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Decomposition analysis of EEG surcharge for promotion of power generation from renewable energies under the German Renewable Energy Sources Act (EEG)

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Executive summary

The German government has decided, as detailed in its Energy Concept, to transform the electricity sector to one based on renewable energies. The key support instrument in the German power sector is the Renewable Energy Sources Act (Erneuerbare Energien Gesetz, EEG). The EEG promotes electricity production from renewable energies on the basis of priority feed-in, purchase guarantee and remuneration at fixed prices. The electricity quantities fed in under the German EEG are predominantly put on the day-ahead (spot) market by the transmission system operators. The differential costs between the guaranteed remuneration payments made to the plant operators and the revenues made on the electricity market are passed through to the so-called privileged and non-privileged electricity consumers on the basis of different rates.

The German EEG surcharge is derived from a large range of factors, above all the electricity quantities fed into the system (quantity effect), the developments of the remuneration rates (degression effect), the level of attainable revenues on the spot market (electricity price effect), the level of total final consumption (final consumption effect), the scope of privileging under the German EEG regulation (privileging effect) and a large number of additional factors (e.g. financial management, forecast errors, other special rules, etc.).

The influence of very diverse factors on the German EEG surcharge makes it difficult to attribute specific shares of the surcharge to the rules and factors at hand. In the case of a sequential analysis (where the factors are layered on one after the other) the ranking of the influencing factors considered plays a substantial, and sometimes an overriding, role in quantitatively specifying the shares of the different factors. Against this background it is necessary to use a more suitable method to analyse the composition of the German EEG surcharge. For a multi-factorial problem requiring explanation such as this, so-called component or decomposition analysis can be used.

With the help of this methodology the relevant influencing factors can be quantified – both those that have led to an increase in the German EEG surcharge in the past and those that are very likely to lead to a further increase in 2013. Based on the assumptions used in this analysis, an EEG surcharge of 5.33 ct/kWh arises for 2013 compared to 3.59 ct/kWh in 2012. The actual level of the EEG surcharge and its composition will be published by the transmission network operators on 15 October 2012.

In our forecast for the upcoming increase of the German EEG surcharge in **2013 compared to 2012** the most important factors can be shown on the basis of the component analysis conducted within the scope of this project:

The largest share of the increase of the EEG surcharge in 2013 compared to 2012 stems from the growth of electricity production from **photovoltaics** (plus 0.5 ct/kWh), which is attributed a share of approx. 29% overall. However, a special analysis of photovoltaics up to 2016 – which is based on an expansion path that continues to be

steep and includes remuneration payments from the revision of the German EEG in 2012 – shows that the period of substantial cost increases for the expansion of electricity production from photovoltaics could well be at an end. A further expansion can lead to significantly lower specific costs due to the falling remuneration rates. An additional increase of the EEG surcharge due to photovoltaics is – in the long term, even in the case of a quick expansion – expected to amount to approx. 0.1 ct/kWh compared to the share of the EEG surcharge up to 2013.

Equalisation of the negative **balance** contributes approx. 20% to the increase of the German EEG surcharge and thereby constitutes the second largest component (plus 0.34 ct/kWh) in the analysis. This is ultimately the result of forecast errors made in determining the EEG surcharge for 2012, which chiefly arose from the unexpected collapse of electricity prices on the wholesale market, so that – should the day-ahead price and future electricity prices diverge less strongly from each other in future – this component is likely to represent a one-time effect.

The creation of a larger **liquidity reserve** constitutes the third largest component in the analysis, bringing about 18% of the increase in the EEG surcharge (0.32 ct/kWh); this liquidity reserve is created in response to the forecast errors of the past and can be reduced with the help of better forecasts in the future.

The huge expansion of **privileged final consumption** represents a share of approx. 16% of the increase in the German EEG surcharge (0.27ct/kWh).

The fall in the **future electricity price on the trading platform for 2013 compared to 2012** makes up a share of approx. 6% of the increase in the surcharge under the German EEG (0.1 ct/kWh) although the price decrease is partly the result of increasing electricity production from renewable energies.

The growth of electricity production from **offshore wind energy** contributes 4.8% (0.08 ct/kWh), of electricity production from **biomass** 2.2% (0.04 ct/kWh) and of **electricity production from onshore wind power plants** 1.8% (0.03 ct/kWh) to the increase of the German EEG surcharge for 2013.

Therefore 54% of the overall increase of the EEG surcharge in 2013 compared to 2012 is the result of equalising the balance after day-ahead electricity prices fell in the last year, the creation of a larger liquidity reserve and the expansion of privileged final consumption – i.e. factors chiefly stemming from causes other than the expansion of renewable energies. With regard to 38% of the increase (equalisation of the balance and liquidity reserve) it is to be assumed that comparable effects will not arise in subsequent years if there are better forecasts for revenues and costs in the future.

Based on the **analyses conducted for 2011, 2012 and 2013 compared to 2010** the following differentiated findings arise for the various influencing factors:

The expansion of **photovoltaics** constitutes the largest component in the analysis, contributing 59% in 2011 (0.87 ct/kWh), 64% in 2012 (0.99 ct/kWh) and (a forecasted) 46% in 2013 (1.49 ct/kWh) to the surcharge increase in the respective years compared to 2010.

Furthermore the effects of the introduction (2011) and modification (from 2012) of different **direct sale models** like the green electricity privilege and the market premium in Germany should be highlighted. The share of consumption privileged as green electricity, which was exempted completely from the surcharge rule, contributes 0.2 ct/kWh to the increase of the EEG surcharge in 2011 compared to 2010. However this effect largely disappears again from 2012 onwards as a result of the decrease in the electricity quantities falling under this category and the weakening of this privilege from complete exemption from the EEG rule to a surcharge decreased by 2 ct/kWh.

At the same time the introduction of the market premium for wind energy and for electricity production from biomass in Germany has different effects. With regard to **wind energy** up to approx. 70% of the growth in electricity production compared to 2010 is compensated by the fall in the specific remuneration payments due to direct sales (the market premium). In 2013 wind energy is expected to lead to an increase of the German EEG surcharge of 0.05 ct/kWh compared to 2010, which corresponds to 1.4% of the total increase since 2010. For comparably well-developed technologies like those used for onshore wind energy, steady states can therefore arise in which the growth in production quantities is largely compensated by cost degression.

A similar situation does not seem to have arisen yet for **biomass**: In contrast to wind energy, for which the specific total costs have decreased compared to 2010 due to use of the market premium model, there was a slight increase in the specific total costs for electricity production from biomass. A growth in electricity production from biomass can therefore not be compensated by cost reduction. Overall biomass contributes 7% in 2011 (0.1 ct/kWh), 15% in 2012 (0.23 ct/kWh) and 9% in 2013 (0.28 ct/kWh) to the increase of the EEG surcharge since 2010.

In conclusion, the different influencing factors have mixed effects overall. The various effects of the different factors should be taken into account in the future design of the German EEG.