Minerals Metals And Sustainability Meeting Future

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Deep-Sea Mining Springer
Materials and Sustainable Development, Second Edition, written by noted materials selection authority Mike Ashby, provides a structure and framework for analyzing sustainable development and the role of materials in it. The book's aim is to introduce ways of exploring sustainable development to readers in a way that avoids simplistic interpretations and approaches complexity in a systematic way. There is no completely 'right' answer to questions of sustainable development, instead, there is a thoughtful, well-researched response that recognizes concerns of stakeholders, conflicting priorities, and the economic, legal and social aspects of the technology and its environmental legacy. The intent of the book is not to offer solutions to sustainability challenges but rather to improve the quality of discussion and enable informed, balanced debate. This updated edition has been updated to reflect new insights, regulatory trends and other developments that have occurred since publication of the previous edition. Describes sustainable development in increasingly detailed progression, from a broad overview to specific tools and methods Includes updated chapter length case studies on topics such as biopolymers, electric cars, bamboo, and lighting that vividly illustrate the sustainable development process from a materials perspective Covers business and economic aspects in chapters on corporate sustainability and the "circular materials economy"

Current Trends in Mineral Based Products and Utilization of Wastes: Recent Studies from India Springer Nature
Minerals, Metals and Sustainability examines the exploitation of minerals and mineral products and the implications for sustainability of the consumption of finite mineral resources and the wastes associated with their production and use. It provides a multi-disciplinary approach that integrates the physical and earth sciences with the social sciences, ecology and economics. Increasingly, graduates in the minerals industry and related sectors will not only require a deep technical and scientific understanding of their fields (such as geology, mining, metallurgy), but will also need a knowledge of how their industry relates to and can contribute to the transition to sustainability. Chapters 1 to 3 introduce the concept of materials, how they are used in society and the environmental basis of our existence. Chapter 4 introduces the concept of sustainability and the issues it raises for the use of non-renewable resources. Chapter 5 discusses the geological basis of the minerals industry and Chapter 6 describes the structure and nature of the industry. Chapters 7 and 8 review the technologies by which mineral resources are extracted from the Earth’s crust and processed. Chapters 9 and 10 examine the usage of energy and water. Chapters 11 and 12 survey the wastes resulting from the production of mineral and metal commodities, the human and environmental impacts of these, and how they are managed. Chapter 13 examines the recycling of mineral-derived materials and the role of secondary materials in meeting material needs. Chapter 14 surveys the potential future sources of minerals and the factors that determine long-term supply. Chapter 15 surveys the socio-economic and technological factors that determine the long-term demand for mineral-derived materials and future trends. Chapter 16 discusses how waste can be reduced, or eliminated, through technological developments and socio-political changes.

Finally, Chapter 17 addresses the concept of stewardship and the role the minerals industry should play in the ongoing transition to sustainability. Minerals, Metals and Sustainability is an important reference for students of engineering and applied science and geology; practising engineers, geologists and scientists; students of economics, social sciences and related disciplines; professionals in government service in areas such as resources, environment and sustainability; and non-technical professionals working in the minerals industry or in sectors servicing the minerals industry.

Metal Sustainability CSIRO PUBLISHING

This book is a sequel to 'Deep-Sea Mining: Resource Potential, Technical and Environmental Considerations' (2017) and 'Environmental Issues of Deep-Sea Mining: Impacts, Consequences and Policy Perspectives' (2019), and aims to provide a comprehensive volume on different perspectives of deep-sea mining from specialists around the world. The work is timely, as deep-sea minerals continue to enthuse researchers involved in activities such as ascertaining their potential as alternative sources for critical metals for green energy and other industrial applications, as well as technology development for their sustainable exploration and exploitation, while addressing environmental concerns. With a steady increase in the number of contractors having exclusive rights over large tracts of seafloor in the 'Area', i.e. area beyond national jurisdictions, the International Seabed Authority, mandated with the responsibility of regulating such activities, is in the process of developing a code for exploitation of deep-sea minerals. These, coupled with growing interest among private entrepreneurs, investment companies and policy makers, underscore the need for updated information to be made available in one place on the subject of deep-sea mining. The book evaluates the potential and sustainability of mining for deep-sea minerals compared to other land-based deposits, the technologies needed for mining and processing of ores, the approach towards environmental monitoring and management, as well as the regulatory frameworks and legal challenges to manage deep-sea mining activities. The book is expected to serve as an important reference for all stakeholders including researchers, contractors, mining companies, regulators and NGOs involved in deep-sea mining.

Proceedings of the 3rd International Conference on Sustainable Development Indicators in the Minerals Industry (SDIMI 2007) World Scientific

This book explores a disciplinary matrix for the study of the law and governance concerning mining and minerals from a global perspective. The book considers the key challenges of achieving the goals of Agenda 2030 and the transition to low-carbon circular economies. The perspective encompasses the multi-faceted and highly complex interaction of multiple fields of international law and policy, soft law and standards, domestic laws and regulations as well as local levels of ordering of social relations. What emerges is a largely neglected, unsystematised and under-theorised field of study which lies at the intersection of the global economy, environmental sustainability, human rights and social equity. But it also underlies the many loopholes to address at all levels, most notably at the local level – land and land holders, artisanal miners, ecosystems, local economies, local linkages and development. The book calls for a truly cosmopolitan academic discipline to be built and identifies challenges to do so. It also sets a research agenda for further studies in this fast-changing field.

Perspectives on Deep-Sea Mining Butterworth-Heinemann

Critical minerals play a vital role in the ongoing energy transition, which aims to shift global energy systems towards more sustainable and low-carbon alternatives. These minerals, also known as critical minerals, are essential components in various clean energy technologies such as wind turbines, solar panels, electric vehicles, and energy storage systems. They possess unique properties that enable efficient energy generation, storage, and transmission. For instance, neodymium, a rare earth element, is crucial for the production of high-performance magnets used in wind turbines and electric motors. Lithium, another critical mineral, is a key component in rechargeable batteries powering electric vehicles and energy storage solutions. As the demand for clean energy technologies continues to rise, securing a sustainable and reliable supply of critical minerals becomes increasingly important to support the global energy transition and reduce dependence on fossil fuels. In this book, we investigate various aspects of critical mineral governance in the context of sustainability transition. We give perspectives around the critical metal requirements of sustainability transition in a forward-looking manner. We discuss the answers to the following questions: What role do the critical raw materials play in the transition to a sustainable economy and energy systems transformation? What are the bottlenecks in achieving a sustainable critical material supply? How do the critical minerals enable renewable energy transition and sustainable development? What is their role in the sustainability transition? How is mineral criticality assessed? And how critical are minerals? What are some regional differences in terms of critical mineral availability, processing capacity, and the supply chain? What strategy should be followed in deciding between primary raw materials and secondary raw materials in supplying critical raw materials for the transition to a sustainable economy? What is the (known) critical material budget, and how does it fit with the climate pledges? The authors of the chapters of this book take a multi-perspective approach and provide insights from industrial ecology, environmental engineering, and sustainable management of natural resources. The information provided will help readers to understand critical metal requirements of present and future key technologies and will help societies to develop and implement sustainable supply strategies.

Sustainable and Economic Waste Management Oxford University Press

The sustainable use of natural resources is an important global challenge, and improved metal sustainability is a crucial goal for the 21st century in order to conserve the supply of critical metals and mitigate the environmental and health issues resulting from unrecovered metals. Metal Sustainability: Global Challenges, Consequences and Prospects discusses important topics and challenges associated with sustainability in metal life cycles, from mining ore to beneficiation processes, to product manufacture, to recovery from end-of-life materials, to environmental and health concerns resulting from generated waste. The broad perspective presented highlights the global interdependence of the many stages of metal life cycles. Economic issues are emphasized and relevant environmental, health, political, industrial and societal issues are discussed. The importance of applying green chemistry principles to metal sustainability is emphasized. Topics covered include: • Recycling and sustainable utilization of precious and specialty metals • Formal and informal recycling from electronic and other high-tech wastes • Global management of electronic wastes • Metal reuse and recycling in developing countries • Effects of toxic and other metal releases on the environment and human health • Effect on bacteria of toxic metal release • Selective recovery of platinum group metals and rare earth metals • Metal sustainability from a manufacturing perspective • Economic perspectives on sustainability, mineral development, and metal life cycles • Closing the Loop – Minerals Industry Issues The aim of this book is to improve awareness of the increasingly important role metals play in our high-tech society, the need to conserve our metal supply throughout the metal life cycle, the importance of improved metal recycling, and the effects that unhindered metal loss can have on the environment and on human health.

Minerals, Metals, and the Environment John Wiley & Sons

Principles of Metal Refining and Recycling provides a self-contained introduction to the field of purification and recycling of metals. The scientific principles in the treatment of the various metals are the same. The importance of using a clean and properly alloyed metal is described in detail. The text covers thermodynamics, physical and transport properties, mixing, mass transfer and numerical models. It describes methods for removal of dissolved impurity elements, particles, and inclusions. It considers important aspects of the solidification process, remelting and adding of alloys. Recycling, future challenges and specific processes for each metal are discussed in detail. The book is a greatly extended update of the 1992 book Principles of Metal Refining by T. Abel Engh. It includes in particular the subjects of metal recycling, ferrous and non-ferrous metal refining, and metalloids like silicon.

Critical Materials and Sustainability Transition CRC Press

With impending and burgeoning societal issues affecting both developed and emerging nations, the global engineering community has a responsibility and an opportunity to truly make a difference and contribute. The papers in this collection address what materials and resources are integral to meeting basic societal sustainability needs in critical areas of energy, transportation, housing, and recycling. Contributions focus on the engineering answers for cost-effective, sustainable pathways; the strategies for effective use of engineering solutions; and the role of the global engineering community. Authors share perspectives on the major engineering challenges that face our world today; identify, discuss, and prioritize engineering solution needs; and establish how these fit into developing global-demand pressures for materials and human resources.

Innovations in Sustainable Mining Springer Science & Business Media

This is the first book of peer-reviewed, edited papers that examines the minerals industry in relation to sustainable development. The book takes a proactive, positivist, and solution-oriented approach, while not shying away from the fundamental problems.

REWAS 2013 Elsevier

Governance of the World's Mineral Resources: Beyond the Foreseeable Future provides in-depth information on the geological scarcity of mineral resources. The book demonstrates the urgent need to implement sustainable utilization of mineral resources, in order to ensure that these resources will be sufficiently available for future generations too. The availability of resources, especially for modern technologies, is an increasingly important issue. Some key mineral resources are so geologically scarce that their availability for future generations may not only become substantially less, but also much less affordable than for the current generation unless timely measures are taken. This book provides detailed data and calculations of the availability of mineral resources. The book elaborates on whether and how it is possible to keep providing sufficient mineral resources to a growing world population, and for how long. The book details also how and for how much time it will be possible for all countries, worldwide, to achieve and maintain service delivery of raw materials to their population at levels equivalent to those in developed countries in 2020. Governance of the World's Mineral Resources: Beyond the Foreseeable Future is therefore an important source of knowledge for postgraduates, academics and researchers in the fields of environmental science, sustainability, and geology, as well as anyone in the field of mining and economics who need to account for sustainable provision of mineral resources. Provides a thorough overview of all considerations related to a sustainable production rate of mineral resources Comprehensively details scarce mineral resources and describes their applications, worldwide in-use stock increases, and sustainable production rates Covers all aspects of a sustainable production rate of mineral resources, detailing the current challenges and possible global solutions, both technically and from a policy point of view Includes detailed studies of thirteen different scarce mineral resources and extensive quantitative data from recent studies and in-depth research

Thanatia: The Destiny Of The Earth's Mineral Resources - A Thermodynamic Cradle-to-cradle Assessment Springer

In recent years the concept of the resource "nexus" has been both hotly debated and widely adopted in research and policy circles. It is a powerful new way to understand and better govern the myriad complex relationships between multiple resources, actors and their security concerns. Particular attention has been paid to water, energy and food interactions, but land and materials emerge as critical too. This comprehensive handbook presents a detailed review of current knowledge about resource nexus-related frameworks, methods and governance, including a broad set of inter-disciplinary perspectives. Written by an international group of scholars and practitioners, the volume focuses on rigorous research, including tools, methods and modelling approaches to analyse resource use patterns across societies and scales from a "nexus perspective". It also provides numerous examples from political economy to demonstrate how resource nexus frameworks can illuminate issues such as land grabs, mining, renewable energy and the growing importance of economies such as China, as well as to propose lessons and outlooks for sound governance. The volume seeks to serve as an essential reference text, source book and state-of-the-art, science-based assessment of this increasingly important topic – the resource nexus – and its utility in efforts to enhance sustainability of many kinds and implement the United Nations Sustainable Development Goals in an era of environmental and geopolitical change.

Light Metals 2020 Springer

Life Cycle Assessment for Sustainable Mining addresses sustainable mining issues based on life cycle assessment, providing a thorough guide to implementing LCAs using sustainability metrics. The book details current research on LCA methodologies related to mining, their outcomes, and how to relate sustainable mining concepts in a circular economy. It is an in-depth, foundational reference for developing ideas for technological advancement through designing reduced-emission mining equipment or processes. It includes literature reviews and theoretical concepts of life cycle assessments applied in mining industries, sustainability metrics and problems related to mining and mineral processing industries identified by the life cycle assessment results. This book will aid researchers, students and academics in the field of environmental science, mining engineering and sustainability to see LCA technology outcomes which would be useful for the future development of environmentally-friendly mining processes. Details state-of-the-art life cycle assessment theory and practices applied in the mining and mineral processing industries Includes in-depth, practical case studies outlined with life cycle assessment results to show future pathways for sustainability enhancement Provides fundamental knowledge on how to measure sustainability metrics using life cycle assessment in mining industries

Mining is the Future Springer
Environmental Materials and Waste: Resource Recovery and Pollution Prevention contains the latest information on environmental sustainability as a wide variety of natural resources are increasingly being exploited to meet the demands of a worldwide growing population and economy. These raw materials cannot, or can only partially, be substituted by renewable resources within the next few decades. As such, the efficient recovery and processing of mineral and energy resources, as well as recycling such resources, is now of significant importance. The book takes a multidisciplinary approach to fully realize the number of by-products which can be remanufactured, providing the foundation needed across disciplines to tackle this issue. As awareness and opportunities to recover valuable resources from process and bleed streams is gaining interest, sustainable recovery of environmental materials, including wastewater, offers tremendous opportunity to combine profitable and sustainable production. Presents a state-of-the-art guide to environmental sustainability Provides an overview of the field highlighting recent and emerging issues in environmental resource recovery that cover a wide array of by-products for remanufacture potential Details a multidisciplinary approach to fully realize the number of by-products which can be remanufactured, providing the foundation needed across disciplines to tackle these global issues
Governance of The World's Mineral Resources Springer Nature
This book compiles research findings directly related to sustainable and economic waste management and resource recovery. Mining wastes and municipal, urban, domestic, industrial and agricultural wastes and effluents—which contain persistent organic contaminants, nanoparticle organic chemicals, nutrients, energy, organic materials, heavy metal, rare earth elements, iron, steel, bauxite, coal and other valuable materials—are significantly responsible for environmental contamination. These low-tenor raw materials, if recycled, can significantly address the demand–supply chain mismatch and process sustainability as a whole while simultaneously decreasing their impacts on human life and biodiversity. This book summarises the large volume of current research in the realm of waste management and resource recovery, which has led to innovation and commercialisation of sustainable and economic waste management for improved environmental safety and improved economics. Key Features: Reviews the key research findings related to sustainable and economic resource recovery and waste management techniques Discusses minimizing waste materials and environmental contaminants with a focus on recovering valuable resources from wastes Examines the potential uses of mining waste in the re-extraction of metals, provision of fuel for power plants, and as a supply of other valuable materials for utilisation/processing Presents research on recycling of municipal, urban, domestic, industrial and agricultural wastes and wastewater in the production and recovery of energy, biogas, fertilizers, organic materials and nutrients Outlines topical research interests resulting in patents and inventions for sustainable and economic waste management techniques and environmental safety
Materials for a Sustainable Future CRC Press
This book highlights recent research on sustainable production. In today's manufacturing industry, cleaner production has become a central goal. "Sustainable production" describes activities that pose no threat to future generations and are not pursued at their expense. In addition, sustainable production is a concept that can improve environmental performance and focuses on technical aspects that can be used to improve efficiency and productivity. Sustainable production is not limited to the manufacturing sector, but affects all production sectors including energy, environment, and material systems – all of which face significant challenges in connection with sustainability, e.g. efforts to reduce production's impact on the environment and to manage health and safety impacts. Key means of reducing environmental pollution from manufacturing involve reducing the main resources used in production (metals used in the machining processes, fluids/oils in production, water, and energy).
Celebrating the Megascale Springer
Minerals are essential commodities for the growth of mankind, and all the progress of humanity owes unequivocally to minerals. However, winning minerals through mining has always been cursed, and mankind has paid a heavy price for mining in the form of great loss of flora and fauna and unprecedented impact on the environment. Notwithstanding any arguments either in favor or against, one cannot deny that for the progression, advancement, and security of nations mining is indispensable, compulsory, and unavoidable trade. It is in the best interest of every stakeholder; a sustainable approach to mining must be adopted. Sustainability has many dimensions, two most important being: the optimum utilization of mined-out materials and creating value-added products from the mining wastes. Taking a cue from this, an international seminar was organized on "Prospects and Challenges of Mineral Based Products and Utilization of Wastes for the 'Make in India' Initiative" at Hotel Radisson Blu from 10–12 November 2022. The conference was attended by about 120 delegates from all over India. This book is a compilation of selected papers presented during the conference, broadly divided into the following groups: (a) rare earth elements, (b) ferrous minerals, (c) non-ferrous minerals, (d) industrial minerals, (e) waste utilization and valorization and (f) other significant contributions. Written by experts and edited by academicians and technocrats, this book promises to be a valuable and essential reading for professionals, researchers, as well as students.
Routledge Handbook of the Resource Nexus Royal Society of Chemistry
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Waste Production and Utilization in the Metal Extraction Industry Society for Mining, Metallurgy & Exploration
Increasingly stringent environmental regulations and industry adoption of waste minimization guidelines have thus, stimulated the need for the development of recycling and reuse options for metal related waste. This book, therefore, gives an overview of the waste generation, recycle and reuse along the mining, beneficiation, extraction, manufacturing and post-consumer value chain. This book reviews current status and future trends in the recycling and reuse of mineral and metal waste and also details the policy and legislation regarding the waste management, health and environmental impacts in the mining, beneficiation, metal extraction and manufacturing processes. This book is a useful reference for engineers and researchers in industry, policymakers and legislators in governance, and academics on the current status and future trends in the recycling and reuse of mineral and metal waste. Some of the key features of the book are as follows: Holistic approach to waste generation, recycling and reuse along the minerals and metals extraction. Detailed overview of metallurgical waste generation. Practical examples with complete flow sheets, techniques and interventions on waste management. Integrates the technical issues related to efficient resources utilization with the policy and regulatory framework. Novel approach to addressing future commodity shortages.
Life Cycle Assessment for Sustainable Mining Routledge
The Light Metals symposia at the TMS Annual Meeting & Exhibition present the most recent developments, discoveries, and practices in primary aluminum science and technology. The annual Light Metals volume has become the definitive reference in the field of aluminum production and related light metal technologies. The 2020 collection includes papers from the following symposia: • Alumina and Bauxite• Aluminum Alloys, Processing and Characterization• Aluminum Reduction Technology• Cast Shop Technology• Cast Shop Technology: Recycling and Sustainability Joint Session• Electrode Technology for Aluminum Production
In Situ Recovery & Remediation of Metals Heliotopos Conferences
This book explores sustainable mining knowledge, assessing researchers on the impacts of waste and new approaches to negotiating these impacts. Mining has always been a profitable venture; however, it comes with several boons and banes. The significant advantages of mining include employment generation, the establishment of townships and trade centers, and socio-economic growth. However, the mining activity is a significant cause of environmental degradation, including soils, atmosphere, water, solid wastes, changed topography, and health hazards. This book emphasizes value-added products from mining wastes and innovations for balancing environment, ecology, and economy. This book is designed for miners, policymakers, professionals, researchers, scientists, industrialists, and environmental agencies.