

Conventional Power Plants in Liberalized Electricity Markets with Renewable Entry

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Executive summary

The increasing penetration of renewable energy has had a profound impact on the economic performance and financial health of conventional power producers. These renewable plants have caused average and peak wholesale electricity prices to decline and triggered a reduction in the utilization of conventional thermal plants. At the same time, the volatility of renewable production has made conventional power plants even more critical to ensure generation adequacy and security of supply.

In this paper we propose a mechanism to restore the incentives of conventional power producers to invest after the entry of renewable plants. In order to do that, we start with a basic and generally accepted model of the liberalized wholesale electricity market that embeds the three potential reasons for underinvestment in capacity: the existence of price caps (which leads to the well-known missing-money problem), the externalities that arise due to blackouts, and the volatility of renewable sources which makes firm capacity more valuable. We show that in those cases a capacity auction can restore an efficient investment.

Using that model we analyze the impact of an additional investment on renewable power plants, due for example to environmental goals, over the profitability of conventional power producers. We show that this investment is more likely to be socially profitable when the redeployment value of conventional power plants is either very high, so that they can be easily decommissioned, or very low, so that it is optimal to increase total capacity.

We show that when the redeployment value of conventional power plants is low the incentives to invest are recovered through a counterfactual capacity payment that takes into account the realized renewable capacity. If, instead, the redeployment value is high and, as a result, it is optimal to foster the exit of some plants, the optimal mechanism consists of an exit auction for conventional power capacity. The reservation price of this auction should be set to cover the part of the investment costs that cannot be recovered through exit. In both cases, the outcome of the mechanism leads to the same remuneration for conventional power producers than an ex-ante capacity auction when the renewable power was already introduced.

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