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The second edition of Renewable and Efficient Electric Power Systems provides a solid, quantitative, practical introduction to a wide range of renewable energy systems. For each topic, essential theoretical background is introduced, practical engineering considerations associated with designing systems and predicting their performance are provided, and methods for evaluating the economics of these systems are presented.

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Renewable and Efficient Electric Power Systems. Preface. 1 Basic Electric and Magnetic Circuits. 1.1 Introduction to Electric Circuits. 1.2 Definitions of Key Electrical Quantities. 1.3 Idealized Voltage and Current Sources. 1.4 Electrical Resistance. 1.5 Capacitance. 1.6 Magnetic Circuits. 1.7 Inductance. 1.8 Transformers. 2 Fundamentals of Electric Power. 2.1 Effective Values of Voltage and Current. 2.2 Idealized Components Subjected to Sinusoidal Voltages. 2.3 Power Factor. 2.4 The Power Triangle and ...

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Among other renewable sources (such as wind, biomass, geothermal, wave and tide, etc.), Photovoltaic (PV) energy systems have been highly developed during the last three decades. Although being a...

Renewable and Efficient Electric Power Systems

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Renewable and efficient electric power systems / Gilbert M. Masters. p. cm. Includes bibliographical references and index. ISBN 0-471-28060-7 (cloth) 1. Electric power systems!Energy conservation. 2. Electric power systems!Electric losses. I. Title TK1005.M33 2004 621.31!dc22 2003062035 Printed in the United States of America. 10987654321

Renewable and Efficient Electric Power Systems

Renewable electricity production, from sources such as wind power and solar power, is variable which results in reduced capacity factor and require either energy storage of capacity equal to its total output, or base load power sources from non intermittent sources like hydropower, fossil fuels or nuclear power. Since renewable energy sources power density per land area is at best three orders of magnitude smaller than fossil or nuclear power, renewable power plants tends to occupy thousands ...

Renewable energy - Wikipedia

Nationwide, renewable energy sources produced more electricity during the first eight months of this year than did either coal or nuclear power.* Including distributed (e.g., rooftop) solar, renewables accounted for 20.8% of the nation's electrical generation during the first two-thirds of 2020 compared to 19.4% from nuclear and 18.4% from coal.

Renewable energy sources produce more electricity than ---

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The Latest in Clean Energy News | Renewable Energy World

Hydropower or water power (from Greek: ὕδωρ, "water") is power derived from the energy of falling or fast-running water, which may be harnessed for useful purposes. Since ancient times, hydropower from many kinds of watermills has been used as a renewable energy source for irrigation and the operation of various mechanical devices, such as gristmills, sawmills, textile mills, trip hammers ...

Hydropower - Wikipedia

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The second edition of Renewable and Efficient Electric Power Systems provides a solid, quantitative, practical introduction to a wide range of renewable energy systems. For each topic, essential theoretical background is introduced, practical engineering considerations associated with designing systems and predicting their performance are provided, and methods for evaluating the economics of these systems are presented.

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Renewable and Efficient Electric Power Systems potx. ... concentrating solar power dish and trough systems, micro-hydropower, and biomass systems for electricity generation. Special attention is given to under-standing the physics of fuel cells and their potential ... in the electric power industry, worldwide. New tech-nologies on both sides of the meter leading to structural changes in the way that power is provided and used, an emerging demand for electricity ...

renewable and efficient electric power systems solutions ---

The second edition of Renewable and Efficient Electric Power Systems provides a solid, quantitative, practical introduction to a wide range of renewable energy systems. For each topic, essential theoretical background is introduced, practical engineering considerations associated with designing systems and predicting their performance are provided, and methods for evaluating the economics of these systems are presented.

A new edition of a successful book, this volume provides engineers in diverse disciplines with a thorough, up-to-date introduction to renewable and efficient energy systems. Offering significant updates to such topics as geothermal power, wave and tidal power, and ocean thermal energy, the Second Edition expands coverage of electric power grids, discusses smart grids and grid integration of renewable energy systems, and addresses the growing issue of off-grid renewable energy systems for emerging markets in the developing world. Completely worked numerical examples of every important concept are provided.

A solid, quantitative, practical introduction to a wide range of renewable energy systems!in a completely updated, new edition The second edition of Renewable and Efficient Electric Power Systems provides a solid, quantitative, practical introduction to a wide range of renewable energy systems. For each topic, essential theoretical background is introduced, practical engineering considerations associated with designing systems and predicting their performance are provided, and methods for evaluating the economics of these systems are presented. While the book focuses on the fastest growing, most promising wind and solar technologies, new material on tidal and wave power, small-scale hydroelectric power, geothermal and biomass systems is introduced. Both supply-side and demand-side technologies are blended in the final chapter, which introduces the emerging smart grid. As the fraction of our power generated by renewable resources increases, the role of demand-side management in helping maintain grid balance is explored. Renewable energy systems have become mainstream technologies and are now, literally, big business. Throughout this edition, more depth has been provided on the financial analysis of large-scale conventional and renewable energy projects. While grid-connected systems dominate the market today, off-grid systems are beginning to have a significant impact on emerging economies where electricity is a scarce commodity. Considerable attention is paid to the economics of all of these systems. This edition has been completely rewritten, updated, and reorganized. New material has been presented both in the form of new topics as well as in greater depth in some areas. The section on the fundamentals of electric power has been enhanced, making this edition a much better bridge to the more advanced courses in power that are returning to many electrical engineering programs. This includes an introduction to phasor notation, more emphasis on reactive power as well as real power, more on power converter and inverter electronics, and more material on generator technologies. Realizing that many students, as well as professionals, in this increasingly important field may have modest electrical engineering backgrounds, early chapters develop the skills and knowledge necessary to understand these important topics without the need for supplementary materials. With numerous completely worked examples throughout, the book has been designed to encourage self-instruction. The book includes worked examples for virtually every topic that lends itself to quantitative analysis. Each chapter ends with a problem set that provides additional practice. This is an essential resource for a mixed audience of engineering and other technology-focused individuals.

Reflecting its reliance on fossil fuels, the electric power industry produces the majority of the world's greenhouse gas emissions. The need for a revolution in the industry becomes further apparent given that 'decarbonization' means an increasing electrification of other sectors of the economy in particular, through a switch from gasoline to electric vehicles. Of the options for producing electric power without significant greenhouse gas emissions, renewable energy is most attractive to policymakers, as it promises increased national self-reliance on energy supplies and the creation of new industries and jobs, without the safety and political concerns of nuclear power or the unproven technology of carbon capture and storage. Drawing on both economic theory and the experiences of the United States and EU member states, Harnessing Renewable Energy addresses the key questions surrounding renewable energy policies. How appropriate is the focus on renewable power as a primary tool for reducing greenhouse gas emissions? If renewable energy is given specific support, what form should that support take? What are the implications for power markets if renewable generation is widely adopted? Thorough and well-evidenced, this book will be of interest to a broad range of policymakers, the electric power industry, and economists who study energy and environmental issues.

This derivative volume stemming from content included in our seminal Power Electronics Handbook takes its chapters related to renewables and establishes them at the core of a new volume dedicated to the increasingly pivotal and as yet under-published intersection of Power Electronics and Alternative Energy. While this re-versioning provides a corollary revenue stream to better leverage our core handbook asset, it does more than simply re-package existing content. Each chapter will be significantly updated and expanded by more than 50%, and all new introductory and summary chapters will be added to contextualize and tie the volume together. Therefore, unlike traditional derivative volumes, we will be able to offer new and updated material to the market and include this largely original content in our ScienceDirect Energy collection. Due to the inherently multi-disciplinary nature of renewables, many engineers come from backgrounds in Physics, Materials, or Chemical Engineering, and therefore do not have experience working in-depth with electronics. As more and more alternative and distributed energy systems require grid hook-ups and on-site storage, a working knowledge of batteries, inverters and other power electronics components becomes requisite. Further, as renewables enjoy broadening commercial implementation, power electronics professionals are interested to learn of the challenges and strategies particular to applications in alternative energy. This book will bring each group up-to-speed with the primary issues of importance at this technological node. This content clarifies the juncture of two key coverage areas for our Energy portfolio: alternative sources and power systems. It serves to bridge the information in our power engineering and renewable energy lists, supporting the growing grid cluster in the former and adding key information on practical implementation to the latter. Provides a thorough overview of the key technologies, methods and challenges for implementing power electronics in alternative energy systems for optimal power generation Includes hard-to-find information on how to apply converters, inverters, batteries, controllers and more for stand-alone and grid-connected systems Covers wind and solar applications, as well as ocean and geothermal energy, hybrid systems and fuel cells

A clear explanation of the technology for producing and delivering electricity Electric Power Systems explains and illustrates how the electric grid works in a clear, straightforward style that makes highly technical material accessible. It begins with a thorough discussion of the underlying physical concepts of electricity, circuits, and complex power that serves as a foundation for more advanced material. Readers are then introduced to the main components of electric power systems, including generators, motors and other appliances, and transmission and distribution equipment such as power lines, transformers, and circuit breakers. The author explains how a whole power system is managed and coordinated, analyzed mathematically, and kept stable and reliable. Recognizing the economic and environmental implications of electric energy production and public concern over disruptions of service, this book exposes the challenges of producing and delivering electricity to help inform public policy decisions. Its discussions of complex concepts such as reactive power balance, load flow, and stability analysis, for example, offer deep insight into the complexity of electric grid operation and demonstrate how and why physics constrains economics and politics. Although this survival guide includes mathematical equations and formulas, it discusses their meaning in plain English and does not assume any prior familiarity with particular notations or technical jargon. Additional features include: * A glossary of symbols, units, abbreviations, and acronyms * Illustrations that help readers visualize processes and better understand complex concepts * Detailed analysis of a case study, including a Web reference to the case, enabling readers to test the consequences of manipulating various parameters With its clear discussion of how electric grids work, Electric Power Systems is appropriate for a broad readership of professionals, undergraduate and graduate students, government agency managers, environmental advocates, and consumers.

As the need for proficient power resources continues to grow, it is becoming increasingly important to implement new strategies and technologies in energy distribution to meet consumption needs. The employment of smart grid networks assists in the efficient allocation of energy resources. Smart Grid as a Solution for Renewable and Efficient Energy features emergent research and trends in energy consumption and management, as well as communication techniques utilized to monitor power transmission and usage. Emphasizing developments and challenges occurring in the field, this book is a critical resource for researchers and students concerned with signal processing, power demand management, energy storage procedures, and control techniques within smart grid networks.

A component in the America's Energy Future study, Electricity from Renewable Resources examines the technical potential for electric power generation with alternative sources such as wind, solar-photovoltaic, geothermal, solar-thermal, hydroelectric, and other renewable sources. The book focuses on those renewable sources that show the most promise for initial commercial deployment within 10 years and will lead to a substantial impact on the U.S. energy system. A quantitative characterization of technologies, this book lays out expectations of costs, performance, and impacts, as well as barriers and research and development needs. In addition to a principal focus on renewable energy technologies for power generation, the book addresses the challenges of incorporating such technologies into the power grid, as well as potential improvements in the national electricity grid that could enable better and more extensive utilization of wind, solar-thermal, solar photovoltaics, and other renewable technologies.

Energy-Efficient Electrical Systems for Buildings offers a systematic and practical analysis and design approaches for electrical distribution and utilization systems in buildings. In addition to meeting the minimal safety requirements set by the National Electrical Code (NEC), the design approach consider the life-cycle cost analysis of designing energy efficient electrical distribution systems as well as integrating renewable energy technologies into both residential and commercial buildings. The book first provides a general overview of basic power systems commonly available in buildings. Then, detailed discussions of various components of typical building electrical distribution system are outlined through several chapters including transformers, protection devices, conductors and conduits, power and lighting panels, and motor control centers. The book includes several illustrations and numerous examples and analysis exercises are included, along with detailed design examples.

Energy for Sustainability is the first undergraduate textbook on renewable energy and energy efficiency with a unique focus on the community scale. Written by two of the foremost experts in the field, it is a pedagogically complete treatment of energy sources and uses. It examines the full range of issues: from generating technologies to land use planning in making the transition to sustainable energy. The book begins by providing a historical perspective on energy use by human civilizations and then covers energy fundamentals and trends; buildings and energy; sustainable electricity; sustainable transportation and land use; and energy policy and planning. Included in these topical areas are in-depth discussions of all of the most promising sources of renewable energy, including solar photovoltaic systems, wind turbines, and biofuels. In addition, the authors offer a thorough presentation of 'green' building design, the impact of land use and transportation patterns on energy use, and the policies needed to transform energy markets at the local, state, and national levels. Throughout, the authors first provide the necessary theory and then demonstrate how it can be applied, utilizing cutting-edge practices and technologies, and the most current available data. Since the dawn of the industrial age, the explosive growth in economic productivity has been fueled by oil, coal, and natural gas. World energy use nearly doubled between 1975 and 2005. China's energy use has been doubling every decade. The implications for the environment are staggering. One way or another, our reliance on fossil fuels will have to end. Energy for Sustainability evaluates the alternatives and helps students understand how, with good planning and policy decisions, renewable energy and efficiency can support world demands at costs we can afford: economically, environmentally, and socially.