

From mineral potential through circular economy towards energy solutions

Philipp Schmidt-Thomé

ELEMENTS AND CHALLENGES OF CHANGE



Megatrends

- Green Transition, Sustainability
- Battery Minerals, Circular Economy

Global Facts

- Ore grades getting lower
- Primary raw materials are increasingly needed

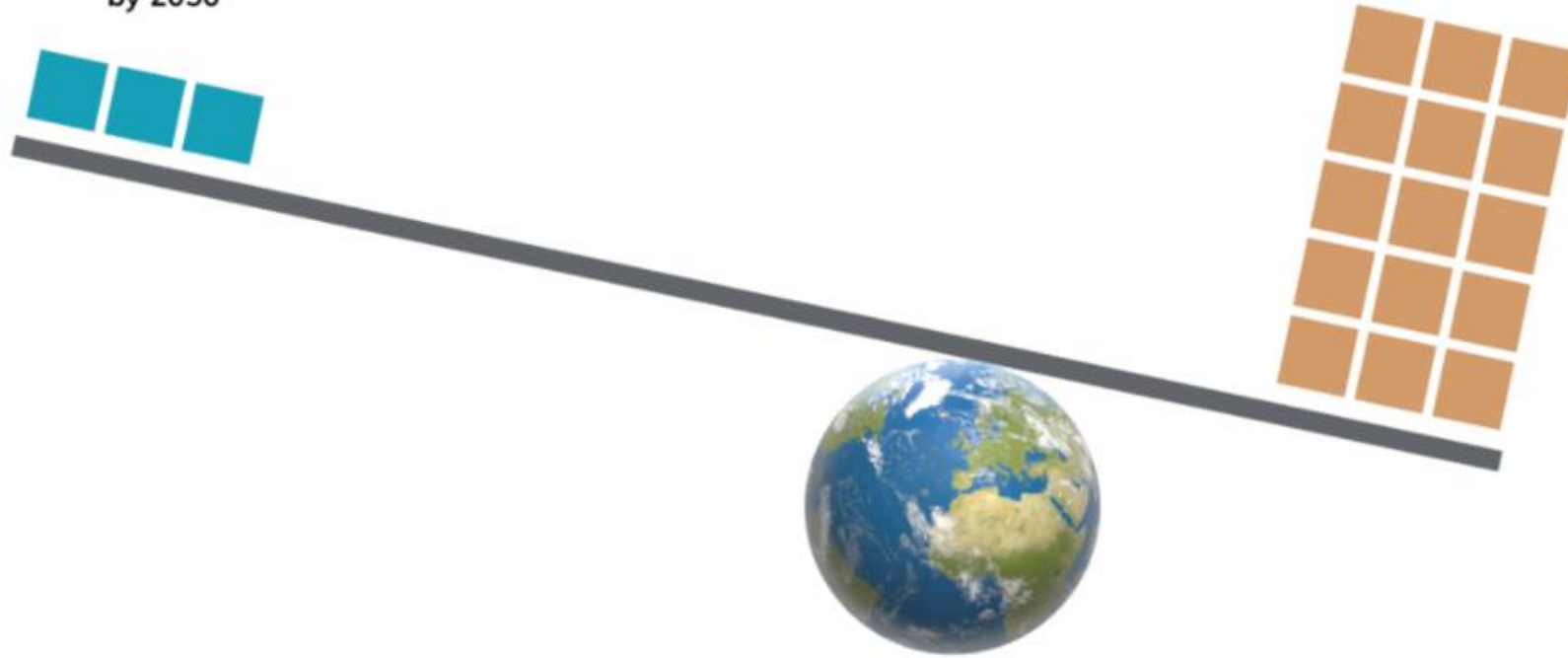
Needs

- Circular economy requires new methods
- Innovations and research

Metal levels towards low-carbon world

~3 billion tons of metal/minerals
is needed for the transition
to low-carbon world
by 2050*

World uses **~15 billion tons**
coal+oil+gas** every year



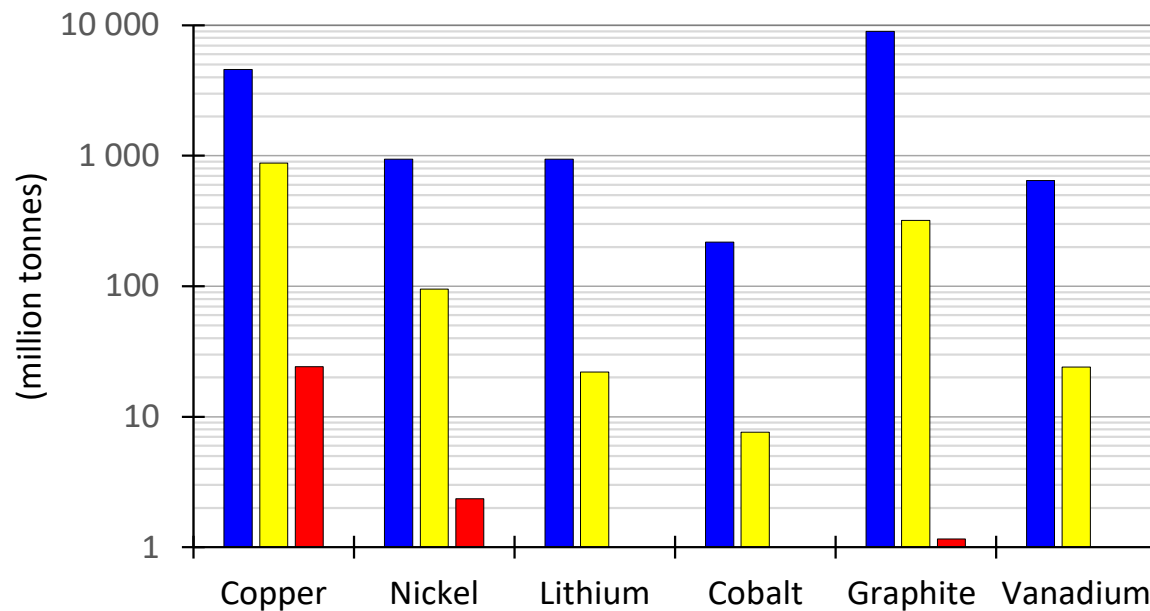
* The Beyond 2 Degrees Scenario (B2DS): Aims to limit with a 50% chance global temperature rise to 1.75°C. above pre-industrial levels. (Hund, K., La Porta, D., Fabregas, T.P., Laing, T. & Drexhage, J. 2020.)

** gas counted as tonne oil equivalent

Simon Michaux: Assessment of the Extra Capacity Required of Alternative Energy Electrical Power Systems to Completely Replace Fossil Fuels

Minerals short fall

Total metal quantity required to manufacture one generation of technology units to phase out fossil fuels compared to 2019 global reserves



■ Total metal required produce one generation of technology units to phase out fossil fuels (Source: Michaux 2022 in peer review)

■ Reported Global Reserves 2022 (Source: USGS)

■ Global Metal Production 2019 (Source: USGS)

- **Currently:**
- For every 1000 deposits discovered, 1 or 2 become mines
- Time taken to develop a discovered deposit to a mine is 15 - 20 years
- For every 10 producing mines, 2 or 3 will lose money and shut down

Source: Simon Michaux, GTK

WHERE WE CAN SUPPORT

Geological Survey of Finland

**Solutions to accelerate
the transition to sustainable
and carbon-neutral world**

We seek common interest in developing solutions

- Mineral potential and QA/QC
- Geochemistry and environmental baselines
- Mine water, mine environment and social license to operate
- Geodata management development and training
- Training and institutional capacity building

GTK MINTEC SOLUTIONS

GTK's world-class mineral processing facility supports transition from fossil fuels towards greener future

Special research focus: battery minerals and recycling of geomaterials

Cooperation with industries

GTK Mintec
World-leading mineral processing pilot plant and re-mining innovation platform

Boosting global raw material industry to meet the challenges of the changing world

Circular Economy

Mineralogical, Materials and Isotope research

Computed Tomography (3D), Isotope geology

Minerals, Ores and Geomaterials process research

Beneficiation research of minerals, from laboratory to pilot scale, up to 2000 tons

Remining and circular economy material research and piloting

Mine Management; environmental impacts and closure

Waste and mine water management

Mine closure and re-mining

Battery minerals

Primary and secondary battery minerals and metals



#gtkmintec

International Project Activities

- 
- A world map showing the global distribution of project activities. Regions highlighted in green include North America, Europe, Russia, China, India, Southeast Asia, and parts of Africa and South America. Other regions are shown in light gray.
- **Mineral potential and QA/QC**
 - **Geochemistry and environmental baselines**
 - **Groundwater management**
 - **Mine water, mine environment and social license to operate**
 - **Climate change adaptation**
 - **Geophysics and geophysical interpretations**
 - **Nuclear waste disposal and NPP siting**
 - **Geodata management development and training**
 - **Institutional capacity building**

More about GTK

www.gtk.fi

GTK experts

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Kiitos!



philipp.schmidt-thome@gtk.fi
www.linkedin.com/in/schmidt-thome