



Electricity price differences between countries

Posted by [Rembrandt](#) on December 11, 2010 - 10:45am

In this post an overview is given of electricity prices in a large number of countries, mainly members of the OECD. This shows how prices vary between households and industry due to tax differences, and by analyzing the sources of electricity per country, it also leads to a better understanding how different energy sources affect the price of electricity.

The price differences show that industrial electricity users are not or only marginally taxed in nearly all countries, while household taxes on electricity usually range between 10% to 35%. The analysis of energy sources show that: 1) countries with a 35% or higher share of natural gas in the electricity mix have the highest industrial electricity prices, 2) Countries with a diversified electricity mix are in the mid-range of electricity prices, 3) No general price level was found for countries with a high share of nuclear, coal, or both in their electricity mix.

Comparisons between households and industrial electricity prices

The quarterly [Energy Prices & Taxes](#) publication of the International Energy Agency is one of the best sources for energy price data. I took a dataset from it of 2009 household and industrial electricity prices including and excluding taxes for 26 countries, mainly member states of the OECD except Kazakhstan, Israel, and Slovenia. Taxes can include value transfer added (VAT), general excise taxes, and renewable energy taxes or feed-in tariffs. An overview of this data is shown in figure 1 and 2 below. Astute readers will notice that Germany is missing in the overview. The IEA does not include electricity price data in its Energy Prices & Taxes publication for Germany. The [EU energy portal](#) shows that Germany's electricity price including taxes is in the upper range in Europe, both for industry and households.

The following observations were made for this dataset:

- 1) The price of electricity for households and industry in this set differs by more than 50% on average. For the 26 countries the average household electricity price was 19 US dollar cents per kWh, while the industrial price was 12 cents per kWh. Many countries therefore have a clear industrial policy to try to keep their industries as competitive as possible, at least regarding energy inputs.
- 2) In general industry is only marginally taxed for energy ranging from a 0% up to 10% level, except in Italy (27% tax), Netherlands (15% tax), France (12% tax), Turkey (23% tax), and Norway (26% tax).
- 3) In most countries households have to pay a 10-35% tax rate on top of their energy bill. Exceptions on the upside include Denmark, which has an extremely high household tax on electricity (122%) to support its renewable energy feed-in system, Norway (50% tax), Sweden (60% tax). Exceptions on the downside include Israel (0% tax), Japan (7% tax), and the United States, Taiwan, the United Kingdom, and Portugal (all 5% tax).
- 4) Only two countries have lower household electricity prices than industry. Industrial electricity

users in Mexico pay 8% more than households, and industrial electricity users in Costa Rica pay 1% more than households.

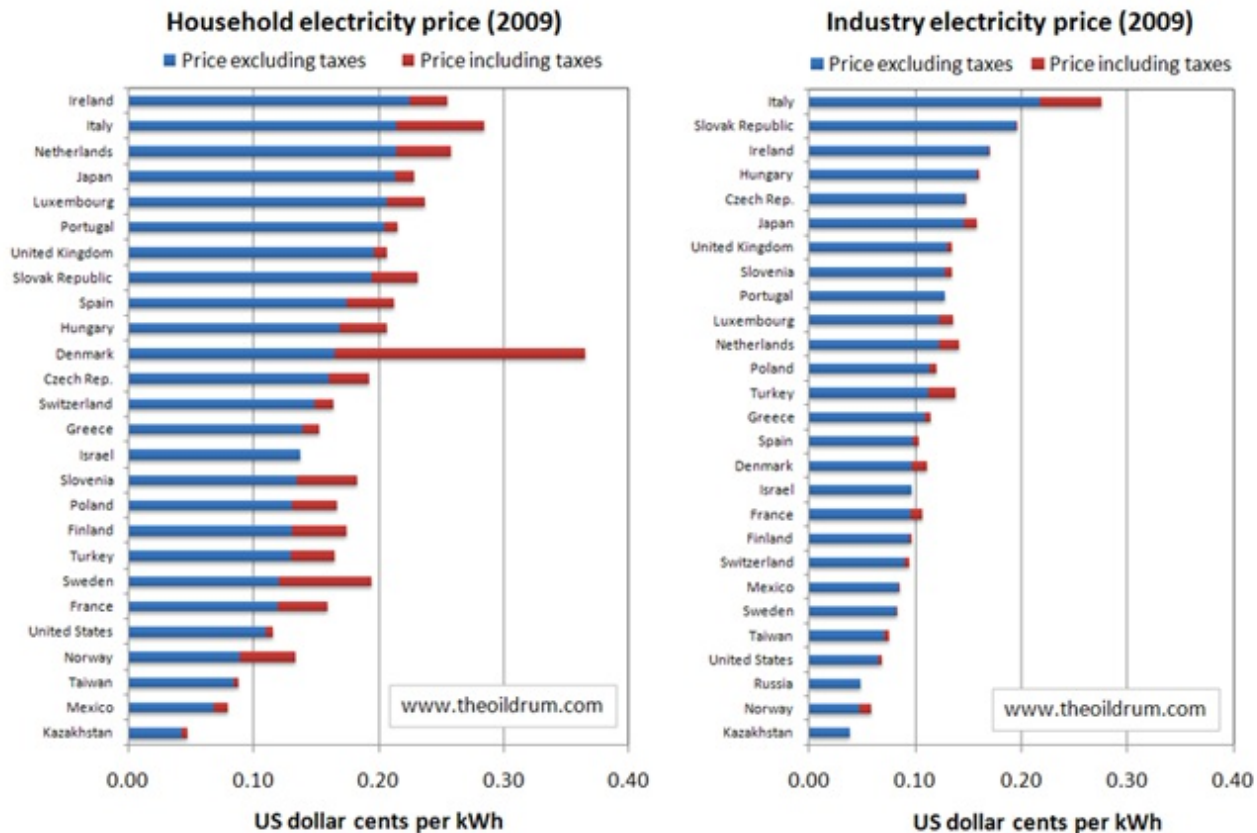


Figure 1 & 2 – Household & industry electricity prices including and excluding taxes in 2009 for a selected number of countries. Prices excluding taxes in blue and taxes added in red. Data obtained from IEA (2010). [Click here for a large version.](#)

How the electricity generation mix affects industrial user electricity prices

To look at effects of energy sources on electricity prices I took another dataset of 25 countries from the Energy Prices & Taxes publication, excluding countries which have large shares of hydro power. The countries are mainly member states of the OECD, except Israel, El Salvador, Kazakhstan, South Korea. An overview of the data can be found in figure 3 below. Although many other factors play a role in electricity price formation, include market structure, regulation, and interconnection between countries, I ignored these factors in this analysis due to time constraints. In such a manner only the cost differences between energy sources are analysed, but these already give interesting insights.

The following observations were made regarding industrial electricity prices including taxes:

1) The highest industrial electricity prices, above 13 US dollar cents per kWh, are found in countries that are more than 35% dependent on natural gas for electricity. For example, Italy has the highest industrial electricity costs in Europe and is 50% dependent on natural gas imports for its electricity. The country paid the highest price for natural gas pipeline imports in 2009 at 9.05 dollars per Million Btu and also the highest price for LNG imports in at 7.86 dollars per million Btu. Similar to Italy are Slovak Republic, Ireland, Japan, Turkey, Luxembourg, and Hungary. Doing slightly better are the United Kingdom, and the Netherlands as they are also producers of natural gas.

- El Salvador's Electricity price is one of the highest in the dataset found because the country relies to a large extent on oil for electricity production. Last estimates found for the energy mix is a 45% oil share in electricity production in 2007.

2) Medium industrial electricity prices, between 9 and 13 US dollar cents per kWh, are found in countries that have a highly diversified energy mix including coal, natural gas, renewable energy and sometimes also nuclear (Portugal, Spain, Finland).

3) The lowest industrial electricity prices, below 9 US dollar cents per kWh, are found in countries that have a diversified mix including nuclear, natural gas, and coal, and are reliant on the North American market for natural gas and (Mexico, USA), and in case of Kazakhstan rely 90% on domestically produced coal and 10% on hydro power.

No pattern of industrial electricity prices, are found in countries dependent mainly on nuclear, coal, or a combination of both for electricity generation.

- High electricity prices, above 13 cents per kWh, are found in Slovenia (59% coal, 32% Nuclear), the Slovak Republic (39% Nuclear, 32% Coal), and Czech republic (59% Coal, 32 Nuclear).

- Medium electricity prices, between 9 and 13 cents per kWh, are found in Greece (52% coal), Poland (90% coal), Israel (63% Nuclear), Denmark (48% coal), and France (77% nuclear).

- Low electricity prices, below 9 cents per kWh, are found in Taiwan (49% coal, 22% nuclear), South Korea (34% nuclear, 38% coal), and Kazakhstan (90% coal).

Especially interesting is the difference in electricity prices of Poland and Kazakhstan (both 90% dependent on domestically produced Coal). Respectively these are 4 US dollar cents per kWh for Kazakhstan and 12 US dollar cents per kWh for Poland. Possible differences would be regulation, differences in quality of mined coal, and efficiency of coal thermal power plants.

Industry & Household Electricity Prices including taxes (2009)

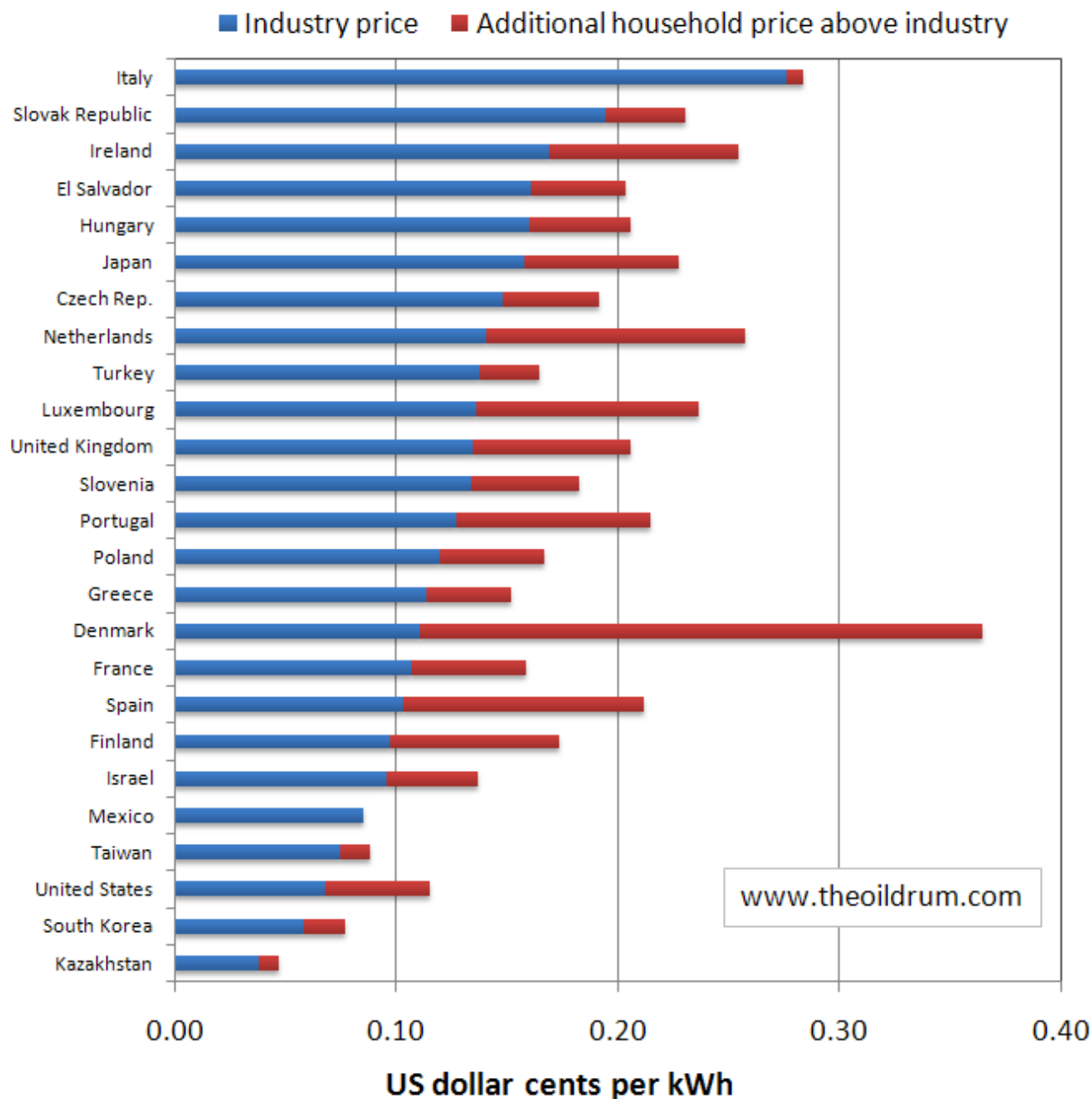


Figure 3 – Household electricity prices including taxes in 2009 for a selected number of countries. Industry prices in blue and household prices in red shown as an added price above the industrial level. Data obtained from IEA (2010).

Overview of countries with a large share of hydropower in the electricity mix

The dataset on countries with large hydropower shares in electricity generation includes 9 countries. Costs ranged from a low of 5 to a high of 12 US dollar cents per kWh in respectively Paraguay and Brazil. Difference can probably be explained by difference in infrastructure costs to transport electricity. For example, Norway and Brazil depend nearly entirely on hydro power but prices differ at respectively 6 to 12 US dollar cents per kWh. Norway has a fairly simple electricity transport infrastructure, and Brazil a highly complex one, due to country size and population differences.

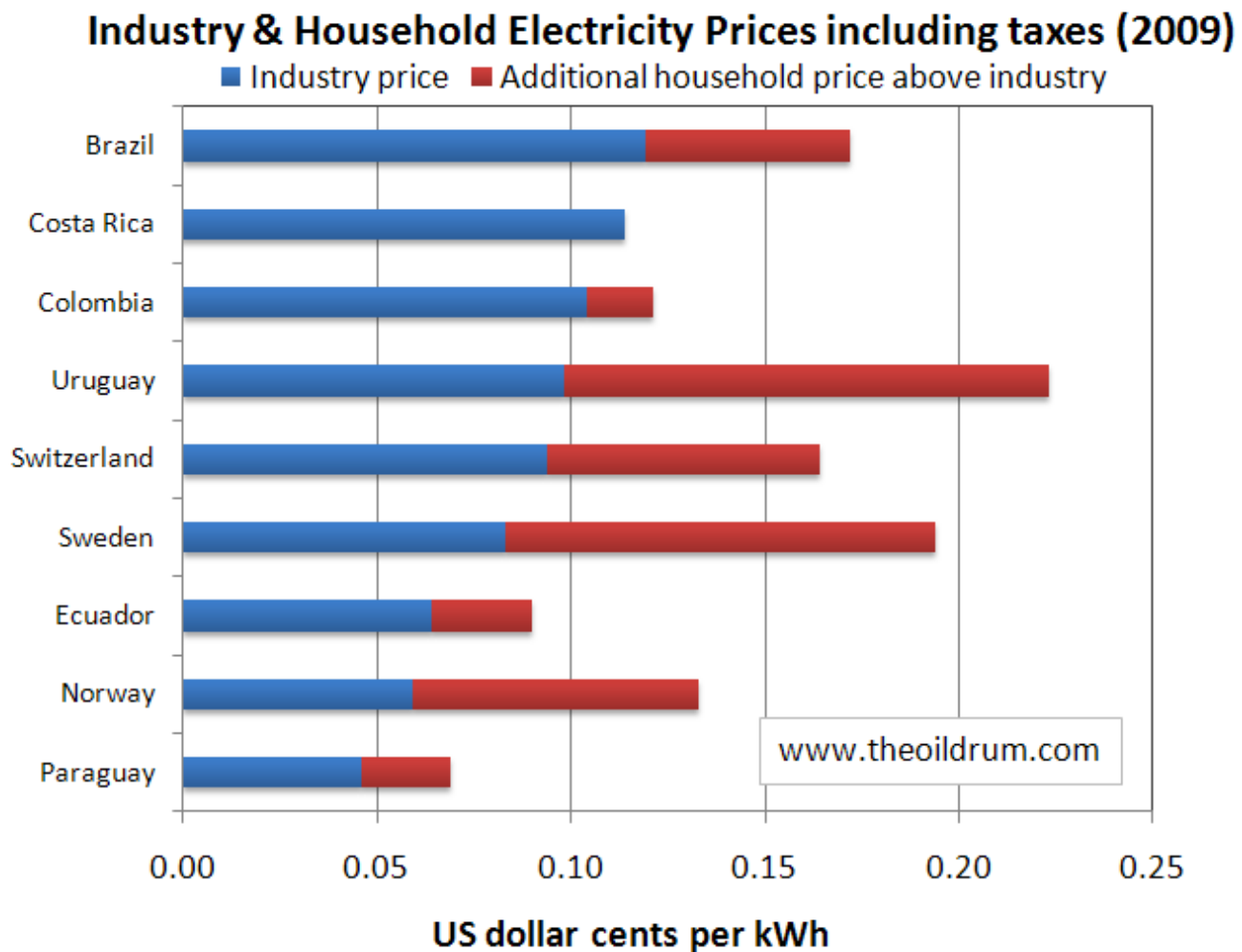


Figure 4 – Industry and household electricity prices including taxes in 2009 for countries with a large share of hydro power. Industry prices in blue and household prices in red shown as an added price above the industry level. Data obtained from IEA (2010).

Discussion question

How can differences in electricity price be explained between countries with a large share of coal, nuclear, or both in the energy mix?

References

IEA, 2010. Energy Prices and Taxes: Quarterly Statistics 3rd quarter 2010. IEA Publications: Paris.



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