



Edited by
**Michael Grubb, Tooraj Jamasb
and Michael G. Pollitt**

Delivering a Low-Carbon Electricity System

Technologies, Economics and Policy

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Delivering a Low-Carbon Electricity System

Meeting targets aimed at tackling the climate change challenge requires moving towards a low-carbon economy. These targets can only be met with major reductions in carbon emissions from the electricity sector.

Written by a team of leading academics and industry experts, *Delivering a Low-Carbon Electricity System* analyses the social, technological, economic and political issues that affect the attempt to create a low-carbon electricity sector and assesses the main instruments for achieving this aim. The book begins by looking at how low-carbon generation technologies might be added in sufficient quantity to the electricity system. Next, it examines how networks and the demand side can help to decarbonise the sector. It then highlights the role of innovation and discusses instruments for promoting technological progress. Finally, given the economic framework and technological possibilities, it presents a number of general and specific policy instruments and options for the future.

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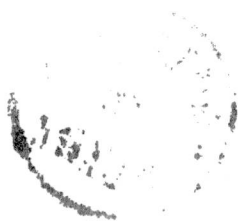
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Foreword

With its radical regulatory changes starting in the late 1980s, in many eyes the UK electricity system became a ‘laboratory’ for the world in new ways of running a power system. One consequence of being at the forefront of electricity liberalisation is that the UK needs to find innovative ways of meeting new challenges in ways that are consistent with its competitive electricity and gas markets. Twenty years after its initial market reforms, the UK system is facing a challenge which again may make it a focus of global attention: to decarbonise a largely fossil-fuel-based power system without compromising the sector’s operational integrity and long-term sustainability, while improving security of supply and economic competitiveness.

At the beginning of this decade, the Engineering and Physics Research Council (EPSRC) formulated the Supergen research programme to prepare the analytic base for addressing this challenge. In addition to technology-specific research, Supergen FutureNet was established to investigate the system-wide issues associated with a low-carbon power system. The resulting programme emerged as a consortium of seven university groups around the UK, combining engineering, economic and social research expertise.

An important part of the consortium’s work was to study how the transition to a new electricity system may come about. The work on ‘System Evolution and Incentives’, coordinated by the team at the University of Cambridge, drew on expertise across the consortium, and in particular the work on scenarios, and was linked to other Supergen consortia. This strand of research sought to combine the engineering insights into a view of the economic and policy implications of moving towards a low-carbon electricity system. In 2006, we published the first product of this work, *Future Electricity Technologies and Systems* (also from Cambridge University Press), assessing from a systems and economic perspective the technology options that can shape the future of the electricity sector towards 2050.

This second book represents the culmination of the research effort, by integrating the associated economic and social underpinnings, and assessing the policy dimensions of a low-carbon power system.

The first book concluded that there are many possible technological combinations that could deliver a low-carbon electricity system by mid-century. This book finds that important steps on the path can be made by 2020 at modest costs, and lays out the policy and societal choices that will have to be made to get us on such a path – and to sustain it. The first book found that, after a century of fossil-fuel-based power system development, a low-carbon system is technically possible: this book shows how it can be done.

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