BOOK REVIEW


Why do we need a second edition of a popular 5-year-old textbook on wind and solar power technologies? The author justifies his latest effort with a series of impressive observations: “…the capital and energy costs of wind power have declined by 20%…wind energy will grow from less than 1% at present to as much as 10% of the U.S. electricity demand by 2020…PV installations grew at an annual rate of 25% to 30% during the period from 2000 to 2004.” He then presents a thoughtfully organized and clearly presented summary of the technological advances, economic conditions, and policy developments that are moving these energy sources from alternatives to mainstream.

After a brief summary of advances and benefits of modern wind-electric systems, the text delivers a short, simple, easily understood explanation of the interactions among wind speed, turbine rotor area, and electric power production. Perhaps more important, the author provides a useful discussion of the effects and importance of wind speed behavior: daily, seasonal, and long-term averages and the distribution patterns that lead to the averages. A brief but comprehensive discussion of power generation components and controls, and possible adverse consequences and effects, includes enough circuit and aerodynamic information to satisfy readers with engineering interests. The importance of coastlines to wind energy planners is emphasized by an entire chapter on off-shore wind farms. A similar tour-de-force through the technology and economics of photovoltaic power systems is then presented, but its brevity is either a testimonial to the simplicity of PV systems or a sign of the author’s interest in wind systems.

Topics common to both wind and photovoltaic systems such as energy storage, electronics, power conditioning, grid- and off-grid installations, and bottom-line economics are discussed, with sufficient clarity and depth to provide useful insights into the benefits, problems, hype, and true potential of these technologies. The author even provides an interesting summary of many of the energy generation schemes that are at present more science fiction than on-line fact: power towers, ocean wave and tide-driven turbines, jet-assisted wind turbines, and similar generators that will compete for funding and commercialization.

Throughout the text it is abundantly clear the author is a knowledgeable engineer with considerable experience in the diverse sciences and technologies that provide the foundations of wind and photovoltaic power generation. It is also obvious that he is an experienced teacher, because the presentations are technically accurate, well organized, effectively paced, and appropriately targeted for the mid- to upper-level undergraduate student with reasonable technical exposure and interest. The comprehensive list of topic-related organizations provided in the appendix, along with the short list of reading recommendations, is a valuable resource for any student. I wish I could have had this book when I taught my own alternative energy classes to Mechanical Engineering undergraduates.

Few texts approach perfection in only a second edition, and this one is no exception. There are a few problems with clarity and labeling of some of the graphics, several figures provide little benefit and serve only as filler, while in other places a graphic aid would be a welcome addition to embellish the text. But the only significant change I would have suggested is a down-sizing of the chapter on counter-rotating wind turbines. In a section of the text where 20 total pages are devoted to the discussion of solar-thermal, marine current, ocean wave, and several other promising technologies, the author devotes a full chapter of almost 30 pages to a system that has received considerable study and testing, but has failed to achieve success and adoption. But after an otherwise useful and enjoyable presentation, the author has perhaps earned the right to express his opinion that something worthwhile has been overlooked.

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