Regulation of the Power Sector, edited by Ignacio Pérez-Arriaga

Reviewed by Richard Green

It is unusual to come across an edited textbook. The risk of missing out important topics, or covering them twice (or more) in confusingly inconsistent ways, appears to be too high, and most texts are written by one, two or three authors. This book's fourteen chapters have thirteen named authors, but the result is not unlucky. Most of the authors are (or have been) members of the Instituto de Investigación Tecnológica (IIT) at Comillas Pontifical University of Madrid, founded by the editor thirty years ago, which has become one of the world's leading centres for research into electricity economics. They have been involved in teaching electricity regulation to students and regulators at many venues, and the experience this brings shines through the pages of this book. As a result, the structure is coherent and the style consistent – this is helped by the fact that the editor is a co-author of six chapters, and Carlos Batlle was involved in five.

The book opens with an account of the technology and operation of electric power systems, by Damián Laloux and Michel Rivier, setting the scene by reminding (or informing) the reader of the technical features that can make the electricity industry such a fascinating (and challenging) subject. This chapter sets the scene by discussing both the traditional planning-oriented approach to running the industry and the newer market-based paradigm, and ends with a short list of challenges for the future, to which we will return.

Mariano Ventosa, Pedro Linares and the editor then set out the economic principles behind power system economics, and develop these to show how a system planner would minimise the cost of generation with an optimal plant mix (a screening curve diagram makes an appearance here). They also provide the equivalent result for an ideal competitive market, and discuss the problems of market power and externalities.

The third scene-setting chapter is by Carlos Batlle and Carlos Ocaña, on the principles and institutions of regulation. They argue that twenty years ago, policy-makers believed they had many degrees of freedom over the way in which the electricity industry could be restructured and re-regulated to increase the role of markets; bitter experiences have shown that in fact, some basic principles must be respected.

Tomás Gómez then discusses how these principles are put into practice when monopolies are regulated. He starts with the traditional rate of return approach before illustrating a range of schemes for incentive regulation, including the famous RPI - X approach and benchmarking techniques. As befits a book aimed partly at regulators who have to carry out these tasks in real life, he has detailed examples in some fairly complex tables; putting the spreadsheets behind these on the web would be a valuable service.

Tomás Gómez is also the author of the following chapter, which shows how distribution companies responsible for the low-voltage networks should be regulated. Quality of supply is an important issue, since most power cuts originate in these networks, and an appropriate model for distribution will be critical in extending electricity supply to unserved customers in rural areas. There are four short case studies, all from OECD countries.

Michel Rivier, the editor and Luis Olmos turn next to electricity transmission, the other natural monopoly element of the industry. This is the longest chapter, at 90 pages, for it covers not just the tricky economics of how nodal prices reflect the marginal cost of meeting demand at different points on the network but also fundamental questions of how costs should be allocated and users granted access to the grid.

Electricity generation can be a competitive activity and Carlos Batlle's chapter combines the topic with a detailed study of wholesale markets. He shows how the development of competitive markets took many years, from the pioneering Chilean reform, via the pools in England and Wales and Norway to the sophisticated Day-Ahead Markets of the United States, which are combined with extensive forward and futures trading. Electricity markets, or some other mechanism, also have to consider ancillary services, particularly reserves, and are vulnerable to the exercise of market power.

A chapter on tariffs, by Javier Reneses, María Pía Rodríguez and the editor, follows. In some markets, the tariffs paid by final consumers are no longer regulated, but the network charges paid by their retailers are, and the allocation of network charges between different kinds of customer is a central question for this chapter. In fact, it is so central that I wondered whether the chapter would have fitted better if it had come immediately after the chapters on distribution and transmission.

Another logical place for the tariff chapter might have been after its successor, an account of electricity retailing written by Carlos Batlle. Since retailing as a distinct and competitive activity will be an unfamiliar concept to many regulators, the chapter sensibly includes a lot of information on the processes required to operate a competitive retail business and the risks that it can face.

Moving back to generation, the next step for regulators, at least in the European Union, is the creation of effective regional markets, and the prospects for these are discussed by Luis Olmos and the editor. It will almost always be necessary to expand the amount of grid capacity between the constituent sub-regional (e.g. national) markets, and ways of allocating access to this capacity, and paying for it, are an important topic here. The steps being taken to complete the EU's internal electricity market are included as a case study.

Pedro Linares, Carlos Batlle and the editor discuss the need for environmental regulation and approaches to it in chapter 11. The chapter also covers ways of promoting renewable electricity as a second-best policy when the first-best approach of policies that would reduce emissions directly is not available.

The second corner of the energy policy triangle concerns security of supply, and this is covered by Pablo Rodilla and Carlos Batlle. Regulators should be concerned that the system can be operated securely, with adequate amounts of generating capacity that is likely to be available when required (it is "firm") and they may wish to promote the development of certain kinds of power station through a strategic expansion policy. A range of policies to achieve these aims are discussed, including the do-nothing approach of the energy-only market, capacity payments and the quantity-based approach of various kinds of capacity market.

In many countries, a significant proportion of electricity is generated from gas, and so Julián Barquín discusses the gas industry, and its potential interactions with the power sector, in the penultimate

chapter. The editor's concluding chapter is a tour-de-force that sums up some of the challenges facing the electricity industry of the future, many of which have already appeared in the book.

The book thus offers a comprehensive resource for those teaching the economics and regulation of electricity. In a few places, I found myself thinking that I would stick with a different approach to a particular issue, but I know there are things that I would like to incorporate in my own courses, not least Grandma's Inheritance Theorem. This is the first discussion I have read that likens a contract for differences to a diamond ring, but it is a great way to illustrate the irrelevance of fixed-quantity hedging instruments to spot market decisions.

There were several mentions of "smart metres" and I wish my own typos were as creative as the US electricity system's "Easter Interconnection". Students coming new to this area have a lot of topics to master, and I think I would have spared them the theory of contestable markets, particularly as the experience in the UK implies that electricity retailing (the example suggested) is not really contestable. A discussion of the UK electricity market says that "capacity payments were made in disguise" – if so, the industry's standard practice of calling them "Capacity Payments" must have been a double-bluff. Springer have done a poor job of printing a few of the more theoretical diagrams, with labels partly hidden by the lines they are indicating. But these are only minor quibbles and I hope the authors will realise that I am praising their book with faint criticisms. If I was teaching a course concentrating on this area, I would use this book.

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