



# Book Reviews

## Solar Energy

by Donald Rapp  
Prentice-Hall,  
Englewood Cliffs, NJ 07632  
1981, 516 pages.

Dr. Rapp has published a text/reference book that should be considered for the library of every serious solar enthusiast. The book is well-organized, with the development and the descriptions of flat plate, intermediate temperature, and high temperature solar thermal collectors spread over three Chapters (4, 9, and 11) to support the discussions and evaluations of various solar energy collection and utilization systems. The system descriptions, which are clearly the strength of the book, include detailed design information and stress economic viability. The descriptions of each system type (domestic hot water, direct and in-direct space heating, space cooling, power and total energy) include at least one large case-study-type example. In addition, several worked examples conclude each chapter, normally followed by a few unsolved problems.

The author points out in the Preface that the book was developed from a "two-semester course in solar energy . . ." taught ". . . to first-year graduate students majoring in environmental sciences." This fact clearly sets the tone as well as the level of the book. It is also the source of the major short-coming of the book as an engineering text: It is basically descriptive. The reader cannot readily extend the author's analyses to other collectors and systems since not enough basic information is presented. Specifically, the determination of thermal losses from collectors is handled only in an approximate manner and only for flat plate collectors. No basic heat transfer correlations are introduced, although some are referenced, and air heaters are only mentioned. Values for thermal loss coefficients are given for various collectors so

that performance comparisons can be made, but the potential of further development by the reader is severely limited. Storage is similarly treated. The discussion of the determination of the available terrestrial insolation on tilted surfaces is also inadequate. A general discussion is presented, followed by a case study for a specific site (Central Texas). However, this development is not particularly useful for other sites.

Over 40 pages are devoted to the development of background information in cooling and power cycles; all cycles are illustrated and discussed with P-v diagrams. Twenty pages of appendices are devoted to thermodynamic property data, including 12 pages of the properties of saturated air-water vapor mixtures. On the other hand, there is no discussion of the fundamentals of heat transfer and no relevant heat transfer data appear anywhere.

The book includes some special topics (e.g., the right to solar access and the merits and limitation of non-tracking concentration) and some details of more conventional topics (e.g., the theory of idealized concentration and the errors and rehabilitation of the National Weather Service insolation data) not found in most textbooks.

Two final shortcomings are noted. First, there is no list of symbols. This deficiency is especially troublesome since the author has utilized a largely non-standard nomenclature. Second, Engineering Units are used throughout. SI units are, more often than not, added in parenthesis. However, the figures are presented mostly in Engineering Units.

In summary, the book is informative, useful for its stated purpose and is recommended as reading for solar specialists.

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