



Composition and Drivers of Energy Prices and Costs: Case Studies in Selected Energy Intensive Industries – 2018

Final Report
Executive Summary

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Abstract

Based on data collected from 189 plants over a 10-year period (2008-2017), the study shows energy prices and costs borne by EU producers operating in 11 energy intensive subsectors: bricks and roof tiles, wall and floor tiles, glass tableware, packaging glass, aluminium primary, aluminium secondary, aluminium downstream, steel (electric arc furnace - EAF), steel (basic oxygen furnace - BOF), nitrogen fertilisers and refineries. Prices for both electricity and natural gas reached a peak between 2011 and 2013 and then decreased. By 2017, recorded prices had returned to pre-crisis levels. Across all sectors, larger consumers are experiencing lower prices and costs. Regulatory components (e.g. network costs, non-recoverable taxes and levies, etc.) have a larger impact on electricity prices than on natural gas prices. Energy costs represent a driver for cost competitiveness, as they account for between 2% and 43% of total production costs in different subsectors. Whereas it is not possible to draw conclusions on the impact of energy costs on margins, a statistically significant negative association between natural gas prices and plant profitability was detected. Finally, the energy costs borne by EU producers appear to be higher than those faced by their international competitors based in Algeria, Egypt, Russia, United Arab Emirates and the US and comparable to those faced by producers in China and Turkey.

Executive Summary

Objectives

The “Composition and Drivers of Energy Prices and Costs: Case Studies in Selected Energy Intensive Industries – 2018” (hereinafter, the “EPC Study”) aims to:

1. Provide well-grounded, bottom-up evidence of the composition and drivers of energy prices and energy costs faced by industrial operators in energy intensive sectors in the EU; and
2. Assess the impact of energy prices and costs and their components on the cost competitiveness and, where possible, international competitiveness of energy intensive sectors in the EU.

Sample

The EPC Study adopts a bottom-up approach. More specifically, the results are based on data collected from 189 plants in eight energy intensive sectors (and 11 subsectors) across the EU. The study does not draw its findings from a statistically representative sample, but rather is based on a sample of typical plants in each subsector, i.e. installations reflecting the average features of EU plants. In each subsector, sampled plants represent more than 10% of the sector’s turnover or production capacity; in some sectors this share is much higher (Table 1).

Table 1 Plants participating in the EPC Study

Subsector	Number of plants by geographical region				Representativeness in 2016
	Central-Eastern Europe ¹	North-Western Europe ²	Southern Europe ³	Total	Share of turnover (T) or production capacity (C)
Bricks and roof tiles	11	36	11	58	11% T
Wall and floor tiles	8	4	10	22	12% T
Glass tableware	2	4	6	12	92% T
Packaging glass	8	8	8	24	17% T
Aluminium primary	1	5	4	10	60% T
Aluminium secondary	2	1	6	9	n.a. ⁴
Aluminium downstream	1	4	3	8	13% T
Steel EAF	3	13	2	18	14% C
Steel BOF	3	4	0	7	26% C
Nitrogen fertiliser	4	1	3	8	17% C
Refineries	1	8	4	13	19% C
TOTAL	44	88	57	194	-

Source: Authors’ elaboration.

¹ This region includes the following Member States: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic and Slovenia.

² This region includes the following Member States: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Luxembourg, the Netherlands, Sweden and the UK.

³ This region includes the following Member States: Cyprus, Greece, Italy, Malta, Portugal and Spain.

⁴ The representativeness of the secondary aluminium sample cannot be computed for two reasons: i) official Eurostat PRODCOM statistics do not allow one to identify the value of secondary aluminium production, as secondary aluminium products are often under the same code as primary aluminium products; and ii) the relevant sectoral association does not collect statistics on the full EU population of EU producers of secondary aluminium.

The selection of sectors aimed to ensure wide coverage of a broad range of features of energy intensive industries in the EU. For instance, the study examines gas-intensive sectors (e.g. bricks and roof tiles and packaging glass) and electricity-intensive sectors (e.g. primary aluminium and EAF steel); sectors relying on solid fuels, such as coking coal (e.g. BOF steel) and sectors using crude oil (e.g. refineries); sectors concentrated in a limited number of Member States (e.g. ceramic tiles and primary aluminium) and geographically dispersed sectors (e.g. packaging glass, secondary and downstream aluminium); sectors dominated by large companies (e.g. primary aluminium and glass tableware) and sectors including more SMEs (e.g. bricks and roof tiles and ceramic tiles); net importers (e.g. aluminium and steel), net exporters (e.g. ceramic tiles and glass tableware) and sectors that are relatively less exposed to international competition (e.g. bricks and tiles and packaging glass). For most of the indicators, the current EPC Study presents data over a 10-year period going from 2008 to 2017. Data collected for fertilisers, glass tableware and packaging glass covered the entire period under investigation, whereas data for aluminium, bricks and roof tiles, refineries, steel and wall and floor tiles were collected only for 2016 and 2017. In the latter sectors, which were already covered up to 2015 by the 2016 EPC Study,⁵ time series were completed by relying on the data that the Research Team collected when performing the earlier edition of the Study.

Results

Sectors

Table 2 provides an overview of energy prices and costs as well as of the impact of energy costs on production costs in the sectors under analysis. This overview is limited to 2016: while this is the year with the largest number of observations available, it is also the year when both electricity and gas prices and costs were at their lowest levels (Figure 2 and Figure 4).

Table 2 Energy prices and costs in EU energy intensive sectors – Simple averages, 2016

Sector	Price of electricity (€/MWh)	Cost of electricity* (€/MWh)	Cost of electricity as a share of production costs (%)	Price of natural gas (€/MWh)	Cost of natural gas as a share of production costs (%)
Bricks and roof tiles	86.3	79.3	5.4%	25.1	13.6%
Wall and floor tiles	99.2	88.1	5.2%	24.1	10.4%
Glass tableware	92.4	85.8	6.2%	23.8	7.5%
Packaging glass	75.4	68.9	7.5%	22.3	12.2%
Primary aluminium	39.4	37	41.6%	20.9	1.3%
Secondary aluminium	97.6	93.9	6.1%	24.4	7.9%
Downstream aluminium	80.0	80.0	1.3%	24.7	0.6%
Steel EAF	53.7	50.6	9.8%	19.2	2.5%
Steel BOF*	57.6	52.1	3.3%	17.2	1.1%
Nitrogen fertiliser	66.5	60.3	6.6%	18.8	52.1%
Refineries*	69.0	62.9	0.8%	20.3	1.1%

*Note: *In these two sectors, fuels other than electricity and natural gas play a significant role; therefore, the share of these fuel costs out of production costs is not representative of the overall energy intensity of the production processes involved. **The cost of electricity takes also into account reimbursement, self-production and flexibility schemes.*

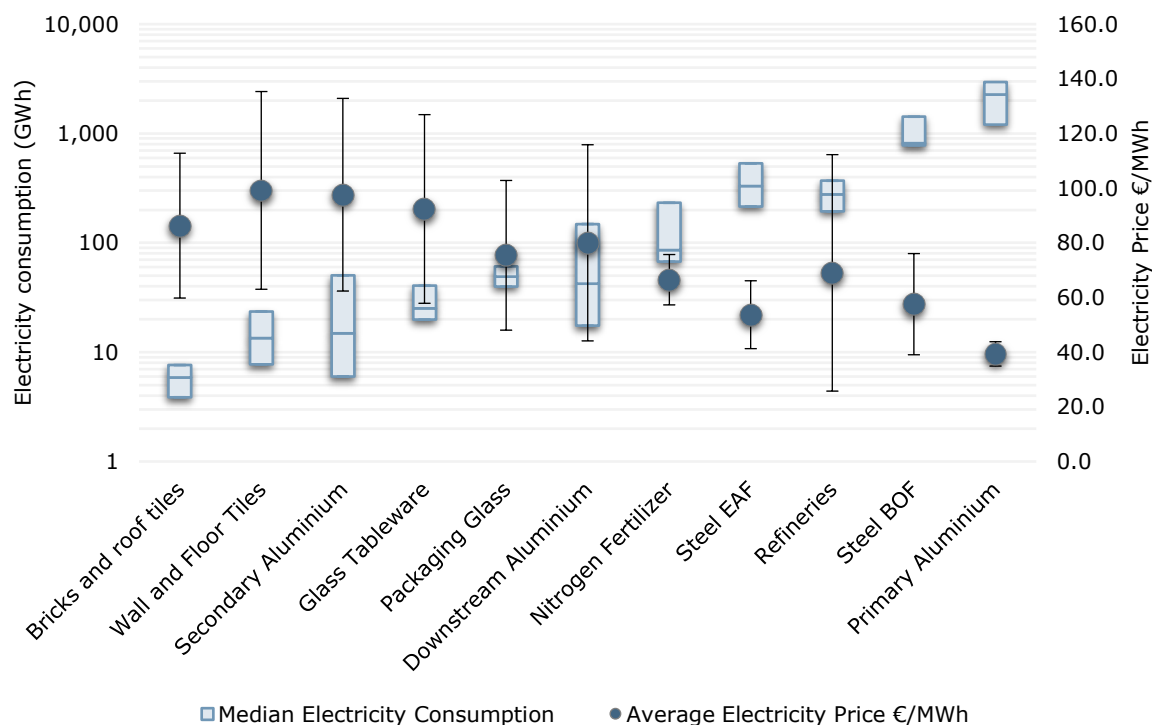
Source: Authors' elaboration.

⁵ CEPS, Ecofys and Economisti Associati (2016), "Composition and drivers of energy prices and costs: Case studies in selected energy intensive industries", European Commission.

Electricity

When comparing data across sectors, a clear inverse relationship between electricity prices and consumption becomes apparent. As electricity consumption increases, electricity prices decline (Figure 1). This result has three possible explanations: i) larger consumers may negotiate more favourable price conditions; ii) larger consumers from energy intensive sectors may be granted exemptions from certain taxes and levies; and iii) plants in some industries run a flat-profile process from day to night, so that they tend to access cheaper base-load electricity.

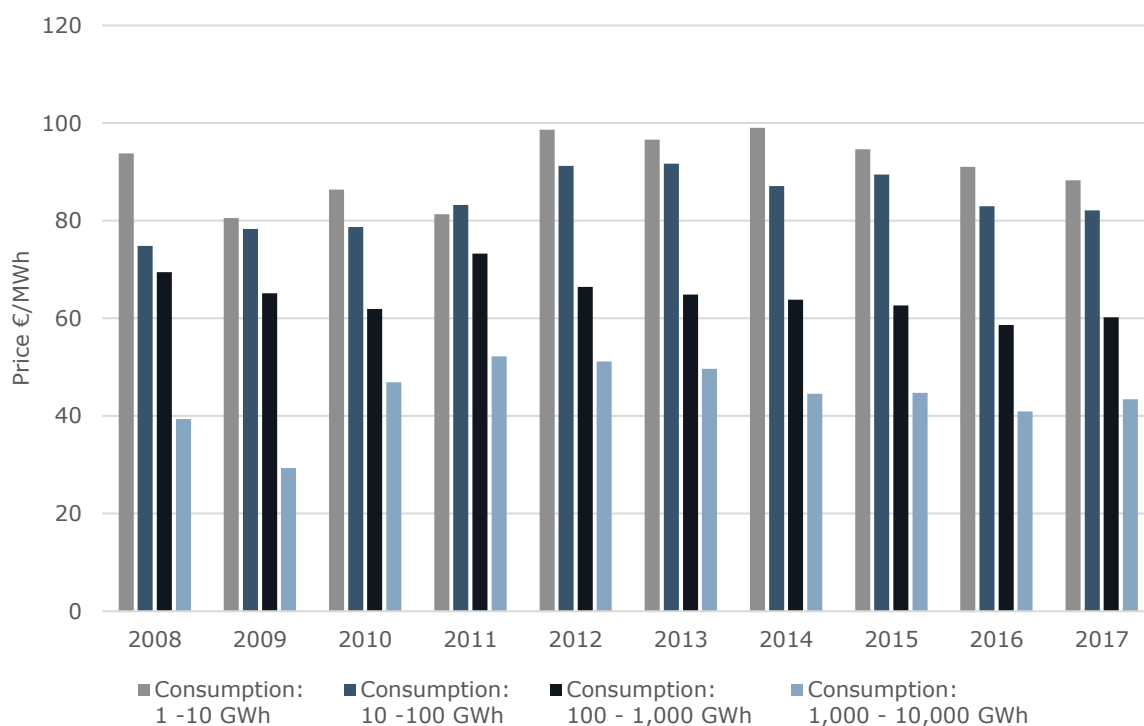
Figure 1 Electricity consumption and prices by sector - Simple averages, 2016



*Note: Based on 185 plants.
Source: Authors' elaboration.*

This inverse relationship is also confirmed when looking at electricity prices by consumption band. Electricity prices in all bands experienced an increasing trend in the first part of the period under observation, peaking between 2011 and 2012; they then decreased and in 2017 recorded values similar to those registered in 2008 (Figure 2). Interestingly, regulatory components (network and capacity market costs, RES levies, other non-recoverable taxes and levies) represent a large share of electricity prices (above 50% of the total price in some Member States).

Figure 2 Electricity prices by consumption band – Simple averages



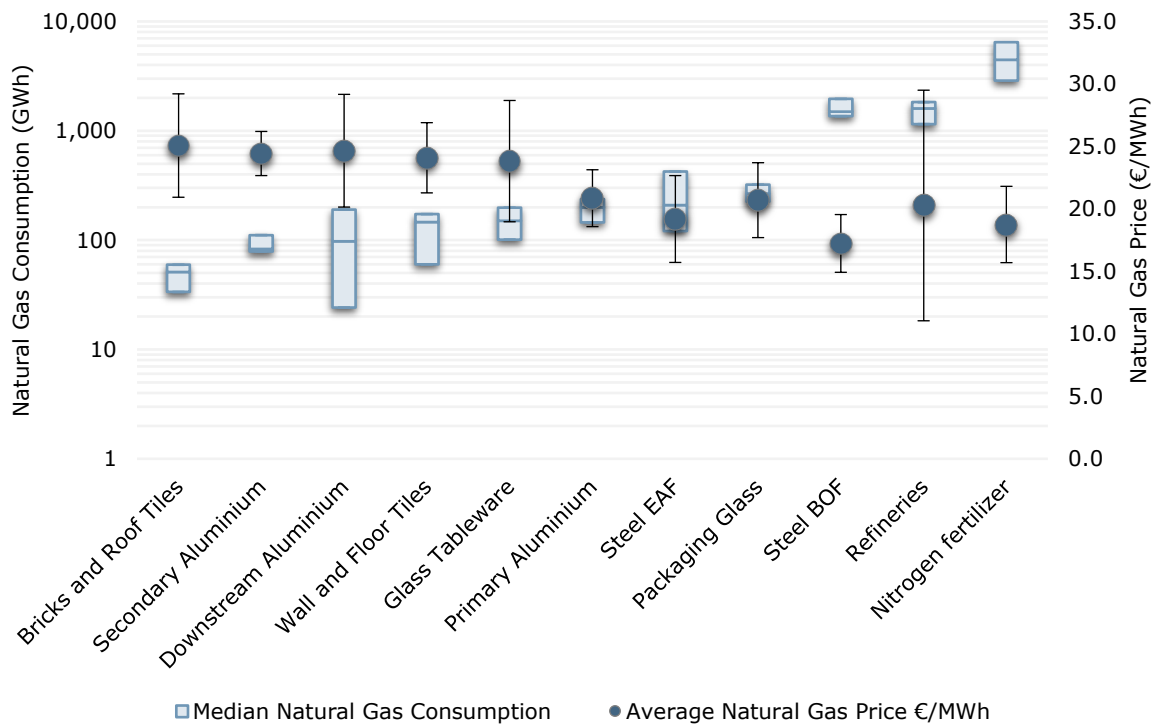
Source: Authors' elaboration.

Natural gas

Natural gas prices and consumption are also linked by an inverse relationship (Figure 3), but the relationship is not as strong as it is in electricity. There are two possible reasons for this lower variation: i) the proportion of regulated components is relatively smaller in the price of natural gas, and hence, there are fewer opportunities for regulators or governments to support large consumers through discounts and exemptions; and ii) natural gas costs largely depend on international prices set by natural gas-producing countries, mostly outside the EU, thereby limiting the room for price negotiation.

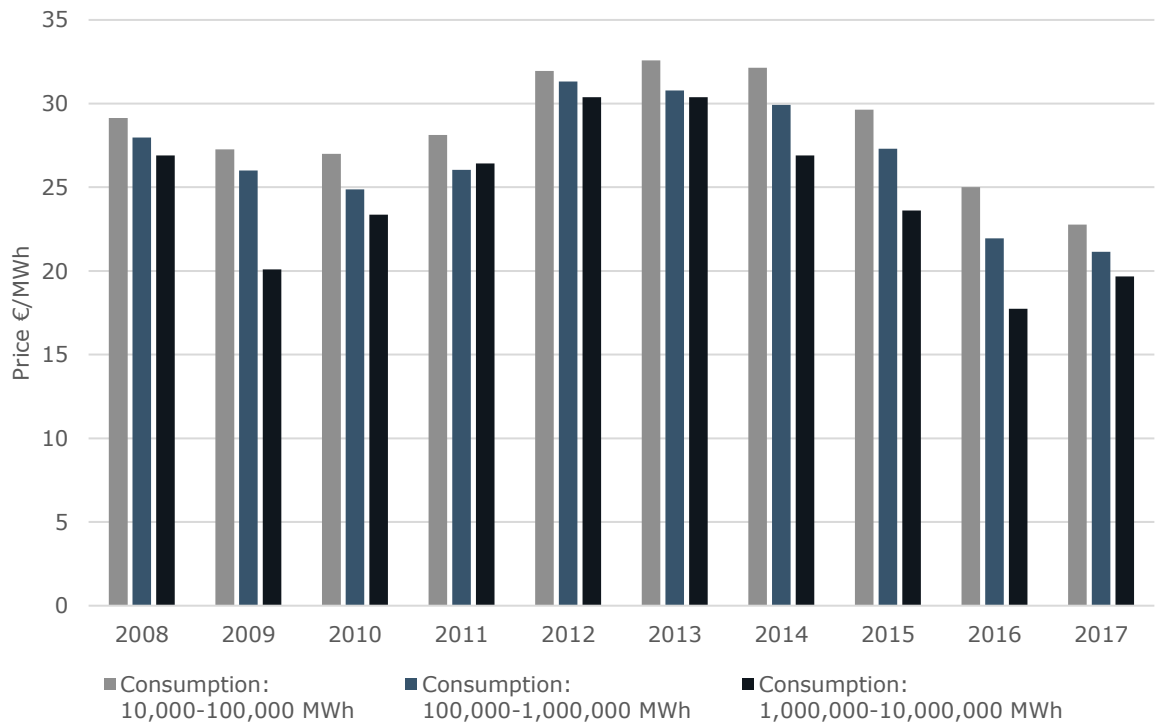
This result is corroborated when looking at differences in prices across consumption bands (Figure 4). Similarly, to electricity prices, natural gas prices recorded an inverted U-shaped trend, with a peak between 2012 and 2013. They then experienced a sharp downward trend and in 2017 were below pre-crisis levels. It is worth remarking that regulatory components (network costs and non-recoverable taxes and levies) generally make up between 8% and 15% of the natural gas prices across the years examined.

Figure 3 Natural gas consumption and prices by sector - Simple averages, 2016



*Note: Based on 165 plants.
Source: Authors' elaboration.*

Figure 4 Natural gas prices by consumption band – Simple averages



Source: Authors' elaboration.



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