



Copper, Systems Thinking, and the Long Afterlines of Extraction: Lessons for the Energy Transition

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University – New Buildings School of Engineering, Building ΠΟΛ10 – Amphitheatre B107

Abstract:

The global energy transition is expected to drive a substantial increase in copper demand, due to electrification, renewable energy infrastructure, and grid expansion. While technical advances in mining and materials engineering are central to meeting this demand, less attention has been paid to how mining systems are conceptualised, governed, and managed across long temporal horizons. This seminar examines copper extraction as a complex socio-technical system, focusing on how “systems thinking” is interpreted and operationalised in practice across the life cycle of mining projects.

Drawing on ongoing research at Imperial College London, the seminar explores the challenges that emerge when environmental processes, institutional responsibilities, and technical decision-making interact over extended timescales, particularly after mine closure. Post-extractive landscapes such as Cyprus, where historical copper mining continues to shape environmental conditions, material legacies, and community relationships decades after production has ceased, provide an important lens for understanding the full temporal and systemic dimensions of extraction.

The seminar argues that these long afterlives of mining are not peripheral issues but central components of extraction systems, with direct implications for the sustainability and legitimacy of future copper supply. By examining how system boundaries are defined, how knowledge is integrated, and how responsibility is distributed over time, the talk highlights the importance of interdisciplinary approaches for improving decision-making in resource governance. It aims to open discussion on how systems-oriented perspectives can contribute to more resilient and socially sustainable pathways for meeting future material demands.

Biography:

Dr Maria Pantsidou is a Postdoctoral Research Associate at the Centre for Environmental Policy, Imperial College London. Her research focuses on the environmental humanities and social dimensions of energy and extractive systems, with particular emphasis on systems thinking, resource governance, and the long-term environmental legacies of mining. She currently works on an interdisciplinary project examining how different forms of knowledge are integrated in decision-making across the life cycle of copper extraction, in collaboration with the Rio Tinto Centre for Future Materials.

Dr Pantsidou completed her PhD at Lancaster University, where her research examined the cultural and historical dimensions of energy materials across the nineteenth to twenty-first centuries, combining archival analysis with qualitative field research. Her work explores how environmental responsibility, technological imaginaries, and material infrastructures interact over time, particularly in relation to extraction, energy transitions, and post-industrial landscapes.

Her broader research interests include environmental governance, socio-technical systems, extractive histories, and the role of humanities and social science methods in addressing complex environmental challenges.

