

# Book Reviews

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Alvin L. Alm and Robert J. Weiner, eds., *Oil Shock: Policy Response and Implementation* (Cambridge, Mass.: Ballinger, 1984), 239 p.

OPEC II spawned a number of studies of oil market dynamics and possible policy responses during oil supply interruptions. This book fills a particular niche by organizing a set of easily readable papers on improving policymaking, with a focus on the implementation of revenue recycling and oil stockpile programs. By design, it does not attempt an in-depth analysis of past oil disruptions, their economic consequences, or broad policy considerations for responding to oil interruptions.

The volume is organized into three major sections: the oil markets during disruptions, macroeconomic policies, and oil stockpile strategies and issues. Two of the eleven chapters have appeared elsewhere in journals, and all but one were originally presented at a conference entitled "Energy Security Policy Implementation Issues," held in mid-July 1982, under the auspices of the Harvard Energy and Environmental Policy Center.

Although virtually all policy prospects are at least mentioned, this volume is really a treatment of two policy options. Revenue "recycling" is advocated for addressing the possible adverse impacts of rising oil prices on households. It is offered primarily to keep government from implementing price controls and allocation schemes during an oil shock. Macroeconomic considerations appear to be second-order concerns. The second option discussed thoroughly is the filling and drawdown of the Strategic Petroleum Reserve (SPR), both unilaterally and in concert with the public reserves of other oil-importing countries.

The fundamental macroeconomic problem is the feasibility of and mechanisms for stabilizing employment and output without exacerbating the inflationary effects of a shock. However, this issue is largely ignored in the section on macroeconomic policy, which primarily addresses the issue of revenue recycling. Several authors correctly note that this term is a misnomer: there is no extra income to recycle because federal deficits worsen rather than improve during an oil shock. In fact, today's draconian federal deficits effectively remove from the policy agenda any options that reduce taxes.

The section on macroeconomic policies includes two chapters on specific revenue-recycling strategies: a temporary reduction in income taxes (M. C. Barth and E. Berk) and a one-time issuance of federal checks through the Internal Revenue Service (S. Kelman). Using results from a macroeconomic model, R. G. Hubbard shows that the effectiveness of a temporary income tax reduction depends importantly on whether the recipients perceive the income as a permanent or temporary gain. Even if all income were treated as a permanent gain, however, the estimated effect of recycling policies will vary widely depending on key macroeconomic parameters, as discussed in Hickman (1984) and Energy Modeling Forum (1984).

R. S. Pindyck and J. J. Rotemberg's article is broader in scope than the other

papers in this section. The authors report some interesting results on the dynamics of capital stock turnover and energy demand. They also prescribe a set of energy and economic policies that hold few surprises, except perhaps that they see little macroeconomic benefit from a recycling program. They advocate cost-cutting policies like a payroll tax cut, but this strand of thought unfortunately is not pursued in the larger volume. Another cost-cutting alternative, which is not mentioned, would be federally financed reductions in state and local excise taxes, which could be facilitated by the state and local block grants suggested by some authors in this section.

The economic benefits of SPR releases operate through their effect on oil prices rather than through the physical replacement of lost oil supplies. The key concern here is developing the mechanisms for transmitting the availability of oil stockpiles to oil market prices. J. L. Plummer provides a lucid description of various options for financing and operating the SPR and discusses how certain approaches may influence price even without a physical release of oil. S. Devarajan and R. G. Hubbard argue for future contracts rather than spot sales in drawing down the SPR. By guaranteeing future supplies, such contracts reduce the demand for private inventories, and hence lower oil market prices. Finally, R. G. Hubbard and R. J. Weiner evaluate the macroeconomic benefits of international coordination of oil stockpile releases, which they conclude are noticeable but not overwhelming.

The last two articles should be commended for explicitly incorporating the linkages between the world oil market and the macroeconomy through an ambitious and complex modeling effort. While the volume does not formally present the model, several results deserve some mention. First, given the change in oil prices, the reported GNP losses due to a disruption appear noticeably smaller than those reported by others (for example, see Dohner (1981) and Energy Modeling Forum (1984)). Second, a temporary interruption in supplies produces a price "spike" (with the price returning to its reference-case level or below) rather than a "ratchet" price effect (with the price remaining consistently above the reference-case level). Some discussion of the nature of the price shock and its implications for the policy simulations would have been useful.

This book discusses the mechanisms that could make revenue recycling and oil stockpile programs operate more efficiently. While this limited focus may be appropriate for policymakers who are already committed to these programs, it will be less useful for those who want a more comprehensive evaluation of the underlying policy dilemma created by oil shocks. Even restricting one's attention to these two policies, critical issues remain unanswered. What conditions make revenue recycling either a more or less effective macroeconomic policy? What happens if oil stockpiles are used for equity goals rather than allocated through the market? An in-depth critical evaluation of the merits of these two policies is conspicuously missing in this collection of papers. Nevertheless, the volume does communicate some basic points for policymakers. I would suggest that potential readers concentrate on the oil stockpile chapters, the best section of the book, and on the Pindyck and Rotemberg paper if they are interested in energy-economy linkages and a broad range of policy options. Those desiring to undertake some

selective reading would do well to start with A. L. Alm's introductory chapter, which summarizes many of the salient points developed elsewhere in the book.

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Douglas R. Bohi and W. David Montgomery, *Oil Prices, Energy Security, and Impact Policy* (Washington, D.C.: Resources for the Future, 1982).

The economic costs of oil supply disruptions are substantial.<sup>1</sup> Hence, it is not surprising that the oil supply shocks of the 1970s and the early 1980s left in their wake numerous policy studies of "what went wrong," "how big the costs are," and "what government can do about it." Far less attention has been paid by economists and policymakers to the operation of the world oil market and to market factors that might determine the success of energy policy initiatives. An important exception is *Oil Prices, Energy Security, and Import Policy* by Douglas R. Bohi and W. David Montgomery—a report from the Energy and National Security Program at Resources for the Future.

Though the oil market has changed since the Bohi and Montgomery volume was published in 1982, the analysis in the book will be interesting to policy-

1. See, for example, the summary of the study of the macroeconomic effects of oil supply shocks by the Stanford University Energy Modeling Forum in Hickman and Huntington (1984).

makers and to applied economists. The authors focus on economic analysis, but the presentation is clear to the noneconomist. Starting with a model of price determination in the world oil market, the study examines the "indirect" effects of higher oil prices on income determination and the terms of trade, the adjustment of private markets to uncertainty in the oil market, and the rationale for tariff and stockpile policy intervention. Though lacking a single conceptual framework to link these issues, Bohi and Montgomery present a systematic overview of the impact of uncertainty on the behavior of actors in the oil market and on the potential for successful policy intervention.

The book covers a wide range of topics. With limited review space, I will focus on three areas: (1) the so-called "oil import premium" concept for measuring the benefits of energy policy responses, (2) adjustment of private decisions to oil market uncertainty and to changes in public policy, and (3) the benefits of stockpile policy.

With respect to the first point, one strength of Bohi and Montgomery's study is its attention to economic models in assessing the benefits of proposed policy initiatives. The primary construct employed in this analysis is the notion of an "import premium," or the difference between the private and social costs of a marginal barrel of oil imports. First introduced to the literature by James Plummer (1981) in this journal, the premium can be broken down into direct (oil market) and indirect (macroeconomic) cost components to facilitate cost-benefit analysis of tariffs (which lower the gap between the private and social costs of oil imports) and the Strategic Petroleum Reserve (releases from which dampen price fluctuations and macroeconomic dislocations). Despite its pedagogical convenience, the premium is what economists would call a partial equilibrium measure. General equilibrium interactions among markets and policy changes are ignored. Those feedbacks can be important.<sup>2</sup> Measures of the premium are not independent of the energy (or, for that matter, nonenergy) policy stances of importing-country governments.

Bohi and Montgomery present a detailed analysis of the response of private energy use and investment decisions to changes in oil prices. Though important, this issue has been ignored by many previous studies. From the point of view of energy policy, the discussion of links between private and public stockpiling is particularly interesting. Their analysis of the extent to which government stocks displace private stocks is not as well developed as it might be. To observe that increasing public stock *levels* decreases private stock *levels* during "normal" periods sidesteps the question of how government stock *changes* would affect private stock *changes* during "disrupted" periods.

Bohi and Montgomery do discuss the use of the Strategic Petroleum Reserve as an energy policy instrument within their paradigm, but they give much less attention to stockpile policy than to tariffs. This is unfortunate, since many

2. For a summary of the importance of macroeconomic feedback, see the summary report of the Energy Modeling Forum in Hickman and Huntington (1984). Hubbard and Winer (1983, 1985) show the importance of general equilibrium feedback effects in assessing the benefits of using the Strategic Petroleum Reserve.

stockpile policies have both economic and political advantages over tariffs.<sup>3</sup> Greater emphasis on the role of international cooperation in the use of public stocks would be useful, as actions by other IEA member countries during a crisis will determine how effective the use of our own SPR will be.

In summary, this book represents an important addition to the energy policy debate. By using the tools of economic analysis in their discussion, the authors have constructed a foundation for future study. That future study must surely have on its agenda further work on the SPR and on more realistic treatments of price determination in an oil market in which spot, long-term contract, and futures markets all play a role.

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3. Optimal stockpile policy need not require a tariff to constitute a first-best solution.

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Robert H. Nelson, *The Making of Federal Coal Policy* (Durham, N.C.: Duke University Press, 1983).

This book represents a valuable contribution to the examination of the critical but inadequately considered question of the proper role of public lands in the U.S. economy. The author uses appraisal of coal leasing policy as a symbol of

broader concerns about extensive federal land ownership. He recognizes that mismanagement of federal lands arises precisely because federal ownership often is not optimal.

Nelson occupies a unique position in the discussion. He is an economist employed as a Department of Interior policy analyst working extensively on coal and other public-land policy issues. He has been given remarkable freedom to prepare and independently publish thoughtful discussions on public-land policy. These have been characterized by careful efforts to use sound economic analysis to appraise the theory as well as the practice of public-land administration. Nelson has been particularly concerned with the economic validity of the various philosophies that have guided public-land policy. He has produced analytically sound discussions that also are accessible to the general reader.

After this book went to the printer, Nelson found himself in the center of the 1982-1984 controversies about coal leasing. Then Secretary of Interior James Watt's impolitic remarks about the Commission on Fair Market Value Policy for Federal Coal Leasing temporarily made coal leasing a national issue. Almost simultaneously, Nelson was assigned to the staff of that commission, where he assumed a major role. However, his contribution and that of the commission necessarily proved narrower than the arguments in the book. Government commissions are notoriously reluctant to challenge existing practices. The coal commission was more than ordinarily cautious because of its problems with external political pressures, internal dissension, and the inexperience of four of its five members with energy and public-land economics. The advice was largely confined to better administering existing law.

In his book, Nelson suggests the desirability of challenging existing laws. He uses coal leasing problems as an apt illustration of broader issues of public-land policy formulation. His discussion stresses the relationship among the economics of public policy, coal policy experience, and various political theories. These last are a central component of the book.

Three disparate political concepts are considered to be major influences. The first is conservationism and its current environmentalist incarnation. Then comes the question of how much planning should government do and what tools it should use. The last is the idea that good public policy will emerge from interest-group liberalism, the meeting of diverse groups to reconcile their differences (essentially what Galbraith called "countervailing power").

Nelson argues that coal policy was affected by all three political concerns, the effects were harmful, and the harm is attributable to the weaknesses of the concepts and the conflicts among them. Conservationism is faulted for neglecting the costs of attaining its goals. Interest-group liberalism is criticized because it assumes that the groups involved adequately represent all sectors of society, and thus that the accords reached fully reconcile all interests. (Here Nelson echoes an argument—popular among economists at least since the appearance of Schumpeter's *Capitalism, Socialism and Democracy*—that competition for votes causes the demands of interest groups to be met politically, and that this is highly inefficient.)

Nelson's first 13 chapters are a largely chronological discussion of coal policy:

the last four are generalizations. The historically oriented discussion starts with pre-1971 coal policy, but concentrates on the 1971–1980 period. Interwoven into the history are discussions of the theories of government considered germane to each phase of development. Nelson views the events of the 1970s as hinging on the Interior Department's response to the ascendancy of different political visions at various phases of the policy-development effort.

He then examines the relationship between coal leasing policy and interest-group liberalism and planning. His penultimate chapter deals with the lessons of the past; the last considers coal-leasing policy reform.

As expected, Nelson stresses the difficulties of planning. Because this is a particularly critical consideration for evaluating coal policy, Nelson devotes considerable space to explaining the issues to the uninitiated. In particular, he pays great attention to the distinction between highly centralized and market-oriented planning. This involves the familiar difference between the government's setting detailed performance standards and reliance on financial rewards and penalties. He finds both forms of planning defective, but market orientation preferable.

Recent coal leasing policy is seen as operating in the realm of interest-group politics, with environmentalism as a dominant force. During the 1970s, Interior attempted to effect market-type planning. But strong pressures from environmentalists and naive views about windfall profits forced it to limit the use of this approach.

Nelson considers the effort additionally flawed by Interior's failure to consider all aspects of the problem. In particular, the Department seemed unable to set appropriate charges for inducing good private-sector performance. As a result environmentalists attacked the program and were able to secure in the courts a considerably more centralized planning system. This required Interior not only to go to great effort to decide how much acreage to lease, but also forced it to rely more on its prelease evaluation (and less on the ability to get higher bids) in determining what tracts to lease.

Efforts of the Carter administration to implement such a policy made it clear that a more flexible approach was needed. Secretary Watt and his associates instituted more radical simplifications, but these only inflamed the ideologues without advancing the cause of greater reliance on the private sector. Thus, they created the dilemma that Nelson and I later met on the Coal Leasing Commission. We both feel that the present system delegates too much power to the federal government and that a more market-oriented approach is needed. Nelson would prefer selling a significant number of coal lands—if not all, as Steve Hanke and others advocate—with the federal government retaining (at most) rights to 5 percent royalties. But recognizing that such precipitous changes run into a stone wall of political opposition, Nelson suggests only a modest start towards reducing federal involvement. He voices only the mildest criticism of intervention, to make clear that no ideological preconceptions tainted his analysis. His suggestions are deliberately restrained, initial steps in partial privatization. They are far more moderate than in the 1970 call of the Public Land Law Review Commission to privatize all rangeland, or the standard views of economists on the undesirability of royalties and severance taxes. One wonders whether such limited efforts could prove productive.

This book is an important contribution. The review of the history of coal leasing is interesting for its own sake. Beyond that, by examining our experience critically, and relating policy actions to their ideological basis, Nelson has rendered valuable service. We end up with a better understanding not only of coal policy, but of how invalid premises generally guide public-land policy. Nelson's broad approach provides an insight into how ideologies can misshape policy in an important area.

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James Plummer, Terry Ferrar, and William Hughes, eds., *Electric Power Strategic Issues* (Arlington, Va.: Public Utilities Reports, and Palo Alto, Calif.: QED Research, 1983).

The editors of this volume, experienced observers of electric utility problems, have compiled a broad-ranging survey of views on the prospects for the industry. The principal concern of the book is with reducing regulation. However, attention is given the role of diversification in improving electric companies' financial status and to a few other issues. Many of the articles are reprints from periodicals addressed to the industry.

The review of lessened regulation centers on the much-discussed concept of deregulating a generating sector that would be separated from a still-regulated transmission and distribution sector. A special feature of the discussion is the examination of alternative financial arrangements that might be made between the generating companies and their customers. Other reforms, such as less stringent regulation by the Federal Energy Regulatory Commission (FERC), also are examined.

The collection begins with a trio of (reprinted) articles representing insider views on deregulated generation. First, William Berry, president of Dominion Energy (formerly Virginia Electric and Power) presents one of the few statements from within the industry supporting deregulation. William White, president of American Electric Power (AEP), fears that restructuring could severely reduce industry efficiency. Seeking better regulation is considered preferable. Alex Radin of the American Public Power Association predictably argues that competition among generating companies will be too weak to produce the desired results of deregulation.

Other papers expound on various aspects of the problem. Two of the most interesting deal with the possibility of using spot pricing of electricity and creation of a futures market to handle transactions in deregulated electricity. Richard Tabors and Fred Scheppe of M.I.T. and Roger Bohn of Harvard were the



authors of both papers. In writing the first, a version of a paper to appear in this journal, they were joined by Bennett Golub, also of M.I.T. Golub also joined with Leonard Hyman of Merrill Lynch to discuss financial aspects of deregulation.

The spot-pricing argument is that the approach can be made to work and, inherently better, reflects changing market conditions. The Golub and Hyman article adds that the long-term contracts advocated by Berry would be de facto reintegration. However, the main concerns of the article are: (1) warning that clauses in existing debt obligations of utilities impose limits on reorganization, and (2) estimating the rent that owners of low-cost capacity would reap under deregulation.

Various other views are provided. Plummer explores less drastic options (such as deregulating only new plants) that might start the deregulatory process. M. Siedel of the Pennsylvania Energy Council explores giving large industrial customers a choice of suppliers. J. Bryson and William Brownell of the California Public Utilities Commission discuss (with considerable sympathy) deregulated generation with spot pricing. William Hughes outlines the (exceedingly modest) effort the agency is making to experiment with allowing more flexible pricing of intercompany sales of electricity. William Lindsay and Jerry Pfeffer of NPS Energy Management broadly survey possible changes in FERC practice. They strongly favor greater flexibility but are unsure about whether fully deregulating wholesale sales is desirable.

Alvin Alm (involved in energy policymaking in the Carter administration, at Harvard when the article was written, and now at the Environmental Protection Agency) and Kathryn Stein (Pacific Gas and Electric) deal with the experience, particularly in California and Massachusetts, under the 1977 Public Utilities Regulatory Policies Act. Robert Trout of QED suggests that reallocation of dam sites by FERC be based on comparison of the estimates made by rivals of each other's willingness to pay. Mason Willrich and Kermit Kubitz of Pacific Gas and Electric contend that regional jointly owned corporations to build and operate generating stations, an idea unsuccessfully attempted in New York State, would actually be the most efficient way to handle industry expansion.

The papers on diversification present a broad but unduly optimistic view. Too little attention is given to the danger that regulators will be tempted to transfer profits from diversification to rate payers and that to escape such action, the regulated part of the business may be divested. In short, diversification can complement, but not replace, regulatory reform. Collectively the papers present the theoretical case for diversification, examples of actual experience, and review of how regulators treat the diversification activities.

The discussion of regulatory reform is by far the most interesting part of the book. The book properly conveys an impression of a serious problem for which all available solutions are flawed. The AEP point about the dangers of lesser integration is well taken. However, regulatory reform does not look particularly promising, and Plummer's concept of gradualism may take too long. The option of totally eliminating regulation would remove the alleged protection of final consumers from monopoly. Whether this protection is worth much is doubtful both because competition may be much greater than conventionally believed

and because regulation may create even worse distortions (see my *Reforming the Regulation of Electric Utilities* [Lexington, Mass.: D.C. Heath Lexington Books, 1982]).

On balance, the book is an important contribution for both the intimately involved and the casual observer. The papers are lucid and thoughtful. While they do not pretend to cover all possible arguments, the editors have managed to secure papers that ably treat more aspects of the situation than can readily be found elsewhere in any one place.

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H. C. Kunreuther, J. Linnerooth, et al., *Risk Analysis and Decision Processes: The Study of Liquefied Energy Gas Facilities in Four Countries* (Berlin, Heidelberg, New York, Tokyo: Springer-Verlag, 1983).

While the topic may sound uninspiring, *Risk Analysis and Decision Processes* is a provocative and stimulating volume. The meat of the book lies in its conclusions about the ways risk analysis is used in the facilities siting process. The implications go beyond risk analysis to the use and misuse of energy policy analysis in general.

The book is written around detailed case studies of the use of risk analysis in the political process of siting liquefied gas facilities in the Federal Republic of Germany, the Netherlands, the United Kingdom, and the United States. The four facilities included three liquefied natural gas (LNG) import terminals and a liquefied petroleum gas (LP-gas) extraction facility and export terminal. At the descriptive task of the case studies, the book does a commendable job. By itself, the clear explanation in laymen's terms of the art of risk assessment as applied to these facilities makes the book worth reading.

The authors found that for the four projects no fewer than 15 risk assessment studies were performed, and their assessments varied widely. They observe, "Societal risk, individual risk, and the risk of one or more fatalities vary over four orders of magnitude across sites, and the risk of ten or more fatalities varies over eight orders of magnitude across sites. It is hard to imagine another area of political concern where performance measures receiving as much attention as these did could vary over such a wide range."

Did the risk assessment studies help create a consensus on the siting decision? Probably not. The studies were used by both proponents and opponents in support of their positions. In fact, the authors conclude, "The case that risk analysis, or analyses in general, contribute to reducing political conflicts is by no means proven." They also note, "An analysis can be swayed in many directions by the simple choice of assumptions and the wording of the results."

The studies did not, in fact, even agree on their definition of risk, let alone their concept of "acceptable" risk. Moreover, of the four facilities studied, the one that seemed clearly the safest—the Point Conception, California LNG terminal—was the only one that was not ultimately fully approved.

These may not be startling conclusions to analysts and policymakers who have been involved with energy facilities siting decisions, but the book is refreshing and interesting for facing these facts directly and considering how analysts and experts could play a more constructive role.

Perhaps principal among the problems identified is that energy decisions are increasingly being made in an adversarial environment—particularly in the United States. Analysts find themselves under pressure to reach crisp, clear conclusions suitable for use in this gladiatorial process. As a result "all reports claim that their [risk] estimates are conservatively high, and only a few mention uncertainties." The authors also observe that risk analysts "tend to present an overconfident picture of the accuracy of their estimates by the way in which they choose the data, couch the assumptions, and present the results."

Another difficulty is that risk analysis tends to be used in the absence of, even as a surrogate for, a political consensus on the need for new energy facilities and the types of risks acceptable to society. The authors seem to suggest that risk analysis should follow or even be a more direct and simultaneous part of the process of developing such a consensus.

The authors point out that the public does not view risk in a "rational" way—that is, by weighting probability and consequences—but tends to evaluate the acceptability of the worst conceivable event. The evaluation of acceptability may be influenced by many factors, not the least being the perceived economic desirability of the facility in question. The analytic community has hurt its case, the authors argue, by focusing "with technocratic tenacity, on just the technology itself and not on the relationship between the technology and the temper of the people that the technology is intended to serve." Further, the economic tradeoffs against risk are seldom made explicit in published risk analyses. There is too often a pretense of an absolute level of acceptable safety that the analysis claims for the project.

Finally, the authors point out that one of the key similarities among the four case studies was that the opposition was dominated by "not-in-my-backyard" groups. Considerations of national economic welfare were (and are) often overwhelmed by questions of how to allocate gains and losses. The losses may be perceived to be suffered by those in the immediate area of the facility. Risk assessment too often denies the existence of the losses or implies that the risk of such losses is acceptable—a judgment that cannot be made analytically.

The book concludes with a number of recommendations for standardizing the risk assessment process and improving the contribution that analysis can make to the siting decision. Among the specific recommendations are a clearly stated definition of risk, clear statements of the events considered and not considered, sensitivity analysis, use of data in lieu of judgments, and avoidance of inherent judgments on whether a certain risk level is acceptable to society or not.

There are, of course, features of the book I don't like. It is pompous in places.

It uses the unfortunate "liquefied energy gas" terminology, lumping together methane with propane and butane—products that have many physical and commercial differences. It also discusses the gas siting questions in the same context as nuclear energy facilities siting. The consequences of potential gas accidents are, of course, short-term/fire or explosion—while those of nuclear accidents may be felt for extended periods.

These are minor matters. Overall, the book is an excellent primer, deals with the reality of risk analysis and energy policy analysis in a political context, and provides food for thought. Highly recommended.

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Arlon R. Tussing and Connie C. Barlow, *The Natural Gas Industry: Evolution, Structure, and Economics* (Cambridge, Mass.: Ballinger Publishing Co., 1984).

By now, it is clear that the partial deregulation of natural gas field prices engendered by the Natural Gas Policy Act of 1978 (NGPA) has ushered in a new era of true market uncertainty for all segments of the industry—producers, pipelines, and local distribution companies. The progress of NGPA's deregulation schedule itself, combined with a soft world oil market and recession, created conditions in which the average price of gas now stands at its market-clearing level. Whereas chronic shortages and guaranteed markets for gas characterized much of the period following *Phillips* (the 1954 Supreme Court decision that extended federal price controls to gas production), changes in relative prices of alternate fuels and the business cycle now will have a direct impact on natural gas demand. With the introduction of new market institutions, such as the flexible pricing and supply programs pioneered by some pipelines, and the emergence of a national spot market, there is a growing recognition that natural gas is quickly becoming a bona fide commodity, much like its closest competitor, petroleum. All this means that the industry can no longer operate in its traditional fashion. Therefore, the industry's regulators (at both the federal and state levels) must adapt to the new regime.

The long and often tortuous history of regulation of this industry is the principal subject of this very readable book. The core of the study begins in the second chapter with an examination of gas distribution companies (often the most neglected segment of the industry in the current debate over whether to speed up or slow down field price deregulation), the rich history of municipal and state government regulation of their activities, and the rise and fall of the *manufactured* gas producing industry. The roots of the interstate pipeline system as we know

it today—which evolved with the exploitation of *natural* gas resources—are traced in Chapter 3. The discussion highlights the technological features of long distance trunk lines and, to a lesser extent, gathering networks and offers a series of detailed tables and maps outlining transmission company construction activities. Chapter 4 focuses on one set of strategies pursued by a number of pipelines in the 1970s, when the regulatory constraint on wellhead prices became especially binding and supply shortages became chronic: investment in very capital-intensive supplemental supply projects such as receiving systems for imported liquefied natural gas, coal gasification plants, and trunk lines connecting the “lower 48” to Arctic gas fields. As the authors correctly suggest, the viability of these overly ambitious projects was questionable from the start and critically dependent on special features of the contemporary regulatory regime. When that regime was dismantled with the passage of NGPA (chronicled in Chapter 5) so, too, were the economics of a number of these projects. The supply-side emphasis is carried through to the sixth chapter, which sketches out an upbeat appraisal of the resource potential of U.S. conventional and unconventional gas supplies as well as the availability of imported gas. The demand side is taken up in Chapter 7, which describes the structure of wellhead and city gate transactions and the role that oil prices—in freely functioning energy markets—should play in determining the level of gas demand from the burner-tip to the wellhead.

Chapter 8 describes—again—the evolution of the structure of the industry. Despite repetition from earlier chapters, the authors make a valuable point—one, I would argue, that cannot be emphasized enough. There is a great degree of heterogeneity among the firms in the natural gas industry, not only across the three major vertical segments, but within each segment as well. This heterogeneity is unlikely to be a surprise to members of Congress. Other policymakers and industry analysts, however, would do well to incorporate this perspective into their prognostications about the industry’s evolution in the post-NGPA era. In the final chapter, the authors present a very brief outlook of where the industry is headed and where it ought to head. At the risk of oversimplification, I would summarize their normative conclusion as twofold: wellhead prices should be decontrolled immediately, and utility-type regulation of interstate pipelines should be abolished.

Analysis of the economics of the natural gas industry is exceedingly complex. To do it well requires mastery of a wealth of details about the industry’s institutional and technological features. While this study is more descriptive than analytical, the authors do a nice job of weaving together the industry’s institutional, technological, and economic dimensions. It could serve as a very useful primer for those unacquainted with the industry.

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Allen Meier, Janice Wright, and A. H. Rosenfeld, *Supplying Energy Through Greater Efficiency: The Potential for Conservation in California's Residential Sector* (Berkeley: University of California Press, 1983).

"A Btu (barrel) saved is a Btu (barrel) earned." The authors advance this simple—though clearly controversial—maxim in a highly readable, yet technically rigorous book. They incorporate this idea into a "supply curve" for conserved energy, and thus contribute significantly to the energy supply vs. conservation debate.

At the time of the 1973 oil embargo, when a national energy policy was being formulated, the nation had access to information on the quantities of coal, oil, gas, and uranium. By contrast, very little information was available on the potential for conservation. In fact, there was (and continues to be) disagreement on whether energy markets operate perfectly or are subject to major imperfections ("market failures"). Adherents of the first view claimed that the potential for conservation (created by the sharp runup in energy prices) would disappear over time as markets equilibrated. Those who took the existence of market failures for granted, on the other hand, found it difficult to demonstrate the "concreteness" of supplies of conserved energy, which are not located in the ground, but in poorly insulated homes, gas-guzzling cars, lights, boilers, and traffic jams. A conservation supply curve, quantifying the "reserves" of conserved energy obtainable at various cost levels, demonstrates the analytical equivalence of energy supply and conservation options.

The approach taken is that of a physical scientist, making the supply curve for conserved natural gas directly comparable to an engineering geologist's supply curve for newly developed natural gas supplies. Thus, the supply curves provide estimates of the *potential* for energy conservation, not a forecast of its occurrence. Since most of the "supplies" exist because of market failures, the supply curve simply provides a useful summary of the engineering cost data that must necessarily underlie the development of public policies to achieve this conservation potential. For example, the lack of information that makes it virtually impossible to identify an energy-efficient appliance is exacerbated by the fact that more than a third of all major appliances are bought by persons (landlords, homebuilders) other than those who will pay the utility bills.

The physicist's approach is also evident in the book's attention to sources of uncertainty in the data and results. In fact, the authors formulated their own uncertainty principle: the more accurately one specifies the conservation measure, the less accurately does one know the stock to which it applies. Thus an explicit concern for accuracy guided the authors' tradeoffs between disaggregating data on housing stock and aggregating over climate zones. Supply curves are presented for each end use of energy (for example, space heating, water heating, refrigerators, lighting) and for each fuel used to provide those energy services. Each supply curve consists of a moderate to large number of steps, each step corresponding to a particular conservation measure (install R-11 insulation in walls; retrofit spark ignition, and so on). Underlying assumptions and calculations

are clearly and concisely presented in each chapter. Finally, all results are aggregated into two "grand supply curves" showing the potential for conservation of electricity and natural gas in California residences.

In an obvious and consistent effort to make their estimates conservative, the authors do not assume that all market failures can be eliminated. For example, investments in long-lived energy-efficient appliances, such as refrigerators, are amortized over 10 years instead of their average physical lifetimes. This reflects the absence of perfect information in the secondhand appliance market. On the other hand, conservation supply curves share the same methodological limitations as conventional energy supply curves. That is, only the quantifiable costs are shown. For example, the authors neglect externalities associated with automatic night-time thermostat setbacks in the same way that conventional supply curves ignore environmental externalities. Of course, positive externalities are also ignored; for example, efficient refrigerators are quieter.

This analytical framework rests on concepts derived from accounting rather than economics and hence is of limited usefulness for decisionmaking. Within this limitation, it achieves a high degree of rigor without sacrificing clarity. Thus, the characteristics of unfamiliar technologies (e.g., screw-in fluorescent light bulbs) are explained simply and clearly, while aggregate energy savings data are translated from technical units into understandable concepts like "power plant equivalents."

The development of conservation policies by federal, state, and local governments will require an extension of the analyses presented in this book. For example, it will be necessary to make another set of assumptions concerning penetration rates, effectiveness of information campaigns and performance standards, and the extent of utility participation. What this book contributes is a method for establishing the technical potential for conservation, a necessary precondition for a constructive debate on how best to achieve the greatest fraction of the potential. The book will be a valuable tool for participants in that debate.

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