



Future scenarios for the world of raw materials 2050



Scenario 3:

NATIONAL WALLS

Economic standstill gives rise to nationalist politicians and protectionist measures.



- Conflicts related to the access to raw materials arise. International institutions are weak, they can barely settle disputes.
- Big countries dominate the raw material value chain
- Disparities between countries got worse, there is little economic growth.
- Securing access to raw materials is a major challenge, especially for the resource-poor countries. Old alliances are re-established.
- Nations focus on solving their own problems. They run national economic development programmes.
- Resource-poor countries re-start mining and invest into recycling, reuse & substitution.
- Resource-rich countries favour technologies that are readily available.





no collaboration

across national

borders



mining technology development is at a standstill, but some countries have to catch up



little economic growth, mostly boosted by national government

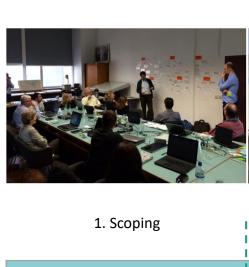


acceptance of mining (it is a necessity)

















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1 2. Identification and selection of 1 3. Description of potential future 1 descriptors

developments

4. Scenario development

5. Transfer

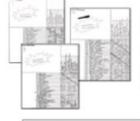
Influence Factors

23 **Descriptors**

57 Projections

Raw Scenarios

Final Scenarios













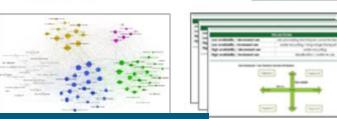


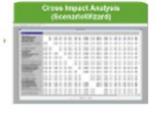


















Main dimensions

International cooperation and domestic policies

Economic situation

Society and environment

Mining value chain and technologies

- International cooperation and trade
- Stability of Domestic Policies

- Infrastructure
- Price volatility
- Economic development

- Responsible consumption and production
- Environmental impact of mining
- Public acceptance of mining
- Mining workforce
- Climate action

- Demand for raw materials
- Industry and value chain structure
- R&D
- Mining technologies





Cleavages between scenarios

- Global trade
- Investments
- Price volatility

Advancement Wave

Divided Dominions

- Political stability
- Economic distress

Downward Spiral

Great Transition

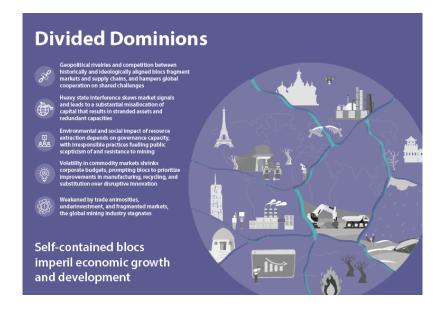
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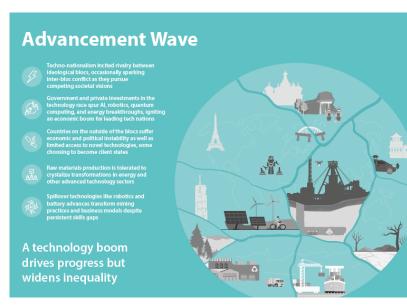




2050 mining scenarios















Divided Dominions

Self-contained blocs imperil economic growth and development

 De-globalisation and trade bloc formation driven by grievances over influence, power, and wealth distribution

Self-contained trade blocs emerge with distinct governance approaches

System shaped by dominant powers and their interests

• Focus on critical industries (AI, space, defence, communications, electronics, health)

• Excluded nations form alliances and obstruct raw materials export

Results in geopolitical rivalries, conflicts, and proxy wars

Conflicts fuelled by historical animosities and opportunism







Divided Dominions











Self-contained blocs imperil economic growth and development

Winners

Industry

- Low-cost mineral producers resilient to price fluctuations
- Mineral producers that enjoy a competitive advantage based on their geographical location
- State-owned miners, aligned with governing regimes
- Highly skilled workers specialised in emerging technologies

Regions, organisations and other players

- Most developed economies
- Small proportion of developing countries with rich resources and near-shoring opportunities
- Countries with good geological endowments and existing infrastructure
- Tech companies

Losers

Industry

- Small miners in developing countries that lack resources to adopt best practices
- Mining innovators struggling from dampened investment and unstable policies
- Mining companies lacking advanced capabilities
- OEMs and consumers in trade blocs facing supply shortages
- Regions, organisations and other players
 - A large proportion of developing countries
 - Multilateral institutions, unable to broker
 - Citizens in totalitarian regimes
 - Future generations





Advancement Wave

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A technology boom drives progress but widens inequality

- Energy transition sparked a tech race akin to dotcom and crypto booms
- Leading economies invested in green innovation, achieving breakthroughs in various fields.
- Well-funded nations saw enhanced productivity and societal well-being
- Transformative solutions revolutionised key sectors (transportation, energy, manufacturing, climate resilience)
- Regional trade blocs restricted technology diffusion, leading to tech nationalism and knowledge hoarding
- Strategic barriers emerged along ideological lines
- Lesser-developed countries leveraged mineral resources within patron trade blocs
- Vulnerable nations faced climate risks and social unrest, resulting in migratory pressures on advanced countries





Downward Spiral

Countries fall into a regressive trap in pursuit of tota

- Resource nationalism led to inward-turning countries and pursuit of selfsufficiency
- Resulted in economic volatility, social divisions, and neglect of shared interests
- Environmental degradation and increased climate vulnerability ensued
- Resource-driven conflicts erupted between major powers, sparking regional wars
- Multiple divides (economic, political, social, religious, cultural) hindered global cooperation
- National and regional markets experienced extreme volatility and protectionism
- Market instability led to community devastation, increased inequality, and social unrest











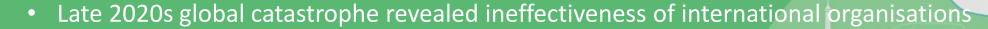






The Great Transition

A global crisis sparks unprecedented unity



- Crisis united previously divergent interests to address common challenges
- Realisation that survival depends on confronting environmental, social, technological, and industrial challenges collectively
- Establishment of Global Council of Nations (GCN) as successor to UN
- New generation of visionary leaders pushed sustainability-focused reforms
- Development and rapid adoption of new technologies in energy, food, and raw materials production
- Global adoption of circular economy and green technologies
- Emergence of a new age focused on universal prosperity and planetary well-being















Leveraging scenarios as a tool

Mineral projects have decadal time horizons, so 2050 is NOW

A playbook for how the industry and social environment might respond to drivers of change

Lessons from 2016

Possible Roles for technology

Preparing for other dynamics

Climate change impacts on operations; economics; etc

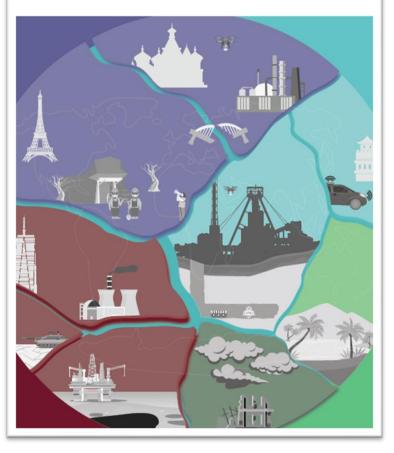
Workforce and educational limiters on development and growth

Role of infrastructure in enabling and sustaining the economic growth and benefits





A forward-looking exploration of the mining industry's future, set against the backdrop of the year 2050







More tooling

Considerations of how political/legal frameworks create stability

How capital will react in a dynamic complex environment relative to political and global dynamics

Examining the unknown unknowns of technological breakthroughs

Al and data-centric activities as current disruptor

Weak points in system opportune for technologic disruption







A forward-looking exploration of the mining industry's future, set against the backdrop of the year 2050





Thank you for your time





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All resources available at:

