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FIXED OR VARIABLE ELECTRICITY TARIFFS – WHEN CAN MICROGENERATION ACHIEVE GRID PARITY?

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(1) Overview

The major transitions in the generation structure of the European electricity sector can inter alia be faced with an increasing share of microgeneration at individual dwellings. The economics of e.g. solar PV and micro-cogeneration units is based on their generation replacing electricity imported from the grid (Bhandari and Stadler, 2009; Sinke, 2010). It is widely assumed that these technologies could be economically viable once their generation cost – possibly in combination with a battery storage system – is below the constant household consumer tariff. This is termed as grid parity and primarily a private-economic consideration (Lettner and Auer, 2013). By contrast, it does not reflect the short-term socio-economic value of microgeneration indicated by spot market prices (Elliston et al., 2010).

(2) Methods

This study extends this classical grid parity concept based on fixed consumer tariffs to hourly varying tariffs. Hence, it addresses the future situation that will apply once so-called smart meters and related hourly tariffs have been introduced. Changing the benchmark to different design options of variable electricity tariffs, we assess the consequences for the grid parity of different technologies by private-economic computations based on historical time series for Denmark. The considered tariff design options are the following: (1) fixed tariffs, as is current practice, or (2) exposing the final consumers to fluctuating power prices while keeping the taxes and network charges as a constant add-on or (3) adapting the hitherto fixed taxes proportionally to hourly market price fluctuations, thus setting a larger incentive for demand side management.

(3) Results

Depending on the merit-order effect of a single technology such as e.g. solar PV (Hirth, 2013), the grid parity value of this technology under variable tariffs can be better than under fixed tariffs for low penetrations, but worse for higher penetrations. The results illustrate that the grid parity level differs for fluctuating renewables under variable tariffs, whereas the consequences are not as pronounced for controllable technologies such as micro-cogeneration. Variable hourly tariffs reflect the value of microgeneration to the overall system better than constant tariffs.

(4) Conclusions

Exposing microgeneration to variable instead of fixed tariffs implies that they become subject to market signals. This impacts their grid parity level and ensures that they are judged on an equal basis with large-scale technologies. It is finally discussed whether variable tariffs should be made compulsory in the future. This could avoid misleading, but beneficial investment incentives for microgeneration due to fixed tariffs in comparison to large-scale renewables subject to fluctuating market prices.

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