

The impact of a Carbon Tax on the CO₂ emissions reduction of wind

EPRG Working Paper 1904

Cambridge Working Paper in Economics 1904

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Abstract

Energy policy aims to reduce emissions at least long-run cost while ensuring reliability. Its efficacy depends on the cost of emissions reduced. Britain introduced an additional carbon tax (the Carbon Price Support, CPS) for fuels used to generate electricity that by 2015 added £18/t CO₂, dramatically reducing the coal share from 41% in 2013 to 6% in 2018. Policies have both short and long-run impacts. Both need to be estimated to measure carbon savings. The paper shows how to measure the Marginal Displacement Factor (MDF, tonnes CO₂ /MWh) for wind. The short-run MDF is estimated econometrically while the long-run MDF is calculated from a unit commitment model of the GB system in 2015. We examine counter-factual fuel and carbon price scenarios. The CPS lowered the short-run SR-MDF by 7% in 2015 but raised the long-run LR-MDF (for a 25% increase in wind capacity) by 18%. We discuss reasons for the modest differences in the SR and LR MDFs. The CPS raised the 2016 wholesale price by £6.22/MWh with impacts on interconnector trade.

Keywords Carbon pricing, fuel mix, wind, marginal displacement factors, unit commitment model, econometrics

JEL Classification H23, L94, Q48, Q54

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Publication 21 January, 2019; revised 23 May 2019
Financial Support