

BOOK REVIEWS

New Challenges in Energy Security: The UK in a Multipolar World, edited by CATHERINE MITCHELL, JIM WATSON, and JESSICA WHITING; (Series: Energy, Climate and the Environment (Palgrave Macmillan, 2013), 306 pages, ISBN-10: 1137298847 | ISBN-13: 978-1137298843

This book *could* serve a broader purpose than the one for which it was ostensibly produced, so it merits more attention than it might normally receive.

Beyond being a case study for a single country, it is an easily accessible template through which to analyze, to evaluate, or to develop a model national energy policy almost anywhere currently, or in the future. By recognizing the inevitability of changing circumstances and the interaction of coordinated or uncoordinated movements toward disparate goals, it is an objective and comprehensive checklist on the road “from here to there.” It favors a dynamic systems approach and warns against any stubborn single-mindedness. It acknowledges unintended consequences in a world filled with transformative developments. It sees government as critical, but only one of many actors in the United Kingdom.

As recently as 1992, the UK disbanded its Department of Energy as an unnecessary “heavy hand” on market forces that had produced some healthy policy initiatives on their own and—if given a chance—might fine-tune any desirable adjustments. Only three years later, as a result of a change in government, perception of the need for direct involvement brought into being in its place a Department of Energy and Climate Change (DECC). Its name shows its aspirations, although the bulk of its budget is devoted to the safe decommissioning of old nuclear power plants (even while improved nuclear units might become an imperative).

“Energy security” is defined by successive chapter-authors in various ways, but the editors’ underlying conviction is that the term applies to *anything* associated with reliable delivery of primary energy resources to the satisfaction of appropriate end-uses at affordable life-cycle costs (including short-term, mid-term and long-term environmental effects in the broadest sense). Obviously, pursuing such a series of potentially conflicting sub-goals requires trade-offs, and the authors all seem to agree that compromises should be reached consciously and openly. This relates to demand, supply, and their resulting price, even when extra-market restrictions or encouragements impinge.

Rather than seeking to impose a master plan that covers every policy nuance simultaneously, the idea is to recognize the interdependence of functional agreements that will get the job done—to the general welfare and acceptance of all. Balance is key. So is adjustment over time—to such matters as the UK’s shift from energy-exporter to energy-importer, as well as changes in technology and international relationships.

Energy economists and policymakers will find few surprises in the details of all this. The novelty lies in a holistic consciousness. Unusual skill is displayed in weaving together objective treatments, chapter by chapter. Coverage includes (not in this order): supply chains, people and communities, infrastructure, demand, investment, governance, local and global market complexities, “energy poverty,” the security-climate nexus, the historic evolution of the European Union and UK policy within an increasingly multipolar world, and diverse techniques for measuring “success.”

Perhaps expectedly, any single, final prescription disappoints. This one envisions an interdepartmental forum of “senior civil servants and external experts” in the UK (or any democracy) that would meet monthly to discuss trade-offs and publish its deliberations. Sadly, such an official formalization of what an organization such as IAEE occasionally tries to do strikes this reviewer as hopelessly unrealistic.

The best we can probably achieve in this direction is improved understanding by the public and policymakers of what energy policy is and does and vigilant resilience in our approach to it. Wide readership of this book could help!

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Electricity Restructuring in the United States: Markets and Policy from the 1978 Energy Policy Act to the Present, by STEVE ISSER, (Cambridge University Press, 2015), 509 pages. ISBN 9781107100787, Hardback.

From his extensive and detailed review of the history of U.S. electricity restructuring, Steve Isser, an economist and lawyer, concludes in his final paragraph:

Muddling through may not be the ideal solution for social engineers or academic economists, who draw up plans for optimal market and regulatory structures, then criticize politicians and special interests when the real world diverges from their vision. However, regulators and policymakers must deal with numerous vested interests, consumer advocates, environmentalists, politicians, corporate lobbyists, and other parties pursuing their own vision of the ideal solution, engaging in turf wars or protecting their piece of the pie. While slicing the Gordian knot of political inertia is tempting, patiently unraveling its strands is often the better strategy.¹

The prime illustration of muddling through is the formation of the most successful type of U.S. electricity markets, although Dr. Isser has some important reservations regarding restructuring, based on the tight power pools and the numerous waves of reforms that Regional Transmission Organizations/Independent System Operators (RTOs/ISOs) have undergone. Dr. Isser also suggests that muddling through may often be the best strategy because it builds the human capital and the experimental base that is needed to design and implement electricity markets, as evidenced by the Federal Energy Regulatory Commission's (FERC) hit-or-miss approach over three decades of transitioning to electricity markets.

The muddling through thesis grows out of the book's approach of analyzing how the economic theory of network industries was applied to political positions, regulatory decision-making, market design, and implementation. Dr. Isser concludes that in the restructuring of the energy industry, economic theory is only one of the drivers, and perhaps not particularly important compared to exogenous shocks, path dependency, and adaptive policy instrumentalism.

In addition to the primary lesson of the value of instrumentalism, the book offers two additional lessons. The second lesson is that although there was a large amount of hype regarding the savings that restructuring would achieve, that hype may have been necessary to overcome the institutional inertia and barriers to restructuring. The chapter describing the creation of the California markets is tellingly titled "Great Expectations." Another example is retail competition, which has been grossly overrated with little innovation in retail services and meager increases in price responsiveness by end-use customers. The book's third lesson is that the efficiency gains that did

1. p. 463.

occur came from the combination of creating wholesale electricity markets (including expanding pooling and trading, which could have been implemented without markets) and stronger regulation (specifically by the FERC) of transmission.

To illustrate the book's multidisciplinary approach, its blow-by-blow discussion of the California market meltdown is useful. Chapter 15 carefully describes the sequence of events starting with the opening of the markets on April 1, 1998 through the end of the market meltdown and the rolling blackouts in 2001. The subsequent chapter addresses market power in California. Dr. Isser's analysis integrates exogenous events—a drought, a powerful winter storm in January 2001, an explosion on the El Paso pipeline in August 2000, and emission controls—intersecting with forced errors of poor market design, hasty implementation, mismanagement, and intrusive stakeholders and politicians (such as Jeff Skilling, Ken Lay, Gray Davis, and Arnold Schwarzenegger). Within the book's instrumentalism theme, Dr. Isser observes that the California meltdown did prod FERC to develop meaningful market oversight.

A welcome insight can be found in the book's second chapter, discussing the importance of air pollution regulation and the Environmental Protection Agency (formed on December 2, 1970) in spurring and shaping electricity markets. Air regulation, motivated in large part due to emissions from coal-fired power plants, had a large impact on those plants. It helped (among other factors) drive the shift to natural gas-fired generation, and led to cap-and-trade allowance markets for sulfur dioxide and nitrous oxides. Similar connections between air pollution regulations of greenhouse gases, such as the proposed rule limiting carbon dioxide emissions from existing power plants under Section 111(d) of the Clean Air Act, are shaping the future of today's grid. In this chapter, Dr. Isser admonishes that criticizing environmental policy for not being completely economically rational is easy if the critic ignores the complex political and regulatory forces that are driving policy.

With any book of this breadth and length, it is easy to quibble with some of its findings. The author argues that regulated utilities were not the abysmal performers that some advocates of restructuring claimed. The two biggest pre-restructuring failings—poor performing, high cost nuclear power plants and substantially overpriced qualifying facilities (QF) contracts—are too easily explained away. Dr. Isser also states that management hubris caused utilities to fall to the hype of nuclear power plant vendors, and that this same hubris also exists in other industries that are market based. The text puts the blame for overpriced QFs on the shoulders of regulators, rather than utility management incompetence. However, one of the public policy motivations for restructuring (in addition to squeezing out management inefficiencies), was to shift the risk of failed investments from ratepayers to shareholders as exhibited by nuclear investments and QF contracts.

If the past is prologue, this book has some implicit suggestions for the future of the electric power industry, particularly in the light of the major distribution restructuring initiatives taking place, for example, in California and New York. First, do not believe the hype associated with the numerous and almost incalculable claimed benefits of pushing restructuring to the distribution system with microgrids, distributed resources, and smart grid technologies. Second, policymakers should be prepared to learn as they go, and perhaps even build in capabilities such as the systematic collection of data and objective analyses performed by truly independent third parties as they develop and implement new policies. Third, the least successful markets' wholesale electricity markets were built from scratch as opposed to starting with a power pool. Unfortunately, policymakers do not have anything analogous to the power pool at the distribution level to build a market for distribution products and services. They will need to establish a starting point for doing so, if that is indeed the future of the grid and electricity markets.

After devoting a chapter to the research on the question of whether there have been net benefits of restructuring, the author believes that the jury is still out. The difficulties of untangling

multiple and changing factors have yet to be overcome given the limited time since restructuring began relative to the long-lived nature of electricity investments. Dr. Isser concludes that it is critical to understand the multifaceted context of electricity policy and markets as a predicate to evaluating the question of net benefits; this is an important finding that future writers of the history of this industry should not ignore.

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Energy Finance and Economics: Analysis and Valuation, Risk Management, and the Future of Energy edited by BETTY SIMKINS and RUSSELL SIMKINS. (Wiley: Kolb Series in Finance, Essential Perspectives, 2013), 624 pages, ISBN: 978-1-118-01712-8. Hardcover.

This volume offers an excellent treatment of corporate finance and economics applied to conventional and renewable energy markets.

Content development is organized into parts, each gathering chapters sharing a common theme, an exception being the last part reporting a number of case-studies across a variety of subjects. Each chapter provides the reader with either a self-contained introductory presentation of the state-of-the-art in a subject of interest or a case-study analyzing a concrete market example. A few chapters contain a useful Q&A section. Readers will particularly appreciate the effort made by the editors to gather a wide variety of topics into a well-shaped and homogeneous framework.

Part I deals with a thorough description of the economics of energy markets. It begins with an overview of past and current market structures, including analyses of cartels, NOC's, geopolitical issues, as well as demand and supply characteristics. It then moves on to analyzing alternative views about market evolution, passing through a description of conventional energy downstream segments and an illustration of asset valuation models for renewable energy sources. Also discussed is energy sustainability in conjunction with related economic, environmental, and social implications. This part of the book is broad and encompasses most of the relevant dimensions of standing and forward-looking dynamics of energy markets.

Part II illustrates a number of applied techniques in corporate financial analysis for the energy industry. A strand of items deals with accounting principles and methods in the upstream segment of several energy markets. Next is a treatment of financial statements, ratio analysis, and cash reserve assessment, in addition to a few case-studies. A major axis of development focuses on real asset valuation, a subject dealt with from two alternative perspectives: one is a variation of the traditional DCF analysis devised to keep track of risk exposure (via scoring assessment) and inflation bias; the other is an operational introduction to the real-option valuation method, which the authors illustrate in considerable depth. Energy-related tax systems are then illustrated across world markets in relation to contract provisions and alternative relational schemes between private and public sectors. A last subject focuses on project finance applied to large energy projects, where a special attention is paid to the pros and cons of the approach. Particular care has been taken in combining methods of analysis and application to practical cases, as the biofuel project development neatly shows.

Part III provides the reader with an overview of the large subject of energy risk management. Here the treatment is somewhat less intensive than the one in the other parts of the book, the goal being to offer a quick introduction to the main topics in the area. These comprise gas and power derivatives, ERM process design, linear and non-linear vanilla instruments, simple option

packages (e.g., collar), arbitrage opportunities (e.g., storage arbitrage), and best practices and pitfalls in energy risk management. A final chapter introduces the reader to carbon management through an empirical assessment of the two cases of SO₂ market allowances in the U.S. and CO₂ permits related to the Kyoto protocol. The authors managed to present a variety of energy-linked financial products in terms of their ability to mitigate corporate exposure to market risk. A chapter dealing with corporate financial risk management in the airline industry represents a particularly useful sample of their approach.

Part IV is *sui generis*: it collects a number of self-contained case-studies spanning a variety of issues raised by energy market practice. They cover energy source property valuation, financial assessment of hybrid vehicles, corporate acquisition valuation, project valuation in the airline industry, cost and revenue assessment in a wind energy company, and a deep analysis of Amaranth's collapse.¹

Overall, the book exhibits a fair balance between descriptive and prescriptive statements. The book's editors managed to create an effective homogenization in content, structure, and notation across the large number of chapters, which turns out to be easily accessible thanks to its self-containedness and clarity of exposition.

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Smart Grid (R)Evolution: Electric Power Struggles by JENNIE C. STEPHENS, ELIZABETH J. WILSON and TARLA RAI PETERSON. (Cambridge University Press, 2015), 218 pages, ISBN: 9781107047280. Hardback.

The electricity system continues evolving, and in recent years, the topic of “smart grids” has gained attention, with the increased usage of renewable energy sources, the rollout of advanced metering infrastructure and even the introduction of a new journal, the *IEEE Transactions on Smart Grid* (Power and Energy Society). But there is no consensus on what a “smart grid” means. In a new book by three professors of environmental policy and communications from the United States and Sweden, the authors aim at providing a more nuanced view, with a focus on the multidisciplinary aspects of the problem.

In the nine chapters of *Smart Grid [R]Evolution*, the authors discuss the overall composition of the “smart grid” system, opportunities and challenges in managing the electricity network and various stakeholders and societal actors vested in the system. The authors compare and draw upon examples from the United States and Europe, grounded in their research from the past years. Each chapter focuses on a different aspect of the problem, on what could be described as nine research papers with dedicated separate bibliographies. The authors have done a remarkable job on linking each chapter with references to the others, in order to present a cohesive book theme, while highlighting the different perspectives affecting the electricity system. Although this feature helps to navigate the book, particularly in a non-sequential reading, it lends itself to repetition that could have been used instead to deepen each one of the topics.

1. Amaranth Advisors LLC was an American multi-strategy hedge fund founded by Nicholas Maounis and headquartered in Greenwich, Connecticut. During its peak, the firm had up to \$9 billion in assets under management before collapsing in September 2006, after losing in excess of \$5 billion on natural gas futures. The firm's failure was one of the largest known trading losses and hedge fund collapses in history.

Chapter 1, titled *Emerging Smart Grid Struggles* is actually a general introduction to the book and its layout while defining the intent of the authors to disclose intricacies and complexities of the electrical system and network in the following 8 chapters.

Chapter 2 talks about *Promises and Pitfalls of Smart Grid* and the need for adjusting the electricity grid to meet the expectations of the modern user. Nowadays, the electricity system in addition to generating, transmitting and distributing electricity, has competing priorities as it must be resilient and able to respond to natural disasters; must be environmentally friendly and reduce the emissions of greenhouse gasses (GHG) while staying affordable for the economically disadvantaged users.

Chapter 3 introduces the *Technologies of Smart Grid* and compares it to the legacy system. This chapter describes different technologies and goes beyond the smart meter, the most familiar and talked about part of the system, and attempts to describe the smart grid system in its entirety including the grid-facing technologies, hardware and software involved, as well as technologies involved in the renewable power generation.

Chapter 4 talks about *Societal Actors and Dominant Smart Grid Visions* and it brings a human factor to the discussion, with a focus on the motivations and often opposite incentives that the participants in the development of smart grid technologies have.

Chapter 5, *Smart Meters: Measuring, Monitoring, and Managing Electricity* concentrates on the details of these devices and the infrastructure supporting it, discussing geographical differences and some of the reason why the deployment of these technologies have faced oppositions.

Chapter 6, *Wind in the Wires* is a detailed compendium of wind technologies, from historical uses in, for example, farming, to the current use in power systems, connecting to the debates regarding bringing this wind energy to consumers and the experiences in two regions of the US and Germany. As the authors point out, the development of smart grid technologies can provide a better integration of renewable resources, and in many regions the prevalent resource is wind, making this a very relevant issue.

The *Community and Small-scale Grid Innovation* chapter (chapter 7) is an account (case study) of three vastly contrasting experiences in the deployment and implementation of new infrastructure and practices in Boulder, Colorado; Austin, Texas (the Pecan Street project) and the Island of Bornholm in Denmark.

Chapter 8, *A Changing Climate and a Smarter Grid: Critical Linkages* provides a vision and abstraction of the control spectrum (centralized vs. hierarchical) vs. the change spectrum (incremental vs. radical), as it relates to the connections between more resilient systems, smarter grids and climate change, in a tightly constructed narrative

In the epilogue, the authors summarize the contributions of the book, especially as it relates to using new lenses to dissect the problems of technology adoption in the modernization of the grid.

With a subject matter topic this extensive, it is difficult to settle on an ordering narrative that provides a logical structure, and the authors chose a coherent chapter layout from fundamental components and participants, through their motivations including social dimensions, to policy issues and the call for more interdisciplinary approaches.

The authors do an admirable job at explaining the complexities of the electricity system and in multiple occasions reiterate the need to understand multiple and alternative perspectives of the actors in the system, and their incentives. Their approach is very accessible for the novice reader, and it also provides an alternative framework for the problem that well seasoned professionals may find useful to gain a general understanding of the larger electricity landscape as it relates to “smart grid” technologies.

The authors set to themselves a very difficult task, that of explaining clearly to both “experts and non-experts” the complexities of the system, leading to an inherent tension between providing a motivation and overview of the problem versus an in-depth look to the issue at hand.

In some instances, that leads to an intriguing setup, for example the cases of Boulder, Austin and Bornholm in Chapter 7, that is more descriptive in the narrative, but where the reader is left wondering what could be the underlying causes, and where a theoretical framework could have helped. Fortunately, the authors provide an extensive list of references, where the interested reader can continue their exploration.

The authors use academic as well as non-academic sources in their research in order to support their perspective, making it approachable. The book convincingly argues for the need to bring social aspects to the study of the grids, surprisingly not including behavioral studies of energy consumption that have been explored by companies like Opower, but providing a qualitative, well researched perspective, and a valuable resource to better understand these problems.

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