Book Reviews

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The range of books reviewed is wide, covering theory and applications in operations research, statistics, management science, econometrics, mathematics, computers, and information systems (no software is reviewed). In addition, we include books in other fields that emphasize technical applications. Publishers who wish to have their books reviewed should send them to Professor Benjamin Lev. We list the books received; not all books received can be reviewed because space is limited. Those who would like to review books are urged to send me their names, addresses, and specific areas of expertise. We commission all reviews and do not accept unsolicited book reviews. Readers are encouraged to suggest books that might be reviewed or to ask publishers to send me copies of such books.

   The authors or editors of the books reviewed in this issue are Benjamin F. Hobbs, Michael H. Rothkopf, Richard P. O'Neill, Hung-Po Chao, David R. Laube, Raymond F. Zammuto, Douglas Long, Charles A. Micchelli, Gianni Di Pillo, and Almerico Murli.

HOBBS, BENJAMIN F., MICHAEL H. ROTHKOPF, RICHARD P. O'NEILL, HUNG-PO CHAO, eds. 2001. *The Next Generation of Electric Power Unit Commitment Models.* Kluwer Academic Publishers, Dordrecht, The Netherlands. 319 pp. $130.00.

Liberalizing and restructuring the electric-power industry requires rethinking formulations of the unit-commitment problem and algorithms in the context of efficient and market-based operations. The unit-commitment problem is a large-scale, nonlinear, mixed-integer problem that—unlike the dispatch problem—must consider start-up, no-load, and shut-down costs and constraints, in addition to the systemwide reliability constraints and power flows, and do so over a longer period (days rather than hours). It is a daunting problem, indeed.

I sat on a markets rules committee for approximately a year prior to the start-up of wholesale electricity markets in a northeastern independent system operator (ISO). Our committee struggled with the limitations and capabilities of unit-commitment and dispatch software. The software imposed binding constraints and critical trade-offs between important market-design problems and implementation problems. Two problems that still exist are how to incorporate bidding of demand-side resources, which reduces both the wealth-transfer effect and inefficiencies due to market power, and how to increase

efficient transactions across large regions, whether by increasing the size of control areas or reducing "seams" between them.

The editors of *The Next Generation of Electric Power Unit Commitment Models* draw on their academic, industry, and regulatory experience to articulate the emerging needs of the electric power industry and to describe efforts to respond to industry developments. Simply presenting the issues is an ambitious task; they span market design, problem structure, different types of unit-commitment users, and selection of algorithms. Providing insight regarding priorities and interrelations among approaches is even more difficult. Hobbs et al. accomplish their twin goals of describing emerging needs and presenting modeling developments that respond to those needs.

The impetus for this collection of 16 papers was a workshop held in September 1999 on the next generation of unit-commitment models. Workshop participants produced a prioritized list of more than 30 research topics and identified the type of research needed (for example, fundamental research or development and implementation). The many interrelated issues include incorporating alternating-current optimal power flows; interregional coordination; simultaneous optimization of energy, operating reserves, and automatic generation control; reduction in solution times; handling demand-side bidding; intertemporal

constraints resulting from limited energy resources such as hydroelectric facilities; comparison of a wide range of algorithms; and whether the schedules and prices output by unit-commitment models will be accepted by market participants.

The authors of the papers address the two major groups of users that confront the unit-commitment problem. In wholesale electricity markets, market participants may use unit commitment as part of their decentralized decisions to commit, schedule, and decommit their resources to maximize profits (including, potentially, to exercise some pricing power) or to minimize the costs of serving their load obligations. The other main user is the centralized ISO that uses a unit commitment to ensure that demand over the next period, typically the next 24-hour day, can be satisfied reliably and to establish the day-ahead hourly market-clearing prices.

Different types of users will find different issues of interest. For instance, an ISO is concerned with the defensibility of its unit-commitment schedule, meaning that it will find unattractive algorithms that produce solutions that have identical or near identical costs but have substantially different impacts on individual market participants. Market participants must submit the economic and technical constraints of all of the assets considered in the unit commitment to the ISO. Since the ISO unit commitment is typically for only a 24-hour period, perhaps completed 10 hours or so prior to the 24-hour period, the stochastic aspect of this problem is not critical. In contrast, the individual market participant does not know its competitors' bidding parameters. If a market participant has generation units that contain intertemporal constraints greater than 24 hours, the stochastic aspect of this problem cannot be ignored, particularly since electricity market prices can be extremely volatile during high-demand periods when participants realize much of their profits and incur much of their costs.

Although the book was published in 2001, the material is not dated; the issues covered are still vibrant and topical. Moreover, although the book is intended primarily for academics and industry developers of unit-commitment algorithms and software, the introductory chapters and much of each of the following papers will be accessible and valuable to nonspecialists in operations research. The broad

understanding this book provides is necessary if the electric power industry is to put unit-commitment enhancements into practice.

As a good text should, the book leaves readers wanting more. After reading it, they will know enough to ask the key follow-on questions. The authors suggest several avenues of possible future research. One is to quantify the social-welfare implications of the 30 or so topics the workshop participants identified. This would help researchers to form research agendas that are somewhat rational with respect to promoting the efficiency goal of liberalized electricity markets and to use common data and assumptions in illustrating and comparing different unit-commitment approaches and algorithms. Another potential avenue is to explore the structure and experiences of specific wholesale markets that use centralized unit-commitment models.

This text is a critical contribution to the electric-power industry and the operations research profession. It is a valuable start to the exciting work needed on unit commitment. The operations research community has an opportunity to contribute to its own profession and to the efficiency of one of the world's largest industries.

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Laube, David R., Raymond F. Zammuto, eds. 2003. *Business Driven Information Technology: Answers to 100 Critical Questions for Every Manager*. Stanford University Press, Palo Alto, California. 519 pp. $34.95.

Business Driven Information Technology is the outcome of collaborative effort at the business school of the University of Colorado at Denver to create an information technology (IT) course for MBA students on the foundations of IT. More than 60 professional and faculty authors participated in the project, called the 100 Questions Project. The project team proposed 100 challenging questions for every manager, and the authors answered them based on their many years of experience with IT. Those conducting IT projects in enterprises frequently encounter these questions. By answering these questions, the authors focus on how to incorporate IT projects into associated business strategies and objectives from the beginning.