Annual Review of Energy, Volume 1. Annual Reviews, Inc., Palo Alto, California (1976). 772 pp. $15.00.

This initial volume of the new series of *Annual Reviews* is the best compendium of the facts and issues involved in the energy situation in the U.S. and belongs on the desk of every energy analyst. It consists of 28 articles, all prepared by experts in their respective fields. The scope is indicated by the headings for the different sections:

Energy Supply and Distribution: Resources and Technologies
Energy and the Economy
Energy Conservation
Impacts on Environment, Health, and Safety
Energy Policy and Politics.

In addition, there is an overall introductory article by Harrison Brown, bringing up-to-date his world view of energy and its place in society, and an article by Mason Willrich on "International Energy Issues and Options." With the exception of these two articles, Vol. 1 concentrates on the U.S. energy system; it is intended that Vol. 2 will concentrate on aspects and issues of the global energy system.

Brown's article, "Energy in our Future," is well worth reading to gain an overall perspective of the historical place of energy in our society and of the problems and prospects for the future. Brown describes our present situation as an "energy trap," into which we have become ensnared by depending on low-cost oil and gas, fuels that will soon be used up and, in the meantime, are not entirely under our control. With regard to the future, Brown takes an optimistic view, stating that "It now appears that humanity need never suffer from a shortage of available energy."

For more accurate details on the available sources of energy, one needs to go beyond Brown's article. For example, he gives our coal resources correctly as ~1500 billion MT; but to find that <10% of this may be available, one must turn to Schmidt and Hill's article on coal. There one learns that not all tons of coal are equal and that the feasibly usable coal may be further discounted after it has been normalized to a standard Btu content. The amount and quality of coal that is usable is important because coal is commonly regarded as the "swing fuel," most readily available to take up the slack when oil and gas become really scarce and to serve as the interim fuel until the breeders or fusion come on line. With the increased use of coal visualized in most energy scenarios, the difference between 1500 billion tons and one-tenth this amount is the difference between coal lasting several hundred years and becoming exhausted near the middle of the next century. Similar optimism with respect to the geothermal energy source is projected by Brown, suggesting that 40 000 MW of geothermal electricity is possible by 1995. In Kruger's article on "Geothermal Energy," numbers an order of magnitude lower are indicated as much more likely, even with a fairly strong national program.

Speaking of optimism, the article by R. F. Post on "Nuclear Fusion" starts with the stated objective of proving that fusion "offers the best, and perhaps only, long-term solution to the complex set of energy-related problems that man will face in the future." Nevertheless, in discussing visions of fusion reactors, he speculates that "the day when fusion power will first be put to practical use may possibly depend more on finding a 'new invention' than on the patient pursuit of present approaches." If this is true, then two of the so-called symptotic energy sources, solar electric and fusion, depend on the luck of invention if they are to appear in an economic form.

The problem of how we make the transition from the still relatively low cost petroleum and gas to liquid fuels from oil shale or coal and to synthetic gas from coal in an economic way is a common thread to many of the articles. The routes for making this transition involve, directly or indirectly, higher energy costs derived either from an escalation of the price of Organization of Petroleum Exporting Countries (OPEC) oil or from some form of artificially induced price increase. As long as oil is available, it will be cheaper to extract from the ground than it will be to produce it from some other energy resource. The problems of waiting until a world scarcity of petroleum forces us into synthetic liquids and gases are (a) that the transition to a new energy source cannot be made quickly, and (b) the foreign source of petroleum could suddenly be cut off. Perhaps the latter has been made less of a hazard by the recently acquired ability of the OPEC nations to spend all the funds they receive, but the time required to shift from one energy source to another cannot be easily overcome.

Higher energy prices are expected to lead to decreased energy use, but there are also other means of reducing our dependence on increased oil imports. As Schipper points out in his article on "Raising the Productivity of Energy Use," ". . . economic analysis of the physical options for energy conservation shows that saving 30-40 percent of the expected total future energy demand in the United States would be far less expensive than supplying the . . . fuels . . . ."

In a review such as this, it is impossible to indicate even a representative number of the very readable insights to various phases of our energy situation given in this volume. Suffice it to say that this book serves as an adequate encyclopedic source of information to the energy dabbler and should be the initial reference used by the energy researcher.

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The Nuclear Fuel Cycle—A Survey of the Public Health, Environmental, and National Security Effects of Nuclear Power, rev. ed. The Union of Concerned Scientists, The MIT Press, Cambridge, Massachusetts. (1975). $4.95.

Like it or not, contrary views are usually most effectively presented elbows out, so to speak, and this book is no exception. In 1972, the U.S. Atomic Energy Commission