Resources in a world of change and uncertainty

John Thompson
PetraScience Consultants
University of Bristol
Human development and impact

Land and ownership

The first person who, having enclosed a plot of land, took it into his head to say this is mine, and found people simple enough to believe him, was the true founder of civil society. What crimes, wars, murders, what miseries and horrors would the human race have been spared, had someone pulled up the stakes or filled in the ditch and cried out to his fellow men: “Do not listen to this imposter. You are lost if you forget that the fruits of the earth belong to all and the earth to no one!”

—Jean-Jacques Rousseau, Discourse on Inequality (1755)

Anthropocene – ‘unconformity’
Exponential growth
Predicting demand – supply constraints

- New demand
  - Energy transition
- New supply
  - Expansions
  - New technology
  - New discoveries

Supply gaps...?

IEA 2021: Mine production and demand scenarios

STEPS – Stated Policies Scenarios; SDS – Sustainable Development Scenarios
Mining euphoria

Copper

- Increasing by 40% in 20 years (IEA-2021)
Metal demand/supply – reality check

Copper reserves
- Reserves always increase
- Predicted ‘gaps’ – in the future
- We are good at ‘discovery’!

Production challenges – ESG
- Communities
- Energy – GHG
- Water
- Waste
- Land – access, competition
- Biodiversity
- Transparency......

Adapted from Jowitt et al., 2020; USGS data
Complexity and volatility

Metal prices

• Copper price – 12 Months 2021-2022
• China, Russia-Ukraine
• Impact on demand?
Predicting the future

Predictions – variable timelines
• Climate change
• Globalization – failed globalization
• Populist politics
• The pandemic
• mRNA vaccines
• Digital transformation – automation, AI...
• Russia-Ukraine

Limited predictions
• Growth of China
• Peak oil
• Global financial crisis
• Social media
• Competitive electric cars
• Technology companies
• Shared economy
• Space companies
Three scenarios

• Follow the trends
• The end of mining
• Materials business
Follow the trends

• Energy transition – more demand, more mining
• Supply chain disruption – more mines in more countries
• ESG – community opposition
• Climate change pressure
• Populism, nationalism, expediency – volatility
The end of mining

- Weeks – employees, people, disruption
- Months – massive economic damage, infrastructure and technology degradation, inequality, migration, war
- Years – pending survival... some countries start to adjust

A materials business

• Material design for recycling – circular economy
• Material sources – recycle streams, re-mined waste, crustal fluids, in-situ recovery, mines
• Mines – partnerships with communities, zero/net zero emissions, energy, water, waste, biodiversity loss; sustainable development for partners
• Secure sources/supply chains through valued partnerships
• Rehabilitation – redesign and reclamation
Improving world

Time

Scenario 1

Scenario 2

Scenario 3
Scenario planning

• Following the trends – not sufficient
• No mining and global disruption – prepare for ‘Black Swans’ and chaos
• The ‘ideal’ case – what will it take

What do we need to do now?