

Optionality and Policymaking in Re-Transforming the British Power Market

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Executive Summary

The electricity market in the UK, through the reforming legislation in 2013, has entered its third decade of radical change. As one of the pioneers of market liberalisation in the 1990s, the UK accomplished the complete unbundling and privatisation of an integrated national electricity monopoly. Consequently, the role of energy policy was minimised and efficient investment in electricity-generating facilities was left to market forces. Models focussed upon the behaviour of imperfectly competitive markets. A decade later, a further liberalisation of the electricity market in 2001 replaced the rather complex rules of the mandatory day-ahead wholesale energy auction with a fully “commoditised” trading approach that offered less institutional interference and motivated continuous, bilateral forward trading. Models developed a more financial focus with an emphasis, for example, upon forward commodity spreads. More recently, as a consequence of the legislation in the Climate Change Act (2008), there has been a legal obligation on the British government to

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introduce policies to achieve an 80% reduction in greenhouse gas emissions by 2050.

Technology choice for new investment is intended to be driven, once again, by government policy, but the dilemma in this post-liberalised phase is how to make this happen whilst retaining a competitive market. Analytically, the challenge in this new context is to model the impacts of risks and incentives on investors who may have several alternative decision options.

This paper looks at the modelling challenges of this new context from a policy-making perspective, with an emphasis on coping with the various risks and uncertainties which decarbonisation policies face. Following a review of conventional longer-term, integrated energy systems models, the paper then shows how real options analysis can provide complementary insights to the dominant optimisation methodologies. Real options are reviewed in detail in order to provide a high-level framework for evaluating the interaction of scenarios, decisions, options to delay, and investment choice, particularly in the context of the electricity market interventions planned for the UK.

In particular, we have provided analytical examples of the effect of timing and competition in investment behaviour, as a response to various policies and their possible risks to market participants. Such aspects tend to be absent from the long term economic and optimisation-based models that support policy initiatives. Yet, if these behavioural inclinations are not properly understood, subsidies and incentives will not be properly set. This leads to dynamic inefficiency with possible cycles of under or over investment and, in consequence, increased regulatory risk when corrective policy actions are required. Understanding the behavioural inclinations to invest is therefore crucial, and getting it wrong destabilises the market.

In summary, this paper is intended to suggest a way forward for policy makers to gain better behavioural insights when seeking to implement low carbon policies through market incentives rather than regulations.