Columbia Center on Sustainable Investment
A JOINT CENTER OF COLUMBIA LAW SCHOOL AND COLUMBIA CLIMATE SCHOOL

Massive Open Online Course (MOOC)
Mining and Materials for Sustainable Development Transformations

Welcome to CCSI's Massive Open Online Course (MOOC) on Mining and Materials for Sustainable Development Transformations. This course consists of 8 modules, and each module consists of 5 lectures of approximately 10 minutes each, plus recommended readings and short quizzes. In each chapter, you will learn from a leading global expert. We hope that this course will encourage you to better understand and think critically about the role of mining and materials in sustainable development transitions.

Module 1	Contextualizing the scale and urgency of the energy and technological transition that underpin the Sustainable Development Goals	
Chapter 1.1	The six transformations of sustainable development and the role of materials	Jeffrey Sachs
Chapter 1.2	The carbon budget and implications for energy systems	Jim Williams
Chapter 1.3	Mineral intensity of new energy technologies and of other digital applications, urbanization, public transport, buildings, and materials	Rohitesh Dhawan
Chapter 1.4	Geopolitics of mineral supply security	Cullen Hendrix
Chapter 1.5	How to make the world goals compatible: Climate, energy, land, biodiversity, human rights, and other SDGs	Jeffrey Sachs

Module 2	How the world is making, measuring, and monitoring progress toward global goals	
Chapter 2.1	Carbon pricing approaches	Aaron Cosbey
Chapter 2.2	Mitigation hierarchy, carbon credits and offset markets, and net-zero pledges	Perrine Toledano
Chapter 2.3	Setting standards and tracking progress on sustainability goals	Glen Mpufane
Chapter 2.4	Contradictory pressures shaping corporate actions	Perrine Toledano
Chapter 2.5	Greenhouse gas accounting in the context of material value chains	Nicole Labutong

Module 3	Decarbonization pathways and implications for mining and materials value chains	
Chapter 3.1	Decarbonization pathways to achieve global net-zero emissions by 2050	Stéphanie Bouckaert
Chapter 3.2	Mining operations' energy and emissions intensity and drivers of sustainability in mining operations	Rohitesh Dhawan
Chapter 3.3	Reaching net-zero emissions in mining	Sheila Khama
Chapter 3.4	Reaching net-zero emissions in hard-to-abate downstream industries	Zafar Samadov
Chapter 3.5	Case study: Decarbonizing copper and nickel value chains	Renata Lawton-Misra

Module 4	Implications of sustainable development transformations for governments of mineral-rich countries	
Chapter 4.1	The case for sustainable mining for host countries and communities	Ana Bastida
Chapter 4.2	Legal implications in mining laws and contracts: Obligations of the parties in light of climate change	Martin Dietrich Brauch
Chapter 4.3	Legal implications in mining laws and contracts: Risk sharing in light of climate change	Martin Dietrich Brauch
Chapter 4.4	Necessary enabling regulatory framework in climate, energy, and electricity laws, and current roadblocks	Zafar Samadov
Chapter 4.5	International investment law and sustainable development transformations	Martin Dietrich Brauch

Module 5	Mining and materials value chains and the circular economy	
Chapter 5.1	Circular economy and sustainable development transformations	Saleem Ali
Chapter 5.2	Various forms of circular economy at mine sites: Opportunities and challenges	Casilda Malagon
Chapter 5.3	Various forms of circular economy along supply chains: Opportunities and challenges	Saleem Ali
Chapter 5.4	Circular business models and potential applications in mining and materials value chains	Casilda Malagon
Chapter 5.5	Development of enabling conditions for circularity in mining and materials value chains	Tamara Veldboer

Module 6	Going up and down mining and materials value chains	
Chapter 6.1	Traditional pitfalls of downstream beneficiation and renewed opportunities brought by the energy transition	Marit Y. Kitaw
Chapter 6.2	The rise in carbon cost, supply chain risk, and implications for the localization of supply chains	Melanie Müller
Chapter 6.3	The feedback loop between energy, mining, and industrialization	Perrine Toledano
Chapter 6.4	Case study: Piloting battery production in the Democratic Republic of Congo	Kiwasi Ampofo
Chapter 6.5	Case study: High-level regional cooperation for downstream beneficiation	Marit Y. Kitaw

Module 7	Implications of sustainable development transformations for communities, workers, and suppliers in mineral-rich countries	
Chapter 7.1	A just transition	Joan Carling
Chapter 7.2	Land rights and other human rights	Joan Carling
Chapter 7.3	Digitalization and its impact on job creation at mine sites	Isabelle Ramdoo
Chapter 7.4	Policies for workers and communities: Retraining and reemployment	Isabelle Ramdoo
Chapter 7.5	Gender considerations in sustainable development transformations	Gillian Davidson

Module 8	Implications of sustainable development transformations for national planning processes	
Chapter 8.1	Backcasting and participatory roadmaps for sustainable development transformations	Jeffrey Sachs
Chapter 8.2	Achieving green growth in sustainable development transformations	Vera Songwe
Chapter 8.3	Sound revenue spending systems for sustainable development transformations	Amir Lebdioui
Chapter 8.4	Diversification strategies, caution about over-projection, and the risk of pre-source curse	Silas Olan'g
Chapter 8.5	Course takeaways	Lisa Sachs