European Commission

Energy costs

for the industry in the EU and main trading partners

Koen Rademaekers, Laurent Zibell, Perla C. Torres Vega, Natalie Janzow (Trinomics).

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Presented by
Consortium led by:
Trinomics B.V.
Westersingel 34
3014 GS Rotterdam
The Netherlands

Contact
Koen Rademaekers
Koen.rademaekers@trinomics.eu
Tel: +31 6 22725505

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Introduction

The findings presented in this brochure are derived from Task 2 of the Study on energy prices, costs and their impact on industry and households produced for the European Commission and conducted by Trinomics in association with Enerdata, Cambridge Econometrics and LBST.

The analysis covers:

· Industry energy costs shares

· Industry energy intensity

For a selection of 30 sectors at NACE 2 and NACE 3-digit level for section C (Manufacturing) and 13 sectors at NACE 1 or 2-digit level for the other sections for the period 2010 to 2017 using country-level data. These sectors were selected based on their energy intensities, levels of trade exposure, and economic relevance.

The study covered the EU27 Member States and non-EU G20 countries, for years 2010 to 2017,

In addition, five energy intensive industries (EIIs) were analysed using plant data collected via a questionnaire. The EIIs covered are flat glass, zinc, ferro-alloys and silicon, refineries and fertilisers.

The detailed methodology and complete findings can be found in the final report available **here**.

Industry energy cost shares in the EU

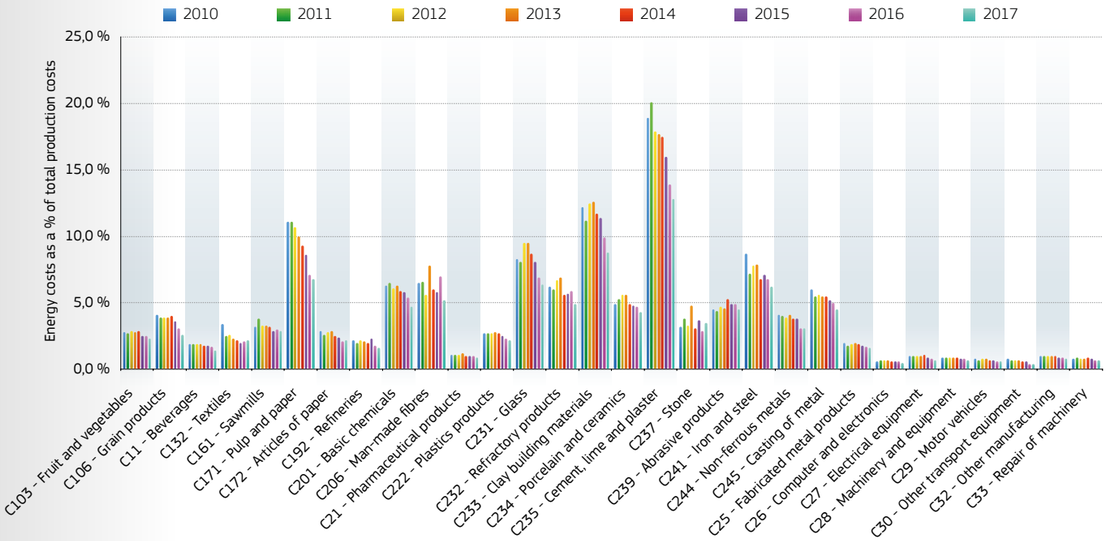
*Headline findings**

- Energy costs shares in total (operational) production costs fell for all the manufacturing sectors studied between 2010 and 2017.
- Energy cost shares also declined for the majority of the non-manufacturing sectors studied.
- For more than half of the sectors studied the energy costs decreased while the production costs increased.

**Findings pertain to the whole value chain of the sectors (thus including upstream and downstream companies).*

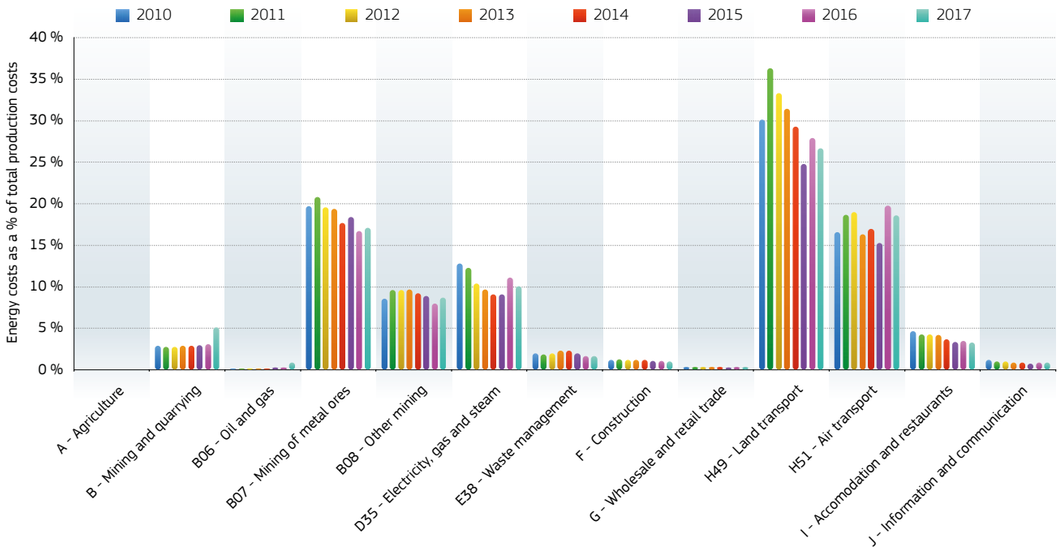
Manufacturing sectors

- Energy costs shares in total (operational) production costs fell for all the manufacturing sectors studied between 2010 and 2017 with the most important declines in paper (-5.7%), cement (-5.1%), steel (-2.9%) and clay building materials (-2.9%).
- The fall was more pronounced in recent years. Between 2010 and 2013 energy costs fell in most sectors, with non-negligible rises in shares in a few of the most energy-intensive sectors like man-made fibres, stone, glass, refractory products, ceramics, clay building materials and in less energy-intensive sectors like computers. Between 2014 and 2017 energy costs fell in all manufacturing sectors.
- Energy costs in manufacturing accounted for around 1-10% production costs. For sectors paper, clay building materials, iron and steel and cement, energy costs accounted for more than 10% production costs in at least one year.



Non-manufacturing sectors

- Energy cost shares also declined for the majority of the non-manufacturing sectors studied, except for some extractive-energy industries and air transport.
- Energy cost shares were comparable to or even higher than the most energy-intensive manufacturing sectors (see above) in the case of land transport, air transport, mining of metal ores, electricity-gas and other mining.
- Energy cost shares are also significant in accommodation and restaurants (3-4.7%), waste management (~2%) while rather small in construction (~1%) and trade (0.4%).



Energy and production costs dynamics

- Between 2010 and 2017 for more than half of the sectors studied (22 out of 41), the energy costs fell while production costs grew, leading to a decrease in energy costs shares.
- For about a quarter of the sectors (9 out of 41), energy costs grew but less than the rise in production costs. In only one case, air transport, the energy costs grew more than the rise of production costs.
- For about another quarter of sectors (9 out of 41), both costs fell, but energy costs declined by more than production costs. Only in the cases of mining and quarrying and its subsector other mining, the energy costs fell less than the production costs, leading to an increase in their energy costs shares.
- For only one sector (oil and gas), energy costs increased while production costs decreased, leading to an increase in the energy cost shares indicator.

	Reduced energy costs 2010-2017	Increased energy costs 2010-2017
Reduced production costs 2010-2017	· C26 - Computer and electronics · C232 - Refractory products · C235 - Cement, lime and plaster · C237 - Stone · C192 - Refineries · C132 – Textiles · B - Mining and quarrying · B07 - Mining of metal ores · B08 - Other mining	· B06 - Oil and gas
Increased production costs 2010-2017	· C33 - Repair of machinery · C244 - Non-ferrous metals · C222 - Plastics products · C11 - Beverages · C21 - Pharmaceutical products · C32 - Other manufacturing · C106 - Grain products · C25 - Fabricated metal products · C245 - Casting of metal · C234 - Porcelain and ceramics · C27 - Electrical equipment · C30 - Other transport equipment · C201 - Basic chemicals · C231 - Glass · C206 - Man-made fibres · C172 - Articles of paper · C233 - Clay building materials · C241 - Iron and steel · C171 - Pulp and paper · D35 - Electricity, gas and steam · I - Accommodation and restaurants · E38 - Waste management	· C29 - Motor vehicles · C239 - Abrasive products · C103 - Fruit and vegetables · C28 - Machinery and equipment · C161 – Sawmills · H49 - Land transport · H51 - Air transport · G - Wholesale and retail trade · F - Construction

Industry energy intensity shares in the EU

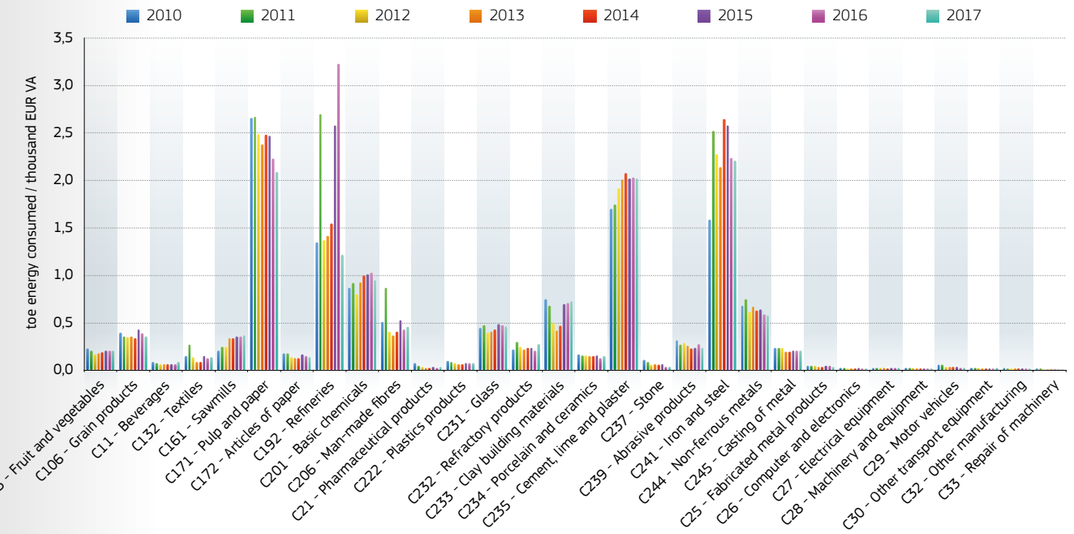
*Headline findings**

- Energy intensity (energy consumption/GVA) was used as a proxy of energy efficiency of EU27 sectors.
- Energy intensity varies considerably across the sectors studied depending predominantly the technological production process.

**Findings pertain to the whole value chain of the sectors (thus including upstream and downstream companies).*

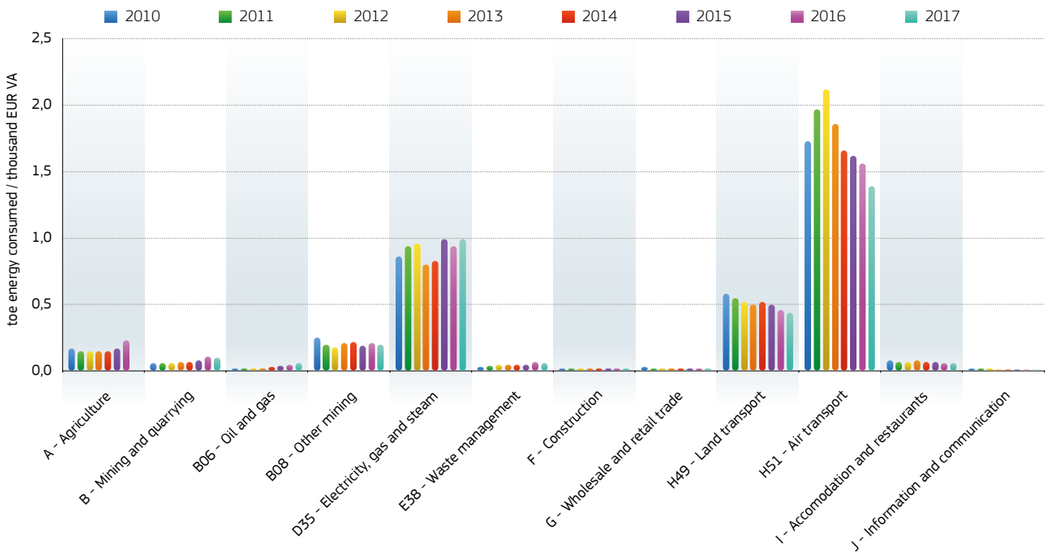
Manufacturing sectors

- The highest energy intensity values in manufacturing sectors appear in steel, cement, refineries, paper and basic chemicals.
- Energy intensity fell in most of the highly energy-intensive sectors in manufacturing, including non-ferrous metals, steel, refineries and paper. However, it increased in a few sectors such as cement, clay building materials, grain products, sawmills and basic chemicals.
- In relative terms, the energy intensity indicator fell the most in stone (-60%), man-made fibres (-45%), refineries (-55%) and paper (-20%).
- Energy intensity decreased for the majority of the less energy-intensive manufacturing sectors in the EU between 2011 and 2017. The decreases were small but important in relative terms for many sectors like textiles, articles of paper, electrical equipment, computers, machinery and motor vehicles.



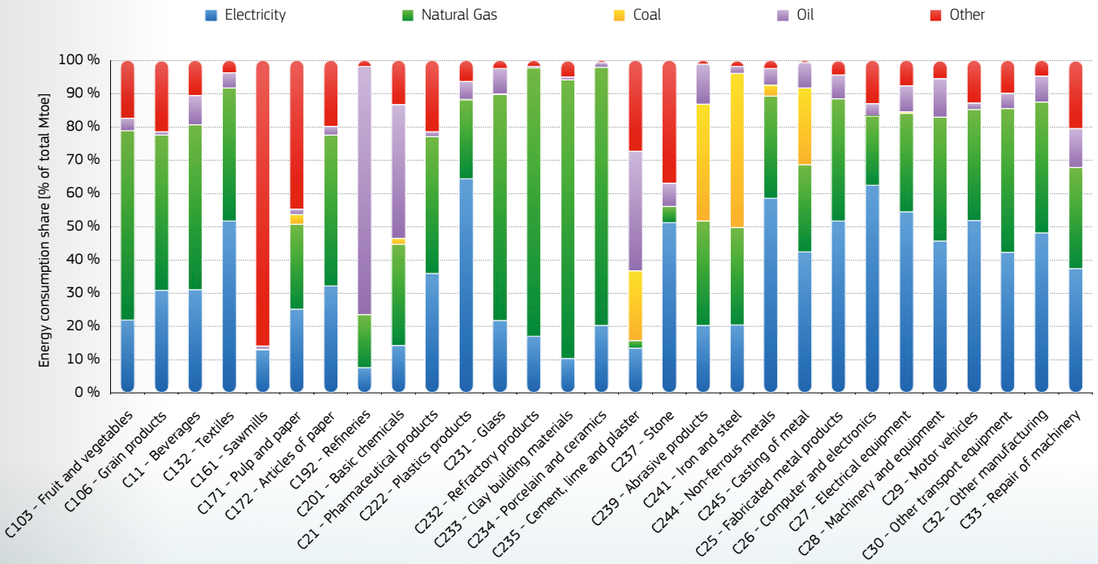
Non-manufacturing sectors

- In non-manufacturing sectors, the highest energy intensities are found in air transport, electricity-gas and land transport.
- Energy intensity decreased in sectors land transport and air transport, although it increased in electricity-gas.
- Amongst those with lower energy intensity, the results were mixed.



Energy consumption per fuel type

- All sectors are affected by fluctuations in electricity prices, but these particularly impact total energy costs in plastics, non-ferrous metals, and computers.
- Natural gas consumption drives energy costs particularly for the sectors glass, refractory products, clay building materials, and ceramics.
- Coal still plays a major role in the manufacturing of cement, abrasive products, and iron and steel;
- Oil plays a substantial role in refineries (mainly used as feedstock) and in the basic chemicals and cement.
- “Other energies”, particularly biomass, contribute significantly to energy consumption on sectors sawmills, man-made fibres, stone, and pulp and paper.



Energy cost in the EU and rest of the world

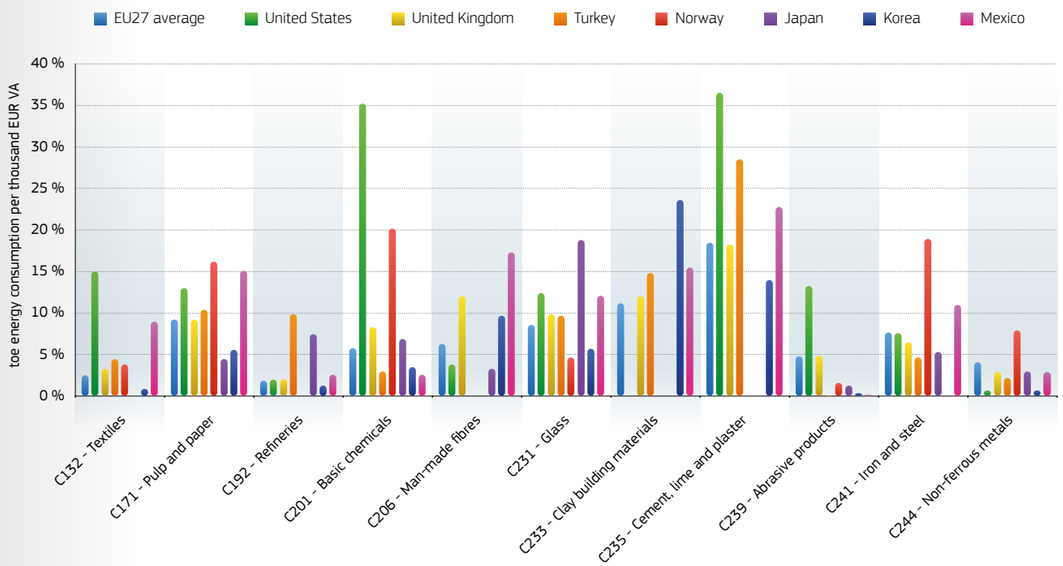
*Headline findings**

- For most of the energy-intensive sectors the EU27 energy costs shares in production costs are lower or similar to those in the US sectors.
- The energy intensity of EU27 sectors studied is consistently lower than in China.

**Findings pertain to the whole value chain of the sectors (thus including upstream and downstream companies).*

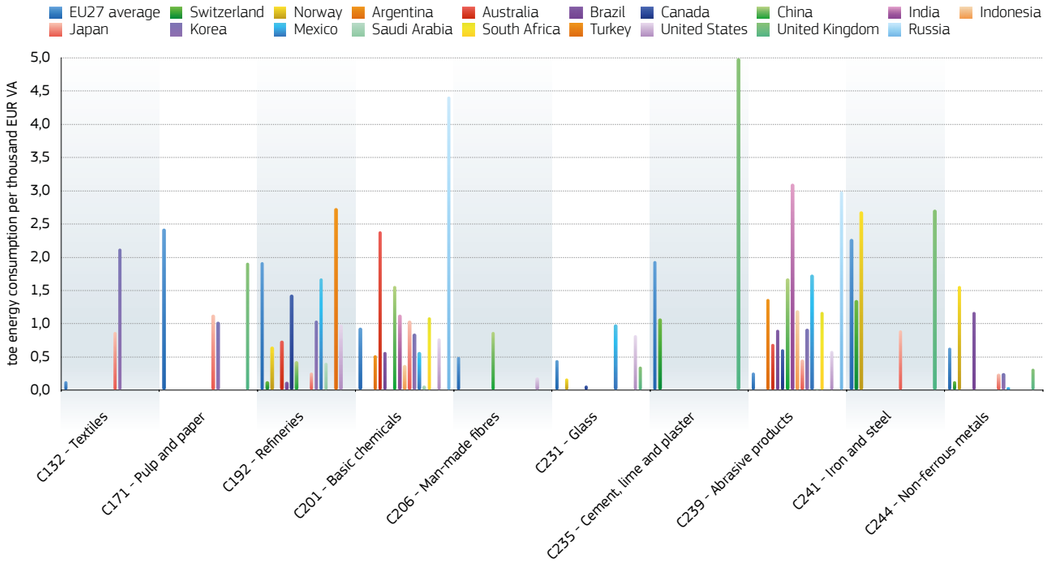
Energy costs as a share of production costs

- For the most energy-intensive sectors, the EU27 energy costs shares in production costs are lower or similar to those in the US sectors, except for non-ferrous metals which display lower energy costs shares in the US.
- The result of the comparison of the energy costs shares of the EU most energy intensive sectors with Japanese sectors is mixed.
- The Korean sectors displays the lowest energy costs shares in production costs of the countries studied.



Energy intensity

- The energy intensity of EU sectors studied is consistently lower that in China, displaying an overall comparable energy intensity to those in the US, yet with differences across the specific sectors.
- Energy intensity of refineries on the EU27 is higher than international trade partners for which data was available.
- For basic chemicals the EU27 has a lower-than-average energy intensity, lower than China, Japan and Brazil.
- The EU27 has the lowest energy intensity in abrasive products.
- In glass, the EU27 has lower energy intensity than Mexico and the US, but higher than Norway and Canada.



Energy intensive industries

*Headline findings**

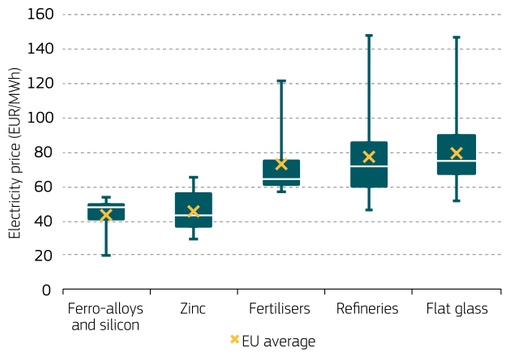
- Five sectors covered: flat glass, zinc, ferro-alloys and silicon, refineries and fertilisers.
- The findings pertain to the result of a bottom-up analysis, based on 96 plants across the five selected industrial sectors.

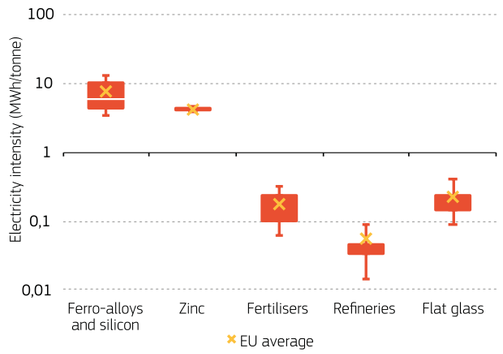
**Findings pertain to the whole value chain of the sectors (thus including upstream and downstream companies).*

Sector	Number of plants by geographical region					Representativeness in 2018
	Central Eastern Europe	North Western Europe	Southern Europe	Non-EU North Western Europe	Total	Share of turnover (T) or production capacity (C)
Flat glass	7	19	10	4	40	74% C
Zinc	5	1	2	-	8	97% T
Ferro-alloys and silicon	2	3	2	-	7	NA
Refineries	4	8	8	3	23	22% C
Fertilisers	7	3	3	-	13	90% C

Electricity prices and intensities

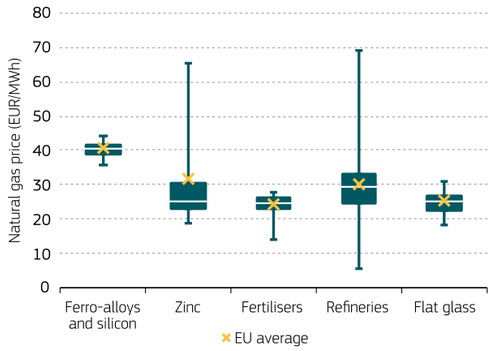
- Electricity prices and intensities across all analysed sectors are found to be inversely related. Given higher energy consumption, sectors pay lower prices for electricity. Similarly, given higher energy intensity, sectors plants will most likely have higher consumption levels and thus tend to pay lower prices for electricity. This effect is slightly less pronounced in the flat glass sector, where electricity price is higher on average than electricity price in the refineries sector despite its higher energy intensity.
- Electricity prices range from 40-45 EUR/MWh in the sectors with plants consuming very large amounts of electricity (ferro-alloys and silicon, zinc) to 70-80 EUR/MWh in sectors with plants with relatively smaller electricity consumption (flat glass, refineries, fertilisers).

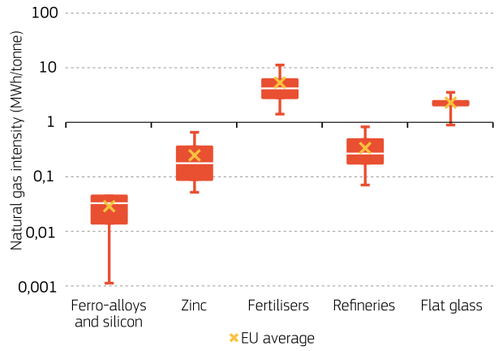




Natural gas prices and intensities

- Natural gas intensities are also inversely related to their natural gas prices. However, natural gas prices vary less widely across sectors than electricity prices as natural gas prices are largely set by international producers and cannot be negotiated down as easily as electricity prices.
- Sectors with large gas consuming plants (fertilisers, flat glass) appear paying much less for their gas (around 25 EUR/MWh) than the other sectors.





Energy costs as a share of production costs

- The energy costs shares in production costs vary widely across sectors. The highest energy costs share amongst the sectors studied was found in the very gas intensive sector of fertilisers (71%), followed by electro intensive sectors such as zinc (31%) and ferro-alloys and silicon (28%) and the gas intensive sector of flat glass (25%). Refineries, for which the sample is rather small, displayed lower energy costs shares (estimated at ~15%).

Sector	Electricity price (€/MWh)	Electricity costs per production quantity (EUR/tonne)	Electricity costs as a share of production costs	Electricity intensity (MWh/tonne)	Natural gas price (€/MWh)	Natural gas costs per production quantity (EUR/tonnes)	Natural gas costs as a share of production costs	Natural gas intensity (MWh/tonne)	Represent-ativeness in 2018
Flat glass	78,6	17,6	6%	0,23	25	54,3	19%	2,19	74% C
Zinc	45,6	190,6	31%	4,18	31,5	6,5	0,30%	0,25	97% T
Ferro-alloys and silicon	43,3	304,3	28%	7,38	40,28	1,1	0,10%	0,03	NA
Refineries*	77	3,8	5%	0,05	29,9	7	9%	0,33	22% C
Fertilisers	72,8	10,7	7%	0,17	24,1	113,7	64%	5,01	90% C

** For this study the definition of production costs includes the costs of crude oil as feedstock. According to Concawe and Fuels Europe, the refining industry standard method to calculate production costs excludes the costs of crude oil. Therefore, the energy costs as a share of production costs presented in this table are lower than those calculated by the industry.*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