

## Access Free Bioeconomy For Sustainable Development

# *Bioeconomy For Sustainable Development*

Sustainable development remains a significant issue in a globalized world requiring new economic standards and practices for the betterment of the environment as well as the world economy. However, sustainable economics must manage environmental solutions to issues on multiple levels and within various disciplines. There is a need for studies

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that seek to understand how environmental economics and governance within small and large sectors affect the capability and wellbeing of the global economy. *Advanced Integrated Approaches to Environmental Economics and Policy: Emerging Research and Opportunities* is an essential publication that focuses on the strategic role of environmental issues within the global economy. While highlighting topics such as complementary currency, reusable waste, and urban planning, this book is ideally designed for policymakers,

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environmental lawyers, economists, sociologists, politicians, academicians, researchers, and students seeking current research on increasing an organization's sustainable performance at both public and private levels.

This book gathers contributions from scientists and industry representatives on achieving a sustainable bioeconomy. It also covers the social sciences, economics, business, education and the environmental sciences. There is an urgent need to optimise and maximise the use of

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biological resources, so that primary production and processing systems can generate more food, fibre and other bio-based products with less environmental impacts and lower greenhouse gas emissions. In other words, we need a "sustainable bioeconomy" - a term that encompasses the sustainable production of renewable resources from land, fisheries and aquaculture environments and their conversion into food, feed, fibre bio-based products and bio-energy, as well as related public goods. Despite the

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relevance of achieving a sustainable bioeconomy, there are very few publications in this field. Addressing that gap, this book illustrates how biological resources and ecosystems could be used in a more sustainable, efficient and integrated manner - in other words, how the principles of sustainable bioeconomy can be implemented in practice. Given its interdisciplinary nature, the field of sustainable bioeconomy offers a unique opportunity to address complex and interconnected challenges, while also

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promoting economic growth. It helps countries and societies to make a transition and to use resources more efficiently, and shows how to rely less on biological resources to satisfy industry demands and consumer needs. The papers are innovative, cross-cutting and include many practice-based lessons learned, some of which are reproducible elsewhere. In closing, the book, prepared by the Inter-University Sustainable Development Research Programme (IUSDRP) and the World Sustainable Development Research and

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Transfer Centre (WSD-RTC), reiterates the need to promote a sustainable bioeconomy today.

The 2018 EU Bioeconomy Strategy aims to develop a circular, sustainable bioeconomy for Europe, strengthening the connection between economy, society, and environment. It addresses global challenges such as meeting the Sustainable Development Goals (SDGs) set by the United Nations and the climate objectives of the Paris Agreement. A circular, sustainable bioeconomy can be a core instrument for the Green Deal in

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the post-COVID-19 era, making the EU more sustainable and competitive. In this context, the EC (Joint Research Centre in collaboration with DG Research and Innovation) created an ad-hoc external Network of Experts (NoE) through individual contracts to contribute to the EC's Knowledge Centre for Bioeconomy with forward-looking analysis needed for exploring possible scenarios towards a sustainable, clean, and resource-efficient bioeconomy, with a focus on climate-neutrality and sustainable development.



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The first work package concerned knowledge synthesis and foresight. This report presents the results of a collaborative foresight process which elaborated four scenarios for the future EU bioeconomy until 2050: Scenario 1: Do it for us - proactive policy, Paris target nearly achieved (2 °C global temperature increase by 2100), no societal change (Business As Usual trend for consumption) Scenario 2: Do it together - integrative policy, Paris target fully achieved (1.5 °C global temp. increase by 2100), fundamental societal

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change (towards sustainable consumption)

Scenario 3: Do it ourselves - societal action, Paris target missed (global temperature increase 2.5 °C by 2100), fundamental societal change (towards sustainable consumption) Scenario 4: Do what is unavoidable - reactive policy, Paris target clearly missed (3.5 °C global temperature increase by 2100), no societal change (Business As Usual trend for consumption) Finally, this report presents initial reflections on transition pathways gained from these scenarios in 2050, and

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insights for the future of the bioeconomy in Europe, and abroad, with a focus on implementing a circular, sustainable, and transformative BioWEconomy, not only in the EU, but globally.

This book provides an interdisciplinary and comprehensible introduction to bioeconomy. It thus provides basic knowledge for understanding a transformation process that will shape the 21st century and requires the integration of many disciplines and industries that have had little to do with each other up

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to now. We are talking about the gradual and necessary transition from the age of fossil fuels, which began around 200 years ago, to a global economy based on renewable raw materials (and renewable energies). The success of this transition is key to coping with the challenge of climate change. This book conceives the realization of bioeconomy as a threefold task - a scientific, an economic and an ecological one. • Where does the biomass come from that we need primarily for feeding the growing world population but

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also for future energy and material use? How can it be processed in biorefineries and what role does biotechnology play in this regard? • Which aspects of innovation economics need to be considered, which economic aspects of value creation, competitiveness and customer acceptance are important? • What conditions must a bioeconomy fulfil in order to enable a sustainable development of life on earth? May it be regarded as a key to further economic growth or shouldn't it rather orient itself towards the ideal of

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sufficiency? By dealing with these questions from the not necessarily consistent perspectives of proven experts, this book provides an interdisciplinary overview of a dynamic field of research and practice that raises more questions than answers and thus may nurture the motivation of many more people to seriously engage for the realization of a bioeconomy.

The Role of Bioenergy in the Bioeconomy: Resources, Technologies, Sustainability and Policy provides the reader with a

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complete understanding on how bioenergy technologies fit into the new bioeconomy paradigm. Sections focus on the main resources and technologies for bioenergy and its integration in energy systems and biorefining chains, analyze the available methodologies for assessing the sustainability of bioenergy, and address and the propose approaches that are demonstrated through concrete case studies. Additionally, the implications of bioenergy in the water-energy and land nexus is presented, along with new

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challenges and opportunities. This book's strong focus on sustainability of bioenergy, both as a standalone, and in the larger context of a bio-based economy, makes it a useful resource for researchers, professionals and students in the bioenergy field who need tactics to assess the lifecycle and sustainability of bioenergy technologies and their integration into existing systems.

Presents a complete overview of the main challenges that bioenergy will have to overcome in order to play a key role in



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future energy systems Explores sustainability aspects in detail, both qualitatively and by applying proposed methodologies to concrete bioenergy case studies Covers, in detail, the water-energy-land nexus implications and governance aspects

In recent years, there has been a rapid expansion of the growing of crops for use in bioenergy production rather than for food. This has been particularly the case for sugarcane in Latin America and Africa. This book examines the further potential

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in the context of the food versus fuel debate, and as a strategy for sustainable development. Detailed case studies of two countries, Colombia and Mozambique, are presented. These address the key issues such as the balance between food security and energy security, rural and land development policies, and feasibility and production models for expanding bioenergy. The authors then assess these issues in the context of broader sustainable development strategies, including implications for economics, employment

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generation, and the environment. The book will be of great interest to researchers and professionals in energy and agricultural development.

Bioeconomy includes agriculture, forestry, food industry, fish farming, chemical, pharmaceutical, cosmetic and textile industries as well as energy production based biomass as the main raw material. The impact of bioeconomy includes replacement of non-renewable resources by biobased ones e.g. in production of energy, plastics and medicine. Bioeconomy can be

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considered sustainable if it is ensured that resources are spent reasonably and in a strategic manner and that they are used in most efficient way by producing high value products. Such a bioeconomy is able to improve the supply security of the country in terms of major resources, such as food, fuels and materials as well as to create an opportunity of a new knowledge based intensive industry. The potential for renewable energy provided by bioresources is an important contribution to sustainability. Biomass is considered to

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be a renewable resource because it receives energy from the sun, but only as long as the nutrients used for growth are returned to the land. Bioeconomy can alleviate poverty by adopting technologies such as bee-keeping, lac cultivation, edible mushroom production etc. which can be implemented by people who remain below poverty line. They need training and guidance in marketing their products.

[Safeguarding the Bioeconomy](#)

[Delivering Sustainable Green Growth](#)

[Meeting Policy Challenges for a](#)

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[Sustainable Bioeconomy](#)

[Sustainable Development Goals](#)

[Valuable Insights Into the Linkages](#)

[Between the Sustainable Bioeconomy and Sustainable Development Goals](#)

[Indicators to monitor and evaluate the sustainability of bioeconomy](#)

[Towards a Sustainable Bioeconomy:](#)

[Principles, Challenges and Perspectives](#)

[Reintegrating Trans-disciplinary Research and Sustainable Development Goals](#)

[Policy Dialogue on a Bioeconomy for](#)

[Sustainable Development in the Baltic Sea](#)

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[Region](#)

[Waste Biorefinery](#)

***This book is open access under a CC BY 4.0 license. This book defines the new field of "Bioeconomy" as the sustainable and innovative use of biomass and biological knowledge to provide food, feed, industrial products, bioenergy and ecological services. The chapters highlight the importance of bioeconomy-related concepts in public, scientific, and political discourse. Using an interdisciplinary approach, the authors outline the dimensions of the bioeconomy as a means of achieving***

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***sustainability. The authors are ideally situated to elaborate on the diverse aspects of the bioeconomy. They have acquired in-depth experience of interdisciplinary research through the university's focus on "Bioeconomy", its contribution to the Bioeconomy Research Program of the federal state of Baden-Württemberg, and its participation in the German Bioeconomy Council. With the number of bioeconomy-related projects at European universities rising, this book will provide graduate students and researchers with background information on the bioeconomy. It***



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***will familiarize scientific readers with bioeconomy-related terms and give scientific background for economists, agronomists and natural scientists alike.***

***Research and innovation in the life sciences is driving rapid growth in agriculture, biomedical science, information science and computing, energy, and other sectors of the U.S. economy. This economic activity, conceptually referred to as the bioeconomy, presents many opportunities to create jobs, improve the quality of life, and continue to drive economic growth. While the United States has been a leader in advancements***

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***in the biological sciences, other countries are also actively investing in and expanding their capabilities in this area. Maintaining competitiveness in the bioeconomy is key to maintaining the economic health and security of the United States and other nations. Safeguarding the Bioeconomy evaluates preexisting and potential approaches for assessing the value of the bioeconomy and identifies intangible assets not sufficiently captured or that are missing from U.S. assessments. This study considers strategies for safeguarding and sustaining the economic***

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***activity driven by research and innovation in the life sciences. It also presents ideas for horizon scanning mechanisms to identify new technologies, markets, and data sources that have the potential to drive future development of the bioeconomy.***

***This book is a review of the basic problems associated with the implementation of bioeconomic processes. The book contains chapters developed by teams from different countries of the world and therefore the chapters correspond to the degree of advancement of the areas within the bioeconomy***

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***in these countries. In selected areas, basic concepts and selected technological processes that create this area of the economy to ensure sustainable development have been characterized.***

***The current era of incredible innovations has made science and technology one of the most powerful tools to meet the goals of incremental prosperity for humans and sustainable development. The development of the biotech industry in any given country is shaped by the characteristics of the technology—particularly its close relation to scientific knowledge—and by***

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***country-specific factors—the level and nature of the scientific knowledge base, the institutional set-up, and the role assumed by the government—which influence the country's ability to exploit new opportunities and appropriate the respective results. This book presents an integrated approach for sustained innovation in various areas of biotechnology. Focusing mainly on the industrial, socio-economic and legal implications of biotechnological advances, it examines in detail not only the implications of IPR in omics-based research but also the ethical and intellectual***

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***standards and how these can be developed for sustained innovation. Integrating science and business, it offers a peek behind the scenes of the biotech industry and provides a comprehensive analysis of the foundations of the present day industry for students and professionals alike. The book is divided into three parts: Food and Agricultural Biotechnology Industrial Biotechnology Pharmaceutical Biotechnology Bioremediation and Bioeconomy provides a common platform for scientists from various backgrounds to find sustainable solutions to***

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***environmental issues, including the ever-growing lack of water resources which are under immense pressure due to land degradation, pollution, population explosion, urbanization, and global economic development. In addition, large amounts of toxic waste have been dispersed in thousands of contaminated sites and bioremediation is emerging as an invaluable tool for environmental clean-up. The book addresses these challenge by presenting innovative and cost-effective solutions to decontaminate polluted environments, including usage of contaminated land and waste water for***

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***bioproducts such as natural fibers, biocomposites, and fuels to boost the economy. Users will find a guide that helps scientists from various backgrounds find sustainable solutions to these environmental issues as they address the topical issues crucial for understanding new and innovative approaches for sustainable development. Provides a compilation of new information on phytoremediation not found in other books in the present market The first book to link phytoremediation and the bioeconomy Includes strategies to utilize contaminated soils for producing bioresources and co-generation of***



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***value chain and value additions products  
Waste Biorefinery: Potential and Perspectives  
offers data-based information on the most  
cutting-edge processes for the utilisation of  
biogenic waste to produce biofuels, energy  
products, and biochemicals - a critical aspect of  
biorefinery. The book explores recent  
developments in biochemical and thermo-  
chemical methods of conversion and the  
potential generated by different kinds of  
biomass in more decentralized biorefineries.  
Additionally, the book discusses the move from  
200 years of raw fossil materials to renewable***

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***resources and how this shift is accompanied by fundamental changes in industrial manufacturing technologies (from chemistry to biochemistry) and in logistics and manufacturing concepts (from petrochemical refineries to biorefineries). Waste Biorefinery: Potential and Perspectives designs concepts that enable modern biorefineries to utilize all types of biogenic wastes, and to integrate processes that convert byproduct streams to high-value products, achieving higher cost benefits. This book is an essential resource for researchers and students studying biomass, biorefineries, and***

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***biofuels/products/processes, as well as chemists, biochemical/chemical engineers, microbiologists, and biotechnologists working in industries and government agencies. Details the most advanced and innovative methods for biomass conversion Covers biochemical and thermo-chemical processes as well as product development Discusses the integration of technologies to produce bio-fuels, energy products, and biochemicals Illustrates specific applications in numerous case studies for reference and teaching purposes The COVID-19 pandemic is causing an***

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***unprecedented global health crisis and socio-economic upheaval and led to severe consequences well beyond previous crises of the last decades which mostly were related to financial issues. COVID-19 caused sudden economic, psychological, and partly physical shocks to markets, societal sub-systems (e.g., education, food, health), and people. As a direct consequence, today, food security and resilience are at stake. The effects on bio-based products and bioenergy (in particular: biofuels) vary and their role in the recovery (with possible changes in customer's behaviour) could differ as well. The***

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***linkages of the bioeconomy to post-pandemic recovery with regard to impacts and possible responses are currently being discussed by many institutions and initiatives, even though there is currently limited data on the impact of the pandemic on the bioeconomy. This report presents preliminary results based on initial analysis from the authors on knowledge synthesis on the EU bioeconomy system, trends, and perspectives of the future development towards 2030 and 2050.***

**[Resources, Technologies, Sustainability and Policy](#)**

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**[Pathways to Sustainable Development Goals](#)**

**[The Bioeconomy](#)**

**[Bioremediation and Bioeconomy](#)**

**[Knowledge Synthesis : Final Report](#)**

**[The Role of Bioenergy in the Emerging](#)**

**[Bioeconomy](#)**

**[Constraints and Opportunities for Sustainable Development](#)**

**[The bioscience revolution in Europe and Africa](#)**

**[Transition Towards a Sustainable Biobased Economy](#)**

**[Policy Dialogue on a Bioeconomy for Sustainable Development in Thailand](#)**

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Current Developments in Biotechnology and Bioengineering: Sustainable Bioresources for the Emerging Bioeconomy outlines recent advances in bioenergy, biorefinery and the bioeconomy, an essential element for a 21st century bio-based society. The book provides information on biomass and various conversion technologies with different parameters that affect the conversion process. Sections cover different bioproducts, biorefinery systems, energy and greenhouse gas emission balances of bioenergy and biorefinery, and environmental and economic footprints of bioeconomy. Finally, different strategies adopted by developed and developing countries for the

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promotion and implementation of a bioeconomy concept for a bio-based society are systematically covered. The book provides comprehensive information starting from early progress to the latest trends on bioenergy, biorefinery and bioeconomy with special reference to the developed and the developing countries and the linkage between bioeconomy and climate change mitigation in simple scientific language to appeal to a wider audience. Includes the fundamentals and concepts of biomass and bioenergy Outlines recent technology development for biomass conversion Provides concept for different bioproducts Covers global strategies and policies on the development of



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bioeconomies

Globally we are being confronted by the depletion of many natural resources as a result of unsustainable use and increasing global population. Although the debate on the bioeconomy has gained momentum in recent decades, the interest in certifications and standards for biobased products is still weak. This book aims to fill this gap by promoting a holistic approach, which covers environmental, social and economic sustainability aspects and pushes forward the development of a circular, biobased economy. This book promotes the development of sustainability schemes (including standards, labels and certifications) for the assessment of biobased

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products, which are fundamental to the establishment of a cutting-edge sustainable bioeconomy. Chemical-related, globally relevant case studies are used throughout the book. The content covers a range of issues from upstream and downstream environmental, techno-economic and social assessment, to crosscutting issues such as indirect land use change (iLUC) and end-of-life options. The chapters included in this book will provide a comprehensive review of recent works on life cycle assessment (LCA), life cycle costing (LCC) and social life cycle assessment (s-LCA) methodologies. An important resource for researchers, industrial professionals and policy

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makers involved in the bioeconomy.

In some cases, technology-based projects have revolutionized the way of living by contributing to job and wealth creation. These types of ventures, regardless of their outstanding relevance, are the exception rather than the norm in that they account for only a very small percentage of entrepreneurial activity. Although not ignoring these important ventures, the main goal of this title is to fully unleash the wide potential of the entrepreneurial activity, exploring and highlighting the somewhat hidden part, which is ultimately responsible for the largest part of new businesses and, as a consequence, for the wellbeing of millions of people virtually

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everywhere. The Handbook of Research on Approaches to Alternative Entrepreneurship Opportunities is a collection of innovative research on the methods and applications of entrepreneurial activity beyond the traditional boundaries of entrepreneurship research. While highlighting topics including collective business, organizational performance, and generational differences, this book is ideally designed for entrepreneurs, developers, researchers, business managers, industry professionals, academicians, and students seeking to draw attention to distinctive and multifaceted types of entrepreneurship.

This publication investigates key aspects surrounding

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the sustainability of bioeconomy development: the use of biomass as feedstock for future production; the design and building of biorefineries for the manufacture of a range of fuels, chemicals and materials, and also for electricity generation.

This publication investigates key aspects surrounding the sustainability of bioeconomy development: the use of biomass as feedstock for future production; the design and building of biorefineries for the manufacture of a range of fuels, chemicals and materials, and also for electricity generation; and the use of biotechnologies such as synthetic biology, metabolic engineering and gene editing. Today more than 50 countries have a dedicated bioeconomy

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strategy or related policies. While the bioeconomy is consistent with sustainability policy (examples are the circular economy, the UN Sustainable Development Goals, green growth, re-industrialisation, rural regeneration, climate change mitigation), synergies must be ensured to avoid over-exploitation of natural resources and conflicting global needs.

This book examines the bioeconomy concept, analysing the opportunities it can generate, the constraints and the potential benefits for society. The main objective of bioeconomy is to promote economic development, by creating jobs and enhancing the sustainable utilization of bio-resources. A primary

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driver of bioeconomy strategy, therefore, is the need to respond to the growing population's food and economic requirements. While today research and literature related to bioeconomy are limited, this book presents a unique collection of perspectives on the complex dimensions of the bioeconomy debate. Drawing on the experiences from Europe, Asia and Africa, it presents an international overview. The chapters address a wide range of issues, including coastal-land interactions, ecosystem services, food production, rural development, agriculture, forest management and bioenergy. As a whole, the volume outlines what role bioeconomy can play in contributing to the United Nations Sustainable

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Development Goals (SDGs) without compromising on the ecological sustainability and equitable distribution of benefits. The book concludes by providing recommendations for developing bioeconomy in respective sectors (agriculture, forestry, fisheries, renewable energy) and directions for planning future bioeconomy programmes and strategies. The Bioeconomy Approach will be of great interest to students and scholars of ecological economics, development economics and environmental economics, as well as policy-makers and practitioners involved in sustainable development.

The current era of incredible innovations has made



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science and technology one of the most powerful tools to meet the goals of incremental prosperity for humans and sustainable development. The development of the biotech industry in any given country is shaped by the characteristics of the technology-particularly its close relation to scientific knowledge-and by country-specific factors-the level and nature of the scientific knowledge base, the institutional set-up, and the role assumed by the government-which influence the country's ability to exploit new opportunities and appropriate the respective results. This book presents an integrated approach for sustained innovation in various areas of biotechnology. Focusing mainly on the industrial,

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socio-economic and legal implications of biotechnological advances, it examines in detail not only the implications of IPR in omics-based research but also the ethical and intellectual standards and how these can be developed for sustained innovation. Integrating science and business, it offers a peek behind the scenes of the biotech industry and provides a comprehensive analysis of the foundations of the present day industry for students and professionals alike. The book is divided into three parts: Food and Agricultural Biotechnology Industrial Biotechnology Pharmaceutical Biotechnology.

[Bioeconomy](#)  
[Bio#Futures](#)

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[Handbook of Research on Approaches to Alternative Entrepreneurship Opportunities](#)

[Creating Sustainable Bioeconomies](#)

[Advanced Integrated Approaches to Environmental Economics and Policy: Emerging Research and Opportunities](#)

[The Bioeconomy Approach](#)

[Sugarcane Bioenergy for Sustainable Development](#)

[Foreseeing and Exploring the Bioeconomy](#)

[Foresight Scenarios for the EU Bioeconomy in 2050](#)

[Future Transitions for the Bioeconomy Towards Sustainable Development and a Climate-neutral Economy](#)

This volume concentrates on the recent scientific

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advancements in agricultural biotechnology and reintegrates it with socio-economic, industrial and intellectual property aspects of agricultural biotechnology and its implications for accomplishing the sustainable development goals. Adopting a unique approach, this book amalgamates science and business perspectives from an insider's viewpoint on the agro-biotech industry, laying the foundations for students and professionals alike. This book: Is a first of its kind by addressing the recent issues emerging in agro-based economies. Will be a single-point source for recent advancements in agro-based global bioeconomy. Empowers the utilization of biotechnology to address worldwide ecological issues by supporting sustainable resolutions for global agricultural markets. Gives both foundational

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hypothesis and functional direction on commercialization and regulatory issues. Empowers the usage of adaptable approaches that can adjust to and uphold socially and financially valuable agro-based technologies.

The updated EU Bioeconomy Strategy aims to develop a sustainable and circular bioeconomy for Europe, strengthening the connection between economy, society, and the environment, thereby addressing global challenges such as meeting the United Nations' Sustainable Development Goals and the climate objectives of the Paris Agreement. To guide policy making in the transition, knowledge and forward-looking capacities are needed. These capacities include quantitative modelling tools, which can support a better understanding of the complexity, trade-offs, and potential

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pathways to achieve the transition. This report (i) analyses the existing capacity and needs for an improved bioeconomy modelling to integrate all three dimensions of sustainability and (ii) provides recommendations for developing new and improved models that are better suited to assist policy making.

Developing the Global Bioeconomy: Technical, Market, and Environmental Lessons from Bioenergy brings together expertise from three IEA-Bioenergy subtasks on pyrolysis, international trade, and biorefineries to review the bioenergy sector and draw useful lessons for the full deployment of the bioeconomy. Despite the vast amount of politically driven strategies, there is little understanding on how current markets will transition towards a global bioeconomy. The

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question is not only how the bioeconomy can be developed, but also how it can be developed sustainably in terms of economic and environmental concerns. To answer this question, this book's expert chapter authors seek to identify the types of biorefineries that are expected to be implemented and the types of feedstock that may be used. They also provide historical analysis of the developments of biopower and biofuel markets, integration opportunities into existing supply chains, and the conditions that would need to be created and enhanced to achieve a global biomass trade system that could support a global bioeconomy. As expectations that a future bioeconomy will rely on a series of tradable commodities, this book provides a central accounting of the state of the discussion in a multidisciplinary approach

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that is ideal for research and academic experts, and analysts in all areas of the bioenergy, biofuels, and bioeconomy sectors, as well as those interested in energy policy and economics. Examines the lessons learned by the bioenergy industry and how they can be applied to the full development of the bioeconomy Explores different transition strategies and how the current fossil based and future bio-based economy are intertwined Reviews the status of current biomass conversion pathways Presents an historical analysis of the developments of biopower and biofuel markets, integration opportunities into existing supply chains, and the conditions that would need to be created and enhanced to achieve a global biomass trade system

This presentation addresses the recognition that the



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sustainability of the bioeconomy requires strong interlinkages between existing and developing industries in agriculture (terrestrial and aquatic); forestry; waste and residue management in rural, industrial, and urban environments; the chemicals and biotechnology industry in terms of production of substitutes or better performing materials and chemicals; and in the fuels and power sectors. The transition to a low-carbon intensity economy requires the integration of systems and uses circular economy concepts to increase resource use efficiency and security for all biomass and other resources used as well. It requires innovation along the whole supply chains as well as research, development, and demonstration of the integrated systems with strong partnerships from the landscapes and watersheds where biomass is planted all the

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way to the many applications.

Presents comprehensive coverage of process intensification and integration for sustainable design, along with fundamental techniques and experiences from the industry. Drawing from fundamental techniques and recent industrial experiences, this book discusses the many developments in process intensification and integration and focuses on increasing sustainability via several overarching topics such as Sustainable Manufacturing, Energy Saving Technologies, and Resource Conservation and Pollution Prevention Techniques. Process Intensification and Integration for Sustainable Design starts discussions on: shale gas as an option for the production of chemicals and challenges for process intensification; the design and techno-economic

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analysis of separation units to handle feedstock variability in shale gas treatment; RO-PRO desalination; and techno-economic and environmental assessment of ultrathin polysulfone membranes for oxygen-enriched combustion. Next, it looks at process intensification of membrane-based systems for water, energy, and environment applications; the design of internally heat-integrated distillation column (HIDiC); and graphical analysis and integration of heat exchanger networks with heat pumps. Decomposition and implementation of large-scale interplant heat integration is covered, as is the synthesis of combined heat and mass exchange networks (CHAMENs) with renewables. The book also covers optimization strategies for integrating and intensifying housing complexes; a sustainable biomass

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conversion process assessment; and more. Covers the many advances and changes in process intensification and integration Provides side-by-side discussions of fundamental techniques and recent industrial experiences to guide practitioners in their own processes Presents comprehensive coverage of topics relevant, among others, to the process industry, biorefineries, and plant energy management Offers insightful analysis and integration of reactor and heat exchanger network Looks at optimization of integrated water and multi-regenerator membrane systems involving multi-contaminants Process Intensification and Integration for Sustainable Design is an ideal book for process engineers, chemical engineers, engineering scientists, engineering consultants, and chemists.

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A global assessment of potential and anticipated impacts of efforts to achieve the SDGs on forests and related socio-economic systems. This title is available as Open Access via Cambridge Core.

The 2018 EU Bioeconomy Strategy aims to develop a circular, sustainable bioeconomy for Europe, strengthening the connection between economy, society, and environment. It addresses global challenges such as meeting the Sustainable Development Goals (SDGs) set by the United Nations and the climate objectives of the Paris Agreement. A circular, sustainable bioeconomy can be a core instrument for the Green Deal in the post-COVID-19 era, making the EU more sustainable and competitive. In this context, the EC (Joint Research Centre in collaboration with DG Research

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and Innovation) created an ad-hoc external Network of Experts (NoE) through individual contracts to contribute to the EC's Knowledge Centre for Bioeconomy with forward-looking analysis needed for exploring possible scenarios towards a sustainable, clean, and resource-efficient bioeconomy, with a focus on climate-neutrality and sustainable development. This first work package concerned knowledge synthesis and foresight. The post-Brexit EU27 bioeconomy employs 17.5 million people ( 9% of its workforce) and generates € 1.5 trillion ( 10% of its GDP) when the tertiary bioeconomy sector (bio-based services) is included. To analyse, assess and monitor the bioeconomy's sustainability, interactions with fossil, mineral, renewable systems as well as bioeconomic contributions to ecosystem services are important,

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considering dynamic interlinkages and substitution effects. The bioeconomy is the only system providing food, feed, and eco-system services, i.e. for those there is no substitute. Sustainable, affordable, and secure biomass is available from EU sources in the medium- to longer-term, meeting demands for existing and emerging uses (e.g. bio-based material) by 2030. There is enough sustainable EU biomass to contribute to all sectors by 2030, and probably beyond, as well as to bring organic carbon back to soil. To ensure sustainable supply, not only residues and wastes are relevant, but sustainably sourced agricultural and forestry feedstocks, and feedstocks from recovering and restoring marginal and degraded land. Options for managing land and forestry systems for biomass supply that lead to a better carbon

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balance depend on many factors and have biodiversity, other environmental and socioeconomic trade-offs, all needing consideration.

[Bioeconomy, Climate Change, and Sustainable Development Policy Dialogue on a Bioeconomy for Sustainable Development in Colombia](#)

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[Elements of Bioeconomy](#)

[Modelling Needs to Integrate All Three Aspects of](#)



# Access Free Bioeconomy For Sustainable Development

## Sustainability

### Overview and a proposed way forward

***Valuable insights into the linkages between the sustainable bioeconomy and Sustainable Development Goals***

***Sustainable development is the most important challenge facing humanity in the 21st century. The global economic growth in the recent past has indeed exhibited marked progress in many countries. Nevertheless, the issues of income disparity, poverty, gender gaps, and malnutrition are not uncommon in the***

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*global landscape, in spite of the upward growth of the economy and technological advances. This grim picture is further exacerbated by our growing human population, unmindful resource use, ever-increasing consumption trends, and changing climate. In order to protect humanity and preserve the planet, the United Nations issued the “2030 agenda for sustainable development,” which includes but is not limited to sustainable production and consumption practices, e.g. in a sustainable bioeconomy. The hallmark*

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*of the sustainable bioeconomy is a paradigm shift from a fossil-fuel-based economy to a biological-based one, which is driven by the virtues of sustainability, efficient utilization of resources, and “circular economy.” As the sustainable bioeconomy is based on the efficient utilization of biological resources and societal transformations, it holds the immense potential to achieve the UN’s Sustainable Development Goals. This book shares valuable insights into the linkages between the sustainable*

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*bioeconomy and Sustainable Development Goals, making it an essential read for policymakers, researchers and students of environmental studies.*

*FAO has been working for many years on non-food biomass products (including sustainable bioenergy) and biotechnology, and it received a mandate to coordinate international work on 'food first' sustainable bioeconomy by 62 Ministers present at the Global Forum for Food and Agriculture (GFFA) 2015. Moreover, FAO has received support from the Government of*

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*Germany to develop guidelines on sustainable bioeconomy development (Phase 1: 2016; Phase 2: 2017-mid 2020). This involves work on the bioeconomy monitoring, including the selection and use of indicators. The ultimate aim of FAO's work on sustainability indicators is to provide technical assistance to countries and stakeholders in developing and monitoring sustainable bioeconomy, more particularly on identifying suitable indicators in line with the Sustainable Bioeconomy Aspirational Principles and*

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*related Criteria, agreed upon in 2016 by the International Sustainable Bioeconomy Working Group created in the context of FAO's project on Sustainable Bioeconomy Guidelines. These indicators shall help both policy makers and producers/manufacturers in monitoring and evaluating the sustainability of their bioeconomy strategies and interventions. In order to cover all the relevant aspects and issues for a sustainable bioeconomy, our approach identifies impact categories from the sustainable bioeconomy principles*

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*and criteria. The monitoring approach suggested is balanced, since it considers the three sustainability dimensions (social, economic and environmental); at the same time, it proposes to use a limited set of core indicators, to keep the monitoring feasible and cost-effective. The suggested methodology starts with a review of existing monitoring approaches to identify already available indicators, from which the authors.*

*The 'bioeconomy' is the idea of an economy*

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*based on the sustainable exploitation of biological resources. Within this concept, there is increasing emphasis on issues such as climate change, depletion of natural resources and growing world food needs. The bioeconomy builds on the recognition of advances in technology, particularly in the life sciences, but at the same time covers issues such as innovation management, ecosystem services, development and governance. This book explores the development of the bioeconomy across the world from an economic and*



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*policy perspective, as well as identifying potential future pathways and issues. It uses a broad definition, covering all sectors using biological resources except health, and rather than focusing on individual sectors, it explores the breadth of interconnections that make the bioeconomy a new and challenging subject. Divided into two parts, the book initially outlines the current definitions, strategies, policy and economic information related to the world's bioeconomy. The second part describes*

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*current economic analysis and research efforts in qualifying and understanding the economics of the bioeconomy. This includes the contributions of technology, research and innovation; driving forces and demand-side economics; supply-side economics, and the role of markets and public policy in matching demand and supply. The political economy, regulation and transitions are considered, as well as the contribution of the bioeconomy to society, including growth, development and sustainability. Key features include: - An*

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*analysis of varied international approaches to the bioeconomy. - A joint consideration of biotechnology, agriculture, food energy and bio-materials. - An assessment of sustainability in the bioeconomy. - A comprehensive view of the issues from an economic and policy perspective. This book will be of interest to students and researchers in agricultural and natural resource economics, agricultural and environmental policy, as well as policy-makers, practitioners and economists.*

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*The growing global demand for food, feed and bio-based renewable material is changing the conditions for agricultural production worldwide. At the same time, revolutionary achievements in the field of biosciences are contributing to a transition whereby bio-based alternatives for energy and materials are becoming more competitive. Creating Sustainable Bioeconomies explores the prospects for biosciences and how its innovation has the potential to help countries in the North (Europe) and the South (Africa) to move*

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*towards resource efficient agriculture and sustainable bioeconomies. Throughout the book, the situations of Europe and Sub-Saharan Africa will be compared and contrasted, and opportunities for mutual learning and collaboration are explored. The chapters have been written by high profile authors and deal with a wide range of issues affecting the development of bioeconomies on both continents. This book compares and contrasts the situations of these two regions as they endeavour to develop knowledge based bioeconomies. This*

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*volume is suitable for those who are interested in ecological economics, development economics and environmental economics. It also provides action plans assisting policy-makers in both areas to support the transition to knowledge based and sustainable bioeconomies.*

*This book examines the bioeconomy concept, analysing the opportunities it can generate, the constraints and the potential benefits for society. It will be of great interest to students and scholars of ecological economics, development*

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*economics and environmental economics, as well as policymakers and practitioners in sustainable development.*

*This volume presents a timely recognition, warning and mapping of the fast approaching wave, or “bio-tsunami”, of global socio-technical transformation, built by a much wider spectrum of converging powers, including biotechnology, new agriculture, novel foods, health, quality of life, environment, energy, sustainability, education, knowledge management, and*

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*design of smart applications. The book contains eight sections corresponding to different clusters of bioeconomic and socio-technical change, as identified by the editors' "Scanning the Horizon" foresight research; it also offers an integrated view of the future bioeconomy landscape through the convergence of several technologies that affect everyday life. The clusters offer methodologies for forecasting the future bioeconomy, and how these predictions can affect target-setting and the orientation of policies*



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*and actions to manage cultural and societal change, and achieve sustainable development in less developed areas. The book will be of interest to researchers, producers, logistics experts, policy makers, regulators, business and financial institutions, and biotechnologists (e.g. geneticists, food experts, etc.).*

[Potential and Perspectives](#)

[Process Intensification and Integration for Sustainable Design](#)

[Developing the Global Bioeconomy](#)

[Technical, Market, and Environmental](#)

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[\*Lessons from Bioenergy\*](#)

[\*Bioeconomy for Sustainable Development\*](#)

[\*Current Developments in Biotechnology and Bioengineering\*](#)

[\*Bioeconomy for Beginners\*](#)

[\*Shaping the Transition to a Sustainable, Biobased Economy\*](#)

[\*Sustainable Bioresources for the Emerging Bioeconomy\*](#)