CEPS ENERGY CLIMATE HOUSE

ECOFYS
sustainable energy for everyone

ECONOMISTI ASSOCIATI

Composition and drivers of energy prices and costs: case studies in selected energy-intensive industries

Eleanor Drabik

30 June 2017

Context of the study

Objective

Analysis of the composition and drivers of energy prices and costs in energy intensive industries

Sectors covered

Steel
Aluminum
Wall and floor tiles (ceramics)
Bricks and roof tiles (ceramics)
Refineries

↔ 9 CEPS researchers, 7 partner researchers, published in January 2017

https://www.ceps.eu/publications/composition-and-drivers-energy-prices-and-costs-case-studies-selected-energy-intensive

Methodology

Data collection

- Based on questionnaires filled in by producers
- 150 plants provided data, 116 plants were included for the electricity analysis and 108 for the gas analysis

Data validation

- Accessing supporting documents (energy bills)
- Triangulating results with secondary resources
- Using commercial data collected by research teams across the EU
- Conducting interviews with companies where questionnaires revealed consistency issues

Strict compliance with **confidentiality**

- To ensure no data can be attributed to any specific plant, only results that three or more companies involved can be shown

Cross-sector analysis

- Case studies reflect general regional trends but what about the situation in member states?

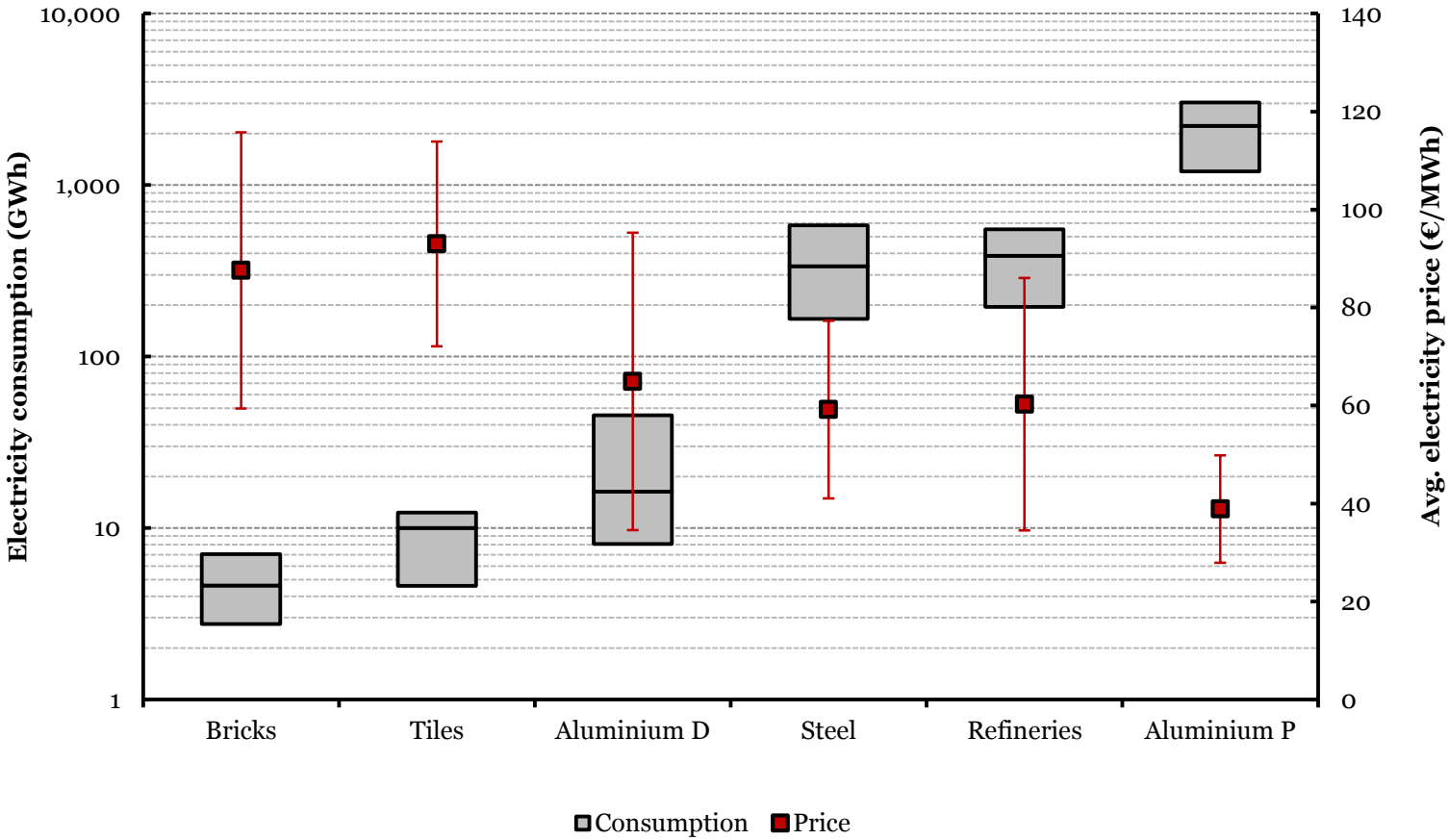
  ➡ cross-sectoral analysis

- Nine member states with enough plant data to allow for a country-specific analysis for electricity prices and eleven for gas prices.

- Cross-sector analysis reveals trends across member states and trends in the energy consumption of plants.

Electricity prices are linked to consumption

Electricity consumption and price variations grouped by sector (116 facilities) weighted average, 2008-15



Cross-sector analysis - Electricity

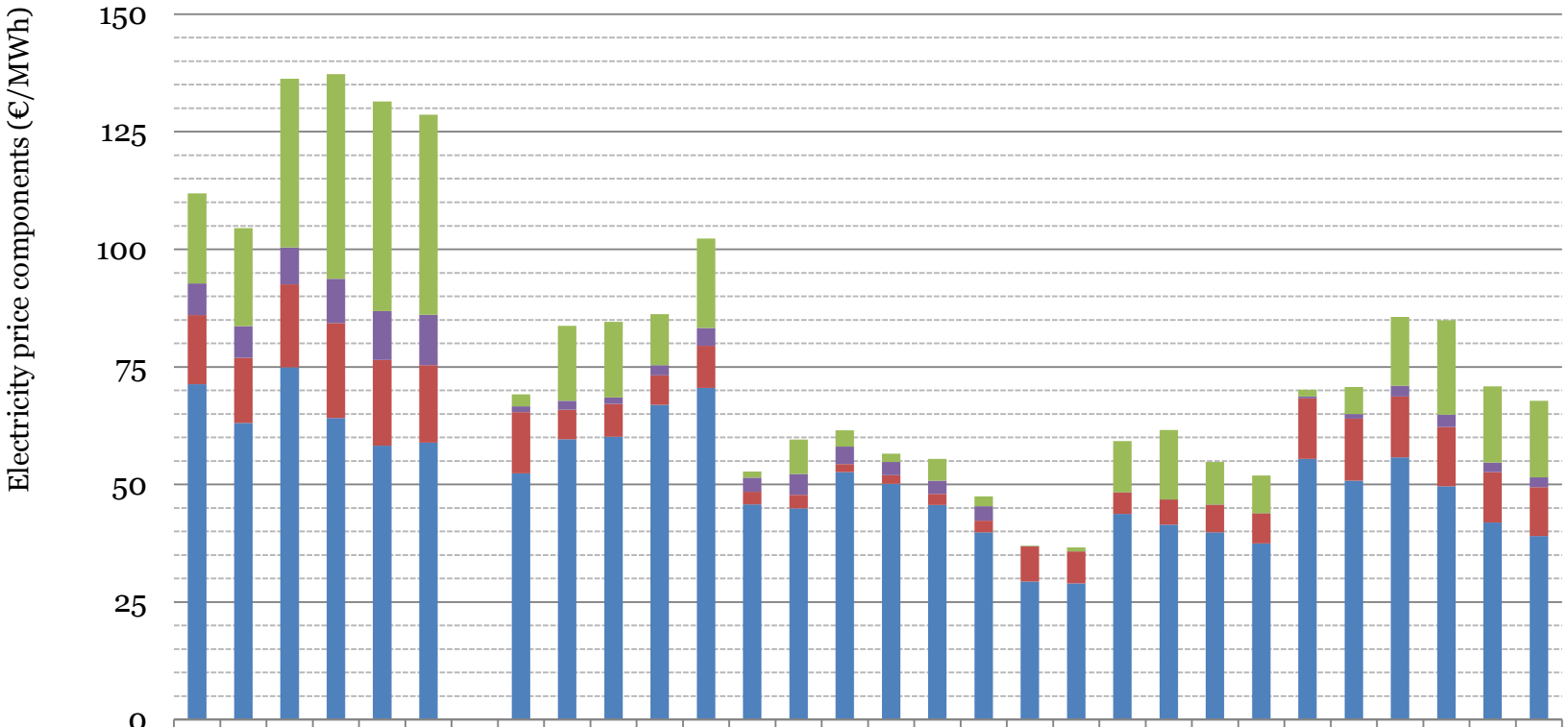
	Bricks and roof tiles	Wall and floor tiles	Aluminium D	Steel	Refineries	Aluminium P
Price (€/MWh) (weighted mean)	**87.6**	**93.0**	**64.9**	**59.2**	**60.3**	**38.9**
Consumption (GWh) (Median)	**4.6**	**10.0**	**16.3**	**336.7**	**386.7**	**2,215.1**

Reason for this trend

- Larger consumers may negotiate more favourable supply contracts in exchange for purchasing large amounts of power in advance.
- A limited number of large-scale consumers may still benefit from old long-term contracts, established before the unbundling process had come into effect.
- Larger consumers from energy-intensive sectors may be granted exemptions from certain taxes and levies, or be provided with lower regulated costs in Member States.

Electricity price components (1/2)

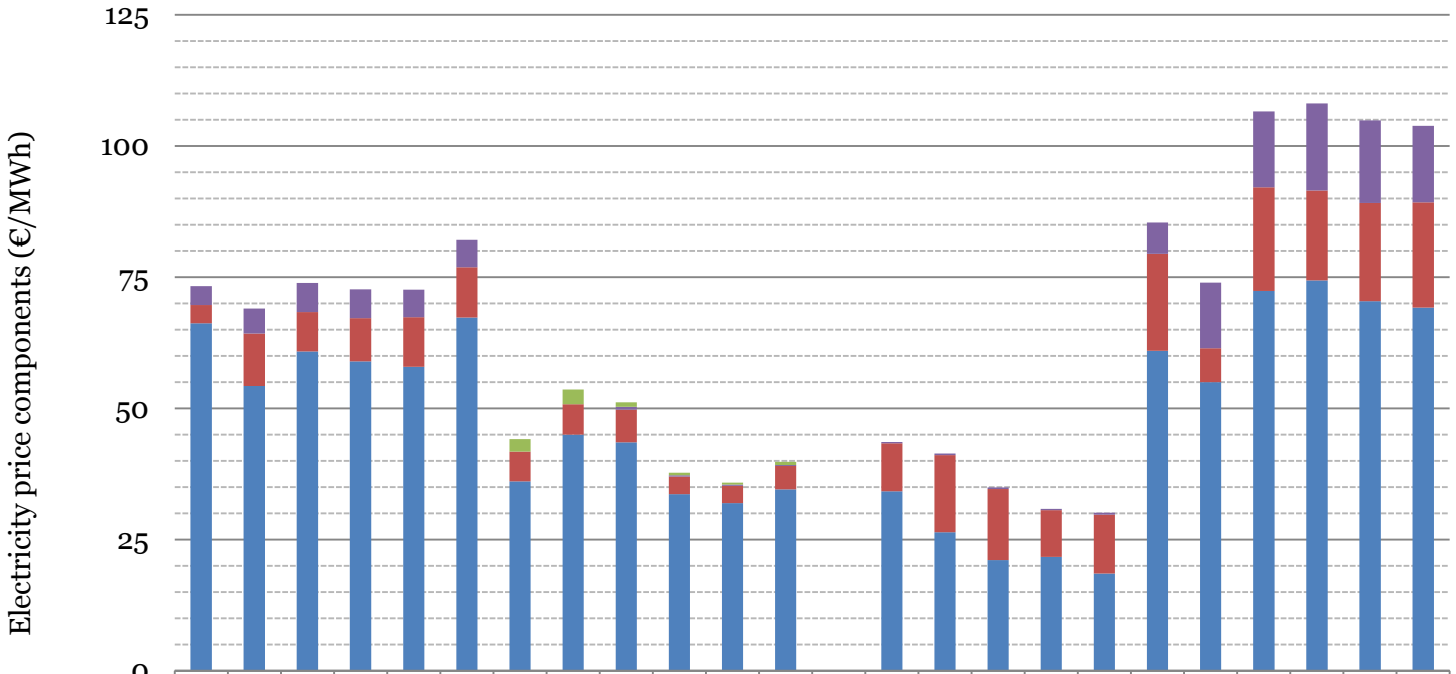
Structure of electricity prices in Italy, UK, Germany, Romania and Czech Republic in absolute terms (€/MWh)



	IT (8 plants)						UK (21 plants)						DE (9 plants)						RO (7 plants)						CZ (6 plants)					
	2008	2010	2012	2013	2014	2015	2008	2010	2012	2013	2014	2015	2008	2010	2012	2013	2014	2015	2008	2010	2012	2013	2014	2015	2008	2010	2012	2013	2014	2015
RES support payment	19.2	20.8	35.9	43.5	44.6	42.5	0.0	2.6	16.0	16.1	10.9	19.0	1.3	7.3	3.5	1.8	4.7	2.1	0.1	0.9	10.9	14.7	9.1	8.0	1.4	5.8	14.6	20.1	16.2	16.3
Other taxes and levies (excl. VAT)	6.7	6.7	7.8	9.5	10.4	10.7	0.0	1.2	1.9	1.4	2.2	3.8	3.0	4.5	3.8	2.8	2.8	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.0	2.3	2.6	2.0	2.1
Network costs	14.7	13.8	17.6	20.2	18.3	16.5	0.0	13.0	6.3	7.0	6.2	8.9	2.7	2.8	1.7	1.9	2.3	2.5	7.5	6.8	4.6	5.3	5.8	6.4	12.9	13.1	12.9	12.6	10.7	10.4
Energy supply costs	71.3	63.1	74.9	64.1	58.2	58.9	0.0	52.4	59.6	60.1	67.0	70.5	45.8	44.9	52.6	50.1	45.7	39.8	29.4	29.0	43.7	41.5	39.8	37.5	55.5	50.8	55.8	49.6	41.9	39.1

Electricity price components (2/2)

Structure of electricity prices in Spain, France, the Netherlands and Portugal in absolute terms (€/MWh)



	ES (12 plants)						FR (12 plants)						NL (3 plants)						PT (3 plants)					
	2008	2010	2012	2013	2014	2015	2008	2010	2012	2013	2014	2015	2008	2010	2012	2013	2014	2015	2008	2010	2012	2013	2014	2015
RES support payment	0.0	0.0	0.0	0.0	0.0	0.0	2.4	2.8	0.9	0.5	0.4	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other taxes and levies (excl. VAT)	3.6	4.8	5.5	5.4	5.3	5.2	0.0	0.0	0.5	0.3	0.3	0.2	0.0	0.2	0.3	0.3	0.3	0.4	6.0	12.5	14.5	16.6	15.7	14.6
Network costs	3.5	10.0	7.5	8.3	9.4	9.5	5.6	5.8	6.3	3.4	3.3	4.5	0.0	9.2	14.7	13.6	8.9	11.2	18.4	6.4	19.7	17.1	18.7	20.1
Energy supply costs	66.2	54.2	60.8	58.9	57.9	67.3	36.1	45.0	43.5	33.6	31.9	34.5	0.0	34.2	26.4	21.1	21.7	18.5	61.0	55.0	72.4	74.4	70.4	69.2

Exemptions

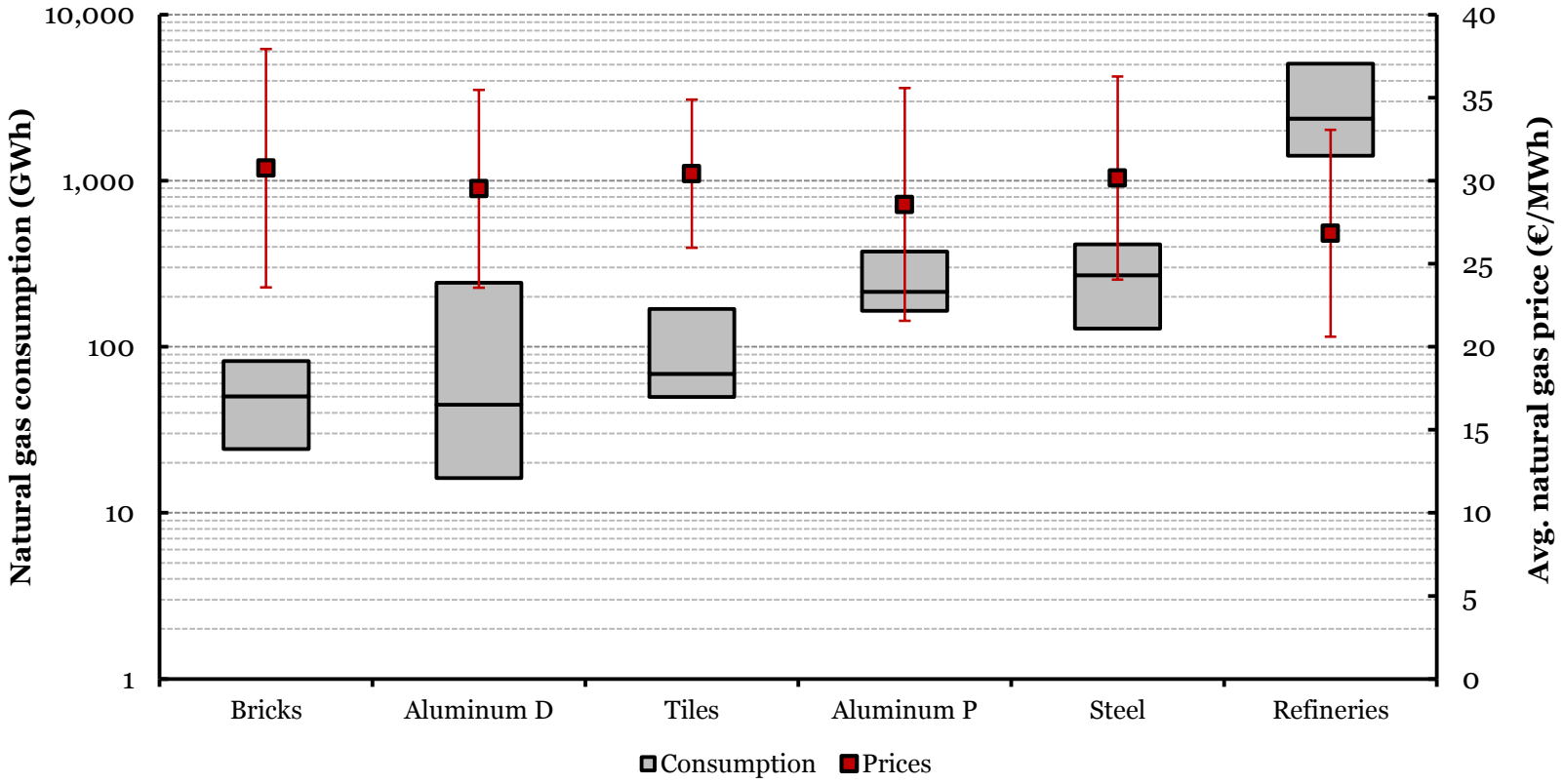
Member State	Exemptions
Italy	• In Italy, consumers have been given tariff exemptions from energy-intensive industries since 2014. • Larger plants have more exemptions and lower electricity prices.
UK	• Businesses entering into an agreement to reduce CO2 emissions (so-called 'Climate Change Agreement') can receive a reduction of 90% in the climate change levy.
Germany	• RES support payments in Germany are considered some of the highest in Europe. • However, low RES levy costs on energy bills of industrial consumers. • Electricity-intensive consumers in Germany receive exemptions after consuming their first GWh.
Czech Republic	• No exemptions available for industrial consumers.
Romania	• Romania plants can receive RES levy exemptions. • Electricity-intensive consumers can receive exemptions up to 85% of their RES support costs.

Exemptions

Member State	Exemptions
Spain	• Spanish access tariffs (incl. access to the network, CHP and renewable compensation) depend on i) peak load, ii) energy consumption and iii) grid connection level. • Discounts on network costs and renewable support costs.
France	• Industrial consumers pay a public service obligation (CSPE) but there is a price cap (€627,783 in 2015)
The Netherlands	• Energy tax for electricity and RES levy are reduced for large consumers (above 10GWh) • Large consumers can be refunded if a company enters into an energy efficiency agreement
Portugal	• Plants pay a public service obligation (CIEG). • Large industrial consumers pay the minimum value of €0.5/MWh

Gas prices linked to consumption

Natural gas consumption and price variations grouped by sector (108 plants), weighted average, 2008-15

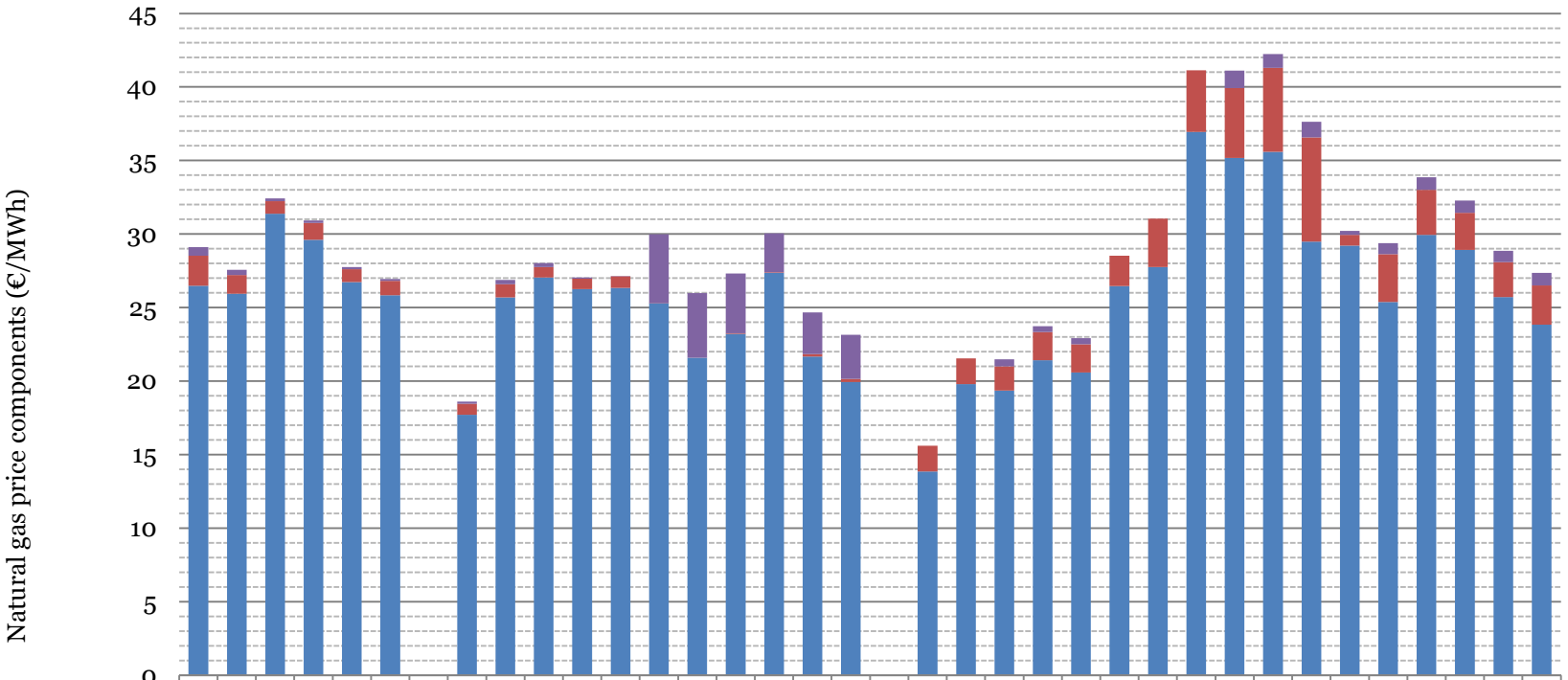


Gas prices vs. consumption

	Bricks and roof tiles	Aluminium D	Wall and floor tiles	Aluminium P	Steel	Refineries
Price (€/MWh) (weighted mean)	30.8	29.5	30.4	28.6	30.2	26.8
Consumption (GWh) (Median)	50.3	44.7	68.6	214.7	270.1	2,368.3

Natural gas price components

Structure of natural gas prices in Italy, UK, Germany, Romania, Portugal and Hungary in absolute terms (€/MWh)

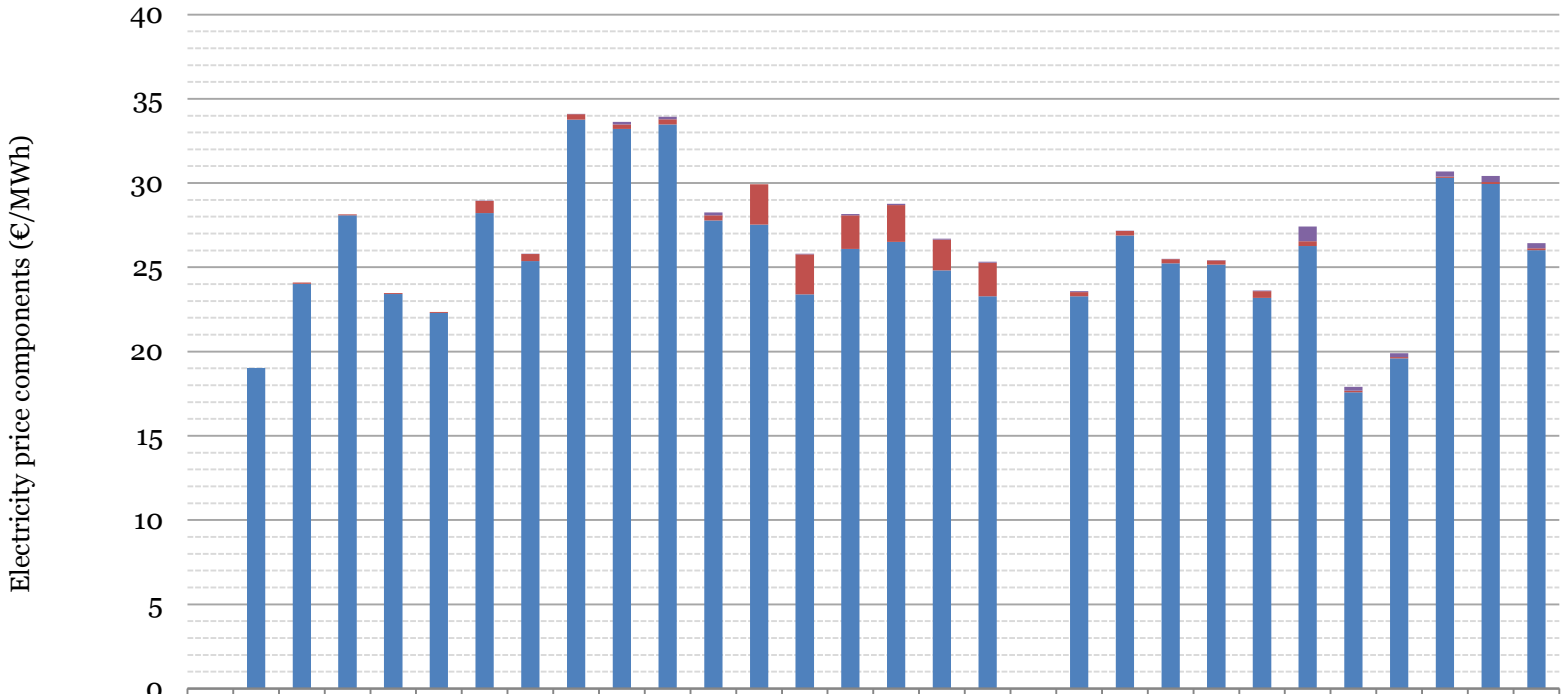


	IT (9 plants)						UK (21 plants)						DE (4 plants)					
	2008	2010	2012	2013	2014	2015	2008	2010	2012	2013	2014	2015	2008	2010	2012	2013	2014	2015
Taxes and levies (excl. VAT)	0.6	0.4	0.2	0.2	0.1	0.1	0.0	0.1	0.3	0.3	0.1	0.0	4.7	4.4	4.0	2.7	2.8	3.0
Network costs	2.0	1.3	0.9	1.2	0.9	1.0	0.0	0.7	0.9	0.7	0.7	0.8	0.0	0.0	0.1	0.0	0.2	0.2
Energy supply costs	26.5	26.0	31.4	29.6	26.7	25.8	0.0	17.7	25.7	27.0	26.3	26.3	25.3	21.6	23.2	27.4	21.7	19.9

	RO (6 plants)						PT (3 plants)						HU (3 plants)					
	2008	2010	2012	2013	2014	2015	2008	2010	2012	2013	2014	2015	2008	2010	2012	2013	2014	2015
Taxes and levies (excl. VAT)	0.0	0.0	0.0	0.5	0.4	0.4	0.0	0.0	0.0	1.2	1.0	1.1	0.3	0.7	0.9	0.8	0.8	0.9
Network costs	0.0	1.7	1.7	1.6	1.9	1.9	2.1	3.3	4.2	4.7	5.7	7.1	0.7	3.3	3.1	2.5	2.4	2.7
Energy supply costs	0.0	13.9	19.8	19.4	21.4	20.6	26.5	27.7	36.9	35.2	35.6	29.5	29.2	25.4	30.0	28.9	25.7	23.8

Natural gas price components

Structure of natural gas prices in France, Spain, Czech Republic, Belgium and the Netherlands in absolute terms (€/MWh)

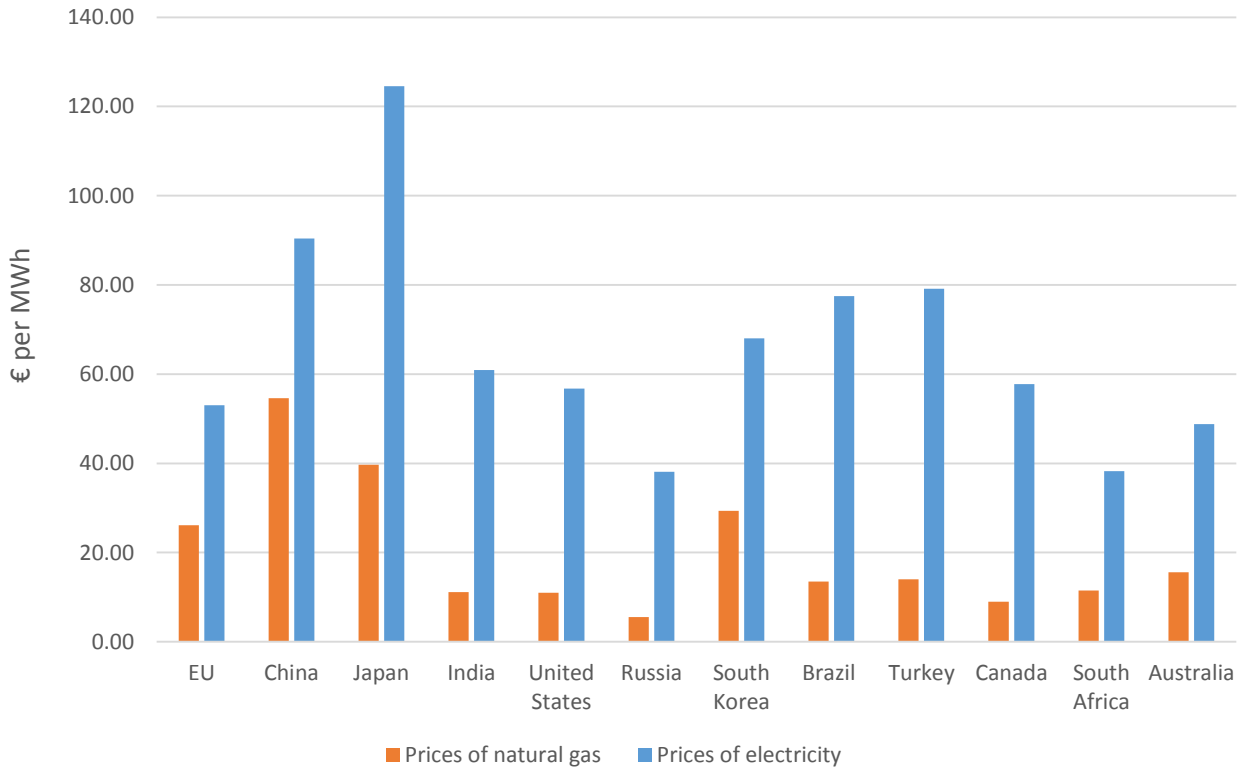


	FR (10 plants)						ES (11 plants)						CZ (6 plants)						BE (5 plants)						NL (3 plants)					
	2008	2010	2012	2013	2014	2015	2008	2010	2012	2013	2014	2015	2008	2010	2012	2013	2014	2015	2008	2010	2012	2013	2014	2015	2008	2010	2012	2013	2014	2015
Taxes and levies (excl. VAT)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.9	0.2	0.2	0.3	0.4	0.3
Network costs	0.0	0.0	0.1	0.1	0.1	0.1	0.7	0.4	0.3	0.3	0.3	0.3	2.4	2.4	2.0	2.2	1.8	2.0	0.0	0.2	0.3	0.2	0.2	0.4	0.3	0.1	0.1	0.1	0.1	0.1
Energy supply costs	0.0	19.0	24.0	28.1	23.4	22.3	28.2	25.4	33.8	33.2	33.5	27.8	27.5	23.4	26.1	26.5	24.8	23.3	0.0	23.3	26.9	25.2	25.2	23.2	26.3	17.6	19.6	30.3	29.9	26.0

Steel

Energy costs – 9% of total production costs (6.5% electricity)
Price trends – Prices declining for gas and electricity since 2012

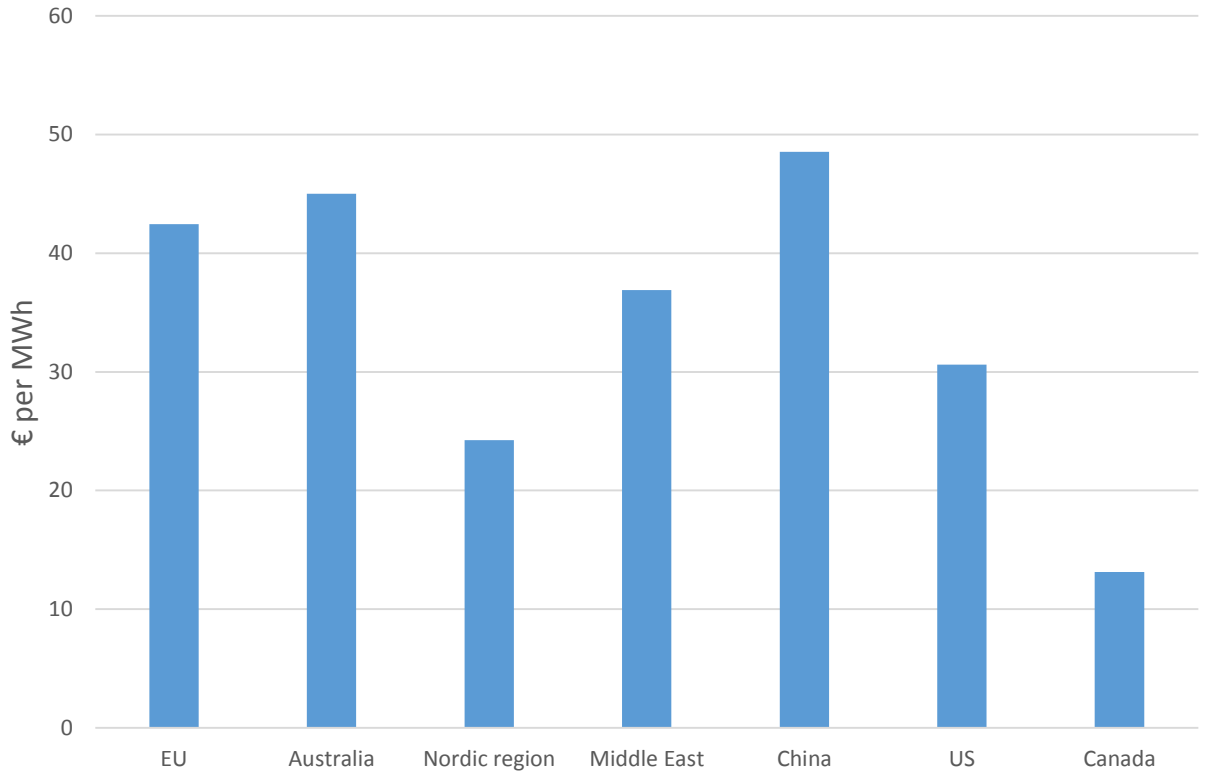
Prices of electricity and natural gas in the EU and third countries/regions for steel plants (€/MWh)



Aluminum

Energy costs – 22% of total production costs of primary aluminum plants. (21% electricity)
Price trends – Prices declining for gas and electricity since 2012

Prices of electricity in the EU and third countries for primary aluminum plants (€/MWh)



Ceramics

Energy costs –

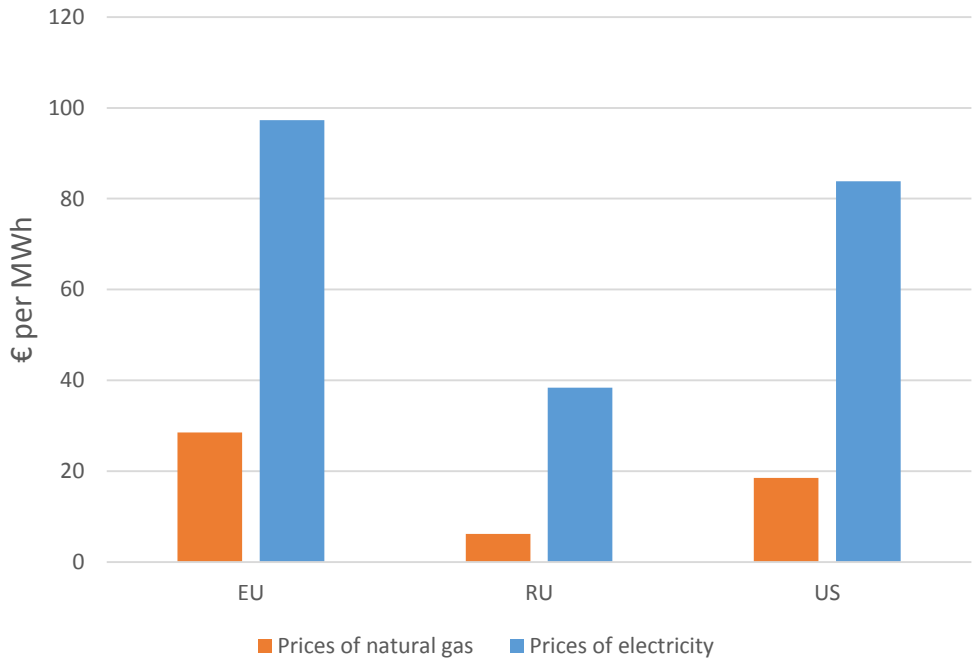
Wall and floor tiles - 24% of total production costs. (18% gas)

Bricks and roof tiles - 29% of total production costs. (20% gas)

Price trends –

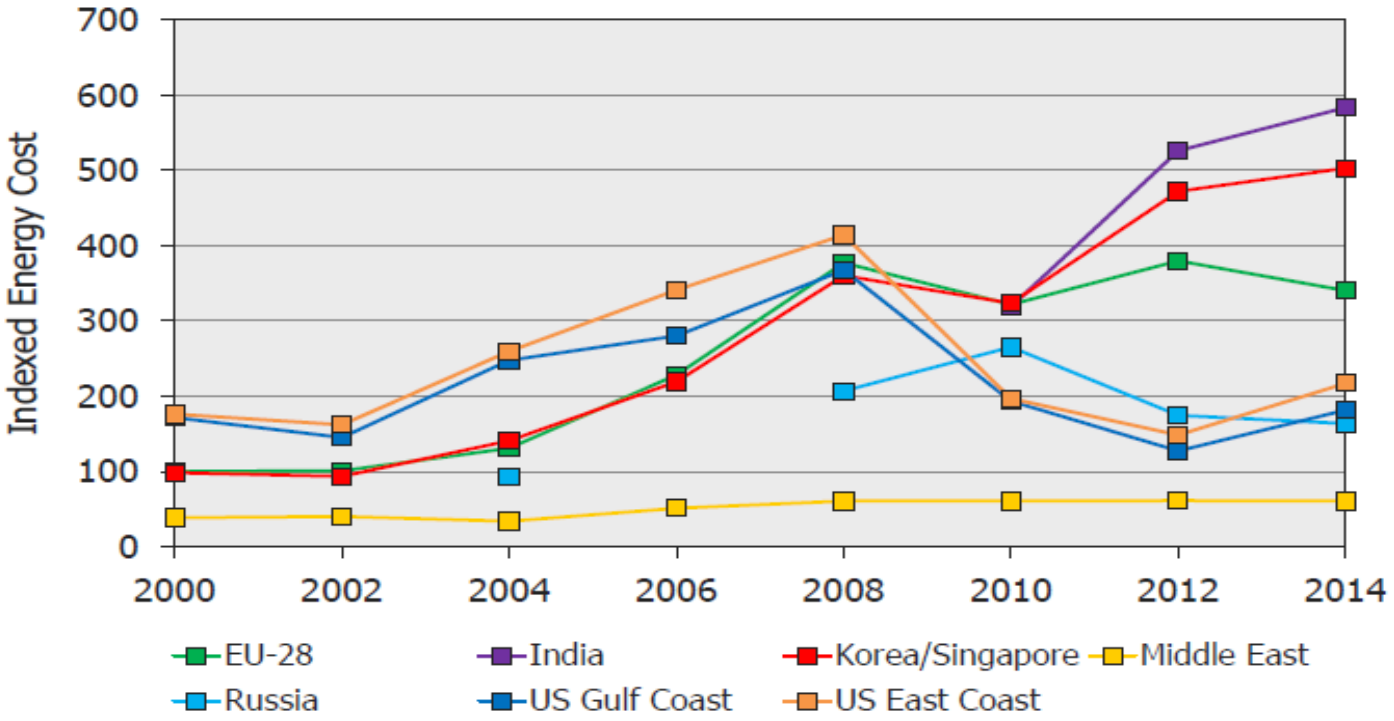
Prices for gas have been declining since 2012/2013

Prices of electricity and natural gas in the EU and third countries for ceramics plants (€/MWh)



Refineries

Energy prices in USD/bbl for all regions indexed relative to EU28=100 in year 2000



Source: Solomon Associates (2015).

Key findings

- **Prices for energy-intensive industries have been declining for most sectors since 2012** – even though regulatory costs (renewable support levies + network costs) have been increasing, wholesale prices have been declining at a much more rapid rate.

- **There is a clear relationship between electricity prices and electricity consumption, as well as a relationship between gas prices and gas consumption** – the higher the consumption the lower the energy price. Larger consumers (1) receive higher shares of renewable support payment exemptions in electricity bills and (2) can negotiate more favourable supply contracts.

- **Gas price are less divergent across sectors compared to electricity**. This is because the regulatory costs have remained stable throughout the period 2008-2015.

www.ceps.eu

Researcher's Email

@CEPS_thinktank

Tel: +32 2 229 39 11 1, Place du Congrès 1000 Brussels