Woodchips Gasifier Combined Heat And Power

The 1st World Conference and Technology Exhibition on Biomass for Energy and Industry, held in Sevilla in June 2000, brought together for the first time the traditional European Conference on Biomass for Energy and Industry and the Biomass Conference of the Americas, thus creating the largest and most outstanding event in the worldwide biomass sector. The conference elaborated innovative global strategies, projects and efficient practice rules for energy and the environment at a key stage in the industry’s development. New concepts and projects were highlighted to increase the social and political awareness for a change in worldwide resource consumption and to promote economically, socially and environmentally sustainable development for the next millennium. In 2 volumes, the Proceedings include some 470 papers essential to an understanding of current thinking, practice, research and global developments in the biomass sector - a vital reference source for researchers, manufacturers, and policy makers involved or interested in the use of biomass for energy and industry. This is the seventh directory of research, development and demonstration projects carried out within the field of energy, and of energy-related subjects, in the Nordic countries. The directory incorporates projects in progress during 1989. 2209 projects, most of which are financed by special public funds, are described. In addition to projects concerning energy sources, energy utilization and energy conservation, the directory also includes descriptions of research on environmental, ecological and socioeconomic issues, etc., where these are related to the main subject. The directory thus provides direct access to topical information relevant to a very comprehensive field of research. In the appendices the organization of the Nordic Energy
Research Programme, and of energy research in each Nordic country, is explained, and the content and uses of the Nordic data base, Nordic Energy Index, are described. Names of people to contact, addresses, telephone numbers and other useful information, can also be found in addition to details about newsletters providing information on current research in some of the Nordic countries.

"Buildings are currently a major part of the carbon emissions problem. Sustainability at the Cutting Edge indicates how they may become part of the solution. This fully updated new edition deals not only with current best practice and state-of-the-art case studies, but also with the very latest emerging technologies which will transform the relationship between buildings and energy. Professor Peter Smith describes how buildings can be made to significantly reduce their reliance on fossil-based energy by the use of solar and geothermal resources."

"Packed with useful diagrams, charts and full colour photographs, this immensely practical book is a great reference for professionals in the design and construction industry."--BOOK JACKET.

Combined Heat and Power Generation is a concise, up-to-date and accessible guide to the combined delivery of heat and power to anything, from a single home to a municipal power plant. Breeze discusses the historical background for CHP and why it is set to be a key emission control strategy for the 21st Century. Various technologies such as piston engines, gas turbines and fuel cells are discussed. Economic and environmental factors also are considered and analyzed, making this a very valuable resource for those involved with the research, design, implementation and management of the provision of heat and power. Discusses the historical background of combined heat and power usage and why CHP is seen
as a key emission control strategy for the 21st Century Explores the technological aspects of CHP in a clear and concise style and delves into various key technologies, such as piston engines, steam and gas turbines and fuel cells Evaluates the economic factors of CHP and the installation of generation systems, along with energy conversion efficiencies
This book presents a collection of studies on state-of-art techniques for converting biomass to chemical products by means of pyrolysis, which are widely applicable to the valorization of biomass. In addition to discussing the fundamentals and mechanisms for producing bio-oils, chemicals, gases and biochar using pyrolysis, it outlines key reaction parameters and reactor configurations for various types of biomass. Written by leading experts and providing a broad range of perspectives on cutting-edge applications, the book is a comprehensive reference guide for academic researchers and industrial engineers in the fields of natural renewable materials, biorefinery of lignocellulose, biofuels, and environmental engineering, and a valuable resource for university students in the fields of chemical engineering, material science and environmental engineering.
Revised to incorporate and reflect changes and advances since it was first published the new edition of Architecture in a Climate of Change provides the latest basic principals of sustainability and the future of sustainable technology. Including new material on wind generation, domestic water conservation, solar thermal electricity as well as international case studies Architecture in a Climate of Change encourages readers to consider new approaches to building making minimum demand on fossil based energy.
This second volume of Energy Resources and Systems is focused on renewable energy resources. Renewable energy mainly comes from wind, solar, hydropower, geothermal, ocean,
bioenergy, ethanol and hydrogen. Each of these energy resources is important and growing. For example, high-head hydroelectric energy is a well established energy resource and already contributes about 20% of the world’s electricity. Some countries have significant high-head resources and produce the bulk of their electrical power by this method. However, the bulk of the world’s high-head hydroelectric resources have not been exploited, particularly by the underdeveloped countries. Low-head hydroelectric is unexploited and has the potential to be a growth area. Wind energy is the fastest growing of the renewable energy resources for the electricity generation. Solar energy is a popular renewable energy resource. Geothermal energy is viable near volcanic areas. Bioenergy and ethanol have grown in recent years primarily due to changes in public policy meant to encourage its usage. Energy policies stimulated the growth of ethanol, for example, with the unintended side effect of rise in food prices. Hydrogen has been pushed as a transportation fuel. The authors want to provide a comprehensive series of texts on the interlinking of the nature of energy resources, the systems that utilize them, the environmental effects, the socioeconomic impact, the political aspects and governing policies. Volume 1 on Fundamentals and Non Renewable Resources was published in 2009. It blends fundamental concepts with an understanding of the non-renewable resources that dominate today’s society. The authors are now working on Volume 3, on nuclear advanced energy resources and nuclear batteries, consists of fusion, space power systems, nuclear energy conversion, nuclear batteries and advanced power, fuel cells and energy storage. Volume 4 will cover environmental effects, remediation and policy. Solutions to providing long term, stable and economical energy is a complex problem, which links social, economical, technical and environmental issues. It is the goal of the four volume
Energy Resources and Systems series to tell the whole story and provide the background required by students of energy to understand the complex nature of the problem and the importance of linking social, economical, technical and environmental issues. This book will provide assistance to the broad range of readers involved in the crude oil import and production; renewable energy production; biomass analysis and bioconversion; greenhouse gas emissions; techno-economic analysis and government policies for implementing biofuels in India. This book presents important aspects on the large scale production of biofuels following a bio-refinery concept and its commercialization and sustainability issues. Hence, it is a useful resource to policy makers, policy analysts, techno-economic analysts and business managers who deal with commercialization and implementation of bio-based energy and other value-added products. The following features of this book attribute its distinctiveness: As a first uniquely focused scientific and technical literature on bioenergy production in the context of India. To its coverage of technological updates on biomass collection, storage and use, biomass processing, microbial fermentation, catalysis, regeneration, solar energy and monitoring of renewable energy and recovery process. To the technical, policy analysis, climate change, geo-political analysis of bioenergy and green transportation fuels at industrial scale.
Char and Carbon Materials Derived from Biomass: Production, Characterization and Applications provides an overview of biomass char production methods (pyrolysis, hydrothermal carbonization, etc.), along with the characterization techniques typically used (Scanning Electronic Microscopy, X-Ray Fluorescence, Nitrogen adsorption, etc.) In addition, the book includes a discussion of the various properties of biomass chars and their suitable recovery processes, concluding with a demonstration of applications. As biomass can be converted to energy, biofuels and bioproducts via thermochemical conversion processes, such as combustion, pyrolysis and gasification, this book is ideal for professionals in energy production and storage fields, as well as professionals in waste treatment, gas treatment, and more. Provides a discussion of sources of biomass feedstocks, such as agricultural, woody plants and food processing residue Discusses the various production processes of biomass chars, including pyrolysis and hydrothermal carbonization Explores various applications of biomass chars within different industries, including energy and agronomy

The first volume of the "Handbook of Polyhydroxyalkanoates (PHA): Microbial Biosynthesis and Feedstocks" focusses on feedstock aspects, enzymology, metabolism and genetic engineering of PHA biosynthesis. It addresses better understanding the mechanisms of PHA biosynthesis in scientific terms and
profiting from this understanding in order to enhance PHA biosynthesis in biotechnological terms and in terms of PHA microstructure. It further discusses making PHA competitive for outperforming established petrol-based plastics on industrial scale and obstacles for market penetration of PHA. Aimed at professionals and graduate students in Polymer (plastic) industry, wastewater treatment plants, food industry, biodiesel industry, this book Covers the intracellular on-goings in PHA-accumulating bacteria Assesses diverse feedstocks to be used as carbon source for PHA production including current knowledge on PHA biosynthesis starting from inexpensive waste feedstocks Summarizes recent relevant results dealing with PHA production from various organic by-products Presents the key elements to understand and fine-tune the microstructure and sequence-controlled molecular architecture of PHA co-polyesters Discusses the use of CO-rich syngas, sourced from various organic waste materials, for PHA biosynthesis An indispensable tool for the beginning stages of designing and planning a building project This new edition of a classic, bestselling text provides, in one concise volume, the essential information needed to form the framework for the more detailed design and development of any building project. Organized largely by building type, it covers planning criteria and considerations of function and
siting—and with over 6200 diagrams, it provides a mass of data on spatial requirements. Most of the featured illustrations are dimensioned and each building type includes plans, sections, site layouts, and design details. The book also includes an extensive bibliography and detailed set of metric/imperial conversion tables. Architects’ Data starts with the basics of designing for a new building project, before moving on to covering everything an architect needs to know. It also looks at the design styles and specifications for creating different types of structures, such as those made for residential, religious, cultural, sports, medical, and other types of occupation. Covers user requirements, planning criteria, basic dimensions, and considerations of function and siting. Includes numerous examples and over 6200 illustrations and tables. 5th English edition of the classic, international reference for architects. Architects’ Data is an excellent resource for architects, building surveyors, space planners, and design and build contractors everywhere. The papers published in this Special Issue “WP3—Innovation in Agriculture and Forestry Sector for Energetic Sustainability” bring together some of the latest research results in the field of biomass valorization and the process of energy production and climate change and other areas relevant to energetic sustainability [1–20]. Moreover, several works address the very important topic of...
evaluating the safety aspects for energy plant use [21–24]. Responses to our call generated the following statistics: • Submissions (21); • Publications (15); • Rejections (6); • Article types: research articles (13), reviews (2). Of the submitted papers, 15 have been successfully published as articles. Reviewing and selecting the papers for this Special Issue was very inspiring and rewarding. We also thank the editorial staff and reviewers for their efforts and help during the process. For better comprehension, the contributions to this Special Issue are divided into sections, as follows.

Authored by 50 top academic, government and industry researchers, this handbook explores mature, evolving technologies for a clean, economically viable alternative to non-renewable energy. In so doing, it also discusses such broader topics as the environmental impact, education, safety and regulatory developments. The text is all-encompassing, covering a wide range that includes hydrogen as an energy carrier, hydrogen for storage of renewable energy, and incorporating hydrogen technologies into existing technologies. More than two billion people worldwide have currently no access to grid electricity or other efficient energy supply. This is one third of humanity and the majority live in rural areas. The productivity and health of these people are diminished by reliance on traditional fuels and technologies, with women and children suffering
most. Energy is the key element to empower people and ensure water, food and fodder supply as well as rural development. Therefore access to energy should be treated as the fundamental right to everybody. Renewable energy has the potential to bring power, not only in the literal sense, to communities by transforming their prospects. This book offers options that meet the needs of people and communities for energy and engage them in identifying and planning their own provision. It describes updated renewable energy technologies and offers strategies and guidelines for the planning and implementation of sustainable energy supply for individuals and communities.

Pulp and paper mill industries are always associated with the disposal problem of highly contaminated sludge or bio-solids. The development of innovative systems to maximize recovery of useful materials and/or energy in a sustainable way has become necessary. The management of wastes, in particular of industrial waste, in an economically and environmentally acceptable manner is one of the most critical issues facing modern industry, mainly due to the increased difficulties in properly locating disposal works and complying with even more stringent environmental quality requirements imposed by legislation. This book presents a general Introduction on waste management in the pulp and paper industry and contains topics on the generation of waste in pulp and paper mills, waste composition, methods of sludge pre-treatment, processes and technologies.
for conversion of pulp and paper mill waste into valuable products, waste reduction techniques employed in the pulp and paper Industry worldwide and future trends. The Handbook of Polyhydroxyalkanoates (PHA) focusses on and addresses varying facets of PHA biosynthesis and processing, spread across three volumes. The first volume discusses feedstock aspects, enzymology, metabolism and genetic engineering of PHA biosynthesis. It addresses better understanding the mechanisms of PHA biosynthesis in scientific terms and profiting from this understanding in order to enhance PHA biosynthesis in bio-technological terms and in terms of PHA microstructure. It further discusses making PHA competitive for outperforming established petrol-based plastics on industrial scale and obstacles for market penetration of PHA. This second volume focusses on thermodynamic and mathematical considerations of PHA biosynthesis, bioengineering aspects regarding bioreactor design and downstream processing for PHA recovery from microbial biomass. It covers microbial mixed culture processes and includes a strong industry-focused section with chapters on the economics of PHA production, industrial-scale PHA production from sucrose, next generation industrial biotechnology approaches for PHA production based on novel robust production strains, and holistic techno-economic and sustainability considerations on PHA manufacturing. Third volume is on the production of functionalized PHA bio-polyesters, the post-synthetic modification of PHA, processing and additive manufacturing of PHA, development and properties of PHA-
based (bio)composites and blends, the market potential of PHA and follow-up materials, different bulk- and niche applications of PHA, and the fate and use of spent PHA items. Divided into fourteen chapters, it describes functionalized PHA and PHA modification, processing and their application including degradation of spent PHA-based products and fate of these bio-polyesters during compositing and other disposal strategies. Aimed at professionals and graduate students in Polymer (plastic) industry, wastewater treatment plants, food industry, biodiesel industry, this set: Presents comprehensive and holistic consideration of these microbial bioplastics in the volumes. Enables reader to learn about microbiological, enzymatic, genetic, synthetic biology, and metabolic aspects of PHA biosynthesis based on the latest scientific discoveries. Discusses design and operate a PHA production plant. Strong focus on post-synthetic modification, preparation of functional PHA and follow-up products, and PHA processing. Covers all related engineering considerations

Small and micro combined heat and power (CHP) systems are a form of cogeneration technology suitable for domestic and community buildings, commercial establishments and industrial facilities, as well as local heat networks. One of the benefits of using cogeneration plant is a vastly improved energy efficiency: in some cases achieving up to 80–90% systems efficiency, whereas small-scale electricity production is typically at well below 40% efficiency, using the same amount of fuel. This higher efficiency affords users greater energy security and increased long-term sustainability of energy
resources, while lower overall emissions levels also contribute to an improved environmental performance. Small and micro combined heat and power (CHP) systems provides a systematic and comprehensive review of the technological and practical developments of small and micro CHP systems. Part one opens with reviews of small and micro CHP systems and their techno-economic and performance assessment, as well as their integration into distributed energy systems and their increasing utilisation of biomass fuels. Part two focuses on the development of different types of CHP technology, including internal combustion and reciprocating engines, gas turbines and microturbines, Stirling engines, organic Rankine cycle process and fuel cell systems. Heat-activated cooling (i.e. trigeneration) technologies and energy storage systems, of importance to the regional/seasonal viability of this technology round out this section. Finally, part three covers the range of applications of small and micro CHP systems, from residential buildings and district heating, to commercial buildings and industrial applications, as well as reviewing the market deployment of this important technology. With its distinguished editor and international team of expert contributors, Small and micro combined heat and power (CHP) systems is an essential reference work for anyone involved or interested in the design, development, installation and optimisation of small and micro CHP systems. Reviews small- and micro-CHP systems and their techno-economic and performance assessment Explores integration into distributed energy systems and their increasing utilisation of biomass fuels Focuses on the
development of different types of CHP technology, including internal combustion and reciprocating engines.

Supercritical fluids are increasingly being used in energy conversion and fluid dynamics studies for energy-related systems and applications. These new applications are contributing to both the increase of energy efficiency as well as greenhouse gas reduction. Such research is critical for scientific advancement and industrial innovations that can support environmentally friendly strategies for sustainable energy systems.

The Handbook of Research on Advancements in Supercritical Fluids Applications for Sustainable Energy Systems is a comprehensive two-volume reference that covers the most recent and challenging issues and outlooks for the applications and innovations of supercritical fluids. The book first converts basic thermo-dynamic behaviors and “abnormal” properties from a thermophysical aspect, then basic heat transfer and flow properties, recent new findings of its physical aspect and indications, chemical engineering properties, micro-nano-scale phenomena, and transient behaviors in fast and critical environments. It is ideal for engineers, energy companies, environmentalists, researchers, academicians, and students studying supercritical fluids and their applications for creating sustainable energy systems.

The fluidized-bed reactor is the centerpiece of industrial fluidization processes. This book focuses on the design and operation of fluidized beds in many different industrial processes, emphasizing the rationale for choosing fluidized beds for each particular
process. The book starts with a brief history of fluidization from its inception in the 1940’s. The authors present both the fluid dynamics of gas-solid fluidized beds and the extensive experimental studies of operating systems and they set them in the context of operating processes that use fluid-bed reactors. Chemical engineering students and postdocs as well as practicing engineers will find great interest in this book.

This book discusses trends in the energy industries of emerging economies in all continents. It provides the forum for dissemination and exchange of scientific and engineering information on the theoretical generic and applied areas of scientific and engineering knowledge relating to electrical power infrastructure in the global marketplace. It is a timely reference to modern deregulated energy infrastructure: challenges of restructuring electricity markets in emerging economies. The topics deal with nuclear and hydropower worldwide; biomass; energy potential of the oceans; geothermal energy; reliability; wind power; integrating renewable and dispersed electricity into the grid; electricity markets in Africa, Asia, China, Europe, India, Russia, and in South America. In addition the merits of GHG programs and markets on the electrical power industry, market mechanisms and supply adequacy in hydro-dominated countries in Latin America, energy issues under deregulated environments (including insurance issues) and the African Union and new partnerships for Africa's development is considered.

Advanced Biomass Gasification
New Concepts for Efficiency Increase and Product
Limited supplies of fossil fuels and concerns about global warming have created a strong desire to solve the resource issue in the age "beyond petroleum". This reference book, from the "Green Chemistry Series", contains the essential areas of green chemistry and sustainability in modern economies. It is the first book to outline the contribution of chemistry, and of renewable chemical or biological resources, to the sustainability concept and to the potential resolution of the world's energy problems. It describes the current status of technical research, and industrial application, as well as the potential of biomass as a renewable resource for energy generation in power stations, as alternative fuels, and for various uses in chemistry. It outlines the historical routes of the sustainability concept and specifies sustainability in metrics, facts and figures. The book is written by European experts from academia, industry and investment banking who are world leaders in research and technology regarding sustainability, alternative energies and renewable resources. The sustainability aspects covered include: * consumer behaviour and demands, lifestyles and mega trends, and their impact on innovation in the industry * consumer industry requirements and their impact on suppliers * emerging paradigm changes in raw material demand, availability, sourcing, and logistics * the contribution of the industry to restore the life support systems of the Earth * socially responsible banking and investment * sustainability metrics The book highlights the potential of the different forms of renewable raw
materials including: * natural fats and oils * plant-based biologically active ingredients * industrial starch * sucrose * natural rubber * wood * natural fibres It also covers the actual status of biomass usage for green energy generation, green transportation, green chemistry and sustainable nutrition and consumer goods, and it depicts the potentials of green solvents and white biotechnology for modern synthesis and manufacturing technologies. The book is aimed at technical and marketing people in industry, universities and institutions as well as readers in administrations and NGOs. The book will also be of value to the worldwide public interested in sustainability issues and strategies as well as others interested in the practical means that are being used to reduce the environmental impact of chemical processes and products, to further eco-efficiency, and to advance the utilization of renewable resources.

Biomass is a vital source of renewable energy, because it offers a wide range of established and potential methods for energy generation. It is also an important facet of the progression toward a sustainable energy future. The need for further development in the provision of bioenergy is underlined by challenges affecting the biomass resource base, including rising demand for biomass for food, feed, materials and fuel. This is underlined by significant concerns over factors relating to land, such as soil, nutrients and biodiversity. This book examines and analyzes Germany's decade-long initiative toward implementation of an active policy for the transition of the energy system to make greater use of renewable energy sources, which has resulted in a significant
increase in the amount of biomass used for electricity, heat and transport fuel. The book begins with a review of market and resource base issues and moves on to analyze the technical options for a more integrated bioenergy use. The analysis spans the entire bioenergy provision chain including solid, liquid and gaseous biofuels. A case study offers a detailed model of the effects of smart biomass energy on the German energy system. The book closes with a view of the most promising fields and an appraisal of needed elements for a successful transition.

Interest in biomass energy resources from forests, farms and other sources has been rapidly increasing in recent years because of growing concern with reducing carbon dioxide emissions and developing alternatives to increasingly scarce, expensive and insecure oil supplies. The uniqueness of this book is its coverage of biomass energy markets in the US from an economic as well as technical perspective. Existing books typically focus on single markets or technical aspects at the exclusion of economics, and have given greater coverage to biomass energy outside the US. This edited collection has three main parts. Part One provides a historical overview of forest biomass energy use in the US; the major technologies, economics, market prospects, and policies. Part Two presents forest biomass energy assessments, including life cycle and sustainability perspectives, and Part Three includes five sets of regional case studies. After reviewing the history of wood energy use in the US and technology options, the book shows that forests could displace sixteen per cent of domestic
transportation fuel use in 2030. Renewable Energy from Forest Resources in the United States includes a Foreword from Chris Flavin, President of the Worldwatch Institute. Completely revised, this second edition of a bestseller explores the latest technology advancements and the many changes and developments in the utility and environmental regulation areas. It includes new information on the state of deregulation and market pricing as well as discussion of smart grid and other emerging programs. The environmental sections reflect the current emphasis on greenhouse gas emissions and carbon management, updates to CAAA regulations and timelines and the latest developments in the use and control of refrigerants.

The support for polygeneration lies in the possibility of integrating different technologies into a single energy system, to maximize the utilization of both fossil and renewable fuels. A system that delivers multiple forms of energy to users, maximizing the overall efficiency makes polygeneration an emerging and viable option for energy consuming industries. Polygeneration Systems: Design, Processes and Technologies provides simple and advanced calculation techniques to evaluate energy, environmental and economic performance of polygeneration systems under analysis. With specific design guidelines for each type of polygeneration system and experimental performance data, referred both to single components and overall systems, this title covers all aspects of polygeneration from design to operation, optimization and practical implementation. Giving different aspects of both fossil and non-fossil fuel based polygeneration and the
wider area of polygeneration processes, this book helps readers learn general principles to specific system design and development through analysis of case studies, examples, simulation characteristics and thermodynamic and economic data. Detailed economic data for technology to assist developing feasibility studies regarding the possible application of polygeneration technologies. Offers a comprehensive list of all current numerical and experimental results of polygeneration available. Includes simulation models, cost figures, demonstration projects and test standards for designers and researchers to validate their own models and/or to test the reliability of their results.

Our systems are failing. Old models—for education, healthcare and government, food production, energy supply—are creaking under the weight of modern challenges. As the world's population heads towards 10 billion, it's clear we need new approaches. In We Do Things Differently, historian and futurologist Mark Stevenson sets out to find them, across four continents. From Brazilian favelas to high tech Boston, from rural India to a shed inventor in England's home counties, Mark Stevenson travels the world to find the advance guard re-imagining our future. At each stop, he meets innovators who have already succeeded in challenging the status quo, pioneering new ways to make our world more sustainable, equitable and humane. Populated by extraordinary characters—including Detroit citizens who created new jobs and promoted healthy eating by building greenhouses, an Austrian mayor who built a new biomass plant using...
the by-product of a local flooring company, and an Indian doctor who crowdsourced his research and published his findings online—We Do Things Differently—paints a riveting picture of what can be done to address the world’s most pressing dilemmas, offering a much needed dose of down-to-earth optimism. It is a window on (and a roadmap to) a different and better future.

Biomass is set to play an increasing role in the supply of energy, both in the industrialised world and in developing countries, as concern for the state of the global environment grows. The possibility for the acceleration of commercial production has received support from the increasing involvement of the large power producers and the growing political commitments of several European countries. The 9th European Bioenergy Conference was held in Copenhagen, 24-27 June 1996. Interest in this conference series continues to grow and the event attracted around 700 delegates from 45 countries. In contrast to previous events, more emphasis was placed on demonstrating bioenergy technology in the marketplace. Overviews on recent achievements in commercial or near commercial activities formed the main focus of the event, but highlights of advances in science and technological development were also presented, in addition to papers covering environmental aspects of bioenergy. The proceedings contain 350 state-of-the-art papers addressing the following areas; primary production of biomass; provision and production of solid biomass fuels; processes for large power plants; processes for decentralised heat and power production; processes...
for production of transportation fuels; market, economic and environmental aspects of bioenergy and policy measures to overcome non-technical barriers

A comprehensive examination of the large number of possible pathways for converting biomass into fuels and power through thermochemical processes. Bringing together a widely scattered body of information into a single volume, this book provides complete coverage of the many ways that thermochemical processes are used to transform biomass into fuels, chemicals and power. Fully revised and updated, this new edition highlights the substantial progress and recent developments that have been made in this rapidly growing field since publication of the first edition and incorporates up-to-date information in each chapter.

Thermochemical Processing of Biomass: Conversion into Fuels, Chemicals and Power, 2nd Edition incorporates two new chapters covering: condensed phased reactions of thermal deconstruction of biomass and life cycle analysis of thermochemical processing systems. It offers a new introductory chapter that provides a more comprehensive overview of thermochemical technologies. The book also features fresh perspectives from new authors covering such evolving areas as solvent liquefaction and hybrid processing. Other chapters cover combustion, gasification, fast pyrolysis, upgrading of syngas and bio-oil to liquid transportation fuels, and the economics of thermochemically producing fuels and power, and more. Features contributions by a distinguished group of European and American researchers offering a broad and unified description of thermochemical processing options for biomass. Combines an overview of the current status of thermochemical biomass conversion as well as engineering aspects to appeal to the broadest audience. Edited by one of Biofuels Digest’s "Top 100 People" in bioenergy for six consecutive years.
Biomass: Conversion into Fuels, Chemicals and Power, 2nd Edition will appeal to all academic researchers, process chemists, and engineers working in the field of biomass conversion to fuels and chemicals. It is also an excellent book for graduate and advanced undergraduate students studying biomass, biofuels, renewable resources, and energy and power generation. Advanced Biomass Gasification: New Concepts for Efficiency Increase and Product Flexibility provides a thorough overview on new concepts in biomass gasification and consolidated information on advances for process integration and combination, which could otherwise only be gained by reading a high number of journal publications. Heidenreich, Müller and Foscolo, highly respected experts in this field, start their exploration with the compact UNIQUE reactor, gasification and pyrolysis, gasification and combustion, and catalysts and membranes. The authors then examine biomass pre-treatment processes, taking into account the energy balance of the overall conversion process, and look into oxygen-steam gasification and solutions for air separation, including new options for integration of O2-membranes into the gasifier. Several polygeneration strategies are covered, including combined heat and power (CHP) production with synthetic natural gas (SNG), biofuels and hydrogen, and new cutting-edge concepts, such as plasma gasification, supercritical water gasification, and catalytic gasification, which allows for insights on the future technological outlook of the area. This book is then a valuable resource for industry and academia-based researchers, as well as graduate students in the energy and chemical sectors with interest in biomass gasification, especially in areas of power engineering, bioenergy, chemical engineering, and catalysis. Explores state-of-the-art technologies that allow for greater efficiency and flexibility in gasification, including process integration, combination, and polygeneration strategies.
was, up until now, scattered among several sources, including journal articles. Provides a valuable resource for industry and academia-based researchers, as well as graduate students in the energy and chemical sectors with interest in biomass gasification, especially in areas of power engineering, bioenergy, chemical engineering, and catalysis.

This book addresses the science and technology of the gasification process and the production of electricity, synthetic fuels and other useful chemicals. Pursuing a holistic approach, it covers the fundamentals of gasification and its various applications. In addition to discussing recent advances and outlining future directions, it covers advanced topics such as underground coal gasification and chemical looping combustion, and describes the state-of-the-art experimental techniques, modeling and numerical simulations, environmentally friendly approaches, and technological challenges involved. Written in an easy-to-understand format with a comprehensive glossary and bibliography, the book offers an ideal reference guide to coal and biomass gasification for beginners, engineers and researchers involved in designing or operating gasification plants.

Researchers, politicians and lay persons around the world agree that renewable energy technologies will play an increasingly important role in strengthening national economies in the future. The renewable energy industry has the potential to significantly increase power capacity of several countries and subsequently create many jobs. This book examines recent advances in specific renewable energy systems. Readers will learn about theoretical and applied perspectives which are key to addressing the major issues associated with such systems. Chapters cover solar energy systems, thermal energy storage, bioenergy, hydrogen production, geothermal energy and measurement techniques for these energy systems.
Students in engineering programs, and engineers working in academia and the renewable energy sector will be able to broaden their understanding of complex renewable energy projects through the comprehensive overview of both the fundamental concepts and the technical issues covered in the text. Integrated Gasification Combined Cycle (IGCC) Technologies discusses this innovative power generation technology that combines modern coal gasification technology with both gas turbine and steam turbine power generation, an important emerging technology which has the potential to significantly improve the efficiencies and emissions of coal power plants. The advantages of this technology over conventional pulverized coal power plants include fuel flexibility, greater efficiencies, and very low pollutant emissions. The book reviews the current status and future developments of key technologies involved in IGCC plants and how they can be integrated to maximize efficiency and reduce the cost of electricity generation in a carbon-constrained world. The first part of this book introduces the principles of IGCC systems and the fuel types for use in IGCC systems. The second part covers syngas production within IGCC systems. The third part looks at syngas cleaning, the separation of CO2 and hydrogen enrichment, with final sections describing the gas turbine combined cycle and presenting several case studies of existing IGCC plants. Provides an in-depth, multi-contributor overview of integrated gasification combined cycle technologies Reviews the current status and future developments of key technologies involved in IGCC plants Provides several case studies of existing IGCC plants around the world

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