Book Reviews

Colorado Energy Institute, *Water and Energy in Colorado's Future: The Impacts of Energy Development on Water Use in 1985 and 2000* (Boulder, Colo.: Westview Press, 1981).

The state of Colorado, rich in energy resources, has been the focus of national attention as playing a major role in any American attempt to be energy independent. Using four scenarios, this book looks at the future of Colorado's energy development and assesses water resources for sufficiency to match that potential, as well as the primary and secondary impacts of that development. Written for policymakers, the book summarizes, both in text and in tables, water requirements by energy technology and water resources by river basin, compacts, and interstate decrees. Renewable and nonrenewable energy resources in Colorado are listed, their water demands assessed, water quality energy development relationships displayed, and population impacts projected for energy project implementation.

The first 40 pages of the book give an overview of the subject – it is all the person with some knowledge of energy and water issues need read. The four scenarios include a base scenario, which covers the minimum development that can be realistically expected. The moderate development scenario is the "most likely" level of development. The two extensive energy development scenarios differ in that one emphasizes a high rate of synthetic fuel development and the other discusses a high rate of electricity production from coal-fired power plants. The use of scenarios allows alternative futures to be projected and their consequences for the state studied. The authors draw the conclusion, though heavily qualified, "that there is no potential shortfall of water in an average year to prevent accommodation of energy development foreseen to the year 2000." However, they point out that considerable planning must be done. "The priorities of resource development will cause disruption to other users, notably irrigated agriculture and outdoor recreation." From a regional perspective, Colorado's increased use of its alloted water will affect the lower Colorado River Basin states because California, Arizona, and Nevada are currently using some of the Colorado's unused share.

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The rest of the book explores in more detail the statements made in the overview. For the uninitiated, it is a good introduction to different energy technologies and to water policy. The data used are from a collection of existing reports and are presented uncritically. Additionally, there is no interpretation as to what is important and what is incidental. The sketchiness of some sections, such as the water compacts, belies the importance that these past agreements will have on future water use. In addition, it is implied that water of any quality can be used for mine revegetation. This is erroneous, for saline, acidic, or highly alkaline water will kill many plants. The section on water demands appears incomplete because the chapters on alcohol as a fuel and petroleum refining include no discussion of water demand, although one of the illustrations (Figure 7) shows a relative comparison of water demand by fuel product, including both alcohol fuels and petroleum refining. The assumptions for the population projections as a result of energy development are barely mentioned, and no attempt is made to put a cost on needed community development. A strong point is the inclusion of evaporation losses from reservoirs in the calculation of consumptive use of water.

The technique of presenting an overview is very useful in terms of rapidly grasping what the study is about. However, the use of overview paragraphs verbatim as the introduction to and opening of subsequent chapters gets in the way by making the reader think, "I already read this." Such a response puts the reader at a loss as to how far to skip forward to reach new material, and interrupts the flow of comprehension and absorption.

The book makes a useful contribution to the policy debate on the impact of extensive energy development on the people of Colorado and the region. It has assembled numbers where there were only words before. The question of how much to trust these numbers remains unanswered.

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Paul Hallwood and Stuart Sinclair, *Oil, Debt and Development: OPEC in the Third World* (London: George Allen & Unwin, 1981).

The authors tackle the interesting, though amorphous, subject of OPEC's relationships with developing countries. Their discussion of these relationships cuts across economic, political, and cultural disciplines. Their approach is comprehensive, incorporating oil trade, other goods and services trade, aid, economic growth, external debt, and political strategies. The table of contents of this book reflects an organized, thoughtful approach to the key questions involved. However, while the authors state the critical question well, their execution of this promising approach falls short of what many readers might expect, in that relatively little scholarly analysis is performed.

The authors do present a good chronological description of the relevant subject areas. The facts and data presented would help form a basis for an in-depth analysis of the role of OPEC in Third World development by providing the reader with a historical perspective and a compendium of factual information. Much im-

portant data is outdated however. The authors ultimately leave the reader teetering on the edge of gaining any new insights, and simply present the issues and questions of conventional wisdom. The related analysis is cursory and the authors fail to develop a further understanding of the implications for the future role of OPEC.

In Chapter 2, the correct point of departure is set out – that the oil price rises in 1973–74 were not the only important causes of world recession. (For example, contractionary monetary and fiscal policies and protectionist trade policies introduced by OECD countries were also key.) But the authors' discussion of the role of these factors is too simplistic. They then discuss the "breakdown of the international monetary system" as international financial markets moved toward floating exchange rate regimes, e.g., "stable exchange rates encourage faster economic growth because they encourage world trade." The effect of exchange rate uncertainty and exposure hedging on trade and business decisions is a hotly debated topic in international finance research. Yet on this subject and many other key research areas in later chapters, the authors cite challengeable research sources as fact.

The authors imply that much of the economic malaise of the mid-1970s was a "chosen" policy of the developed countries, with contributing external events such as problems with "manageable levels" of balance of payments positions and OPEC financial surpluses, and even Kondratieff waves. The related external debt and financing problems of the non-OPEC developing countries is discussed in Chapter 5, but there, again, only facts and conventional wisdom are reported rather than new insights into this complex problem.

In Chapter 3 the discussion of oil supply–demand balances is based on dated material that has been overtaken by events. Relying on "gap" analysis and the somewhat discredited CIA 1979 forecast, the authors forecast that demand for OPEC oil output will soon outrun its supply. Of course the reverse is currently happening, consistent with the earlier analytical results of other researchers who incorporated market-clearing price responses.

Chapter 4 presents a useful discussion and synthesis of the non-OPEC developing countries' terms of trade. But the context is a static, partial equilibrium one rather than an attempt to indicate the dynamic, more general equilibrium implications.

Chapter 6 contains a good discussion of the political aspects of OPEC aid to non-OPEC developing countries, but the reader must beware, again, of some debatable conclusions. For example, the authors claim that "OPEC aid is mainly disbursed from burgeoning foreign exchange reserves which would otherwise earn a negative rate of return in inflation-prone Western, mainly American, financial centres." Among others, this statement begs the questions of why the reserves were generated and what the expected (*ex ante*, not *ex post*) return was.

Chapters 7 and 8 present an interesting, useful discussion of trade (goods and services) development between OPEC and the non-OPEC developing countries. Included is an examination of the role of labor migration and wage remittances. The authors present one of the better summaries of this process available.

In sum, Hallwood and Sinclair present a very good descriptive chronology of the events and trends in terms of which OPEC's complex relations with other

developing countries must be analyzed; and this discussion is usefully presented in an economic-analytic framework. However, the authors draw few substantiated conclusions; for the most part their "conclusion" sections are simply chapter summaries. The reader does not derive a sense of where the world is headed, or what the implications are of various policy alternatives or subsequent events.

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Energy in America: Fifteen Views, introduction by Simon Ramo (Los Angeles: University of Southern California Press, 1980).

It is not easy to review fifteen "views" of energy in a short space; in any event, most of them will be quite familiar to informed readers. The purpose of the conference at which these papers was given was apparently to restate some views on energy policy, bring their applications up to date, report some recent research findings, and explore a common approach to the future.

The papers fall generally into several groups. The *technocratic* and supply-oriented papers call for a strong technological initiative. Most advocate a major role for the government in partnership with industry – to provide R&D funds, price guarantees, and even risk capital, often on the model of defense procurement. And, of course, all decry government regulation and the stifling of private energy investment with price controls, lengthy environmental impact procedures, windfall profits taxes, etc. Included in this group are offerings by W. Kenneth Davis of Bechtel, John S. Foster of TRW, Henry R. Linden of the Gas Research Institute, and John Swearingen of Standard Oil (Indiana). Swearingen seems again to hold out an implicit promise that if policy would only follow the indicated prescriptions, the U.S. oil industry could develop enough new hydrocarbon resources and synthetic capacity to restore domestic abundance and virtually phase out insecure imports. The polemical paper by J. Clayburn La Force of UCLA should probably be included in this group, though much of it reads like an address to Junior Achievement students.

Papers by Charles J. Hitch (Resources for the Future) and Sam H. Schurr (Electric Power Research Institute) offer more general *economic* analyses of current energy problems. Hitch presents a sensible and comprehensive analysis of the relation of energy to economic growth and of energy costs and prices. His position on policy emphasizes free-market solutions. Schurr's paper summarizes the recent RFF study, *Energy in America's Future*, which he largely directed. Both of the economic papers consider the demand side of the energy equation to be far more important than those in the first group do.

Other contributions take a *modeling* approach. One, by William W. Hogan of Harvard, also develops an economic analysis which is similar to those mentioned above, based on the familiar Hogan–EMF models that include elasticities of substitution as parameters. Like the economic papers, and unlike the supply-oriented technocratic papers, Hogan's bears heavily on the point that the

energy–GNP relation is not rigid and that energy coefficients are variables, not constants. (By contrast, John S. Foster, Jr., on p. 115, says, ". . .a dollar spent on energy generates 14 dollars in GNP.") But the quality of other papers emphasizing data and econometric models is uneven. David Sternlight's (ARCO) sets up a straw man (that *costs* of alternative energy sources rise as a result of a rise in oil *prices*) and knocks it down. His conclusions on the effects of decontrol of oil prices are probably correct, but they depend more on insight than on analysis. Selwyn Enzer of the University of Southern California advocates that INTERAX behavioral model as a substitute for market analysis. He expresses a strong disbelief in the efficacy of market solutions, primarily because he thinks that markets are too myopic, though this reviewer does not see how the proposed procedure would handle uncertainty any better. The papers by Arthur Bueche of General Electric and Dale Myers of the Department of Energy present data without fully disclosing the underlying models, and offer conclusions without much insight.

Finally, several papers have a *philosophical* tone, with a wide field of focus on social issues. Jerome Wiesner of MIT analyzes the efficacy of society as a "learning machine" in response to the energy crisis, and outlines what society must learn about such things as conservation and replacement energy technologies. John Holdren of the University of California has a paper on conservation as a "source" of energy and the "equitable" nature of renewable sources that has distinct overtones of Amory Lovins. "The Case for Solar Electric" by Bruce Murray of JPL is an apparently technical paper that ends in a rather simplistic call for a "revision of the incentive structure" to make solar electric economically possible, by pricing existing energy sources at their cost of "replacement" (by solar?).

In his introduction, conference chairman Simon Ramo draws a general conclusion from the papers as a group: what we need for a solution, or a transition to a solution, of the U.S. energy predicament is a doubling of energy prices and removal of controls on prices and other burdensome restrictions. (Most, but by no means all of the papers do support that view). Within a few months after the conference we had a doubling of oil prices, thanks to OPEC; not long after that most price controls were removed. It will be interesting to see whether the "solutions" expected by these energy experts will be forthcoming in proportion to these changes.

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Richard L. Gordon, *An Economic Analysis of World Energy Problems* (Cambridge, Mass.: MIT Press, 1981)

This book poses a dilemma for the reviewer. The author, Richard Gordon, asserts that it is written for "an audience with at least minimal exposure to economic analysis," yet the level of analysis does not rise above the level of a microprinciples course in which many important tools are completely neglected.

Thus, there is little in the volume for sophisticated readers of *The Energy Journal*. At the same time, it cannot be recommended as reading for undergraduates, since it is strongly flavored by the author's personal preferences and thus is hardly an impartial analysis.

Chapter 1 consists of a primer on economics and energy. It provides an analytical system where "all markets have cleared" (p. 6), so that important questions such as reserve holdings – i.e., decisions of annual flow rates from existing stocks – are neglected by assumption. The analysis ignores the fact that real-world energy markets do not (as even the author admits) provide the competitive equilibrium solution of price equals marginal costs. Gordon notes that "seeing these deficits, a welfare economist is likely to conclude that the system is very bad" (p. 9). However, he indicates that real-world markets should not be compared to ideal analytical systems but to feasible alternatives. Then, using the Latin slogan *de minimis not curat praetor* (judges do not worry about trivia), Gordon dismisses the fact that markets have a "minimal" gap between price and marginal costs, for "the minima that are ignored are ones that cost more than the reform is worth" (p. 9). This argument in its *pristine* state implies if the market has not closed the price-marginal cost gap, the regulatory game can't be worth the candle!

Chapter 2 is primarily a descriptive chapter on the energy system. Several *obiter dicta* are presented up front. For example, "Higher prices increase output" (p. 21). This opinion is presented as absolute truth. Yet higher prices do not increase OPEC output (and after all, by any structural analysis via concentration ratios, the world oil market is competitive).

Chapters 3 and 4 deal with "Investment Analysis and Spatial and Product Heterogeneity of Energy Markets." Chapter 5, "The Theory and Practice of Mineral Resources Exhaustion," ignores Keynes's use of the "user cost" concept, which Keynes applied with great analytical ability to deal with all cases of raw material production, especially mineral mining, in both his *Treatise on Money* and his *General Theory*. I used this concept in analyzing "Public Policy Problems of the Domestic Crude Oil Industry" in the *American Economic Review* (1963). Thus Gordon's intertemporal production decision analysis assumes (a) perfectly competitive markets over time (or more properly, ones in which the degree of monopoly is unchanged); (b) that there is no speculative demand for oil – even in the short run; and (c) that the real cost of oil rises each year. Hence the Hotelling conclusion that "the real price of oil is rising at r percent per year" (p. 96). No facts are given to support this assertion. Nor is the reader ever informed that the *real* price of oil continuously declined from the finding of Drake's well in Pennsylvania until the early 1970s. Thus, more than a century elapsed before this basic pricing principle of Gordon's analysis took effect in the real world.

But Gordon claims in summary that his "complex exercise in exhaustible resource economics only confirms what economists have always known: exhaustion is presaged by increasing prices. A price rise reflecting clear increases in resource scarcity remains the only useful indicator" (p. 107). Does that explain the rise in oil prices since 1973? At least one economist, M. A. Adelman, claimed in 1976 that the then-current world price of oil had "no possible relation to scarcity present or future, known or feared." Perhaps, then, rising prices are not an indication of scarcity but rather of growing monopoly or oligopoly power.

Chapter 6 deals with "Industrial Organization in the Energy Structure." Using the structuralist argument based on concentration ratios, it demonstrates the competitive nature of the industry. Since the "As Is" agreement of the 1920s, it is clear that concentration ratios cannot be used as the sole evidence of competitive markets.

Chapters 7 through 10 deal with various topics such as prorationing, mineral taxation, environment policy, and Middle East oil. Enough has been said in this review to indicate that I find many analytical difficulties with Gordon's presentation; these chapters are no exception.

To conclude, Gordon's admittedly opinionated book is unlikely to convince anyone but the already convinced. He readily proclaims his position: "U.S. energy companies are not monopolists and should be encouraged rather than vilified. I tend to be more critical of environmental policies than most economists." In my view, this position is due to Gordon's willingness to adopt a hypothetical world as though it were the real world and then live in it by rejecting or ignoring empirical facts that vary from his logical consistency. Some others may prefer to be roughly right rather than precisely wrong. To the latter group I cannot recommend Gordon's analytical treatise.

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