ASSESSMENT OF RES TECHNOLOGY MARKET VALUES AND THE MERIT -ORDER EFFECT - AN ECONOMETRIC MULTI-COUNTRY ANALYSIS

Welisch, Marijke, TU Wien (EEG), Phone +43-1-58801 370365, E-mail: welisch@eeg.tuwien.ac.at
Ortner, André, TU Wien (EEG), Phone +43-1-58801 370367, E-mail: ortner@eeg.tuwien.ac.at
Resch, Gustav, TU Wien (EEG), Phone +43-1-58801 370354, E-mail: resch@eeg.tuwien.ac.at

Overview

The increasing deployment of (variable) renewable energy sources for electricity and power generation (RES-e) has initiated an intensive debate on its costs and benefits. One part of this debate concerns the market values of renewable technologies and the merit order effect induced by renewable electricity generation.

In general, the market value of (variable) renewable technologies is lower than for other technologies that are not subject to variability of natural resources (wind and solar irradiation). Furthermore, when renewable generation is high, the lowest marginal net cost electricity is dispatched first and lowers the overall price of electricity in the spot market by shifting the merit order curve (which depicts the available sources of electrical generation in ascending order of price).

To gain further insights into these developments, this study presents an assessment of both, the merit order effect and the market values of electricity generated from variable renewable energy sources (RES), namely wind and solar PV in the European Union. The historical price development in several European countries - that cover 73 % of the installed capacity of RES in Europe's regional electricity markets - has been taken into account.

Methods

To gain insights into the impact of renewable electricity on prices, market values and the merit order effect were calculated using a multivariate regression analysis and ex-post calculations. The approach followed in our regression analysis is oriented along the lines of the papers by Würzburg et al. [5] and Gelabert et al. [4]. The independent or outcome variable is the electricity price, measured as the hourly spot price on the country's respective electricity exchange platform. We then assess, as explained before, how this price changes in hours with different levels of RES infeed. To determine the market values, an ex-post calculation of the hourly spot price has been performed for the respective countries.

Results

All countries analyzed show a consistent, negative impact of renewable electricity infeed on electricity spot market prices and a decreasing market value of RES, possibly attributable to increased shares. The coefficients are economically and statistically significant. Figure 1 shows exemplarily for wind power how the hourly spot prices would decrease if one additional percent of the load would be served by variable renewable sources. One can see that a high share of variable renewables does not necessarily lead to an increased Merit-Order-Effect.

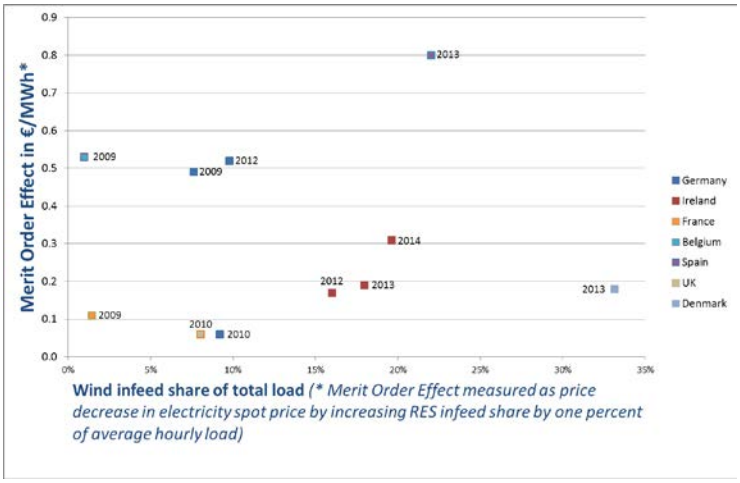

Figure 1: Merit Order Effect of Wind Power – Price Decreases in the Day-Ahead Price (2008-2014)

It seems to be highly influential, how flexibly the residual power plants (or the demand side) are able to react to fluctuating supply of variable RES. Market values (not depicted) of RES show a clearer trend. The higher the share of RES of the total load, the lower the market value of the respective renewable technology. At the same time one can see that, again, flexible systems are more likely to yield higher market values even with very high shares of variable renewable generation of the total load.

Conclusions

This study provides insights into a large geographical spread of European electricity markets, enables a comparison between countries, and therefore has valuable implications for policy makers. The findings should enhance transparency in the RES policy debate and contribute to RES cooperation and coordination among member states, offering new arguments to possibly increase RES deployment even beyond the obliged national 2020 RES targets.

References

L. Gelabert, X. Labandeira, and P. Linares, “An ex-post analysis of the effect of renewables and cogeneration on Spanish electricity prices,” Energy Econ., vol. 33, pp. S59–S65, Dec. 2011.

K. Würzburg, X. Labandeira, and P. Linares, “Renewable generation and electricity prices: Taking stock and new evidence for Germany and Austria,” Energy Econ., vol. 40, pp. S159–S171, Dec. 2013.

DiaCORE 2015, “Policy Dialogue on the assessment and convergence of RES policy in EU Member States”, EU project, Intelligent Energy Programme, http://www.diacore.eu.