Assessing the Energy Situation

Energy Future. Report of the Energy Project at the Harvard Business School. ROBERT STOBAUGH and DANIEL YERGIN, Eds. Random House, New York, 1979. xii, 356 pp. $12.95.

Energy: The Next Twenty Years. A Report . . . Sponsored by the Ford Foundation. Ballinger (Harper and Row), Cambridge, Mass., 1979. xxviii, 628 pp. Cloth, $25; paper, $9.95.

Energy in America's Future. The Choices before Us. SAM H. SCHURR, JOEL DARMSTADTER, HARRY PERRY, WILLIAM RAMSAY, and MILTON RUSSELL. Published for Resources for the Future by Johns Hopkins University Press, Baltimore, 1979. xxviii, 556 pp., illus. Cloth, $30; paper, $10.95.

The failure of the United States to adopt a coherent energy policy during the 1970's—punctuated by the ominous undertones of the events in the Middle East during 1979—has brought forth a bumper crop of books that are designed to educate the public about the energy problem and its possible solutions. The three books reviewed here are representative of the best of these efforts, having been put together by committees of experts on energy policy issues under the auspices of leading institutions at the center of the American intellectual establishment. All three are worthwhile, if prolix, efforts and ought to be at least skimmed by anyone who wishes to keep informed about the debate over energy policy.

Each book has a somewhat different scope and purpose. The Harvard study, *Energy Future*, focuses on the development of policies to ease the transition from the era of inexpensive, reliable supplies of oil and gas to a more balanced energy system at the beginning of the next century. The treatment is motivated by interesting chapters on the history of conventional fuels and the dim prognosis for stable, growing supplies of oil and gas.

Although the Harvard study contains numerous facts and references pertaining to engineering and economic analyses of alternative energy systems, the distinguishing feature of the book is its attention to the political realities as the authors perceive them. The authors believe that fuel price deregulation and significant increases in the use of coal and nuclear power are not politically acceptable and that synthetic fuels are unlikely to become a major energy source in this century because of economic and technical uncertainties and the long lead time for large-scale development of these technologies. Thus, they believe that during the transition period energy policy must concentrate on promoting conservation and some solar energy technologies (including renewable biomass).

The Ford and Resources for the Future studies, *Energy: The Next Twenty Years* and *Energy in America's Future*, place less emphasis on transition problems and on political feasibility and much more emphasis on presenting a complete, balanced assessment of the problems confronting policy-makers. The RFF book explicitly avoids presenting a comprehensive energy policy proposal, although a fairly complete one can easily be inferred from the body of the study. Instead, the book seeks to narrow the range of debate over energy policy by resolving disagreements over facts. One premise of the RFF study is that the United States has failed to adopt a comprehensive energy policy partly because an ill-informed Congress and electorate persist in arguing about the facts. Most of the book, therefore, consists of a compilation of the results of numerous engineering and economic analyses (some done for the study, but most done previously) of such issues as the long-run supply prospects of conventional energy resources, the relationship between energy and economic growth, the costs of new technologies, and the environmental and health effects of various energy sources.

The Ford study (which itself was administered by RFF) is similar to the RFF book, but it has two important differences. The Ford and RFF studies agree that the failure of American energy policy is partly due to the unwillingness of politicians and the public to analyze the problem in long-run, economic terms. But the Ford study makes this observation the centerpiece of its analysis, whereas the RFF study, as it states in the overview, deals relatively little with the problem. The Ford book is, therefore, an extensive long-run economic interpretation and analysis of the energy problem, the myths surrounding it, and possible solutions to it. Moreover, unlike the RFF study, the Ford book explicitly pursues its analysis to the logical end of proposing a comprehensive energy policy. Like the RFF study, the Ford book contains detailed analyses and lots of facts about a wide range of energy policy issues.

In the end, the Ford book is probably more successful than the RFF study because of the differences in choice of focus. While the RFF study probably has more data and somewhat greater coverage of the literature, the Ford study makes the information more meaningful by placing it in the consistent context of economic analysis. Moreover, the analytical focus of the Ford study easily carries over into the true dilemmas of energy policy. At present there is fundamental uncertainty about many of the specific issues that are the concern of energy policy. Examples are the link between growth and energy consumption, the comparative safety of nuclear and coal facilities when all direct and indirect effects are accounted for, the likely future costs of incompletely developed technologies such as coal liquefaction, photovoltaics, oil shale processing, and breeder reactors, and the motives and stability of Middle Eastern oil-producing nations. Consequently, the RFF book often refutes its premise that the most significant part of the problem is disagreement over facts. More likely, on many issues the distribution of beliefs about the facts is not much different from the distribution of estimates of what the facts are likely to turn out to be after another decade or two of research.

Although the RFF book is generally good in revealing the range of uncertainty in its analysis, sometimes in the search for resolution of factual disagreements it is guilty of converting estimates with wide variance into point estimates. For example, the introduction summarizes the comparison of the health effects of coal and nuclear energy by citing the estimates of the maximum possible damage from each, which gives a decided health advantage to nuclear. However, the text of the book stresses the uncertainties in the calculations and shows that the ranges between the highest and lowest estimates of health effects are largely overlapping for the two technologies.

Oddly enough, although the Ford study generally tends to emphasize uncertainties, on occasion it lapses into wildly ad hoc calculations leading to very soft point estimates. One example is an estimate of the redistribution ef-

fects of oil price deregulation; another (repeated in slightly different form and with a little more modesty in the Harvard study) is a calculation of the "true" cost of importing a barrel of oil, taking account of the effect United States purchases have on world oil prices. Both calculations are important in the energy policy debate, and the Ford study usefully demonstrates how such a calculation can be made. But both calculations depend on crucial assumptions about supply and demand elasticities that are not known with enough precision to justify anything other than a broad range of possible results. One hopes that the ad hocery employed in these calculations will not cause readers to miss the qualitative importance of the points being illustrated.

The Harvard study, too, has a strange quirk. Econometric and engineering modelers will be surprised to learn that they are a major political force whose inaccurate forecasting models have led policy-makers astray in developing an energy program. The book contains a lengthy critique of the efforts of the mid-1970's to forecast oil prices and imports under the new pricing regime that arose after the 1973 oil embargo. These modeling efforts were unsuccessful, predicting laughably low oil prices and excessively optimistic reductions in imports. But beating up on the early models now is not a contribution to the current debate. The reasons for the failures are well known: the models were constructed too quickly in response to great urgency on the part of the government, and they were built upon an insufficient data base and incomplete engineering and economic understanding of the complex energy sector. The Harvard study adds nothing new to this list of problems. But it essentially writes off all further modeling efforts on the basis of these failures, a conclusion akin to throwing away a hammer because one missed the nail on the first swing.

The very factors that undermined the early models undermine any attempt to analyze the energy problem. Moreover, the complexity of the energy sector means that understanding the effect of any important change requires that all of the interactions within the system be taken into account. To capture these complexities requires modeling. The task of building useful models is likely to take time, to be quite difficult, and to have failures along the way for the very reason that modeling is promising—namely, the complexity of the phenomenon under analysis.

Because these studies are so detailed, to find a major omission requires some effort; however, there is one. None of the studies deals in much detail with the difficulties that abound in current regulation of the energy sector. For example, recent studies, including some interesting experiments in a few American cities, are beginning to provide strong evidence that a major reduction in the need for new electrical generation capacity could be accomplished by some form of peak-load pricing of electricity, yet not one state has seriously pushed utilities in this direction. Another example is oil and gas regulation. Not only do price controls encourage excessive consumption, allocation rules compound the problem. A case in point is the "small refiner bias," which gives small refineries advantages in gaining access to cheaper oil and in maintaining supplies during crisis periods, such as during the period in which Iranian oil was cut off in 1979. The net effect has been to make small, inefficient refineries the profit centers of the refining industry, even though they have higher costs and, in many cases, produce a less valuable product mix. A major source of the gasoline shortages in the United States last spring was the allocation of excessive amounts of oil to small refineries that produced either no or a relatively small fraction of gasoline as a final product.

In any study of the energy problem, recitation of these and other features of current regulatory policies would be useful. It would demonstrate that the magnitude of the problem is due in large measure to some rather grotesque self-inflicted wounds due to present policies.

Despite differences in style and emphasis, the books produce very similar policy conclusions. All agree that the vulnerability of the United States to a cutoff of Middle Eastern oil is a serious threat to our survival and that the objective of policy should be to end this vulnerability during the 1980's in the least costly way possible. As a first step, all three favor more rational pricing of all energy, although the Harvard book is skeptical about making a lot of headway in the matter. All of the books emphasize that there is no panacea, that the energy problem will be with us for another decade or so, and that oil imports will be a major component of energy use for a long time. All three studies favor some additional subsidies for solar energy and conservation methods because, even in the most favorable circumstances imaginable, energy markets are not likely to provide as great an incentive to pursue these technologies as is justified when all of their effects—on imports, on the environment, on health—are taken into account. At the same time, none of the three studies is very optimistic about central-station solar thermal systems or about extensive commercialization of photovoltaics. All three favor continued support of basic research on alternative hydrocarbon fuel technologies, and two (RFF and Ford) go into great detail on how this support can be most effectively provided. These two studies propose greater emphasis on research than on development and demonstration, and, with respect to the latter, on federal promises to buy a final product in a fixed quantity at a fixed price rather than direct subsidization of capital investments. All three studies propose a major governmental effort to improve nuclear reactor safety and to solve the problem of disposing of nuclear waste. In calculating which policies to pursue, the studies favor the use of an economic calculus, using government interventions only to make markets work better or to make certain that market decisions better reflect true social costs of alternative energy resources.

All of the studies are optimistic in the sense that they all believe the energy problem can be solved. At some price of oil in the range of $40 to $50 a barrel in 1980 prices, a wide variety of other energy options become economically attractive, even if maximal efforts are made to protect the environment and public health. Yet all of the studies are deeply pessimistic about the future of the United States, because none presents any real hope that the United States will take the actions that are needed to solve its energy problem. As stated above, all of the books begin with the premise that a defect in the political process has made the development of a rational energy policy impossible to date. The hope is that the defects can be overcome by a solid analysis of the issues. Given the magnitude of the disruption to this country that has occurred since 1973, there must be some doubt that a few hundred pages of facts and analysis is all that it takes to convince the electorate and their representatives that it is time to act. Nevertheless, we should thank the authors of these studies for trying. No doubt each of these books will be widely used in college courses in resource economics and energy policy, and surely the students will be better off for having read that the energy problem, though difficult, could be solved had we the will to do so.

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