European electricity prices and their components

Final electricity prices for end consumers consist of different price components:

- Prices for electricity generation (wholesale prices and retail costs)
- Network costs (transmission and distribution)
- Taxes, fees, surcharges

The wholesale prices for electricity depend on the generation mix, market structure, elasticity of demand and price mechanisms. Capital costs for power plants, fuel costs, operation and maintenance costs and in Europe, additional costs for carbon certificates have to be recovered. Especially for small customers, retail costs have to be added. Costs for grid infrastructure, operation and maintenance costs for grids as well as grid losses are aggregated as transmission costs. Distribution costs include distribution grid costs as well as the costs for measurement and billing. Our analysis focuses on taxes, fees and surcharges; especially those components that finance the deployment of renewable energy sources. We have analysed national regulations and criteria for energy intensive industries to apply for reduced tariffs ("privilege criteria").

The given examples show generic power prices for two power intensive industrial installations: One big steel producer that works with electric arc furnaces and one medium size textile company. Total payments per kilowatt-hour are calculated for Germany, the Netherlands, France, United Kingdom, Texas and Pennsylvania. The actual price for power, which the steel companies are paying, is assumed to be equivalent to a combination of forward and spot market prices on power exchanges in those states. Textile companies are assumed to have average acquisition costs that are provided by Eurostat. Long-term contracts and special conditions can lead to a big bandwidth of acquisition costs for single installations.

Based on these two examples, we analyse the impact of the different power price components on the final power price, which the companies are facing. We use country specific privilege criteria for taxes and levies as well as distribution and transmission cost components. Calculations are based on publicly available information and data on taxes, fees, surcharges and conditions for industrial installations for the years 2012 and 2013.

Example 1: Steel producers

A steel producer is assumed to consume 1000 GWh of electricity per year. Peak load is assumed to reach maximum 120 MW. It is connected to the grid at the transmission level. Its power costs exceed 15% of its the value added and 10% of turnover. In all countries, the producer benefits from all feasible exceptions . Wholesale market prices are applied as power prices for the steel producers in all countries but France. French steel producers are assumed to have access to the regulated price for nuclear power (ARENH).

The dark grey area shows the calculated power price. Transmission costs are coloured in lighter grey. To a certain extent they are individually regulated by the states. Green areas show country specific surcharges and fees paid for the deployment of renewable energy sources. Blue areas show other taxes, fees and surcharges.

Power price for electric steel producers
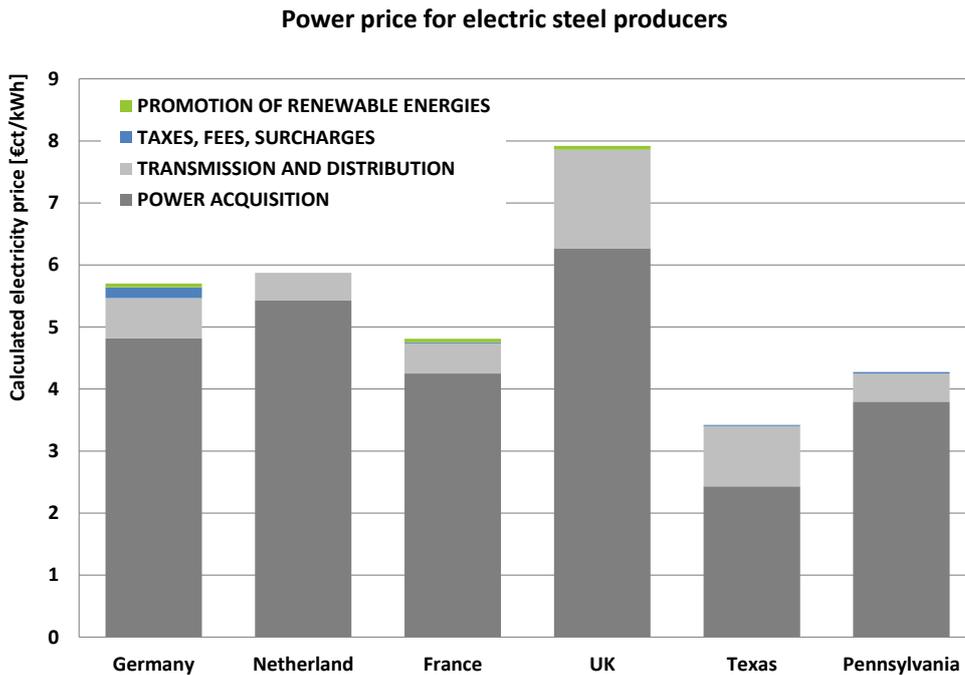
Figure 1: Comparison of electricity prices for big industrial companies according to existing regulation.

Surcharges for the deployment of renewable energies are very small in comparison to wholesale prices. In Germany, big industrial installations pay 0.05 ct/kWh. In the Netherlands, big industrial installations pay 0.0017 ct/kWh. In France, the surcharge sums up to 0.06 ct/kWh. In the UK there are different instruments in force such as the feed-in tariff, renewables obligations and the climate change levy. The green area reflects estimations by DECC regarding the shares the steel producer has to pay for renewable energy. In the US, data was hardly available. The assumptions about prices in Pennsylvania and Texas reflect tariffs for industrial consumers published by the main electricity suppliers of the respective state.

Table 1: Values underlying the graph showing electricity prices for big industrial companies

POWER PRICES STEEL	Germany	Netherland	France	UK	Texas	Pennsylvania
POWER ACQUISITION	4.82	5.43	4.25	6.27	2.43	3.80
TRANSMISSION AND DISTRIBUTION	0.65	0.45	0.49	1.59	0.97	0.45
TAXES, FEES, SURCHARGES	0.18	0.00	0.02	0.00	0.02	0.02
PROMOTION OF RENEWABLE ENERGIES	0.06	0.00	0.06	0.06	0.00	0.00
SUM	5.70	5.87	4.81	7.92	3.42	4.27

Example 2: Textile companies

In the second case , prices are calculated for a medium size textile producer. Its consumption sums up to 8.5 GWh per year, with an installed capacity of 1.6 MW. It is connected to the distribution grid. The textile company's power costs exceed 14% of the textile company's value added and 5% of its turnover.

Medium size companies in general buy their power from power retailers. Because of their high consumption level, they receive lower prices than households. These prices vary highly by time of use, and specific requirements, therefore, power prices and grid fees are extracted from Eurostat for 2012 (Band ID: 2 000 MWh < Consumption < 20 000 MWh). Because of the lack of data for the US, acquisition costs are again calculated from wholesale prices.

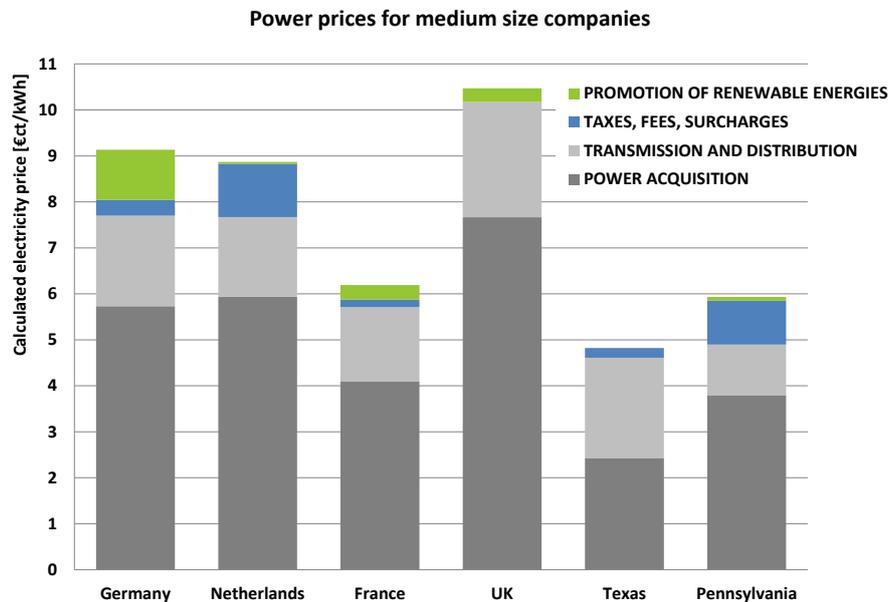**Power prices for medium size companies**

Figure 2: Comparison of electricity prices for medium size industrial companies according to existing regulation.

Figure 2 shows the power price components in different colours. Payments for renewable energy surcharges are much higher in Germany than in the other countries. Although the privilege criteria for the "Besondere Ausgleichsregelung" ("special adjustment provision") are met, the digressive character of the surcharge leads to payments of about 1.1 ct/kWh.

Table 2: Values underlying the graph showing electricity prices for medium size companies

POWER PRICES TEXTILE	Germany	Netherlands	France	UK	Texas	Pennsylvania
POWER ACQUISITION	5,73	5,94	4,10	7,66	2,43	3,80
TRANSMISSION AND DISTRIBUTION	1,97	1,73	1,61	2,51	2,18	1,10
TAXES, FEES, SURCHARGES	0,35	1,16	0,17	0,00	0,21	0,96
PROMOTION OF RENEWABLE ENERGIES	1,09	0,04	0,32	0,30	0,00	0,08
SUM	9,14	8,87	6,19	10,47	4,82	5,93

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