**Fundamental limits of the supply chain of critical metals and minerals within the circular economy**

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**ABSTRACT**

There is a lot of talk about greening society, greening the supply chain, circular economy etc. The question that needs to be answered, how green is all of this and what is the shade of green (or grey) is achievable.

In this contribution the key role of metallurgy and minerals processing will be discussed in applying its simulation methods and theory can be applied to understand the greenness of systems and in fact what the limits are of the system.

Various cases will be shown, covering process metallurgy, recycling, design for recycling, etc. any analysing the system on the basis of exergy and footprinting the system. A large body of published information will be highlighted rooted in industrial practice to illustrate how far the industry has also progressed to address green issues fundamentally.

The “Handbook of Recycling, 2nd Edition, Elsevier 2024” [Handbook of Recycling | ScienceDirect](https://www.sciencedirect.com/book/9780323855143/handbook-of-recycling) provides a detailed basis also for this overview related also to greening the supply chain of metals in general and also specifically critical materials, metals and minerals.