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UK Electricity Market Reform and the Energy Transition: Emerging Lessons

EPRG Working Paper 1817

Cambridge Working Paper in Economics 1834

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Until 1990, the UK - like many other countries - had an electricity system that was centralised, state-owned, and dominated almost entirely by coal and nuclear power generation. The privatisation of the system that year with the creation of a competitive electricity market attracted global interest, helping to set a path which many have followed.

Two decades later, however, the UK government embarked on a radical reform that some critics described as a return to central planning. The UK's Electricity Market Reform (EMR), enacted in 2013, has been a topic of intense debate and global interest in the motivations, components, and consequences.

This paper summarises the evolution of UK electricity policy since 1990 and explains the EMR in context: its origins, rationales, characteristics, and results to date. We explain why the EMR is a consequence of fundamental and growing problems with the form of liberalisation adopted, particularly after 2000, combined with the growing imperative to maintain system security and cut CO2 emissions, whilst delivering affordable electricity prices.

The first fifteen years after privatisation, coinciding with an era of low fossil fuel prices, had seen mostly falling electricity bills; from about 2004 they started to rise sharply, for multiple reasons including increasing fossil fuel prices, the need for new investment in both generation and transmission, and inefficient ways of promoting renewable energy.

The EMR comprises four instruments:

- fixed-price contracts for zero-carbon sources (defined as contracts-for-difference (CfDs) on the electricity price, lasting 15 years for renewables);
- a whole-system capacity market (paying a fixed £/kW/yr for firm power committed to be available if called upon);
- a minimum or top-up price on CO2 emissions;
- and an emissions performance standard which in effect bans new coal plants.

Competitive auctions are used to procure the first two of these - respectively, the targeted capacity for renewable energy (for the CfDs), and the estimated capacity needed to ensure system security (for capacity market volumes). These auctions have seen prices far lower than predicted and produced major surprises:

- The fixed-price contracts for renewable are estimated to have reduced financing costs to little over 3%/yr, which would save over £2bn/yr on the cost of financing the projected renewables investments, compared to the previous support system; the most recent auction saw contracted prices even for offshore wind, which was previously widely assumed to be the most expensive renewables, tumbling to less than £60/MWh, including the costs of transmission to shore

- The price in the first three auctions of the capacity market was around £20/kW/yr, compared to the expected price of £40-50/kW/yr required to support new combined cycle gas plants. Instead, smaller scale decentralised generation - and more recently storage (and some demand-side response) – provided the new capacity. To an extent this highlighted complexities and distortions elsewhere in the system, but after reforms to fix these problems, the price in the most recent (fourth) auction was even lower – under £9/kW/yr.

New forms of generation have expanded rapidly at both small and large scales on the system. Renewable electricity in particular has grown from under 5% of generation in 2010, to almost 25% by 2016, and is projected to reach over 30% by 2020 despite a political de-facto ban on the cheapest bulk renewable, of onshore wind energy.

Meanwhile, the minimum carbon price moved cleaner gas generation to baseload, displacing coal to the margin. Combined with improving energy efficiency reducing the overall demand, the environmental consequences of these developments have been dramatic: coal generation has shrunk from about 2/3rd of generation in 1990, to 35% in 2000, to 7% in 2017, more than halving CO_2 emissions from power generation over the quarter century.

Neither the technological nor regulatory transitions are complete, and the results to date highlight other challenges. Pushing coal to the price-setting margin cuts emissions but initially exacerbates the impact of carbon prices on electricity prices; however the impact will decline as coal retreats (and coal is due to be phased out entirely by 2025).The Capacity mechanism has proved ill-suited to encouraging demand-side response, at least initially, and in combination with the growing share of renewables, has underlined problems in transmission and distribution pricing. As the share of variable renewables grows further, the associated contracts will require reform to improve siting efficiency and avoid adverse impacts on the wholesale market.

Thus the results to date show that EMR is a step forwards, not backwards; but it is not the end of the story.

Contact	dmgn@cam.ac.uk
Publication	June 2018
Financial Support	Support from MIT CEEPR is gratefully acknowledged. A fuller and earlier version of this paper was published as CEEPR WP 2018-4 at http://ceepr.mit.edu/files/papers/2018-004.pdf