

Renewable energy and market power in the Italian electricity market

S. Bigerna - C.A. Bollino* - P. Polinori*^(a)*

**Department of Economics - University of Perugia, Via A. Pascoli 20, 06123, Perugia (I)*

Tel +39-075-585.5002 Fax +39-075-585.5299

^(a)Corresponding author: paolo.polinori@unipg.it

Non-technical Executive Summary

The growth in wind and photovoltaic power capacity promoted by national support schemes for renewable energy sources (RES) is one of the most relevant changes in the Italian Power Exchange. The reductions in electricity consumption due the economic crisis as well as the high penetration of solar and wind power have noticeably changed the Italian electricity mix in favor of RES. In particular, during favorable weather conditions increasing supply of RES generation determines two main consequences. It exerts a downward pressure to the formation of the equilibrium price in the market and at the same time forces an increase in the line congestions. The consequence of the congestions is the market splitting. In the period 2010-2013 there are 2.16 average number of market split per hour in the Italian Power Exchange.

In this paper we have investigated whether such RES increase has affected the exercise of market power in the Italian Power Exchange, explicitly considering transmission line congestion.

As first step we have used a new approach to measuring market power in the Italian Power Exchange explicitly considering transmission line congestion constructing a new measure of the residual demand curve to disentangle unilateral market power from congestion rent. This has allowed to compute a measure of market power, called zonal Lerner index, during the period 2009 to 2013 for the main generators in the Italian market and we have analyzed the relationship among market power, congestion and RES supply. In particular, we investigate whether RES development has affected congestion and firm's strategic behavior, empirically testing whether structural changes have occurred in market power or in congestion rent.

Analysis performed highlights an increase in transmission congestion, resulting in a decrease in the number of hours when there is one market and an increase in the number of hours when there are two markets in the period. Generators behavior is also changed. Operators not equipped with an appreciable proportion of RES are forced out of the merit order during the usual peak hours. Consequently cycle gas plants exercise market power during the evening hours instead of the usual peak-hours. Furthermore, small operators not equipped with an appreciable proportion of renewable in their energy mix are forced out of the market potentially increasing market concentration.

Our findings have relevant policy implications for the efficient functioning of the Italian Power Exchange and constitute new challenges to the regulatory authority.

The empirical measure of the exercise of zonal market power is a useful instrument for the regulator, in order to enact more efficient policy measures. This is particularly true when RES penetration increases the transmission congestion. Focusing the attention to specific zones allows the regulator to design an optimal portfolio intervention especially in term of new generation capacities localization.