BOOK REVIEWS

Selection of books for review is based on the editor's opinions regarding possible reader interest and on the availability of the book to the editor. Occasional selections may include books on topics somewhat peripheral to the subject matter ordinarily considered acceptable.

Our Energy Future

Authors	Don E. Kash, Michael D. Devine, James B. Freim, Martha W. Gilliland, Robert W. Rycroft, and Thomas J. Wilbanks
Publisher	University of Oklahoma Press (1976)
Pages	489
Price	$19.95
Reviewer	Helmut J. Frank

Since the energy emergency of 1973-1974, there has been a proliferation of printed works on a vast variety of energy issues, ranging from the highly technical to those popular in appeal, and covering every imaginable aspect of this complex subject. Many of these works have contributed to clarifying issues for the diligent reader, especially if he were already well informed on at least some aspects of the energy tangle. On the more popular level, there has been a babel of conflicting voices, so that it is no wonder that the general public is as confused as ever and that a large segment, perhaps a majority, still doubt the existence of a real energy problem.

In these circumstances, the addition of still another volume on the subject should justify its appearance by either having something to say that is new and worthwhile or by clarifying some major issues on which there has existed widespread confusion. Fortunately, *Our Energy Future* makes such a contribution. Prepared by an interdisciplinary research team working under the aegis of the Science and Public Policy Program at the University of Oklahoma, the study accomplishes two objectives: One, it provides a comprehensive compilation of research, development, and demonstration (RD&D) proposals on the full range of energy supply possibilities, and two, it analyzes these possibilities from an interdisciplinary point of view that comprises technical (scientific and engineering) as well as institutional (socio-political, ecological, and economic) criteria.

The volume's central theme is that progress toward solving the energy problem, at least as far as increasing U.S. domestic supplies are concerned, has been stymied by a variety of barriers, and that the existence of these barriers makes it difficult to determine the relative merits of the various energy supply options offered to reach U.S. energy goals. In the technical area, the barriers could be significantly reduced by a well-designed program to develop, test, and demonstrate the feasibility and commercial attractiveness of new processes and/or energy sources. In the institutional realm, the task is, if anything, more difficult: Progress is blocked by mistrust of various interest groups (industry, government, consumers, environmentalists) who have little faith in each others' arguments and supporting data. Such a lack of credibility of key players requires the creation of new institutions whose competence and integrity are above reproach.

The study includes individual chapters examining technical and institutional aspects of solid fuels, liquid fuels, gaseous fuels, electricity, and miscellaneous sources (solar heating and cooling, and hydrogen systems). The treatment is comprehensive, but the wide range of aspects covered limits the authors to summaries, frequently only one or two paragraphs in length, that offer little that is new to students of energy supply problems. Moreover, much of the information dates from 1973-1974 (e.g., U.S. energy supply targets) and was out of date even before the volume became available, though some effort was made to include later information (through early 1976).

The book's real contribution, however, lies in the integrating sections, where the *leitmotif* of uncertainty as the main obstacle to progress toward energy independence is developed, criteria for establishing priorities for RD&D expenditures are established (based on informal benefit-cost considerations, especially their contribution in the short term), and a suggested RD&D program is presented, along with procedures essential to its implementation. General readers who are thoroughly confused by the complexities of the energy tangle will very likely benefit from the clear directions the authors provide, whether or not one agrees on every detail. Specialists in both the hard and soft sciences, who typically have limited perspectives on energy questions determined by their own backgrounds, will gain new insights from the integration that the interdisciplinary approach yields. The presentation is highly readable. If there is a weakness in the work, it is the inadequate attention given to economic criteria, at least explicitly. One surmises that this reflects the failure to replace the original economist member, who had to discontinue participation after the early phases of the effort.

Helmut J. Frank (PhD, economics, Columbia University, 1961) is professor of economics at the University of Arizona. His interests in petroleum and energy generally *date to 1950, when he joined the staff of Walter Levy Associates. He has also been affiliated, as a consultant or a research associate, with such organizations as Resources for the Future, the Electric Power Research Institute, the Petroleum Industry Research Foundation, and the Gas Requirements Agency at the University of Denver. He is currently a member of the Governor's Energy Task Force of Arizona. His publications include* Crude Oil Prices in the Middle East, *contributions to* Middle Eastern Oil and the Western World, *and monographs and articles in professional journals on a wide range of topics in energy economics and energy policy.*

Basic Nuclear Engineering

Author	K. S. Ram
Publisher	John Wiley and Sons, Inc., Halstead Press (1977)
Pages	212
Price	$9.75
Reviewer	Barry D. Ganapol

With the increased reliance on nuclear power in the U.S., it became apparent ~20 yr ago that a sufficiently knowledgeable work force had to be educated to bring the nuclear option to fruition. This challenge was undertaken by the educational community, and many fine texts on reactor physics and engineering were produced. These texts were initially designed to accommodate students of various backgrounds (chemical and mechanical engineering, nuclear physics, etc.), since few nuclear engineering disciplines existed at that time. They emphasized light-water-moderated systems, since these reactors were destined to become the workhorse of the U.S. nuclear power grid. India, recently turning to the nuclear option to meet its energy requirements, finds itself in a position similar to that of the U.S. two decades ago. Like the early U.S. nuclear engineering texts, *Basic Nuclear Engineering* by K. S. Ram is an attempt to provide the required training in nuclear engineering fundamentals to students or practicing engineers with varied backgrounds, emphasizing heavy-water-moderated systems, which initially will be the mainstay of the Indian nuclear energy program.

This text is written in much the same format as the U.S. texts. The initial chapters are concerned with a review of nuclear physics, introducing only the very basics on the assumption of prior knowledge of the subject. The next three chapters deal with neutron physics and diffusion, with application to homogeneous systems. Chapter 7 then applies the fundamental concepts presented in Chaps. 1 through 6 to heterogeneous reactors and completes what the author designates as the first part of the book concerned with basic principles. The second part opens with a chapter on steady-state multigroup diffusion theory methods, followed by two chapters dealing with time-dependent aspects (burnup, control rods, etc.). The final section of the text is concerned with the engineering fundamentals of nuclear power–fuel pin heat transfer, thermal stresses, shielding, and fuel cycle considerations. The text of 212 pages is replete with examples, most of which have to do with the RAPP (Rajastham Atomic Power Plant) heavy water reactor, thus serving to familiarize the reader with D_2O systems, while using the fundamentals just presented. In addition, problems well suited to the beginner are given at the end of each chapter. Appendices containing relevant derivations and explanations not germain to the main thrust of the chapter are included at the end to maintain continuity.

The author has attempted to cover much of the material in Lamarsh's *Nuclear Reactor Theory,* Bonilla's *Nuclear Engineering,* and portions of El-Wakil's *Nuclear Power Engineering* in his short 212-page volume. At best, only the surface of the many subjects covered can be presented, and to provide a clear picture to graduates in nuclear engineering, supplementary material would be necessary. It becomes readily apparent that this book is essentially a glossary of nuclear power terminology and provides very little in the way of stimulation and deep understanding. This is apparently in keeping with the author's intention of training personnel and providing a review of the field for practicing engineers rather than producing researchers of advanced systems.

Since the text is directed toward those unfamiliar with the subject, it is imperative that the presentation be clear and error free. Unfortunately, this is not the case. Some material is presented without explanation, such as question 1-8 in Chap. 1, where the threshold energy is asked for but is nowhere defined, or in Chap. 4, where the idea of energy flux is not introduced and the differential dE seems to appear magically. These are only two examples of many. There are also several examples of misleading statements, such as on p. 61: "It is customary to say that the medium of three diffusion lengths behaves as an infinite medium." What I believe the author wanted to state is that the neutron flux at a position greater than three diffusion lengths from a surface is relatively unaffected by the surfaces. Probably the most annoying aspect of Dr. Ram's new book is the occurrence of many typographical errors and omissions, for which the publisher is as much responsible as the author. These errors include incorrect formulas, such as the second of Eqs. 4.14, which should read

$$\lambda_{tr} = \frac{\lambda}{1 - \bar{\mu}} \left(\text{not } \Sigma_{tr} = \frac{\Sigma_s}{1 - \bar{\xi}} \right) ,$$

missing terms, such as the source strength in Eq. 13.6, and incomplete, duplicated, or missing sentences.

In the final analysis, this text is not of the quality of U.S. texts, but it does orient the reader toward the Indian energy program—a major reason for its existence. It is the hope of this reviewer that, if and when there is a second printing, the author and publisher both take the time to correct the many errors and omissions in this first printing.

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