CO_2 abatement from renewables in the German electricity sector: Does a CO_2 price help?

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Abstract

The overlapping impact of the Emission Trading System (ETS) and renewable energy (RE) deployment targets creates a classic case of interaction effects. Whereas the price interaction is widely recognized and has been thoroughly discussed, the effect of an overlapping instrument on the abatement attributable to an instrument has gained little attention. This paper estimates the actual reduction in demand for European Union Allowances that has occurred due to RE deployment focusing on the German electricity sector, for the five years 2006 through 2010. Based on a unit commitment model we estimate that CO_2 emissions from the German electricity sector are reduced by 35 to 60 Mtons, or 10% to 18% of what estimated emissions would have been without any RE policy but with the CO_2 price remaining in place at the observed level. Furthermore, we find that the abatement attributable to RE injections is greater in the presence of an allowance price than otherwise. The same holds for the ETS effect in presence of RE injection. This interaction effect is consistently positive for the German electricity system, at least for the considered years, and on the order of 0.5% to 1.5% of emissions.