

Evaluating the Impact of Wind Generation on the Cost of Balancing Electricity Demand and Supply in the UK

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Overview

The montly cost of balancing the demand and supply of electricity has tripled to £108 million in August 2019 from £35 million in April 2007 for the National GRID, UK. During the same period the net supplies of wind power has increased to 4.50 TWh from 0.20 TWh. The dispatch of wind power, among other variables, may impact the procurement of balancing services. Unexpectedly, there are limited empirical evidences of the effects of wind power on the procurement needs of different balancing services and the cost of balancing in GB electricity market. In this paper we examine the impacts of wind power on the marginal costs of balancing services in GB using monthly data from 2007 to 2019.

Methods

Time-series model: Autoregressive Distributed Lag (ARDL) and Error Correction Model (ECM) using OLS.

Results

The preliminary results from monthly data show that with every unit increase in the supply of wind power (in TWh) results in an additional costs of £1.00 to the National GRID in incremental balancing needs for every unit of energy supplied (in MWh) in both short and long run. The substantial portion of this increase can be directly attributed to the procurement of constraints services to maintain the realiablity and availability of GRID. The incremental costs of procuring operating reserves, STOR and frequency response services are £0.07, £0.01 and £0.02 respectively for every unit of enegy supplied. It is also observed that constraints services Granger cause the wind power supplies, implying that the incremental availability of constraints services increases the ability of National GRID to procure additional wind power.

Conclusions

The marginal cost of balancing the demand and supply of electricity is positively correlated to the wind power supplies in UK. Since the constraints services Granger cause wind power supplies, therefore, adequate policies may be formulated for technological innovation and market development to reduce their costs. This will aid the additional procurement of wind power at efficient costs.

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