



The contribution of taxes, subsidies and regulations to British electricity decarbonisation

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Abstract

Great Britain's carbon emissions from electricity generation fell by two-thirds between 2012 and 2019, providing an important example for other nations. This rapid transition was driven by a complex interplay of policies and events: investment in renewable generation, closure of coal power stations, raising carbon prices and energy efficiency measures. Previous studies of the impact of these simultaneous individual measures miss their interactions with each other and with exogenous changes in fuel prices and the weather. Here we use Shapley values, a concept from cooperative game theory, to disentangle these and precisely attribute outcomes (CO₂ saved, changes to electricity prices and fossil fuel consumption) to individual drivers. We find the effectiveness of each driver remained stable despite the transformation seen over the 7 years we study. The four main drivers each saved 19–29 MtCO₂ per year in 2019, reinforcing the view that there is no 'silver bullet', and a multi-faceted approach to deep decarbonisation is essential.

Keywords Electricity Decarbonisation, Shapley Value, Carbon Pricing, Renewables

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