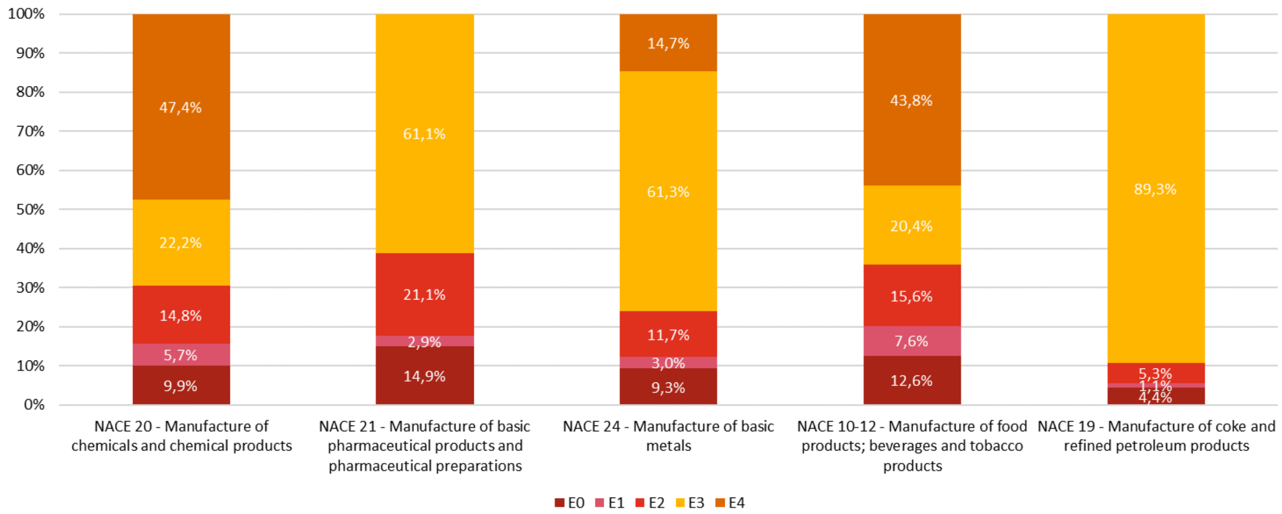
Source: CREG (2017), PwC Computations

[355] 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.

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, 153 for G1 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 below figure, profile E3 is the predominant profile in most of the sectors (NACE 19, 21 and 24), while for the chemicals and food and beverages sector (NACE 20 and10-12) it is profile E4.

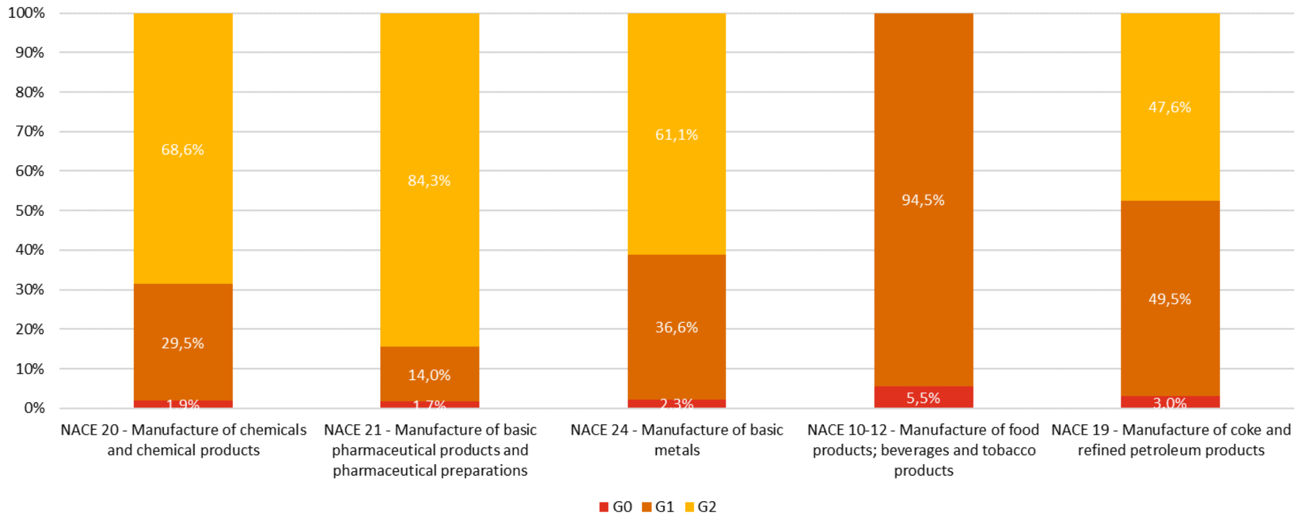
Figure 95: Share of sectoral electricity consumption attributed to each consumer profile



Source: CREG (2017), PwC Computations

From Figure 96, it is observed that for half of the sectors, G2 is the profile with the highest relative frequency (NACE 10-12, 19 and 23). 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 96: Share of sectoral natural gas consumption attributed to each consumer profile



Source: CREG (2017), 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[356], 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[357]:

$$\mathrm{European\ average\ of\ P_{elec}\ for\ Sector_i} = \sum_{X=0}^{4} (Average\ price\ for\ E_X\ in\ neighbouring\ countries * Relative\ frequency\ of\ E_X\ in\ Sector_i)$$

$$\mathrm{European\ average\ of\ P_{gas}\ for\ Sector_i} = \sum_{X=0}^{2} (Average\ price\ for\ G_Y\ in\ neighbouring\ countries * Relative\ frequency\ of\ G_Y\ in\ Sector_i)$$

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

[356] 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.

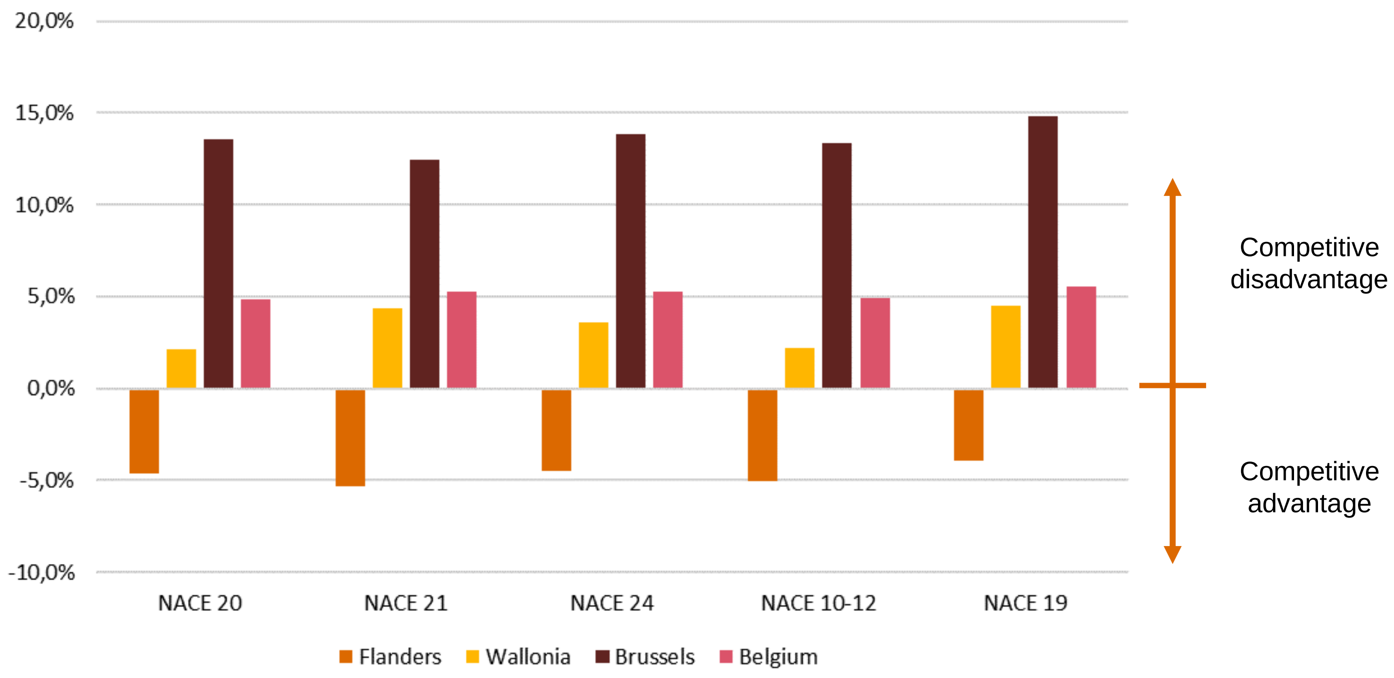
[357] We have used the same share of sectoral electricity and natural gas consumption attributed to each consumer profile to calculate the average price of electricity and natural gas in the neighbouring countries. This way we assume that the different consumer profiles are equally distributed in the sectors under scope of the neighbouring countries.

Figure 97 (for electro-intensive consumers), Figure 98 (for non-electro-intensive consumers) and Figure 99 for natural gas consumers.

$$X_{ij} = \left(\frac{P_{elec}\ in\ Sector_i\ in\ Region_j\ - European\ average\ of\ P_{elec}\ in\ Sector_i}{European\ average\ of\ P_{elec}\ in\ Sector_i}\right)$$

$$Y_{ij} = \left(\frac{P_{gas}\ in\ Sector_i\ in\ Region_j\ - European\ average\ of\ P_{gas}\ in\ Sector_i}{European\ average\ of\ P_{gas}\ in\ Sector_i}\right)$$

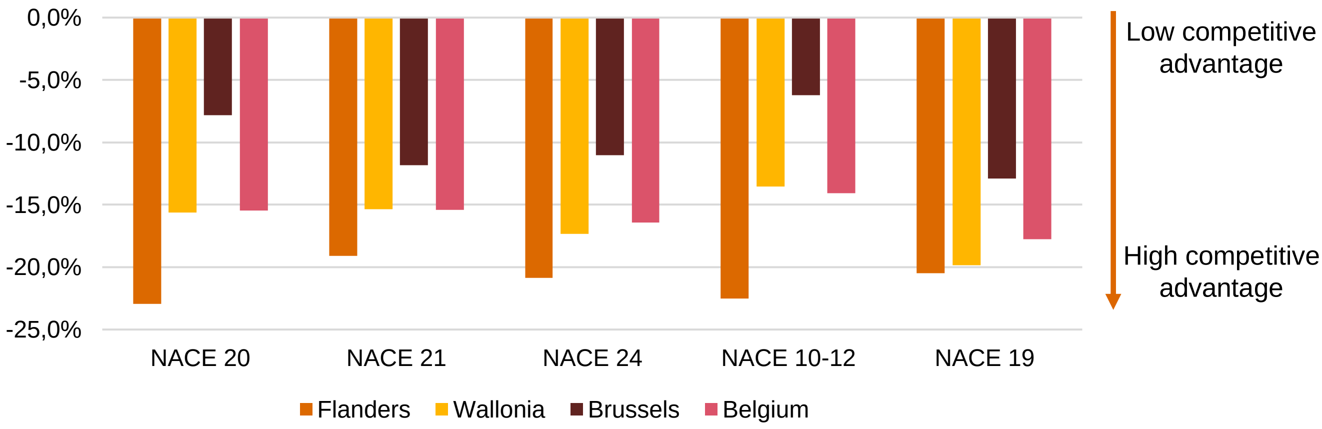
Figure 97: Electricity price differences for electro-intensive consumers compared with the average in the neighbouring countries



Source: CREG (2017), PwC Calculations

One can observe in Figure 97, that electricity price differences differ substantially from sector to sector and from region to region, but are almost always higher when comparing Belgian consumers with companies that are considered electro-intensive consumers in their countries (lack of competitiveness). While the disadvantage is substantial for Belgium as a whole, we can see that Flanders is the most competitive region as it always faces competitive advantages compared to our European average, as a consequence of the cap. The cap instituted in Flanders leaves the NACE 21 as the most significant advantage for Flanders whereas the NACE 19 sector is the smallest from all studied sectors. Conversely, Brussels and Wallonia, regarding all sectors, are seen as relatively non-competitive with NACE 19 being the least competitive sectors 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.

Figure 98: Electricity price differences for non-electro-intensive consumers compared with the average in the neighbouring countries

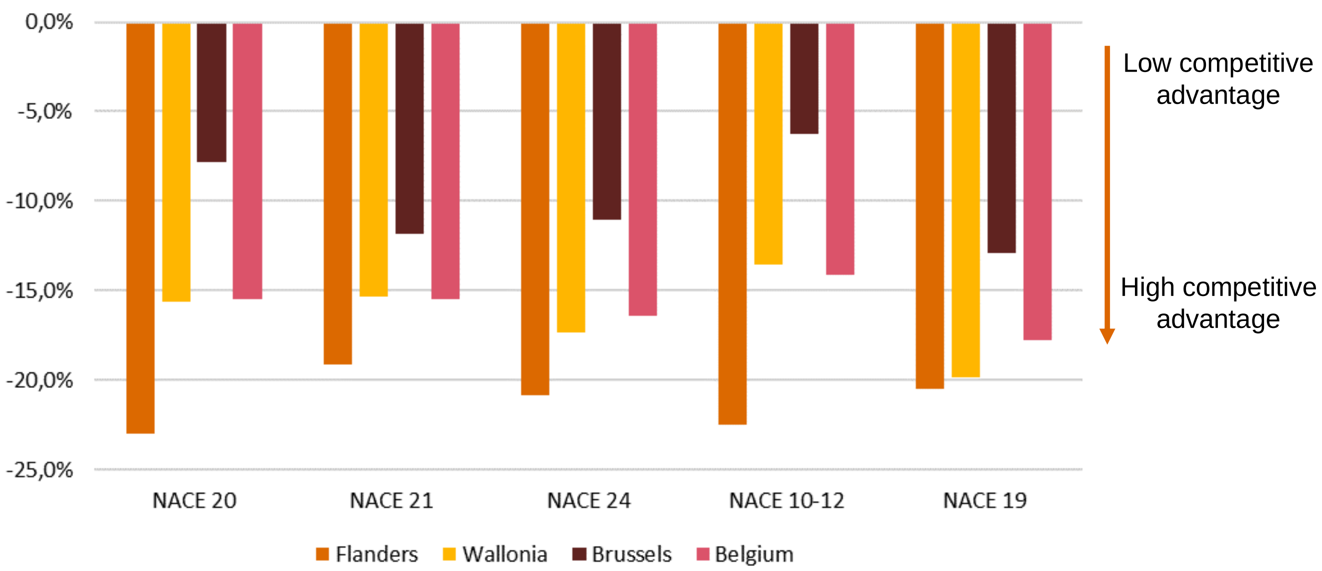


Source: CREG (2017), PwC Calculations

From Figure 98, one can observe that all regions display an important competitive advantage, for all the studied sectors when looking at non-electro-intensive industries. However, similarities can be drawn: Flanders is the most competitive region among all, whereas Brussels is the least competitive. 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) and chemicals (NACE 20) exhibit the highest advantage for electricity prices in Flanders. Brussels and Wallonia's most competitive sectors are the manufacture of coke and refined petroleum products (NACE 19) and the manufacture of basic metals (NACE 24)

When comparing the two above figures about electricity price differences, we can observe an overall high positive competitiveness 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 99: Natural gas price differences for natural gas consumers in comparison with the average in the neighbouring countries



Source: CREG (2017), PwC Calculations

From Figure 99, 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 consumers (for example NACE 10-12)[358].

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, compare 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 Table 133.

Table 133: 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 [359].
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[360].
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).

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.

Natural gas prices are the same in both cases, electro-intensive and non-electro-intensive. 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

[358] 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.

[359] These consumers have a significant reduction on some taxes for instance (e.g. EEG-Umlage)

[360] 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)

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.

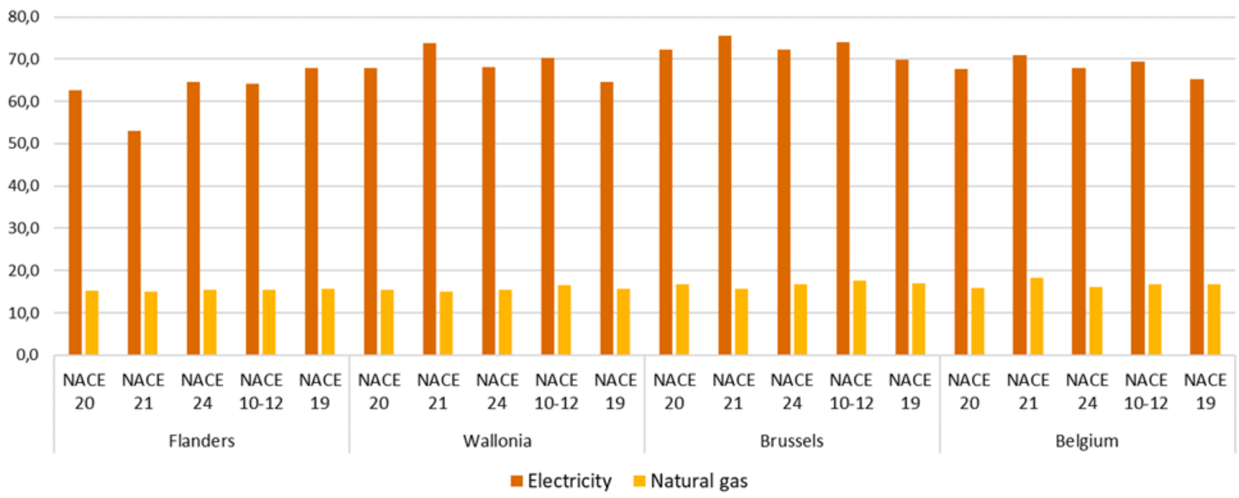
To get an idea of the relationship between the electro-intensity criteria of the neighbouring countries and the level of electro-intensity in Belgium and its 5 main sectors, we first introduce in this section the concept of energy cost based on:

- The electricity and natural gas prices for each sector and region (EUR/MWh) on the one hand (Figure 100);
- Energy intensity or MWh/EUR of value added for both electricity and natural gas per sector on the other hand (Figure 101).

The cost of energy reflects the cost of electricity and natural gas for the sector as a whole in terms of value added.

As can be seen in the following figure, electricity prices are the highest for the NACE 21 due to important energy consumption while the added value created per MWh is high. Natural gas prices present a flattened curve with similar price levels among sectors.

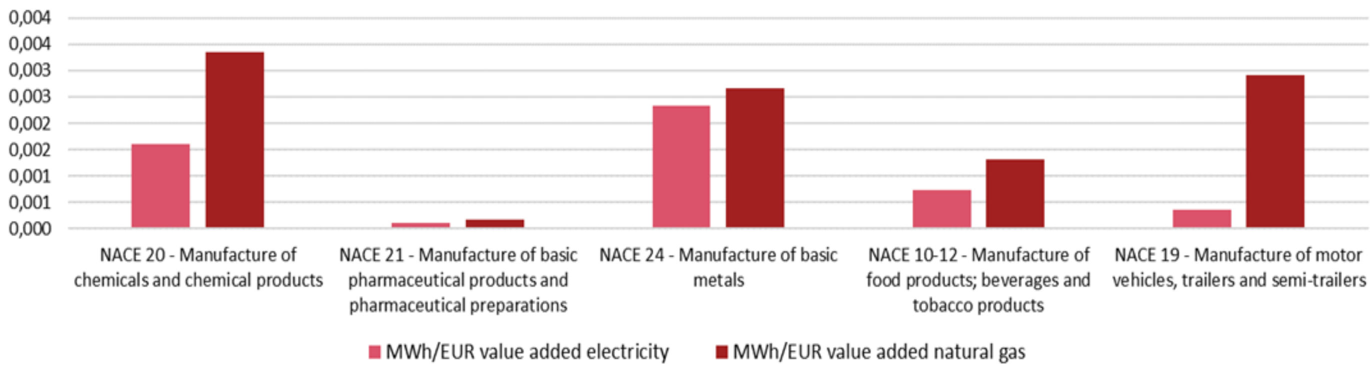
Figure 100: Sector and region-specific electricity and natural gas prices in 2020



Source: CREG (2017), PwC Calculations

As shown in Figure 101, the energy intensity is higher for natural gas than for electricity and vary by 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 101: Energy intensity per sector in Belgium



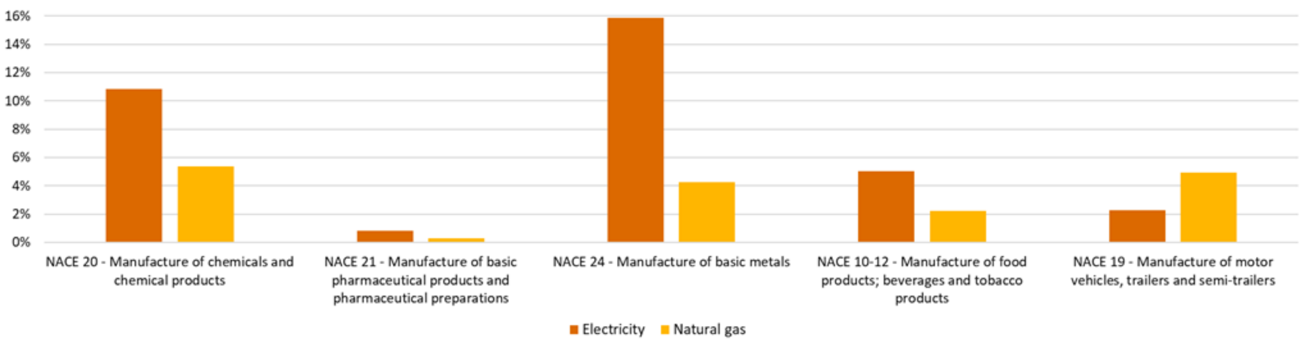
Source: Federal Planning Bureau, Eurostat, PwC Calculations

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 102). These data are extracted according to the following formulas:

$$\text{Electricity cost for Sector i in Region j (\% of added value)} \\ = P_{elec}\ for\ Sector\ i\ in\ Region\ j * Energy\ intensity\ (electricity)\ for\ Sector\ i$$

$$\text{Natural gas cost for Sector i in Region j (\% of added value)} \\ = P_{gas}\ for\ Sector\ i\ in\ Region\ j * Energy\ intensity\ (natural\ gas) for\ Sector\ i$$

Figure 102: Energy cost as % of value added in Belgium



Source: Federal Planning Bureau, Eurostat, PwC Calculations

Figure 102 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 for 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 NACE 24 (E3 predominance) and NACE 20 (E4 predominance) sectors in all regions, while the cost of energy, in general, is lowest for NACE 21 sectors in Belgium (E3 predominance).

As mentioned above, in Germany, France and the Netherlands, some industrial consumers may apply for 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 benefiting from a lower tax regime is the cost of electricity above 14 % of the value added. As shown in Figure 102, no sector (with the exception of NACE 24) in Belgium achieves an electricity cost above 11% at sectoral level. However, as these are aggregate figures that mask information on the level of industrial consumers, some individual industrial consumers may have above-average electricity intensities and therefore have to compete with so-called electro-intensive consumers in neighbouring countries. As it will be seen in the following section, these energy-intensive companies could be at a considerable disadvantage compared with their European competitors.

Weighted energy cost differences

The sector- and region-specific electricity and natural gas price differences recovered in the “Sector- and region-specific electricity and natural gas prices” section is useful to compare electricity and natural gas prices for a certain sector and region with the European average. 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[361]. If an industrial company consumes a lot of electricity and almost 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[362]. The two first formulas are helpful to better understand the final computation, which is the relative energy cost difference expressed in percentage.

$$\text{Energy cost difference for Sector}_\text{i} \text{ in Region}_\text{j} \ (\text{in}\frac{\text{EUR}}{\text{MWh}})$$
$$= \frac{(European\ average\ of\ P_{elec}\ for\ Sector_i\ *\ X_{ij}) * C_i + (European\ average\ of\ P_{gas}\ for\ Sector_i * Y_{ij})}{C_i + 1}$$

$$\text{Energy cost difference for } \text{P}_\text{energy} \text{ for Sector}_\text{i} \ (\text{in}\frac{\text{EUR}}{\text{MWh}})$$
$$= \frac{(European\ average\ of\ P_{elec}\ for\ Sector_i\ * C_i + European\ average\ of\ P_{gas}\ for\ Sector_i}{C_i + 1}$$

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). Figure 103 gives an overview of relative consumption by sector.

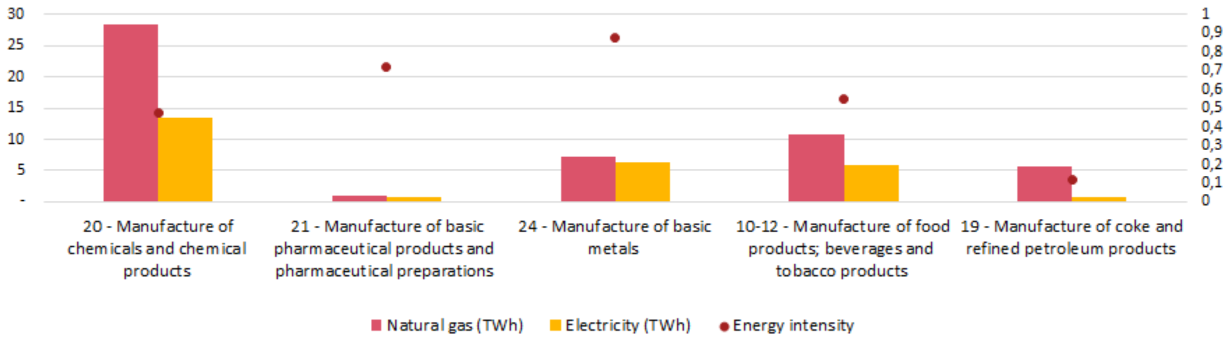
The volume of each energy type consumer by sector is presented on the left axis, while the relative consumption (volume of electricity divided by the volume of natural gas) is presented on the right axis. It is clear that the 5 most important sectors have a relative consumption of less than 1, which means that the 5 most important sectors consume more natural gas than electricity during the production process. For NACE 24, consumption is relatively

[361] 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

[362] 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

balanced (relative consumption of 0,87), but within NACE 20 and NACE 19, natural gas consumption is almost double compared to electricity consumption.

Figure 103: Energy consumption per sector



Source: Federal Planning Bureau, PwC Calculations

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 134. 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.

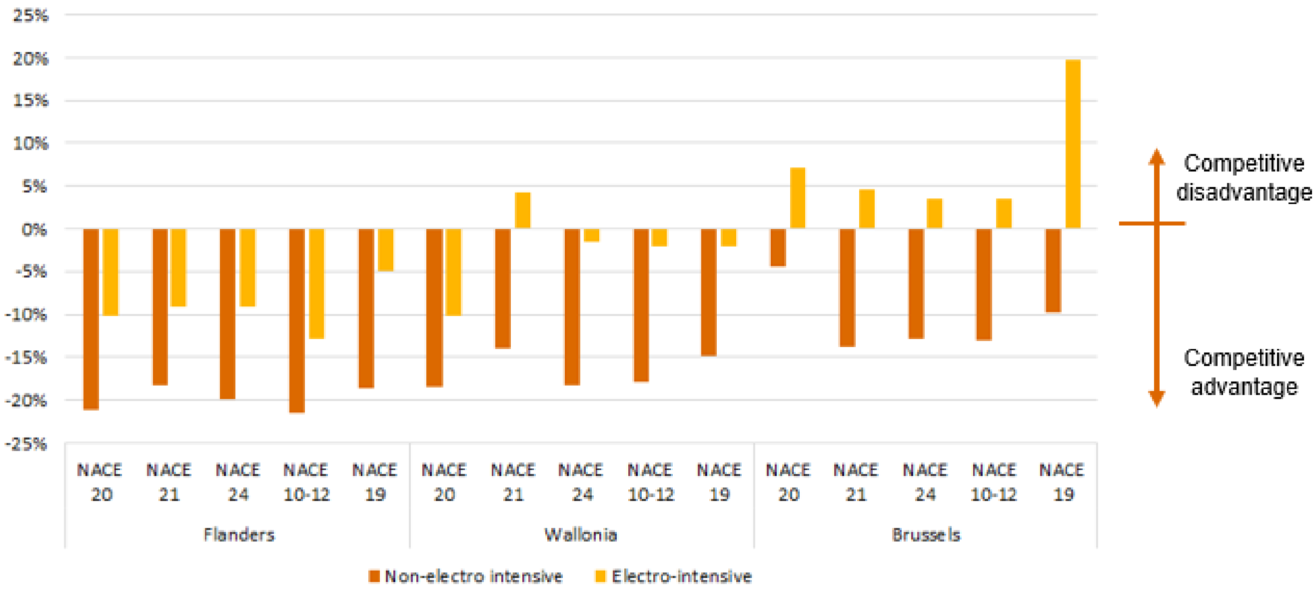
Table 134: Results for every industrial sector in Flanders, Wallonia and Brussels compared to the average prices in Germany, France, the Netherlands and the UK (2020)

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	-9,20%	-23,22%	-13,18%	0,48	-10,23%	-21,08%
	NACE 21	-8,53%	-20,27%	-4,55%	0,72	-9,14%	-18,25%
	NACE 24	-8,02%	-21,51%	-13,59%	0,88	-9,13%	-19,83%
	NACE 10-12	-10,71%	-22,79%	-21,10%	0,55	-12,78%	-21,58%
	NACE 19	-4,21%	-19,21%	-14,31%	0,12	-4,88%	-18,70%
Wallonia	NACE 20	-9,50%	-20,01%	-12,79%	0,48	-10,11%	-18,46%
	NACE 21	7,49%	-16,88%	-11,28%	0,72	4,31%	-18,29%
	NACE 24	1,13%	-19,47%	-13,16%	0,88	-1,53%	-16,69%
	NACE 10-12	1,19%	-18,34%	-15,88%	0,55	-2,05%	-17,87%
	NACE 19	-0,79%	-14,56%	-7,00%	0,12	-2,01%	-14,83%
Brussels	NACE 20	10,07%	-4,39%	-4,74%	0,48	7,07%	-4,46%
	NACE 21	9,13%	-15,62%	-5,19%	0,72	4,59%	-13,77%
	NACE 24	7,11%	-14,71%	-5,34%	0,88	3,53%	-12,92%
	NACE 10-12	6,69%	-13,90%	-9,73%	0,55	3,49%	-13,09%
	NACE 19	8,55%	-9,91%	-9,57%	0,12	19,77%	-9,85%

(green)	Competitive advantage
(red)	Competitive disadvantage

Source: Federal Planning Bureau, PwC Calculations

Figure 104: 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



Source: Federal Planning Bureau, CREG, PwC Calculations

As the previous figure shows, there are variations within the regions: all sectors in Flanders enjoy a competitive advantage, while the Brussel regions face competitive disadvantages in all sectors in terms of differences in weighted energy costs when comparing electro-intensive consumers. For non-electro-intensive consumers, all sectors present 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 4% to 13%. As regards to the Wallonia, electro-intensive consumers cross-sectors face lower competitive advantages (NACE 10-12, 19, 24) and lower competitive disadvantages (NACE 21). NACE 20 displays a high competitive advantage. As for Brussels, electro-intensive consumers face relative competitive disadvantage except for NACE 19 with a high disadvantage.
- **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. 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 chemical sector (NACE 20) and the food and beverages sector (NACE 10-12) have the most advantageous weighted energy cost, while this is the chemical sector (NACE 20) in Wallonia. This is due mainly to the importance of the E3 and E4 profiles, less expensive profiles than E0-E2.

  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 between -5% and -22% lower than the average in neighbouring countries.

Both electro-intensive and non-electro-intensive consumers benefit from competitive advantages in Flanders, while Wallonia presents important relative differences – but still competitive advantages, except for NACE 21 – for the two types of consumer. Brussels presents advantage only for non- electro-intensive.

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.

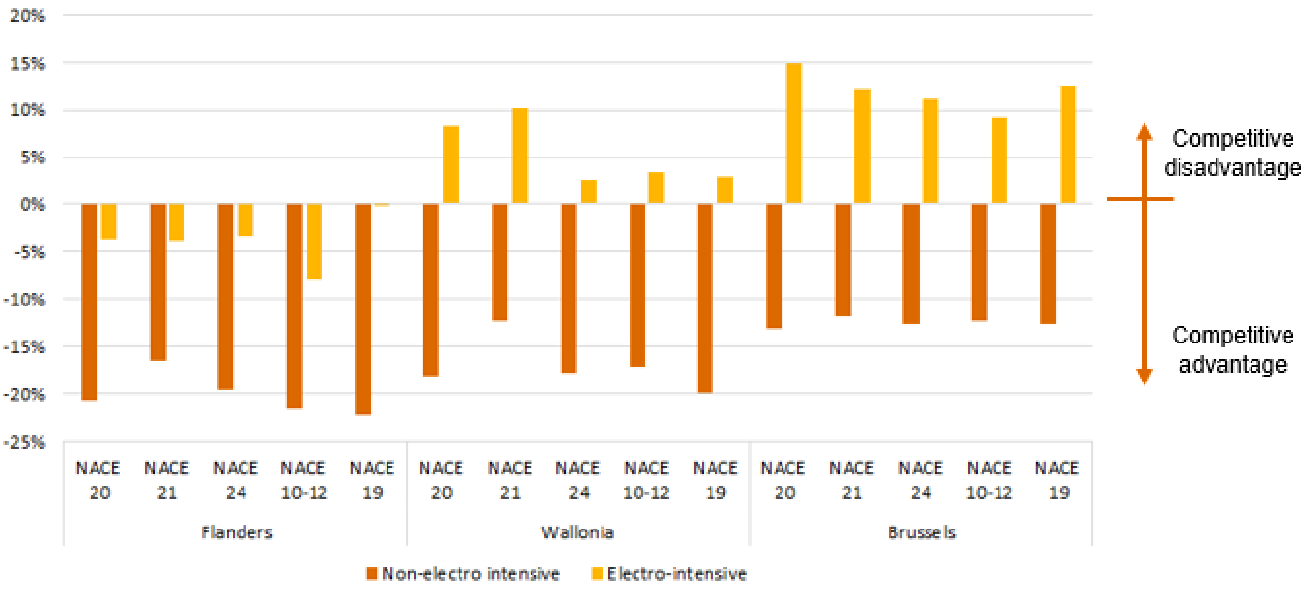
For electro-intensive industries, the competitiveness of all sectors in all regions is negatively affected when the UK is not taken into account whereas the situation is more contrasted for non-electro-intensive industries: some sectors gain in competitiveness while others lose, as pictured afterwards.

The results of the comparison for (non-)electro-intensive consumers are shown in Table 135 below. The differences in weighted energy costs for electro-intensive and non-electro-intensive consumers are shown in Figure 105.

Table 135: Results for every industrial sector in Flanders, Wallonia and Brussels compared to the average prices in Germany, France and the Netherlands (2020)

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	-3,03%	-22,00%	-14,22%	0,48	-3,66%	-20,80%
	NACE 21	-3,77%	-16,72%	-11,68%	0,72	-3,92%	-16,47%
	NACE 24	-2,74%	-20,39%	-13,59%	0,88	-3,38%	-19,57%
	NACE 10-12	-5,68%	-21,57%	-21,10%	0,55	-7,99%	-21,58%
	NACE 19	1,60%	-23,49%	-7,54%	0,12	-0,09%	-22,15%
Wallonia	NACE 20	11,27%	-18,73%	-12,79%	0,48	8,33%	-18,11%
	NACE 21	13,08%	-13,18%	-11,28%	0,72	10,16%	-12,25%
	NACE 24	6,93%	-18,32%	-13,16%	0,88	2,57%	-17,82%
	NACE 10-12	6,89%	-17,05%	-15,88%	0,55	3,34%	-17,12%
	NACE 19	5,24%	-20,75%	-7,00%	0,12	2,97%	-19,88%
Brussels	NACE 20	17,55%	-14,14%	-4,74%	0,48	14,82%	-13,10%
	NACE 21	14,80%	-11,86%	-5,19%	0,72	12,16%	-11,85%
	NACE 24	13,25%	-13,49%	-5,34%	0,88	11,14%	-12,64%
	NACE 10-12	12,70%	-12,54%	-9,73%	0,55	9,22%	-12,32%
	NACE 19	15,15%	-13,29%	-9,57%	0,12	12,39%	-12,59%

Figure 105: 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



Source: Federal Planning Bureau, CREG, 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[363]:

$$\text{The elasticity of demand} = \frac{\%\text{ change in quantity demand}}{\%\text{ change in price demand}} = \frac{\frac{\Delta\, Quantity}{Quantity} * 100}{\frac{\Delta\, Price}{Price} * 100}$$

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.

[363] 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[364] 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 discrimination exists 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[365]. 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[366].

---

[364] 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.

[365] 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.

[366] 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, as explained in chapters 6 and 7. 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)[367].
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 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.

[367] 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 industrials 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 6), 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.

Most papers consider energy as a whole without narrowing it down to types of energy goods. As such, Labandeira et al. (2017)[368], 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)[369]. 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)[370] derive similar results with a relatively inelastic price demand for industrial consumers of -0,2 where Adeyemi & Hunt (2007)[371] 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)[372] 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)[373], benchmarking 36 studies, which evaluates electricity price elasticities to range from -0,16 to -0,21 and Bilgili (2013)[374], 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 136: 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:

- ***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.

[368] (Labandeira, Labeaga, & López-Oteroa, 2017)

[369] 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.

[370] (Trinomics, 2018)

[371] Adeyemi, O.I. and L.C. Hunt, 2007. Modelling OECD industrial energy demand: Asymmetric price responses and energy-saving technical change

[372] (Labandeira, Labeaga, & López-Oteroa, 2017)

[373] (Horáček, 2014)

[374] (Bilgili, 2013)

- ***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 137: 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]
	Industrials	Energy	All	-0,166	-0,508
Trinomics (2018)	Industrials	Energy	All	-0,2	/
Adeyemi & Hunt (2007)	Industrials	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)	Industrials	Energy	Energy-intensive	[-0,2; -0,029]	[-0,529; -0,128]
	Industrials	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 138 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 138: Total energy (electricity and natural gas) bills in absolute and relative terms (compared to Belgium average)[375]

Sector	Consumers range	Belgium (average)	Germany		France		The Netherlands		UK	
		(kEUR)	(kEUR)	%	(kEUR)	%	(kEUR)	%	(kEUR)	%
20	High range	55.276	118.770	115%	77.245	40%	57.988	5%	78.892	43%
	Low range	53.888	51.224	-5%	48.177	-11%	49.062	-9%	73.558	37%
24	High range	32.102	55.329	72%	46.416	45%	38.107	19%	43.481	35%
	Low range	31.040	31.715	2%	29.129	-6%	30.451	-2%	38.733	25%
10,11 and 12	High range	16.458	43.926	167%	21.002	28%	14.342	-13%	24.281	48%
	Low range	16.210	13.769	-15%	13.213	-18%	13.765	-15%	24.281	50%
21	High range	48.245	71.459	48%	72.973	51%	61.621	28%	64.577	34%
	Low range	46.504	50.286	8%	45.803	-2%	47.561	2%	55.392	19%
19	High range	40.196	81.894	104%	53.778	34%	42.573	6%	54.714	36%
	Low range	38.932	36.140	-7%	33.618	-14%	35.577	-9%	51.018	31%

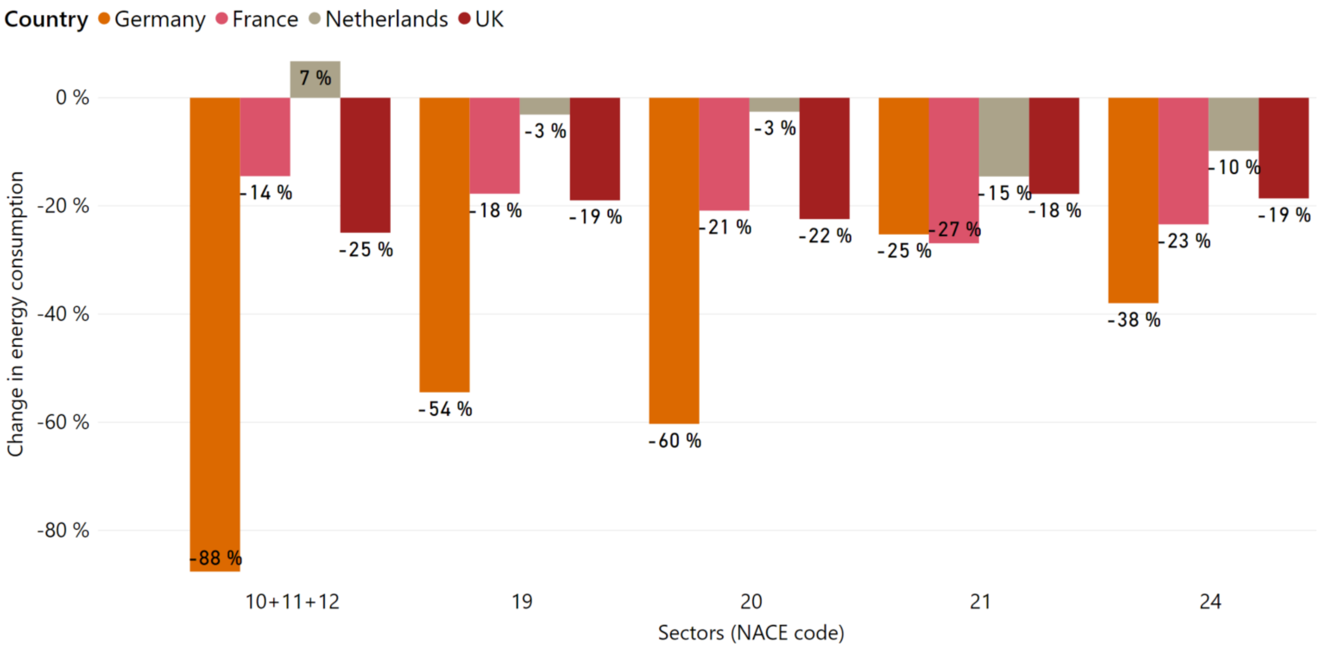
Overall, Belgium seems to offer lower prices than other countries for high range consumers for all sectors, apart from sectors 10, 11 and 12 (food and beverages) for the Netherlands. For instance, Germany's prices are 115% higher than Belgium's with regards to sector 20 (chemicals). This statement holds as lower natural gas prices in Belgium drive down the total energy bill compared to countries such as the Netherlands 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 Germany in sectors 21 (pharmaceuticals) and 24 (basic metals) and for the Netherlands in sector 21.

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 106 attests for these variations (in %) for high

[375] 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.

range consumers (i.e., the maximum applicable price range for non-electro-intensive and natural gas consumers) whereas Figure 107 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 106: 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)



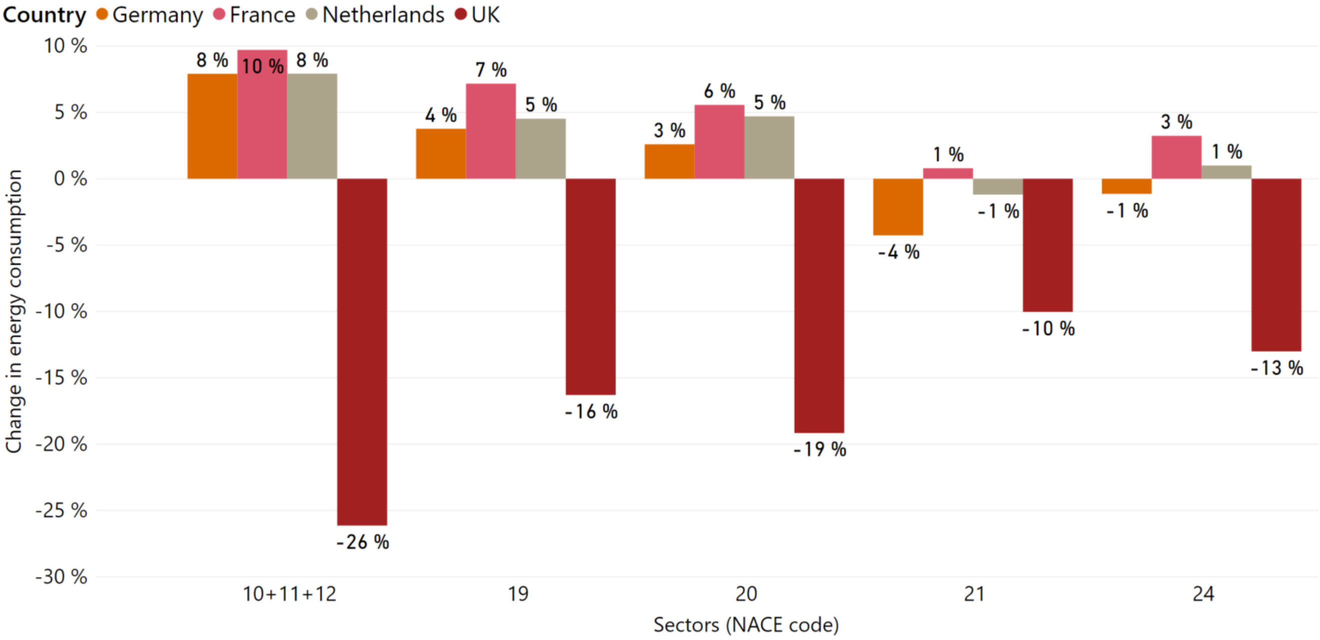
Results depicted here-above demonstrate a negative change in the high range of foreign companies' consumption. As prices are usually lower in Belgium, foreign companies usually observe positive price differences compared to Belgium. Given that the elasticity term displayed preceding is negative, a negative change in consumption is expected for foreign high range consumers regardless of the sector considered – but sector 10, 11 and 12 (food and beverages) in the Netherlands.

Germany appears to be the country from where consumers are currently the most affected by higher German prices (from -25% to -88% change in demand depending on the sector) whereas the Netherlands constitute the least impacted as Dutch prices are more aligned to Belgium's (from -15% to +7% 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 10, 11 and 12 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, sector 21 (pharmaceuticals) in Germany and the Netherlands and sector 24 (basic metals) in Germany excepted, all Belgian consumers would experience higher consumption 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 1% to 10%) before the Netherlands (-1% to 8%). Overall, sector 10, 11 and 12 (food and beverages) and sector 19 (coke and refined petroleum products) appear as being the most impacted by such change as opposed to sector 21. The below graph depicts the situation with regards to the low range of consumers.

Figure 107: 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 106 and Figure 107 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 106 and Figure 107, we obtain -13%. Therefore, we decide to set a consumption reduction threshold of 10% (i.e. a consumer is ready to accept a 10% 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:

$$Elasticity\ of\ demand = \frac{\%\ change\ in\ quantity\ demand}{\%\ change\ in\ price\ demand}$$

$$-0{,}525 = \frac{-10\%}{\%\ change\ in\ price\ demand}$$

$$\%\ change\ in\ price\ demand = \frac{-10\%}{-0{,}525} = 19\%$$

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 19% than Belgian prices as foreign consumers are likely to remain abroad up to that maximum acceptable price. Table 138 casts light on the current price differences across countries and Table 139 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 19% maximum acceptable price.

Table 139: Relocation possibilities for high range consumers

Sector	Germany	France	Netherlands	UK
20				
24				
10+11+12				
21				
19				

For all sectors, Belgium constitutes a real relocation opportunity for high range consumers from all countries under study but the Netherlands (except sector 21).

Conversely, low range consumers would relocate outside Belgium once they find a country where they can benefit from a price difference higher than 19% (i.e. prices abroad are at least 19% lower than in Belgium).

Table 140: Relocation possibilities for low range consumers

Sector	Germany	France	Netherlands	UK
20				
24				
10+11+12				
21				
19				

From Table 138, 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 19%. Table 140 identifies potential countries to relocate for each sector. As such, no country under study offers prices currently lower by more than 19% than Belgium prices. Yet, with prices inferior by 15, 18 and 15%, sector 10,11 and 12 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 (-14%) and 20 (-11%) to France.

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 all 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 exceed their maximum acceptable price. The situation is more contrasted in the Netherlands as only sector 21 (pharmaceuticals) could operate a move to Belgium as a result of current lower prices.

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 10, 11 and 12 (food and beverages) whose low range consumers might find prices low enough in France, Germany and the Netherlands. Besides, France seems to be a credible relocation option for Belgian low range consumers from sector 19 (coke and refined petroleum products) and sector 20 (chemicals). 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[376].

   Even excluding the United Kingdom (high outlier) from the equation, 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). The situation is different for industrial consumers that compete with their counterparts in neighbouring countries where electro-intensive consumers benefit from discounts. Their total cost of energy is an important competitiveness issue when the UK is not included in the comparison. However, when the United Kingdom is included in the comparison, all sectors in Flanders, Wallonia and Brussels face slight to important competitive advantage for non-electro-intensive consumers.

   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.

   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. However, non-electro intensive consumers do not face this issue.

2. The effect of the relatively **low cost of natural gas** for the industry in Belgium - which we observed in chapters 6 and 7 - 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

[376] Although a cap and super cap on the cost of Green Certificates was introduced in Flanders in 2018.

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).

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 chapters 6 and 7 of this report, 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.

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.

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 COVID-19 virus.

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 withdrawal 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.

Bibliography

Bibliography

European Commission. (2020). *Energy poverty*. Retrieved from https://ec.europa.eu/energy/topics/markets-and-consumers/energy-consumer-rights/energy-poverty_en?redir=1

ACM. (2020). *Energiecontracten*. Retrieved from https://www.acm.nl/nl/onderwerpen/energie/afnemers-van-energie/energiecontracten/waar-betaalt-u-voor

Acteno. (2019). *Konzessionsabgabe: Umstellung von Tarif- auf Sondervertagskunde*. Retrieved from https://www.acteno.de/ecms/de/energieanwendungen-4-0/konzessionsabgabe.html

Agence pour une Vie de Qualité (AVIQ). (2020). *Allocations familiales*. Retrieved from https://www.aviq.be/familles/index.html

BDEW. (2018). *Strompreisanalyse: Haushalte und Industrie, Bundesverband der Energie- und Wasserwirtschaft*.

Belastingdienst. (2019). *Handboek Milieubelastingen 2019*. Amsterdam: Belastingdienst. Retrieved from https://www.vemw.nl/~/media/VEMW/Downloads/Public/Gas%20en%20WKK/Handboek%20milieubelastingen.ashx

Belastingdienst. (2020). *Huurtoeslag*. Retrieved from https://www.belastingdienst.nl/wps/wcm/connect/bldcontentnl/belastingdienst/prive/toeslagen/huurtoeslag/

Belastingdienst Nederland. (2020). *Tabellen tarieven milieubelastingen*. Retrieved from https://www.belastingdienst.nl/wps/wcm/connect/bldcontentnl/belastingdienst/zakelijk/overige_belastingen/belastingen_op_milieugrondslag/tarieven_milieubelastingen/tabellen_tarieven_milieubelastingen

Belastingdiesnt. (2020). *Voorwaarden voor zorgtoeslag*. Retrieved from https://www.belastingdienst.nl/wps/wcm/connect/bldcontentnl/belastingdienst/prive/toeslagen/zorgtoeslag/voorwaarden/

Belastingsdienst Nederland. (2020). *Energiebelasting opslag duurzame energie- en klimaattransitie*. Retrieved from https://www.belastingdienst.nl/wps/wcm/connect/bldcontentnl/belastingdienst/zakelijk/overige_belastingen/belastingen_op_milieugrondslag/energiebelasting/

Betanet.de. (2019). *Stromkosten, Stromschulden*. Retrieved from https://www.betanet.de/stromkosten-stromschulden.html

Bilgili. (2013). Long run elasticities of demand for natural gas: OECD panel data evidence.

Brugel. (2019). *Comparateur des offres de fournisseurs*. Retrieved from www.brusim.be

Brussels studies. (2017). *Quelle place pour les activités portuaires et logistiques à Bruxelles ?* Retrieved from https://journals.openedition.org/brussels/1491

Bundesamt für Justiz. (2019). *Stromsteuergesetz (StromStG) § 10*.

Bundesamt für Justiz. (2020). *(Stromnetzentgeltverordnung - StromNEV § 19 Sonderformen der Netznutzung*. Retrieved from https://www.gesetze-im-internet.de/stromnev/__19.html

Bundesamt für Justiz. (2020). *Energiesteuergesetz (EnergieStG)*. Retrieved from https://www.gesetze-im-internet.de/energiestg/__2.html

Bundesamt für Justiz. (2020). *Stromsteuergesetz (StromStG)*. Retrieved from Gesetze im Internet: https://www.gesetze-im-internet.de/stromstg/BJNR037810999.html

Bundesamt für Justiz. (2020). *Verordnung über Konzessionsabgaben für Strom und Gas*. Retrieved from https://www.gesetze-im-internet.de/kav/KAV.pdf

Bundesamtes für Wirtschaft und Ausfuhrko-trolle. (2017). *Statistischen Auswertungen zur "Besonderes Ausgleichsregelung"*.

Bundesministerium für Arbeit und Soziales. (2020). *Arbeitslosengeld II / Sozialgeld*. Retrieved from https://www.bmas.de/DE/Themen/Arbeitsmarkt/Grundsicherung/Leistungen-zur-Sicherung-des-Lebensunterhalts/2-teaser-artikelseite-arbeitslosengeld-2-sozialgeld.html

Bundesministerium für Arbeit und Soziales. (2020). *Arbeitslosengeld II/Sozialgeld*. Retrieved from https://www.bmas.de/DE/Themen/Arbeitsmarkt/Grundsicherung/Leistungen-zur-Sicherung-des-Lebensunterhalts/2-teaser-artikelseite-arbeitslosengeld-2-sozialgeld.html

Bundesministerium für Arbeit und Soziales. (2020). *Leistungen zur Sicherung des Lebensunterhaltes*. Retrieved from https://www.bmas.de/DE/Themen/Arbeitsmarkt/Grundsicherung/Leistungen-zur-Sicherung-des-Lebensunterhalts/2-teaser-artikelseite-arbeitslosengeld-2-sozialgeld.html

Bundesnetzagentur. (2019). *Monitoringbericht 2019*.

CEER. (2018). *Monitoring Report on the Performance of European Retail Markets in 2018*.

CEER. (2019). *Monitoring Report on the Performance of European Retail Markets in 2018*. Brussels: Council of European Energy Regulators. Retrieved from https://www.ceer.eu/documents/104400/-/-/5c492f87-c88f-6c78-5852-43f1f13c89e4

Centre des liaisons européennes et internationales de sécurité sociale. (2020). *Les prestations familiales*. Retrieved from https://www.cleiss.fr/docs/regimes/regime_france4.html#allocations-familiales

Collectivités locales (gouv.fr). (2020). *TARIFS DE TLCFE APPLICABLES AU TITRE DE LA TAXE DUE EN 2020*.

Commissie Energiebeleidsovereenkomsten. (2018). *Energiebeleidsovereenkomsten voor de verankering van en voor blijvende energie-efficiëntie in de Vlaamse energie-intensieve industrie voor VER-bedrijven en niet VER-bedrijven - Jaarverslag 2017*. Antwerpen: Commissie Energiebeleidsovereenkomsten. Retrieved from https://ebo-vlaanderen.be/sites/ebovlaanderen/files/downloads/20190204%20Jaarverslag%202017%20Commissie%20EBO.pdf

Connaissance des Energies. (2020). *Bilan électrique de la France : que retenir de 2019 ?* Retrieved from https://www.connaissancedesenergies.org/la-production-delectricite-en-france-metropolitaine-tous-les-chiffres-cles-de-2019-200212-0

CRE. (2018). *Le fonctionnement des marchés de détail français de l'électricité et du gaz naturel - Rapport 2016-2017*. Retrieved from https://www.cre.fr/Documents/Publications/Rapports-thematiques/Marches-de-detail-de-l-electricite-et-du-gaz-2016-2017

CRE. (2018). *Le fonctionnement des marchés de détail français de l'électricité et du gaz naturel - Rapport 2016-2017*. Retrieved from https://www.cre.fr/Documents/Publications/Rapports-thematiques/Marches-de-detail-de-l-electricite-et-du-gaz-2016-2017

CRE. (2019). *Accès régulé à l'électricité nucléaire historique*. Retrieved from https://www.cre.fr/Electricite/Marche-de-gros-de-l-electricite/acces-regule-a-l-electricite-nucleaire-historique

CRE. (2019). *https://www.cre.fr/Electricite/marche-de-detail-de-l-electricite*. Retrieved from https://www.cre.fr/Electricite/marche-de-detail-de-l-electricite

CRE. (2019). *Présentation des réseaux de gaz naturel*. Retrieved from https://www.cre.fr/Gaz-naturel/Reseaux-de-gaz-naturel/Presentation-des-reseaux-de-gaz-naturel

CRE. (2019). *Réseaux de gaz naturel*. Retrieved from http://www.cre.fr/reseaux/infrastructures-gazieres/description-generale#section3

CREG. (2016). *A European comparison of electricity and natural gas prices for large industrial consumers*. Brussels: CREG. Retrieved from https://www.creg.be/sites/default/files/assets/Publications/Others/20160629-EnergyPrices-FinalReport.pdf

CREG. (2018). *Etude sur le poids de la facture d'électricité et de gaz naturel dans le budget des ménages belges en 2018*. Retrieved from https://www.creg.be/fr/publications/etude-f2012

CREG. (2019). *Etude relative aux prix pratiqués sur le marché belge du gaz naturel en 2018*. Brussels: CREG. Retrieved from https://www.creg.be/sites/default/files/assets/Publications/Studies/F2020FR.pdf

CREG. (2019). *Etude sur la fourniture en gaz naturel des grands clients industriels en Belgique en 2018*. Brussels: CREG. Retrieved from https://www.creg.be/fr/publications/etude-f1927

CREG. (2020). *Décision sur la proposition tarifaire amendée de Fluxys Belgium SA*. Retrieved from https://www.creg.be/fr/publications/decision-b656g40

CWaPE. (2018). *Bilan de la situation du marché de l'électricité pour l'année 2018*. Retrieved from file:///C:/Users/tamignef/Downloads/Bilan-de-la-situation-du-march-du-gaz-po.pdf

CWaPE. (2019). *Comparateur des offres de fournisseurs*. Retrieved from www.compacwape.be

Department for Business, Energy & Industrial Strategy. (2019). *Annual Fuel Poverty Statistics* . Retrieved from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/829006/Annual_Fuel_Poverty_Statistics_Report_2019__2017_data_.pdf

Department for Business, Energy & Industrial Strategy. (2020). *Headline statistics*. Retrieved from https://www.gov.uk/government/publications/business-population-estimates-2019/business-population-estimates-for-the-uk-and-regions-2019-statistical-release-html

Ecofys and adelphi. (2018). *Climate Change Agreements in the UK - Factsheet*. Berlin: Federal Ministry for the Environment, Nature Conservation. Retrieved from https://www.nao.org.uk/wp-content/uploads/2012/11/climate_change_review.pdf

Elia. (2018). *"TARIFFS FOR PUBLIC SERVICE OBLIGATIONS" AND "TAXES AND LEVIES"*. Retrieved from https://www.elia.be/-/media/project/elia/elia-site/customers/green-certificats-and-levies-tariffs/tariffs-and-levies/levies_2019_with_taxes_pylons_envdef.pdf

ENA. (2020). *Electricity - Distribution Charges Overview*. Retrieved from https://www.energynetworks.org/electricity/regulation/distribution-charging/distribution-charges-overview.html

Enedis. (2019). *Home page*. Retrieved from https://www.enedis.fr/english

Enedis. (2020). *Enedis and local distribution companies (LDCs)*. Retrieved from https://www.enedis.fr/relations-with-local-distribution-companies

Energie Leveranciers. (2020). *Belasting Toegevoegde Waarde*. Retrieved from https://www.energieleveranciers.nl/energie/begrippen/btw

European Commission. (2010). *Distribution System Operators observatory 2018*. Retrieved from https://publications.jrc.ec.europa.eu/repository/bitstream/JRC113926/jrc113926_kjna29615enn_newer.pdf

European commission. (2014). *EU Energy market in 2014*. Retrieved from https://ec.europa.eu/energy/sites/ener/files/documents/2014_energy_market_en_0.pdf

European Commission. (2014-2020). *Guidelines on State aid for environmental protection and energy 2014-2020*. Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52014XC0628(01)

European Commission. (2014-2020). *Guidelines on State aid for environmental protection and energy 2014-2020*.

European Commission. (2017). *Energy Union Factsheet The Netherlands*.

European Commission. (2019). *Distribution System Operators observatory 2018*. Retrieved from https://publications.jrc.ec.europa.eu/repository/bitstream/JRC113926/jrc113926_kjna29615enn_newer.pdf

European Commission. (2019). *Distribution System Operators observatory 2018*. Retrieved from https://publications.jrc.ec.europa.eu/repository/bitstream/JRC113926/jrc113926_kjna29615enn_newer.pdf

European Commission. (2020). *Manufacture of chemicals and chemical products*. Retrieved from http://inspire.ec.europa.eu/codelist/EconomicActivityNACEValue/C.20

European Commission. (2020). *Manufacture of coke and refined petroleum products*. Retrieved from http://inspire.ec.europa.eu/codelist/EconomicActivityNACEValue/C.19

Fluvius. (2017). *Trans-HT Aansuiting*. Retrieved from https://www.fluvius.be/sites/fluvius/files/2019-02/Aansluitingscontract-HS-5-bijlage-Trans-HS-aansluiting-2017.pdf

Fluxys. (2020). *Tariffs*. Retrieved from http://www.fluxys.com/belgium/en/Services/Transmission/TransmissionTariffs/TransmissionTar iffs

Fluxys. (2020). *Transport cost*. Retrieved from https://www.fluxys.com/-/media/project/fluxys/public/corporate/fluxyscom/documents/fluxys-belgium/commercial/public-distribution/2020_fluxys_costestimation_domesticexit_en.pdf

FNB gas. (2019). *Homepage*. Retrieved from https://www.fnb-gas.de

Gaspool. (2016). *The association of german TSO jointly support contiunation of gas quality conversion fee*. Retrieved from https://www.gaspool.de/en/company/press/press-releases/press-release/artikel/gaspool-netconnect-germany-and-the-association-of-german-gas-tsos-jointly-support-continuation-of-ga/

Gasunie Transport Services. (2020). *Explanation network points*. Retrieved from https://www.gasunietransportservices.nl/en/transparency/dataport/explanation-network-points

GOV.UK. (2020). *Climate Change Levy rates*. Retrieved from https://www.gov.uk/guidance/climate-change-levy-rates

GOV.UK. (2020). *Exemptions from Climate Change Levy*. Retrieved from https://www.gov.uk/guidance/exemptions-from-climate-change-levy

GOV.UK. (2020). *VAT rates on different goods and services*. Retrieved from https://www.gov.uk/guidance/rates-of-vat-on-different-goods-and-services#power

Government, U. (2020). *Winter Fuel Payment*. Retrieved from https://www.gov.uk/winter-fuel-payment/what-youll-get

GRDF. (2019). *Ouverture du marché de l'énergie : quels impacts pour les copropriétaires ?* Retrieved from https://www.grdf.fr/entreprises/actualites/ouverture-marche-energie-impacts-copro

Horáček, P. (2014). Price Elasticity of Electricity Demand: A Meta Analysis.

KidsLife. (2020). *Allocations familiales*. Retrieved from https://www.kidslife.be/fr/allocations-familiales/bruxelles

Labandeira, X., Labeaga, J., & López-Oteroa, X. (2017). A meta-analysis on the price elasticity of energy demand.

Le Médiateur National de l'Energie. (2019). *Le comparateur d'offres d'électricité et de gaz naturel*. Retrieved from http://comparateur-offres.energie-info.fr

Legifrance. (2020). *Décrêt fixant les modalités d'accès à l'ARENH*. Retrieved from https://www.legifrance.gouv.fr/affichTexteArticle.do?cidTexte=JORFTEXT000023915642&idArticle=JORFARTI000023915652&categorieLien=cid

Marketsgebietzusammenlungen. (2019). *Homepage*. Retrieved from http://www.marktgebietszusammenlegung.de/en/home/

Médiateur national de l'énergie. (2019). *Comparateur offres enrgie*. Retrieved from http://comparateur-offres.energie-info.fr

Merkur.de. (2020). *Energieexperten schlagen Alarm: Hartz-IV-Empfänger könnten sich 2020 Strom nicht leisten*. Retrieved from https://www.merkur.de/wirtschaft/hartz-iv-strom-kosten-2020-check-24-arbeitslosengeld-ii-sozialhilfe-jobcenter-geld-zr-13412510.html

Ministère de la Transition écologique et solidaire. (2020). *Lutte contre la précarité énergétique*. Retrieved from https://www.ecologique-solidaire.gouv.fr/lutte-contre-precarite-energetique

Ministère des Finances (France). (2020). *Taxe sur la consommation finale (TCFE)*. Retrieved from https://www.impots.gouv.fr/portail/taxe-sur-la-consommation-finale-delectricite-tcfe

National Grid ESO. (2019). *Assistance for Areas with High Electricity Distribution Costs final tariff 2019/20*. Retrieved from https://www.nationalgrideso.com/document/148076/download

Nationalgrid. (2019). *Gas Transmission Transportation charges*. Retrieved from https://www.nationalgridgas.com/document/126581/download

Netztransparenz.de. (2020). *§ 19 StromNEV-Umlage*. Retrieved from Information platform of the four German TSOs: https://www.netztransparenz.de/EnWG/-19-StromNEV-Umlage/-19-StromNEV-Umlagen-Uebersicht

Netztransparenz.de. (2020). *Abschaltbare Lasten-Umlage*. Retrieved from Information platform of the four German TSOs: https://www.netztransparenz.de/EnWG/Abschaltbare-Lasten-Umlage/Abschaltbare-Lasten-Umlagen-Uebersicht

Netztransparenz.de. (2020). *EEG-Umlage*. Retrieved from Information platform of the four Gemran TSO: https://www.netztransparenz.de/EEG/EEG-Umlagen-Uebersicht

Netztransparenz.de. (2020). *Offshore-Netzumlage*. Retrieved from Information platform of the four German TSO: https://www.netztransparenz.de/EnWG/Offshore-Netzumlage/Offshore-Netzumlagen-Uebersicht

OFGEM. (2015). *Regional differences in network charges.*

OFGEM. (2018). *Warm Home Discount*. Retrieved from https://www.ofgem.gov.uk/system/files/docs/2018/08/warm_home_discount_whd_guidance_for_suppliers_-_version_6.1.pdf

OFGEM. (2019). *RIIO Electricity Distribution annual report 2017-18*. Retrieved from https://www.ofgem.gov.uk/publications-and-updates/riio-electricity-distribution-annual-report-2017-18

OFGEM. (2020). *Renewables Obligation - Energy suppliers*. Retrieved from https://www.ofgem.gov.uk/environmental-programmes/ro/energy-suppliers

OFGEM. (2020). *Retail Market Indicators*. Retrieved from https://www.ofgem.gov.uk/data-portal/retail-market-indicators

OFGEM. (2020). *Understand your gas and electricity bills*. Retrieved from https://www.ofgem.gov.uk/consumers/household-gas-and-electricity-guide/understand-your-gas-and-electricity-bills

ONPE. (2020). *Définition des indicateurs de l'ONPE*. Retrieved from https://onpe.org/definition_indicateurs/definition_des_indicateurs

Overheid. (2014). *Officiële publicaties*. Retrieved from https://zoek.officielebekendmakingen.nl/kst-33777-3.html

Région Wallonne. (2018). *Accords de branche « Energie/CO2 » avec les secteurs industriels wallons - Rapport public concernant l'année 2016* . Namur: Région Wallonne. Retrieved from https://energie.wallonie.be/servlet/Repository/adb2-rapport-public-2016.pdf?ID=51070

RGC Manager. (2019). *Statistisches Bundesamt veröffentlicht Grenzpreis für Strom*. Retrieved from https://rgc-manager.de/news/energierecht/statistisches-bundesamt-veroeffentlicht-grenzpreis-fuer-strom/

Rijksoverheid. (2020). *Het sociaal minimum*. Retrieved from https://www.rijksoverheid.nl/onderwerpen/ww-uitkering/vraag-en-antwoord/wat-is-het-sociaal-minimum-en-wat-als-mijn-uitkering-lager-is-dan-dat-minimum

Selectra. (2020). *Calendrier d'installation du compteur Linky : date de la pose dans votre commune*. Retrieved from https://www.fournisseurs-electricite.com/guides/compteur/linky/calendrier-deploiement

Selectra. (2020). *Guides taxes*. Retrieved from https://selectra.info/energie/guides/tarifs/taxes/tva

Selectra. (2020). *Liste complète 2020 des fournisseurs d'éléectricité en France*. Retrieved from https://www.fournisseurs-electricite.com/fournisseurs

Selectra. (2020). *Trouver la zone tarifaire de gaz dont je dépends*. Retrieved from https://selectra.info/energie/guides/demarches/zone-tarifaire-gaz

Selectra. (n.d.). *ARENH : définition, prix 2020, fonctionnement*. Retrieved from https://entreprises.selectra.info/energie/guides/arenh

Sibelga. (2020). *Chiffres clés*. Retrieved from https://www.sibelga.be/fr/sibelga-group/sibelga-en-chiffres

Sibelga. (2020). *Obligation de Service Public (OSP)*. Retrieved from https://www.sibelga.be/fr/tarifs/tarifs-utilisation-reseau/obligations-de-service-public

Smart Rechner. (2019). *Mehrwertsteuer (Mwst)*. Retrieved from https://www.smart-rechner.de/mwst/ratgeber/mehrwertsteuer_deutschland.php

Sociale Verzekeringsbank. (2020). *Bedragen kinderbijslag*. Retrieved from https://www.svb.nl/nl/kinderbijslag/bedragen-betaaldagen/bedragen-kinderbijslag

Stromanbieter vergleich. (2019). *Stromanbieter vergleich*. Retrieved from https://www.stromanbietervergleich.net/

Stromvergleich. (2015). *Strom report news*. Retrieved from https://1-stromvergleich.com/stromanbieter-deutschland-marktanteile/

Switch Expert BV. (2019). *Energieprijzen vergelijken*. Retrieved from https://www.energieleveranciers.nl/

TenneT. (2020). *Tariffs*. Retrieved from https://www.tennet.eu/electricity-market/dutch-market/tariffs/

Toptarif. (2020). *Mehrwertsteuer*. Retrieved from https://www.toptarif.de/strom/wissen/mehrwertsteuer/

Trinomics. (2018). Study on Energy Prices, Costs and Subsidies and their Impact on Industry and Households.

UK Government . (2020). *Disability Living Allowance (DLA) for children*. Retrieved from https://www.gov.uk/disability-living-allowance-children/rates

UK Government. (2020). *Claim Child Benefit*. Retrieved from https://www.gov.uk/child-benefit/what-youll-get

UK Government. (2020). *Disability premiums*. Retrieved from https://www.gov.uk/disability-premiums/eligibility

UK Government. (2020). *Housing Benefit*. Retrieved from https://www.gov.uk/housing-benefit

UK Government. (2020). *Income Support*. Retrieved from https://www.gov.uk/income-support

UK Government. (2020). *Pension Credit*. Retrieved from https://www.gov.uk/pension-credit/eligibility

Vlaamse Overheid. (n.d.). Retrieved from Tarief van de energieheffing: https://www.vlaanderen.be/energieheffing-of-bijdrage-energiefonds-heffing-op-afnamepunten/tarief-van-de-energieheffing

Vlaamse Overheid. (2020). *Tarief van de energieheffing*. Retrieved from https://www.vlaanderen.be/energieheffing-of-bijdrage-energiefonds-heffing-op-afnamepunten/tarief-van-de-energieheffing

VREG. (2019). *Met betrekking tot de kwaliteit van de dienstverlening van de aardgasdistributienetbeheerders in het Vlaamse Gewest in 2018*. Brussels: VREG. Retrieved from https://docplayer.nl/162997723-

Rapport-24-09-2019-met-betrekking-tot-de-kwaliteit-van-de-dienstverlening-van-de-aardgasdistributienetbeheerders-in-het-vlaamse-gewest-in-2018.html

VREG. (2019). *met betrekking tot de kwaliteit van de dienstverlening van de elektriciteitsdistributienetbeheerders en de beheerder van het plaatselijk vervoernet in het Vlaamse Gewest in 2018*. Brussels: VREG. Retrieved from https://www.vreg.be/sites/default/files/document/rapp-2019-12.pdf

VREG. (2019). *Vergelijk energiecontracten in Vlaanderen*. Retrieved from https://vtest.vreg.be/

Wolters Kluwer. (2013). *Federale overheid herschikt eigen regime van minimumsteun voor groenestroomcertificaten*. Retrieved from https://immospector.kluwer.be/newsview.aspx?contentdomains=IMMORES&id=kl1623711&lang=nl

Appendix

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 3,1459 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 0,1188 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 9,0141 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). 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 annexees 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.
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: -98% * only for industry (NACE 5-33) and deep frost alimentary (46391 and 52100).

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 - 5.000 MWh/year: -25% • 5.000 - 25.000 MWh/year: -50% • 25.000 - 75.000 MWh/year: -85% • > 75.000 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 2,26 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 0,34 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 0,45 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 3,58 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 4,16 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 0,624 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 0,832 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 67,56 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 10,13 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 13,51 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. 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 d'acheminement" (CTA)	No		The ***CTA*** for electricity is a surcharge for energy sector pensions. It amounts to 27,04% of the fixed part of the transport tariff for consumers connected to the distribution grid. One reduction applies, based on grid level criteria: for consumers directly connected to

				the transmission grid or those who are connected to the distribution grid ≥ 50 kV (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: 97,70 EUR/MWh; • 10 - 50 MWh/year: 50,80 EUR/MWh; • 50 - 10.000 MWh/year: 13,55 EUR/MWh; • > 10.000 MWh/year: 0,55 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: 27,20 EUR/MWh; • 10 - 50 MWh/year: 37,50 EUR/MWh; • 50 - 10.000 MWh/year: 20,50 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 industrials 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 8,47 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 0,484 Renewable Obligation Certificate (ROC) applies per MWh. Companies missing this quota must pay 48,78 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 0,7423 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 is 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 8,45 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: 0,33307 EUR/m³; • 5.000 – 170.000 m³: 0,06444 EUR/m³; • 170.000 – 1.000.000 m³: 0,02348 EUR/m³; • 1.000.000 - 10.000.000 m³: 0,01261 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: 0,0775 EUR/m³; • 5.000 – 170.000 m³: 0,0214 EUR/m³; • 170.000 – 1.000.000 m³: 0,0212 EUR/m³; • 1.000.000 - 10.000.000 m³: 0,0212 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 3,39 EUR/MWh for natural gas (January 2020). When users have signed up to a Climate Change Agreement (sectoral or individual), they obtain a 35% reduction (1,49 EUR/MWh). Companies that do not use natural gas as a fuel (for example as a raw material) are exempted from the Climate Change Levy.