Meeting our future mineral resource needs sustainably – a socio-technical transitions perspective

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We rely on minerals for almost everything we do in our lives – from metals of all kinds, used in bulk or in tiny quantities in a huge range of technologies, to construction materials and fertilisers. Sourcing this ever-growing range of raw minerals depends on a global mining industry, which has historically caused great social and environmental harm, and all too often continues to do so (not least because it is so energy- and water-intensive), despite progress towards addressing these impacts.

The circular economy (CE) promises more sustainable alternatives to conventional linear production and consumption models in which raw materials are extracted, used and ultimately discarded as waste. It seeks to minimise waste and environmental harm throughout the supply chain while optimising resource efficiency, and recognises the need to transform the design of products, services and technologies in order to reduce resource use and maximise recoverability for recycling, remanufacture and reuse. Nonetheless, however rapidly a CE transition is implemented, society will still require significant quantities of primary mined resources. For instance, many of the elements required for low-carbon energy technologies have not previously been mined and used in significant quantities, so they are simply not (yet) available to recycle. A transition to a more sustainable and socially just ‘new minerals economy’ must therefore encompass both the emergent circular economy and the mining sector.

Although there is an urgent need for the mineral resource consumption and production system to undergo a sustainability transition, and despite its deep entanglement with other such socio-technical systems (energy, but also water, food and transport, for instance), it has yet to be addressed in the transitions literature. Indeed, there has been very little research from any perspective that has considered CE and mining together, or taken a system-level view including both responsible sourcing (by manufacturers) and responsible supply (by mining companies or through CE routes).

This presentation outlines my ongoing PhD project to develop a preliminary conceptual framework for a socio-technical transition to a ‘new minerals economy’, and to undertake three case studies of actors across the mineral resources system seeking to take a more responsible and sustainable approach encompassing both mined and CE resources – a manufacturer, a mining company and a material stewardship scheme operator. The research will take an iterative,
abductive approach, to develop the preliminary framework while drawing on relevant concepts from the transitions literature to maximise learning opportunities from the case studies.