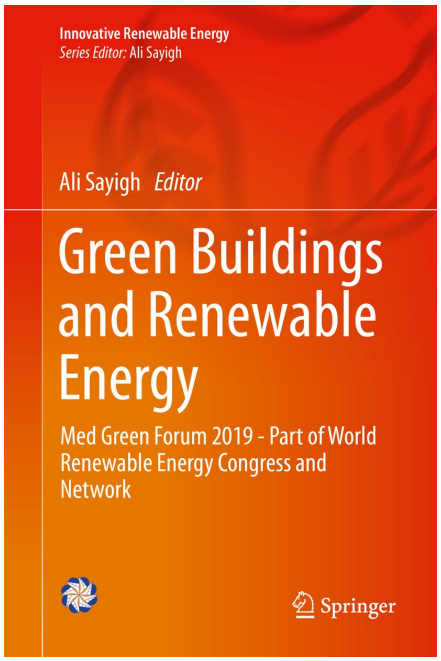

1st ed. 2020, XIV, 663 p. 537 illus., 494 illus. in color.

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Ali Sayigh (Ed.)

Green Buildings and Renewable Energy

Med Green Forum 2019 - Part of World Renewable Energy Congress and Network

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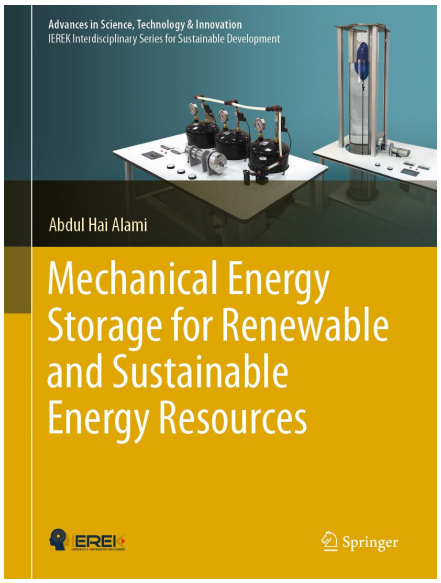
- Presents leading-edge research in green building, sustainable architecture, and renewable energy
- Covers a broad range of renewable energy technologies and applications in all sectors
- Contains case studies and examples to enhance practical application of the technologies presented

This book highlights selected papers presented during the bi-annual World Renewable Energy Network's 2019 Med Green Forum. This international forum highlights the importance of growing renewable energy applications in two main sectors: Electricity Generation and Sustainable Building. The papers highlight the most current research and technological breakthroughs illustrating the viability of using renewable energy to satisfy energy needs. Coverage includes a broad range of renewable energy technologies and applications in all sectors – electricity production, heating and cooling, agricultural applications, water desalination, industrial applications, and transport. Presents leading-edge research in green building, sustainable architecture, and renewable energy; Covers a broad range of renewable energy technologies and applications in all sectors; Contains case studies and examples to enhance practical application of the technologies presented.



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Abdul Hai Alami

Mechanical Energy Storage for Renewable and Sustainable Energy Resources

Series: Advances in Science, Technology & Innovation

- Describes storage techniques intuitively, yet based on highly effective approaches
- Includes a wealth of unique ideas/approaches in terms of development and analysis
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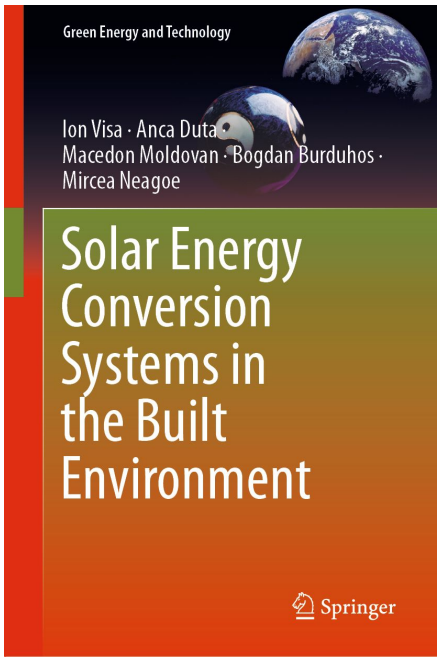
The available literature on energy storage technologies in general, and mechanical energy storage in particular, is lacking in terms of both quantity and quality. This edited volume focuses on novel (yet uncomplicated) ideas that are currently part of the Energy Storage curriculum at the University of Sharjah, UAE. These techniques have been extensively researched and their prototypes are central to the undergraduate Energy Storage Lab that is associated with the course. Although ideally suited for wind energy storage, the techniques described are also suitable for renewable energy storage in general, and offer high two-way efficiency ratings.



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I. Visa, A. Duta, M. Moldovan, B. Burduhos, M. Neagoe

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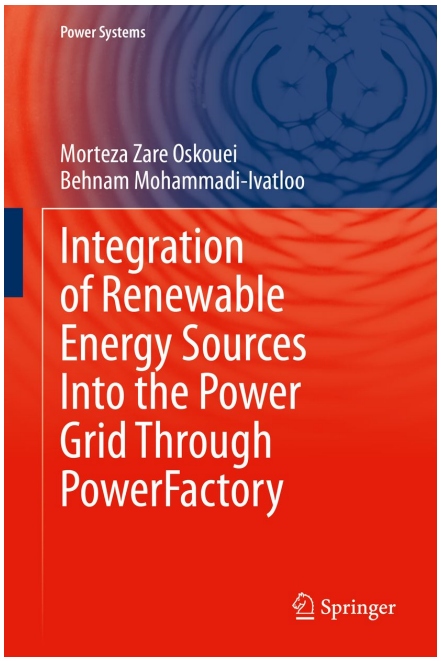
Series: Green Energy and Technology

- Provides insight into the influence of the built environment on the available solar energy in the implementation location
- Presents the specific requirements on solar energy conversion systems (photovoltaic and solar-thermal systems) implemented in the built environment
- Proposes solutions to increase the conversion efficiency and to mitigate the losses
- Discusses the main problems to be solved: solar energy conversion, the energy storage, the durability of the systems

This book focuses on solar energy conversion systems that can be implemented in the built environment, at building or at community level.The quest for developing a sustainable built environment asks for specific solutions to provide clean energy based on renewable sources, and solar energy is considered one of the cleanest available energy on Earth.The specific issues raised by the implementation location are discussed, including the climatic profile distorted by the buildings, the available surface on the buildings for implementation, etc.This book also discusses the seasonal and diurnal variability of the solar energy resource in parallel with the variability of the electrical and thermal energy demand in the built environment (particularly focusing on the residential buildings). Solutions are proposed to match these variabilities, including the development of energy mixes with other renewables (e.g. geothermal or biomass, for thermal energy production). Specific solutions, including case studies of systems implemented on buildings all over the world, are presented and analyzed for electrical and for thermal energy production and the main differences in the systems design are outlined. The conversion efficiency (thus the output) and the main causes of energy losses are considered in both cases.



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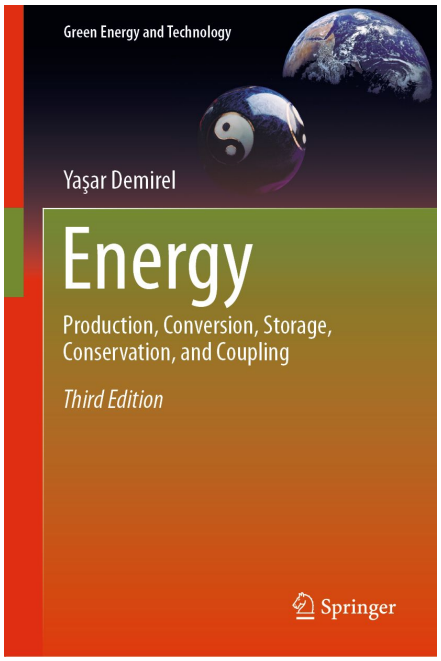
Morteza Zare Oskouei, Behnam Mohammadi-Ivatloo

Integration of Renewable Energy Sources Into the Power Grid Through PowerFactory

Series: Power Systems

- Evaluates challenges associated with integrating renewable energy sources into electric power grids
- Covers modeling renewable energy sources in DIgSILENT
- Includes practical case studies

This book evaluates a number of serious technical challenges related to the integration of renewable energy sources into the power grid using the DIgSILENT PowerFactory power system simulation software package. It provides a fresh perspective on analyzing power systems according to renewable energy sources and how they affect power system performance in various situations. The book examines load flow, short-circuit, RMS simulation, power quality, and system reliability in the presence of renewable energy sources, and presents readers with the tools needed for modeling, simulation, and analysis for network planning. The book is a valuable resource for researchers, engineers, and students working to solve power system problems in the presence of renewable energy sources in power system operations and utilities.



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Yaşar Demirel

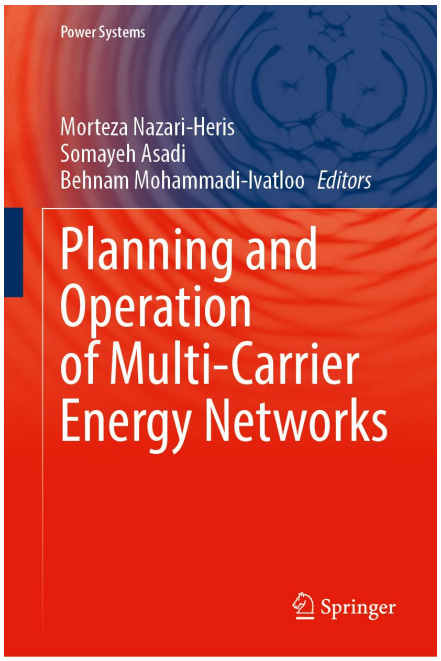
Energy

Production, Conversion, Storage, Conservation, and Coupling

Series: Green Energy and Technology

- Updates previous editions with thorough revisions and new chapters covering renewable energy and energy management and economics
- Presents a comprehensive review of energy, covering the five interrelated aspects of production, conversion, storage, conservation, and coupling
- Includes fully worked examples and practice problems in every chapter
- Provides supplementary material for students and instructors, including a solution manual

This revised and updated 3rdedition of the book allows readers to develop a practical understanding of the major aspects of energy. It also includes two new chapters addressing renewable energy, and energy management and economics. The book begins by introducing basic definitions, and then moves on to discuss the primary and secondary energy types, internal energy and enthalpy, and energy balance, heat of reaction and heat transfer. Each chapter features fully solved example problemsand practice problems to support learning and the application of the topics discussed, including: energy production and conversion; energy conservation; energy storage; energy coupling; sustainability in energy systems; renewable energy; and energy management and economics. Written for students across a range of engineering and science disciplines, the book provides a comprehensive study guide. It is particularly suitable for courses in energy technology, sustainable energy technologies and energy conversion & management, and offers an ideal reference text for students, engineers, energy researchers and industry professionals. A updated solutions manual to this textbook's problems ais available to course instructors on request from the author and online on www.springer.com.



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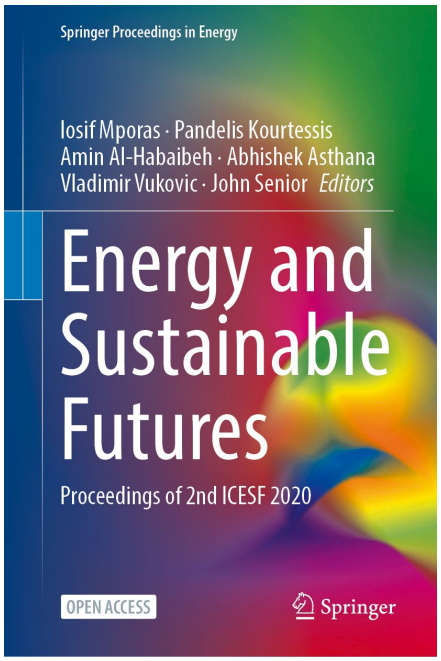
Morteza Nazari-Heris, Somayeh Asadi, Behnam Mohammadi-Ivatloo (Eds.)

Planning and Operation of Multi-Carrier Energy Networks

Series: Power Systems

- Provides insight on the design and operation of multi-carrier energy systems
- Covers both theoretical aspects and technical applications
- Includes case studies to help apply concepts to real engineering situations

This book discusses the optimal design and operation of multi-carrier energy systems, providing a comprehensive review of existing systems as well as proposing new models. Chapters cover the theoretical background and application examples of interconnecting energy technologies such as combined heat and power plants, natural gas-fired power plants, power to gas technology, hydropower plants, and water desalination systems, taking into account the operational and technical constraints of each interconnecting element and the network constraint of each energy system. This book will be a valuable reference for power network and mechanical system professionals and engineers, electrical power engineering researchers and developers, and professionals from affiliated power system planning communities. Provides insight on the design and operation of multi-carrier energy systems; Covers both theoretical aspects and technical applications; Includes case studies to help apply concepts to real engineering situations.



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I. Mporas, P. Kourtessis, A. Al-Habaibeh, A. Asthana, V. Vukovic, J. Senior (Eds.)

Energy and Sustainable Futures

Proceedings of 2nd ICESF 2020

Series: Springer Proceedings in Energy

- Presents a thorough guide to the latest research in energy and sustainability
- Includes papers on energy governance, renewable energy, and conventional energy sources
- Collates research from experts around the world
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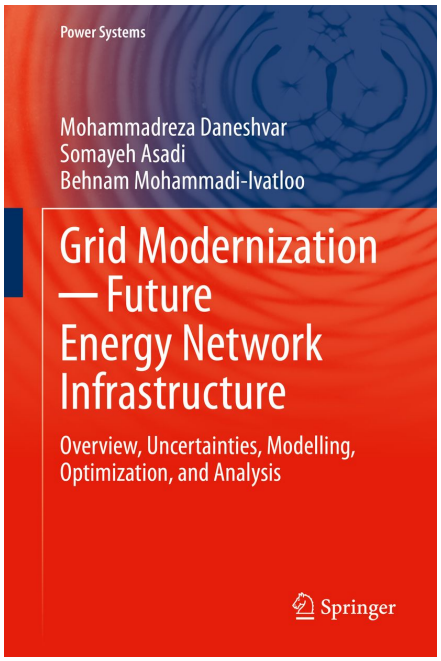
This open access book presents papers displayed in the 2nd International Conference on Energy and Sustainable Futures (ICESF 2020), co-organised by the University of Hertfordshire and the University Alliance DTA in Energy. The research included in this book covers a wide range of topics in the areas of energy and sustainability including: • ICT and control of energy; • conventional energy sources; • energy governance; • materials in energy research; • renewable energy; and • energy storage. The book offers a holistic view of topics related to energy and sustainability, making it of interest to experts in the field, from industry and academia.



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Mohammadreza Daneshvar, Somayeh Asadi, Behnam Mohammadi-Ivatloo

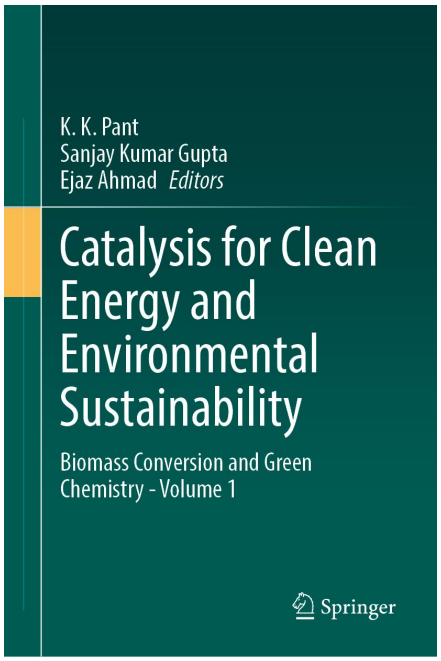
Grid Modernization Future Energy Network Infrastructure

Overview, Uncertainties, Modelling, Optimization, and Analysis

Series: Power Systems

- Proposes practical solutions for solving the challenges of modern multi-carrier energy grids;
- Examines various types of energy storage systems and distributed energy resources (DERs) with an emphasis on renewable energy resources (RERs);
- Provides comprehensive mathematical models for optimizing of future modern multi-carrier energy grids

This book presents theoretical, technical, and practical information on the modernization of future energy networks. All the basic requirements covering concepts, modeling, optimizing, and analyzing of future energy grids with various energy carriers such as electricity, gas, heat, and water, as well as their markets and contracts, are explained in detail. The main focus of the book is on modernizing both the energy consumers and the energy producers and analyzing various aspects of grid modernization such as reliability, resiliency, stability, and security. Coverage includes advanced communication protocols and solution methods for the Internet of Energy (IoE) infrastructure and energy trading in future energy grids with high/full share of renewable energy resources (RERs) within the transactive energy (TE) paradigm. Probabilistic modeling and optimizing of modern grids will be evaluated using realistic case studies considering the economic aspects of multi-carrier energy markets. This book will be welcomed as an important resource by researchers and postgraduate students studying energy systems, as well as practicing engineers working on modernizing energy grids and the design, planning, scheduling, and operation of smart power systems.



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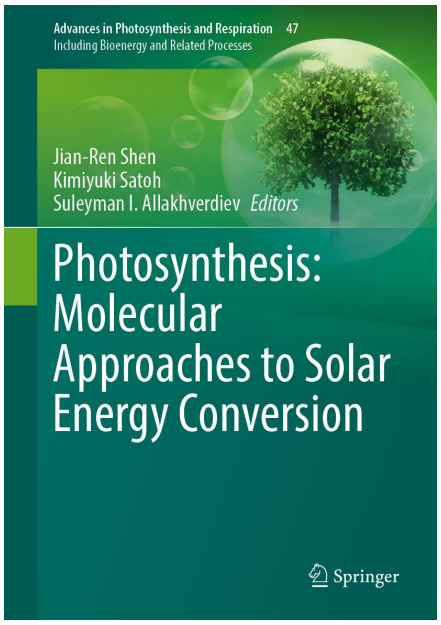
K. K. Pant, Sanjay Kumar Gupta, Ejaz Ahmad (Eds.)

Catalysis for Clean Energy and Environmental Sustainability

Biomass Conversion and Green Chemistry - Volume 1

- Discusses key issues in catalysis for clean energy production and environmental sustainability
- Offers a unique combination of chapters on lab-scale catalytic processes and industrial catalytic processes
- Assesses the potential, current status, and future prospects of catalysis for biomass conversion and value-added chemicals production

This book is part of a two-volume work that offers a unique blend of information on realistic evaluations of catalyst-based synthesis processes using green chemistry principles and the environmental sustainability applications of such processes for biomass conversion, refining, and petrochemical production. The volumes provide a comprehensive resource of state-of-the-art technologies and green chemistry methodologies from researchers, academics, and chemical and manufacturing industrial scientists. The work will be of interest to professors, researchers, and practitioners in clean energy catalysis, green chemistry, chemical engineering and manufacturing, and environmental sustainability. This volume focuses on the potentials, recent advances, and future prospects of catalysis for biomass conversion and value-added chemicals production via green catalytic routes.Readers are presented with a mechanistic framework assessing the development of product selective catalytic processes forbiomass and biomass-derived feedstock conversion.The book offers a unique combination of contributions from experts working on both lab-scale and industrial catalytic processes and provides insight into the use of various catalytic materials (e.g.,mineral acids, heteropolyacid, metal catalysts, zeolites, metal oxides) for clean energy productionand environmentalsustainability.



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Jian-Ren Shen, Kimiyuki Satoh, Suleyman I. Allakhverdiev (Eds.)

Photosynthesis: Molecular Approaches to Solar Energy Conversion

Series: Advances in Photosynthesis and Respiration

- Brings together a group of top scholars on all aspects of photosynthesis ranging from the structure of photosystems and light-harvesting complexes, to the roles of far-red chlorophylls and artificial photosynthesis
- The most up-to-date elucidation of the structure of photosystem II and the mechanism of photosynthetic water-oxidation
- Comprehensive examinations on the plasticity and adaptation of photosynthetic systems to different environments such as different light, temperature, etc

In the modern world, to meet increasing energy demands we need to develop new technologies allowing us to use eco-friendly carbon-neutral energy sources. Solar energy as the most promising renewable source could be the way to solve that problem, but it is variable depending on day time and season. From this side, the understanding of photosynthesis process could be of significant help for us to develop effective strategies of solar energy capturing, conversion, and storage. Plants, algae, and cyanobacteria perform photosynthesis, annually producing around 100 billion tons of dry biomass. Presently, the detailed studies of photosynthetic system structure make functional investigations of the photosynthetic process available, allowing scientists to construct artificial systems for solar energy transduction. This book summarizes exciting achievements in understanding of photosynthetic structures and mechanisms of this process made by world leaders in photosynthesis field, and contains information about modern ideas in development of revolutionary new technologies of energy conversion. Organized according to the natural sequence of events occurring during photosynthesis, the book includes information of both photosynthetic structures and mechanisms and its applications in bioenergetics issues.

1st ed. 2021, VIII, 132 p.

Eklas Hossain, Slobodan Petrovic

Renewable Energy Crash Course

A Concise Introduction

- **Concise guide to all you need to know about the technology behind renewable energy**
- **Offers case studies and a comparative analysis of different types of renewables available**
- **Provides an alternative to overly detailed textbooks on the subject**

This book is a concise reader-friendly introductory guide to understanding renewable energy technologies. By using simplified classroom-tested methods developed while teaching the subject to engineering students, the authors explain in simple language an otherwise complex subject in terms that enable readers to gain a rapid fundamental understanding of renewable energy, including basic principles, the different types, energy storage, grid integration, and economies. This powerful tutorial is a great resource for students, engineers, technicians, analysts, investors, and other busy professionals who need to quickly acquire a solid understanding of the science of renewable energy technology.

Y.-j. Gao, W. Song, J.L. Liu, S. Bashir (Eds.)

Advances in Sustainable Energy

Policy, Materials and Devices

- Overview on clean energy for policy makers and practitioners including graduate students
- Presents latest developments specific to clean coal
- Provides technical diagrams and how to conduct synthesis and characterization

This books provides a comprehensive platform to the scientific, education and research communities working on various fields related to sustainable energy. It covers the exploration, generation and application of this areato meet societal needs as well as addressing global issues related to the environment. The content of this book presents research related to energy and how to tackle climate change as a comprehensive framework based on the success of the Millennium Development Goals (MDGs). The authors use the scientific method to analyze and deliver viable technical solutions, demonstrating how chemistry and engineering can be combined to solve technically challenging problems. While maintaining high scientific rigor, a quantitative approach is offered in select chapters to the study of energy related to our societies increasing need for electrical and chemical energy feedstocks.

1st ed. 2021, XLIV, 905 p. 424 illus., 344 illus. in color.

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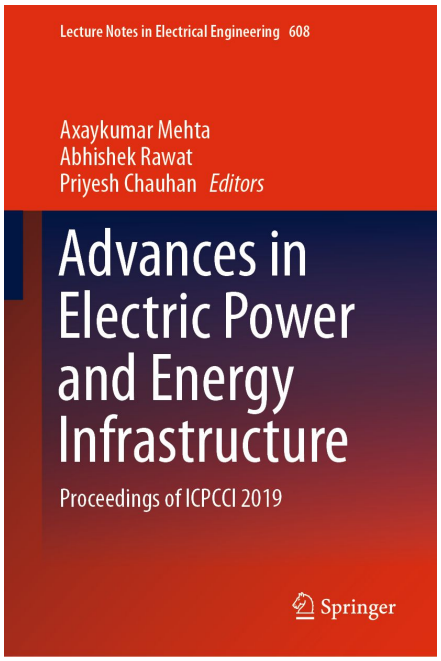
Pawel Oclon

Renewable Energy Utilization Using Underground Energy Systems

Series: Lecture Notes in Energy

- Discusses the challenge of underground energy storage in a comprehensive manner
- Applies the Finite Element Method and Finite Volume Method to the modeling of underground heat transfer
- Discusses the modelling of PVT performance

This book discusses heat transfer in underground energy systems. It covers a wide range of important and practical topics including the modeling and optimization of underground power cable systems, modeling of thermal energy storage systems utilizing waste heat from PV panels cooling. Modeling of PV pannels with cooling. While the performance of energy systems which utilize heat transfer in the ground is not yet fully understood, this book attempts to make sense of them. It provides mathematical modeling fundaments, as well as experimental investigation for underground energy systems. The book shows detailed examples, with solution procedures. The solutions are based on the Finite Element Method and the Finite Volume Method. The book allows the reader to perform a detailed design of various underground energy systems, as well as enables them to study the economic aspects and energy efficiency of underground energy systems. Therefore, this text is of interest to researchers, students, and lecturers alike.



1st ed. 2020, XII, 264 p. 149 illus., 109 illus. in color.

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Axaykumar Mehta, Abhishek Rawat, Priyesh Chauhan (Eds.)

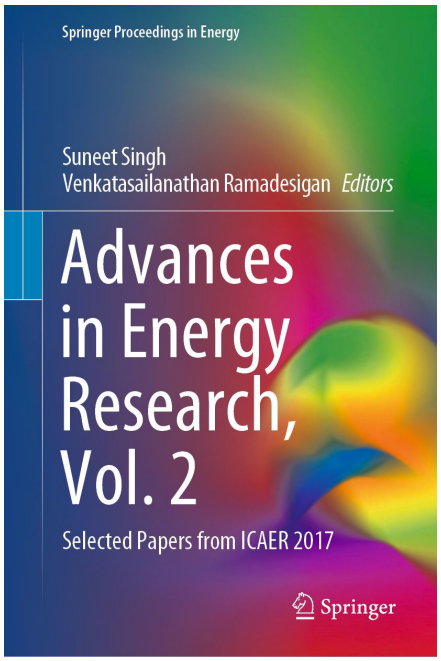
Advances in Electric Power and Energy Infrastructure

Proceedings of ICPCCI 2019

Series: Lecture Notes in Electrical Engineering

- Gathers outstanding research papers presented at the ICPCCI 2019
- Discusses new findings in electric power and energy infrastructure
- Offers a valuable reference guide for researchers and practitioners in academia and industry

This book gathers selected research papers presented at the International Conference on Power, Control and Communication Infrastructure 2019 (ICPCCI 2019), organized by the Institute of Infrastructure, Technology, Research and Management (IITRAM), Ahmedabad, Gujarat, India, on July 4–5, 2019. It highlights the latest advances, trends and challenges in electrical power generation-integration-transmission-distribution-conversion-storage-control, electrical machines, power quality, energy management, electrical infrastructure of future grids-buildings-cities-transportation, energy conversion, plasma technology, renewable energy & grid integration, energy storage systems, power electronic converters, power system protection & security, FACTS and HVDC, power quality, power system operation & control, computer applications in power systems, energy management, energy policies & regulation, power & energy education, restructured power system, future grids, buildings, cities & resiliency, microgrids, electrical machines & drives, transportation electrification, optimal operation, electricity-gas-water coordination, condition monitoring & predictive maintenance of electric equipment, and asset management. The solutions discussed here will encourage and inspire researchers, industry professionals and policymakers to put these methods into practice.



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Suneet Singh, Venkatasailanathan Ramadesigan (Eds.)

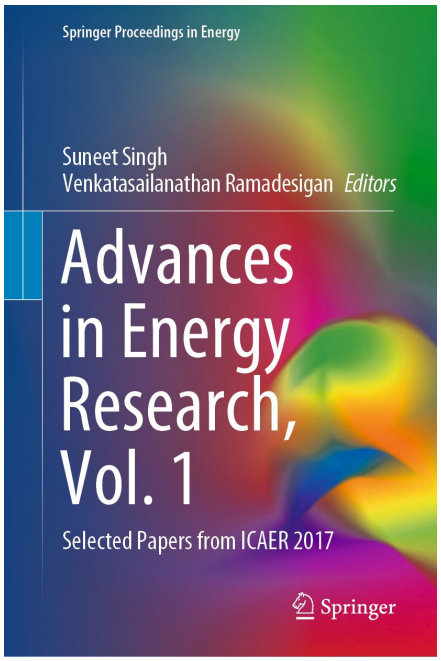
Advances in Energy Research, Vol. 2

Selected Papers from ICAER 2017

Series: Springer Proceedings in Energy

- Presents research relevant to academics, industry experts, and policymakers alike
- Promotes communication and collaboration between diverse research areas
- Covers a broad range of areas relevant to energy research

This book presents selected papers from the 6th International Conference on Advances in Energy Research (ICAER 2017), which cover topics ranging from energy optimization, generation, storage and distribution, and emerging technologies, to energy management, policy, and economics. The book is inter-disciplinary in scope and addresses a host of different areas relevant to energy research, making it of interest to scientists, policymakers, students, economists, rural activists, and social scientists alike.



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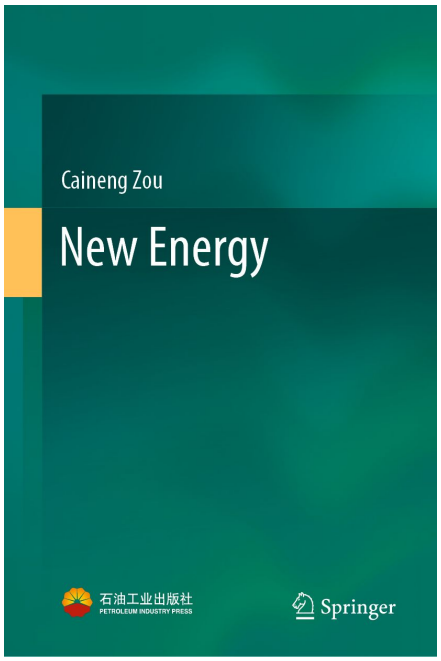

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New Energy

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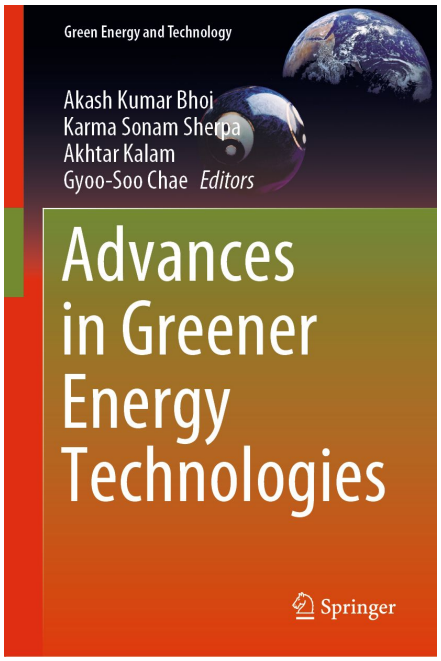

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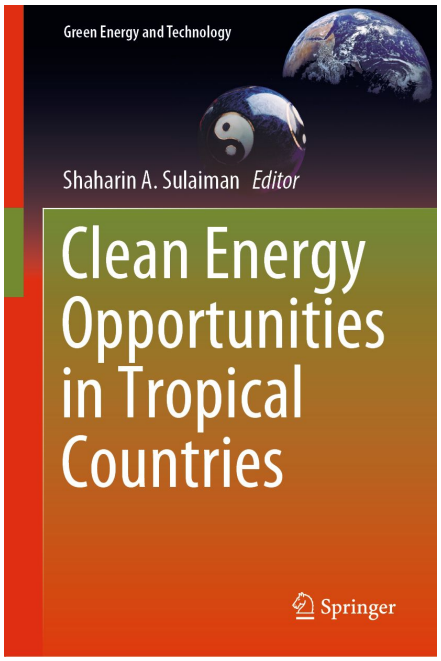

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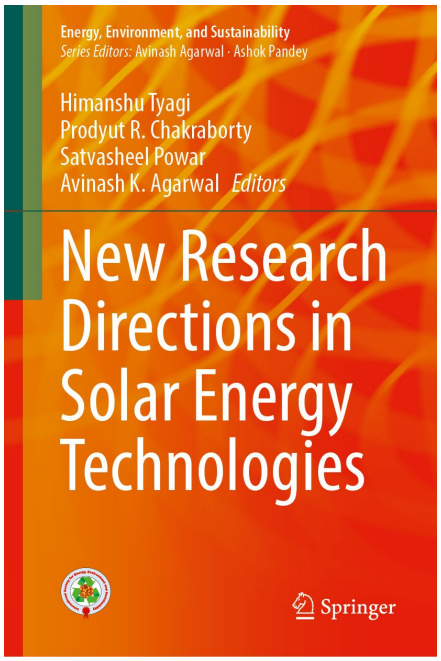

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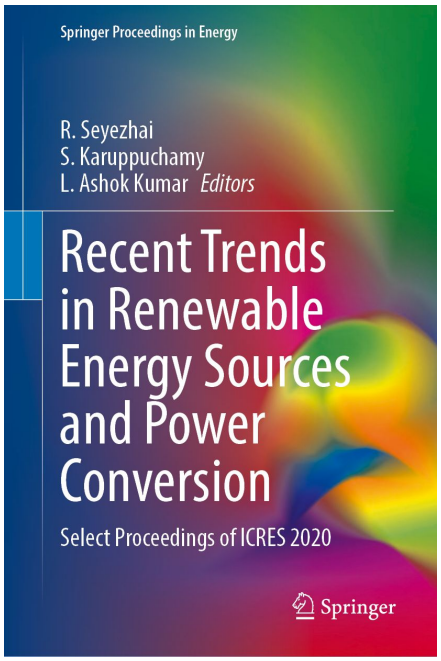

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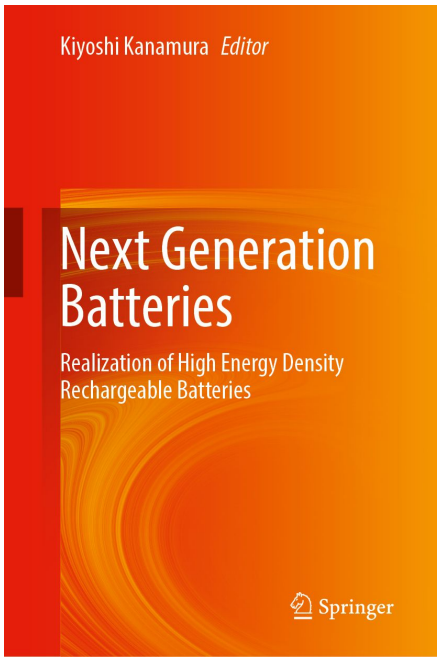
- Discusses about various types of renewable energy resources
- Presents the select proceedings of ICRES 2020

This book presents selected papers from the International Conference on Renewable Energy Systems (ICRES 2020). It throws light over the state of the art of renewable energy sources and their technological advances. Renewable energy sources discussed in this book include solar, wind, biomass, fuel cells, hydropower , hydrogen, nuclear, and geothermal. This book comprehensively explains each of these sources, materials associated, technological development, economics and their impact on the environment. As the renewable energy sources are intermittent, they require specific power electronic converter to convert the generated power into useful form that can be used for utility. Hence, this book describes different forms of power converter such as AC-DC, DC-DC, DC-AC and AC-AC. Advanced power semiconductor devices, their gate drive and protection circuits, heat sink design and magnetic components for power converter are the additional topics included in this book. The topics covered in these proceedings will have a large impact among academicians, researchers, policy makers, scientists, practitioners and students in fields of electronics and electrical engineering, energy engineering, automotive engineering, and so on.



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Kiyoshi Kanamura (Ed.)

Next Generation Batteries

Realization of High Energy Density Rechargeable Batteries

- Reports on the developments and investigations in next-generation batteries
- Enables readers to understand the current status of studies, difficulties in science, and challenging technological issues of next-generation batteries
- Provides a view of the future of next-generation batteries

In this book, the development of next-generation batteries is introduced. Included are reports of investigations to realize high energy density batteries: Li-air, Li-sulfur, and all solid-state and metal anode (Mg, Al, Zn) batteries. Sulfide and oxide solid electrolytes are also reviewed. A number of relevant aspects of all solid-state batteries with a carbon anode or Li-metal anode are discussed and described: The formation of the cathode; the interface between the cathode (anode) and electrolyte; the discharge and charge mechanisms of the Li-air battery; the electrolyte system for the Li-air battery; and cell construction. The Li-sulfur battery involves a critical problem, namely, the dissolution of intermediates of sulfur during the discharge process. Here, new electrolyte systems for the suppression of intermediate dissolution are discussed. Li-metal batteries with liquid electrolytes also present a significant problem: the dendrite formation of lithium. New separators and electrolytes are introduced to improve the safety and rechargeability of the Li-metal anode. Mg, Al, and Zn metal anodes have been also applied to rechargeable batteries, and in this book, new metal anode batteries are introduced as the generation-after-next batteries. This volume is a summary of ALCA-SPRING projects, which constitute the most extensive research for next-generation batteries in Japan. The work presented in this book is highly informative and useful not only for battery researchers but also for researchers in the fields of electric vehicles and energy storage.

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