

<<非传统能源>>

图书基本信息

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## 前言

Energy has become an important and one of the basic infrastructures for economic development of a country. Energy security is, therefore, imperative for sustained growth of economy. The oil crisis of 1973 and concern for environment due to excessive use of fossil fuels have led to remarkable global efforts in harnessing alternative energy resources. The renewable energy resources such as the sun, wind, biomass and geothermal heat are environment friendly and perennial in nature. These resources are also referred to as non-conventional energy resources as, at present, their large-scale use is not common. Harnessing of energy through these resources using efficient technologies is expected to play an important role in serving as clean energy sources for mankind. Thus, processes to harness these are steadily gaining technical and economic importance worldwide. Most governments have substantial plans directed towards encouraging these technologies in order to develop them commercially. As we had hoped and wished initially, the development of these technologies have not been dramatic. They have yet to achieve the cost-benefit ratio possible with conventional fuels and are not likely to replace fossil fuels in the near future. Nevertheless, they have come to play a very important supportive role in addition to conventional sources. Therefore, it is necessary for energy planners / users to know the virtues as well as limitations of these technologies. The present book is an effort to explore these technologies in a balanced perspective. Being a relatively recent field, the subject matter is scattered in specialized research journals and a few books of advanced levels are devoted exclusively to a particular technology. There is, however, scarcity of publications that introduce all these technologies in a single volume to a beginner. Therefore, a natural consequence of the current volume will be a much-needed and relatively inexpensive textbook at an undergraduate level. While teaching a course on non-conventional energy to undergraduate engineering students, the author himself felt this need, which encouraged him to write the present book. Human-resource development in the area of energy, in general, and in new and renewable sources of energy, in particular, has been neglected all over the world, and more so in developing countries. Therefore, the book is primarily intended to serve as a textbook for undergraduate-level courses for engineering and science students. It stresses scientific understanding, analysis and applications of non-conventional energy technologies. Many practicing engineers and scientists may not have a formal exposure to this area and may be interested to have a general training of these technologies. Therefore, the book is oriented to cover both basic study and its widespread applications. It describes the fundamental physical processes governing various non-conventional energy technologies and their applications. The book may also serve to create awareness among energy planners, policymakers and users at large about these technologies in general. Because of the spread of disciplines involved, it is not possible to discuss each of them exhaustively in a single book. Therefore, only relevant background up to a depth essential to understand the basic principles has been included.

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## 内容概要

《非传统能源》(Non-Conventional Energy Resources)一书的内容非常丰富,也比较有特色。从内容上讲,该书不仅包含了太阳能、风能、生物质能、地热能、海洋能、水能等可再生能源,而且对各种新型的能源利用技术,包括燃料电池、氢能、磁流体发电、热电堆发电等进行了介绍,同时还对财务和经济评价方法进行了较详细的说明。

这与国内一些院校为本科生开设的课程“可再生能源及其利用技术”或类似的课程时,也将财务和经济评价的内容包括在内的情况不谋而合。

这说明对于这些非传统能源,经济评价已经是相当重要的一个方面。

而对于每种主要的能源形式,该书都从基本理论、主要利用技术、环境特性、发展应用现状等方面进行了详细的介绍。

如果作为教材或教学参考书,建议教师能够再在技术经济性方面做些补充,教学内容会更加全面。

《非传统能源(第2版)》对太阳能的介绍最为详尽,共用了三个章节,分别介绍了太阳能的基础知识,太阳热系统,以及太阳能光伏系统。

其他能源形式基本是每种一章。

同时,《非传统能源(第2版)》对储能也给予了关注,除了有单独的一章介绍储能外,对风能等具体能源形式的储存问题也进行了介绍。

《非传统能源(第2版)》的主要特色还有以下几个方面:首先是有大量的例题,这在目前很多相关内容的书籍中是比较少见的;大量的例题非常有利于对内容的理解。

其次是有很多特色习题,《非传统能源(第2版)》的习题分为三部分,一是用来复习课本内容的问题(Review Questions);二是一些分析或计算题(Problems),可以对课本中的知识进行应用;三是客观题(Objective Questions),主要是对一些基本的知识点进行考查。

《非传统能源(第2版)》所介绍的例子、应用情况均是以印度的情况为主,阅读和使用时,建议尽量参考我国的实际情况进行修改和补充。

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## 章节摘录

插图：The highest inlet steam temperature for a steam turbine is limited by the properties of the materials to about 540°C. However, the flame temperatures of burning fossil fuel in a boiler may be more than 1650°C. Consequently, in a combined cycle system, steam turbine is preceded by a topping cycle heat engine, which can utilize heat at higher temperatures. The working fluid leaves the topping cycle at a sufficiently high temperature to generate steam for the steam turbine. Because the technology is well developed for the gas turbine, it is most commonly used as a topping cycle engine. The turbine exhaust gases at a temperature of 600°C or more pass through a waste heat (heat recovery steam generator) boiler where steam is produced from water under pressure. In addition to using fuel more efficiently, a combined gas and steam turbine generating system requires less condenser cooling water for a given electrical output than a steam turbine generator alone.

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