

Editors: Natalia Yakovleva and Edmund Nickless

Delivery to publisher – 31 December 2020

Contracted word count: 300,000

Chapter No.	Chapter title	Keywords	Authors
	Foreword		Saleem Ali
	Introduction		Natalia Yakovleva and Edmund Nickless
Part 1	Global Trends in Mineral Resource Consumption and Production		Section editors: Judith Kinnaird and Andrew Bloodworth
1	Introduction to Part 1		Judith Kinnaird and Andrew Bloodworth
2	Historical development of mineral demand: From prehistory to 1950 - Stone tools to the atomic age	Stone tools; bronze; iron; gold; building stone; trade routes; industrial revolution; metallurgy; steam; internal combustion engines; electricity; mining engineering; logistics; flight; nuclear energy	David Killick and Andrew Bloodworth
3	Development of mineral supply and demand from 1950 to 2020: Cold War and consumerism	Cold war; defence and aerospace technologies; globalisation; population; consumerism; Asia; China; digital technology; energy; economies of scale; periodic table.	Mark Burnett
4	Current global patterns of non-energy minerals and metals consumption of minerals: trends and challenges - Living in a material world	Urbanisation; emerging middle class; ethical consumption; geopolitics; environment; road transport; energy; digital technology	Patrice Christmann, Elias Ayuk, Antonio Pedro and S. Vijay Kumar
5	Future mineral demand: climate change and materials for the energy transition	Renewables; nuclear; road transport; batteries; digital technology; electric motors; solar; wind; circular economy; SDGs	Gavin Mudd
6	Future mineral demand: population growth and economic development	Urbanisation; grids; transport; steel; copper; aluminium; digital technology; food security; energy security; infrastructure; circular economy; SDGs.	Antonio Pedro, Elias Ayule, Patrice Christmann, Heinz Schandl and Janet Salem
7	Current and future supply of minerals: Technical, environmental and business issues	Mining; extractive metallurgy; carbon; environment; water; habitats; communities; safety; permitting; price volatility; investment; trade wars; circular economy; recycling; SDGs.	Karin Elizabeth Olson Hoal, Eric Pirard and Alan Butcher
8	Deep exploration and remote sensing	Exploration methods for deposit discovery under deep cover; Large-scale structural, geophysics and geochemical survey programs; Big vs Small data for identifying deep deposits; How to move from big data sources to finding deposits; Future of deep exploration and remote sensing; Implications for sustainable development.	Raymond Durrheim
9	International policy instruments for promotion sustainable development in the extractive industries	World Bank; ICMM; Global Mining Initiative; resource curse; conflict minerals; Dodd Frank Act; Kimberly Process; ethical sourcing; SDGs, International Resource Governance	Ben Milligan
10	Mining for a low-carbon economy: New technologies and integrated governance	Renewable energy; EITI; copper; Zambia, DRC, local content, resource curse, development policy, regional economic integration, circular economy	Anja Casper-Berretta and Ross Harvey
11	Review of International policy instruments for promotion	World Bank; ICMM; Global Mining Initiative; conflict minerals; Dodd Frank	Ana Bastida

	sustainable development in the extractive industries	Act; Kimberly Process; ethical sourcing; SDGs	
Part 2	Technology, Minerals and Sustainable Development		Section editors: Damien Giurco, Kazuyo Matsubae, Stephen Northey
12	Introduction to Part 2		Damien Giurco, Kazuyo Matsubae and Stephen Northey
13	Minerals for green energy and transport technologies	SDG11, 12, 13, Effect of solar-cells, wind power, batteries and changing distribution networks on the material intensity of energy supply; Implications of widespread adoption of electric and alternative fuel (e.g. hydrogen) vehicles; Differences in the implications for demand of major / 'bulk' commodities (e.g. steel, copper, etc.) and for minor/by-product commodities (e.g. indium, platinum group elements, etc.)	Simon Jowitt
14	Industrial minerals for sustainable development	Bulk material, sand, gravel, construction material, rural development, SDG1, SDG8, SDG 9.	Daniel Franks
15	Cities and mineral resources	SDG11, Material intensity of cities; Rates of urbanisation; Changing infrastructure and building sector needs; Material flows of cities (China, EU, Japan); To focus on technological development in the urban space and related demands for minerals	Hiroki Tanikawa
16	Soil remineralizer: a new route to sustainability for Brazil, a giant exporting agromineral commodities	Agriculture, Mining, Stonemeal Technology	Suzi H Theodoro, David Manning, Andre M. Carvalho, Fabyane Ferrão and Gustavo Rosa de Almeida
17	Circular economy and minerals – Role of mining	SDG 9, SDG11, SDG12, SDG17, Role of primary supply within a circular economy, Adapting circular economy principles to mine site management and innovations	Anna Littleboy
18	Circular economy, metals and minerals: system and downstream focused	SDG9, SDG11, SDG12, SDG17, Intersection of circular economy and sustainable development; Material efficiency, lifetime extensions and effects on demand; Urban mining and secondary resource classifications.	Wei-Qiang Chen
19	Product design for recovery of metals and minerals in manufacturing	SDG12, design for disassembly, disassembly, consistency in allow selection.	Yasushi Umeda
20	Advanced manufacturing and high-quality materials: Scandium	High quality, purity of minerals, scandium, sustainable development	Toru H. Okabe and Osamu Takeda
21	Advanced manufacturing and high-quality materials: Elemental phosphorus	High quality, purity of minerals, P4 elemental phosphorus, sustainable development	Eiji Yamasue, Hisao Ohtake and Kazuyo Matsubae
Part 3	Management of Social, Environmental and Economic Issues in the Mining Industry		Section editors: Maria Amelia Enriquez and Natalia Yakovleva
22	Introduction to Part 3		Maria Amelia Enriquez, Natalia Yakovleva and Marcello Veiga
23	Mining contribution to the United Nations Sustainable Development Goals	UN SDGs, Voluntary initiatives, Geologists and sustainable development, Mining industry and sustainable development.	Sarah Caven
24	Poverty and mining	SDG 1, Resource curse, Corruption, Public accounting, Sovereign wealth funds, Distribution of wealth from mineral exploitation	Antonio Pedro

25	Mining and human rights	SDG 4, SDG 8, SDG 10, Human rights violation provoked by mining; Human rights promoted by mining; Child labour; Conflict with local communities provoked by mining.	Qingxiu Bu
26	Gender mainstreaming for sustainable mining in sub-Saharan Africa: Opportunities and challenges	SDG 5, Artisanal women miners, Vulnerability to gender-based violence, Gender inclusion, Gender diversity, Mining workforce, Women Leaders in Mining	Judy Muthuri, Willice O. Abuya and Luis D Torres
27	Mining and indigenous peoples	SDG 10, 12, 16, 17; Mineral deposits on indigenous lands; Vulnerability of indigenous peoples; Native cultural identity; Impact of mining on indigenous lands; Forced relocation; Sovereignty; environmental risks and benefits	Natalia Yakovleva, Tuyara Gavriljeva, Nadezhda Stepanova, Tanja Hoffman and Ken Coates
28	Environmental management, health and safety in mining	SDG12, SDG 14, SDG15, Environmental hazards, Dam and tailings safety, Environmental impact on population, Air and water pollution, Mining Accidents, Deforestation	Luis Enrique Sánchez and Daniel Franks
29	Mining, water and land	SDG 15, SDG 16, Territorial disputes, Opportunity cost of land, Conflict over water use, Environmental costs.	Nadja Kunz, Laura Sonder and Chris Moran
30	Ethical supply chains of metals and minerals	Responsible sourcing, ethical issues in metal and mineral supply chains, SDG 3, SDG 5, SDG 8, SDG 12, SDG 16, consumer education and concerns.	Mary Bingham-Chee
31	Rethinking the Social License to Operate and Community Participation: The Contribution of Social Impact Assessment	Social License to Operate, Mining, Social Impact Assessment, Constructivist Approach, Community Participation, Local Community	Jacques Demajorovic and Viviane Pisano
32	Civil Society and Mining: An era of new approaches and voices will accelerate SDG impacts	Social movements, Role of NGOs, Perception of mining in civil society, Collaboration between NGOs and mining industry, Monitoring of mining industry by NGOs, social enterprise models in mining, civil society involvement in standard setting	Cristina Villegas
33	Mining cities and sustainable development	Mining cities that host mining enterprises; Economic aspects - taxes and jobs; Social and environmental issues in mining cities; Global perspective – examples from Canada, Australia and USA; Social legacy of mining, Mine closure	Maria Amélia Enriquez and Marcello Veiga
34	Artisanal and small-scale mining and sustainable development	Formalisation, Environmental Issues, Social Issues, ASM.	Marcello Veiga
35	ASM cooperatives in Africa	Cooperatives, ASM, gender	Estrela Cordoso and Gavin Hilson