

Strategic Materials for a Low-Carbon Future: From Scarcity to Availability
2-3 November 2017 – Session Summary

Groundwork session 1: What materials for a low-carbon future?

What is the ‘low-carbon transition’, and what are its implications? Panellists identified the sectors most affected by the low-carbon transition (for instance, energy infrastructure, construction, transportation, and digital technologies) and mapped out trends, scenarios and issues relating to material use as those sectors evolve. Resources considered included structural materials, key to low-carbon infrastructure in an urbanizing world (cement, sand, concrete, copper, aluminium, steel), as well as critical or strategic metals whose supply is at stake in a low-carbon economy (lithium, rare earth metals). What is the real potential for physical scarcity of such resources in the face of such demand?

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Summary [200-400 words]

- The key materials necessary for low-carbon growth are the ‘metals of energy transport’ - for the transportation of not only energy from solar and wind, but also of people and things. Projections for various such metals (like copper) suggest 2.5-4x current demand and 3-4x current production by mid-century.
- More and more elements are being utilised in today’s technology economies: “most parts of the periodic table are now in play”. Some key materials are obtained only as by-products of major mined metals, and this contributes to complexity.

- Historically the rate of exploration adds to resources at the same approximate rate as they are depleted, because resource characterisation is an economic decision not a physical one.
- While resource availability is not an imminent issue, mining faces several technological and physical challenges, including the degradation of available ore grades, and increasing mine depths - mines of the future may go up to 3km into the Earth's crust compared to 1km today. The mining sector suffers from a lack of investment into productivity, and its environmental footprint, mostly waste and water pollution, needs to be better managed. Waste from the mining industry is growing 6% per annum, while water consumption is growing 10% p.a. In terms of waste volumes, over 80bn tonnes is generated per year, 20-25bn tonnes of which are in China, and sourced from low-grade small open cast mines. Many of these are also situated in mountainous areas with high risks of floods, earthquakes and water pollution.
- The material demand which will underpin the UN Sustainable Development Goals is under-examined, and should be better explored. Because infrastructure gets locked in, for as much as 80-120 years, it is critical to pose such questions today.
- We need new international governance arrangements for mineral production and consumption. Such arrangements would help the coordination of mineral production and exploration; set global targets; monitor impacts, support investment and research into new production technologies; and model risks for early warnings of criticality.

