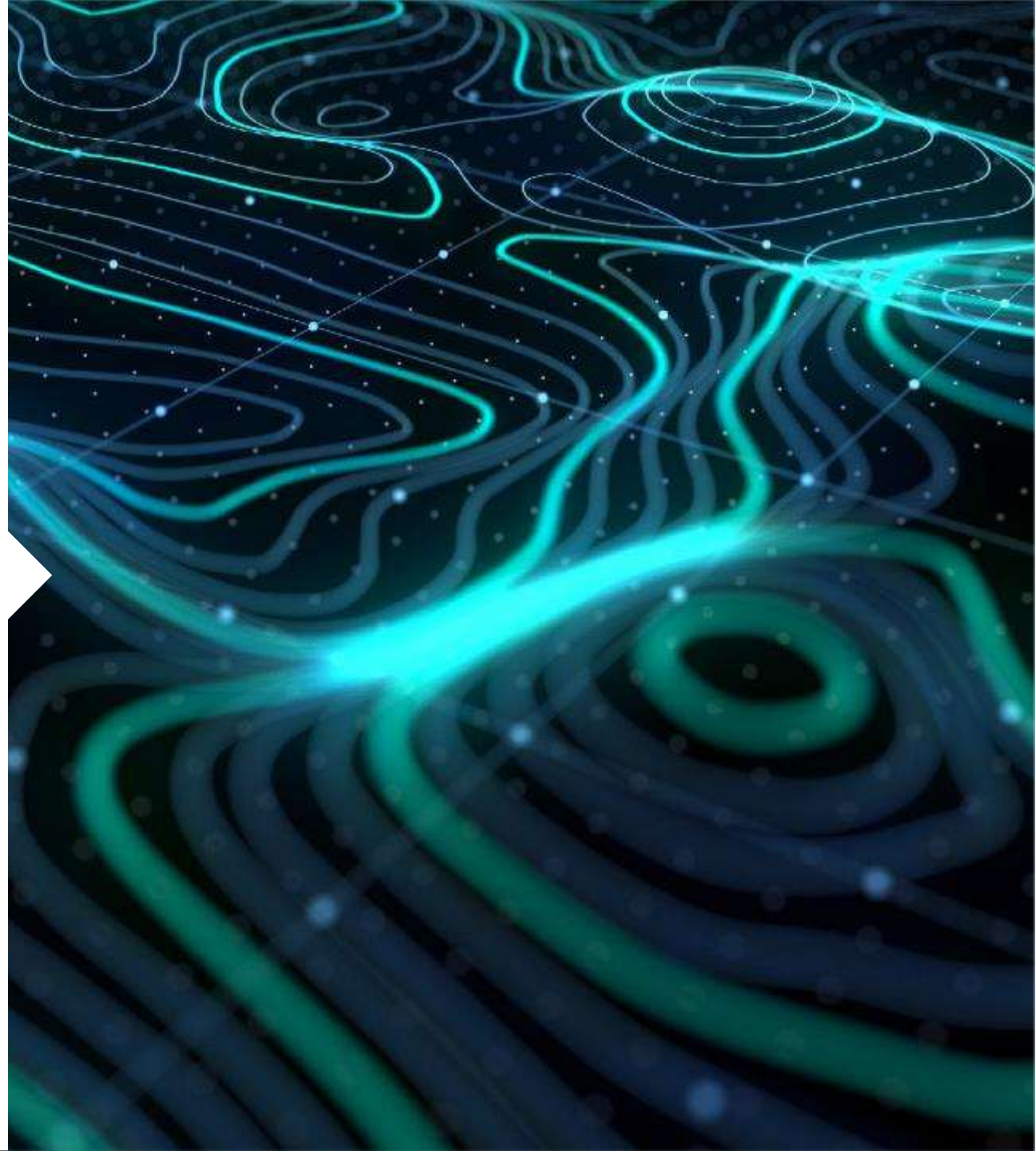
Minception

# Sustainable Mining for a Brighter Future

NATIONAL MINING CONCLAVE 2024

28th & 29th June, 2024



# About Speaker

- Swapnil Gupta, a distinguished expert in Management Consulting and Strategic Advisory with 15 years of impactful experience in Mining and Metals Sector.
- He is a Mining Engineer from IIT BHU and an MBA from IIM Bangalore with specialization in Public Policy and Management.
- Swapnil is leading the **Minception,** a consulting firm with 80 years of practical experience and legacy of VIMSON Group.
- He has been associated with organizations like PwC, Adani and Reliance in Business development and corporate strategy roles.
- Swapnil has worked on multiple consulting assignments ranging from strategy to execution such as Transaction Advisory, Due Diligence, M&A, Operation Improvement, Planning, MDO contracting, Sustainability and Technologies.
- His extensive portfolio includes advising Ministries, State DGMs, SMDCs, and leading PSUs like NMDC, SAIL, and NALCO; top private companies like Adani, Reliance, Vedanta, and Tata; and international projects with the World Bank, GIZ, ADB, and global MNCs like VALCO, BHP etc. across various geographies.
- Swapnil has been participating as speaker and panel member in multiple Knowledge events organized by FICCI, CII, MEAI and other industry forums.

**Swapnil Gupta**

CEO– Minception

VM Salgaocar Group Company

| | |
|---|---|
| **Experience:** | 15+ Years |
| **Credentials:** | BTech – Mining Engineering – IIT BHU<br>MBA – IIM Bangalore |
| **Skills:** | Management Consulting, Strategy, Public Policy, Financial Modelling, Business Transformation, M&A, Digital and ESG |

# Sustainable Mining

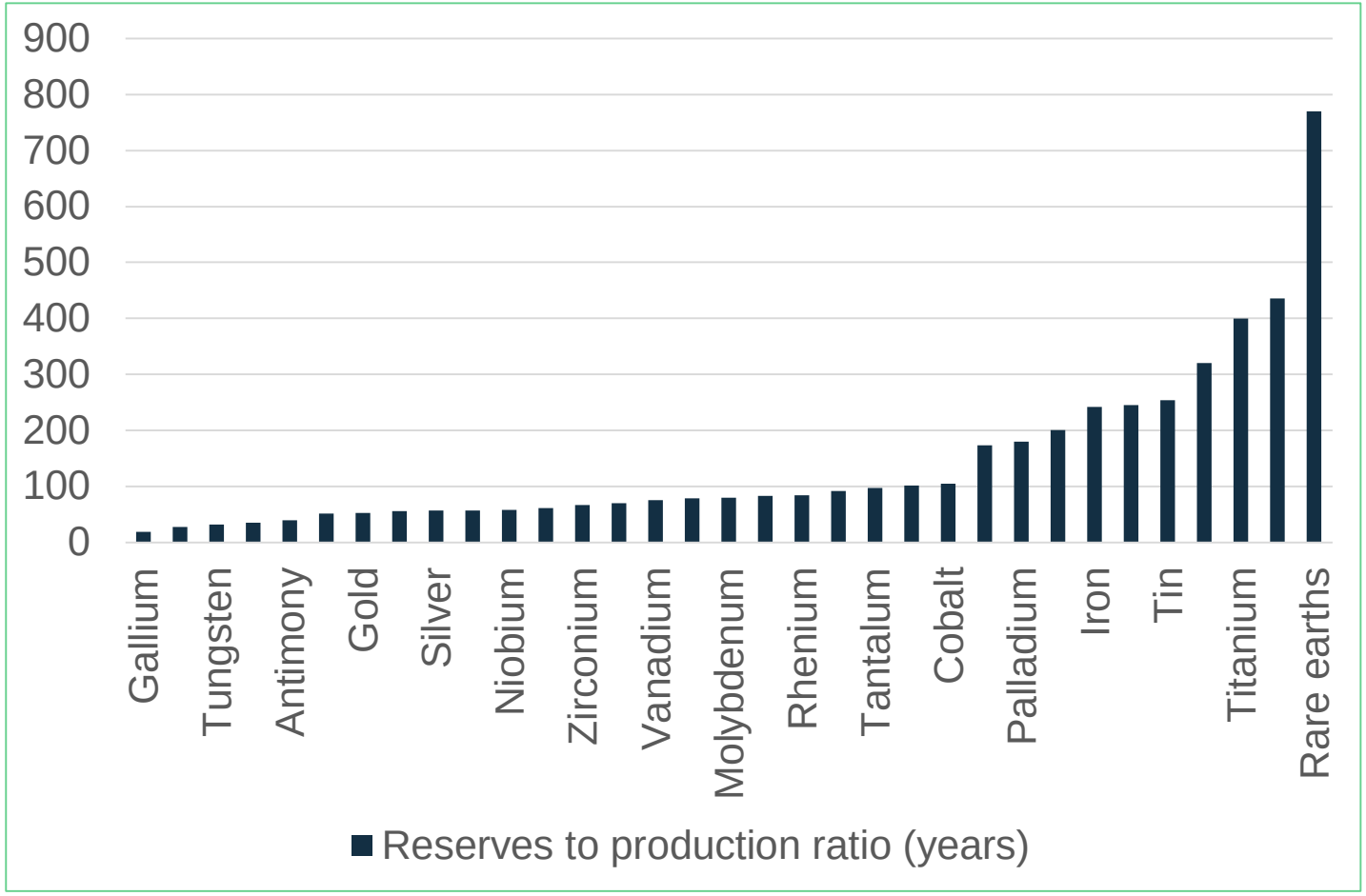
- Sustainable mining is a way to minimize negative impacts of mining on environment, economy, and society.
- Some ways to achieve sustainable mining include:
  - ✓ **Reducing waste** - Recycling and reprocessing tailings, segregating waste, and reusing mining waste can all help reduce waste. For example, tailings can be used to make bricks, paint extenders, or in agroforestry.
  - ✓ **Lowering emissions** - Miners can use renewable energy sources to reduce their carbon footprint and energy costs. They can also electrify their vehicles to reduce emissions and improve worker safety.
  - ✓ **Conserving water** – Mining operations can conserve water.
  - ✓ **Restoring the land** - Mining companies can replenish native soils and grasses, replant trees, and perform site inspections. They can also work to restore the land to its natural state after a mine is exhausted.
  - ✓ **Supporting communities** - Mining companies can ensure that communities thrive beyond the life of a mine.
  - ✓ **Increasing Efficiency**:
    - Combating illegal mining and efficient regulations
    - Monitoring and improving Human Resources
    - Technology Improvement

Sustainable Mining involves ***limiting extraction rates*** so that future generations can still have access to resources.

# Reserve Depletion rate is alarming

Reducin g Waste

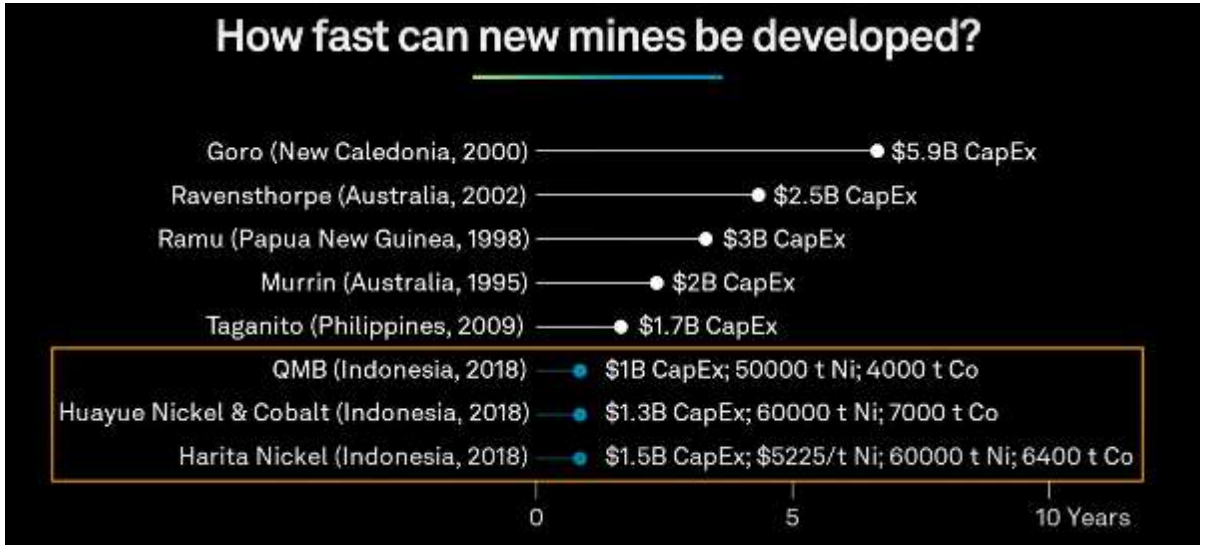
- The extraction and processing of materials, fuels and food contribute half of total global greenhouse gas emissions and over 90% of biodiversity loss and water stress
- Resource extraction has more than tripled since 1970, including a fivefold increase in the use of non-metallic minerals and a 45% in fossil fuel use
- By 2060, global material use could double to 190 billion tonnes (from 92 billion), while greenhouse gas emissions could increase by 43%

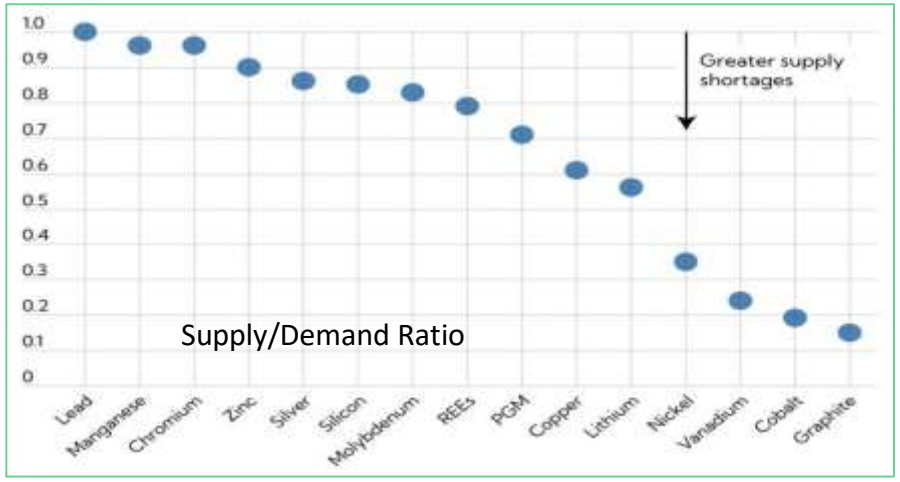


# Supply Demand Ratio

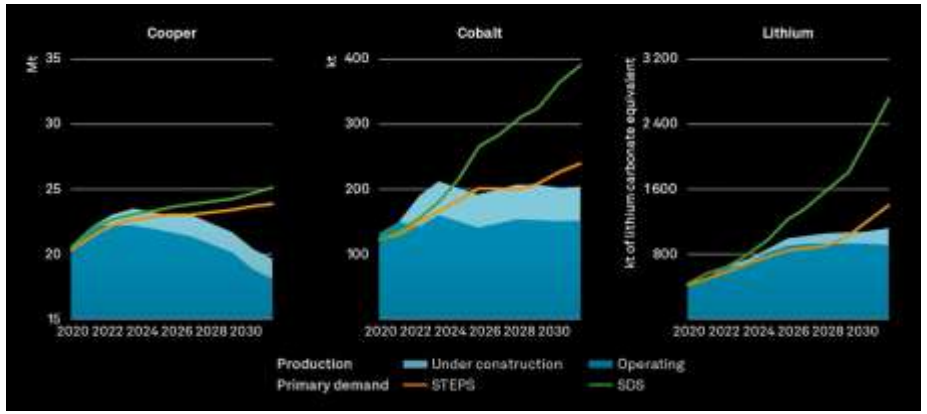
Reducing Waste

- Current production rates of some important minerals are likely to be inadequate to satisfy future demand
- Global average of discovery to production time interval during last decade was **17 years**
- Recently in 2018, Indonesia has reduced this process to as low as 1 year for the Nickel mines.



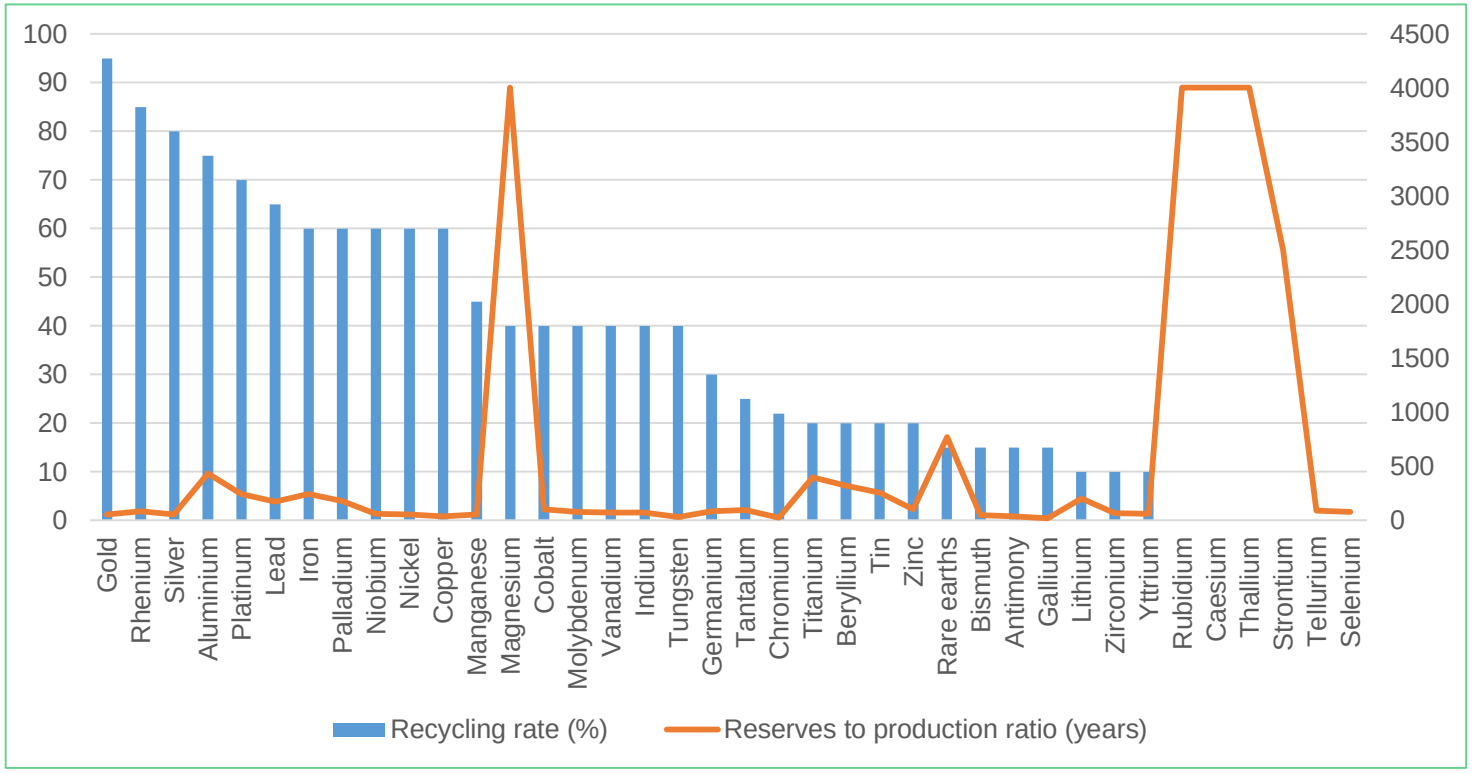

Source: https://www.imf.org/en/Blogs



# Recycling and Recovery

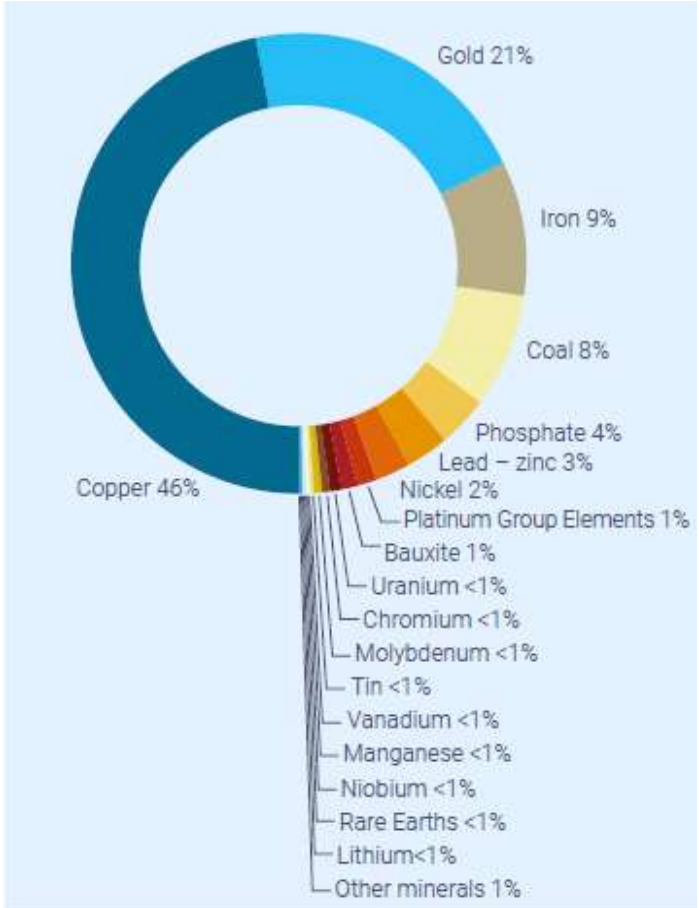
Reducin
g Waste

## Recycling proportional to Price




Source: Sverdrup & Ragnersdottir; USGS 2016 mudd 2020

## % Global Tailing Volume




- ~225 billion t of tailings @ 2 trillion USD
- ~1 plus trillion tonnes of waste rock

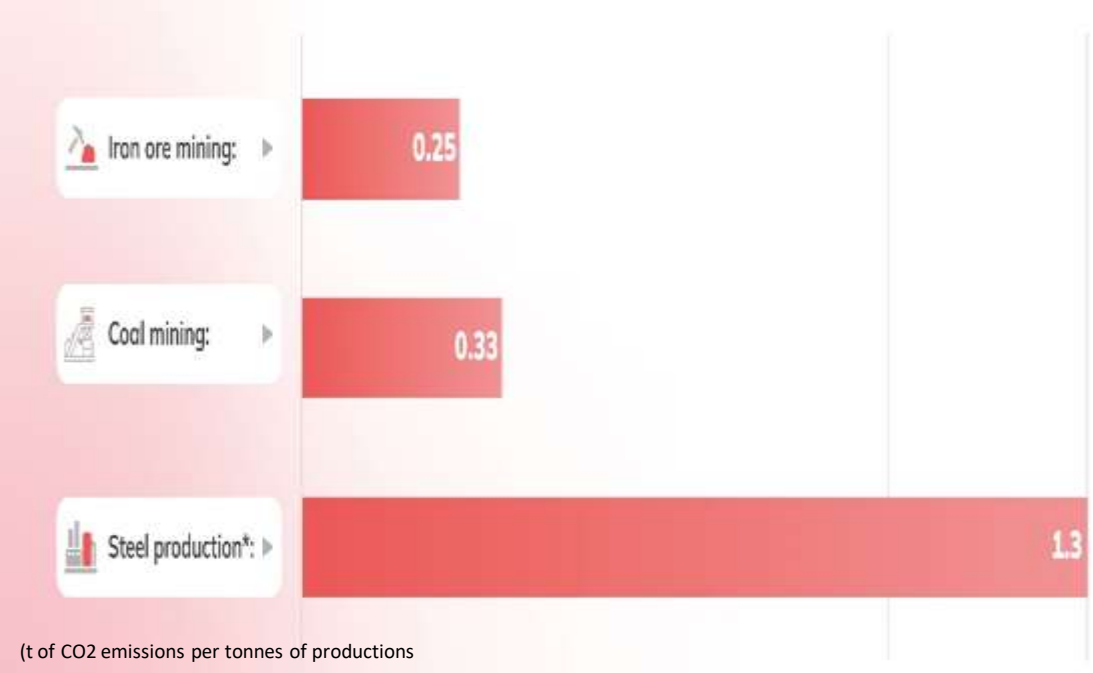
To stay on track for a global 2°C scenario, all sectors would need to reduce $CO_2$ emissions from 2010 levels by at least 50% by 2050.

To limit warming to 1.5°C, a reduction of at least 85% would likely be needed.

# Global carbon share

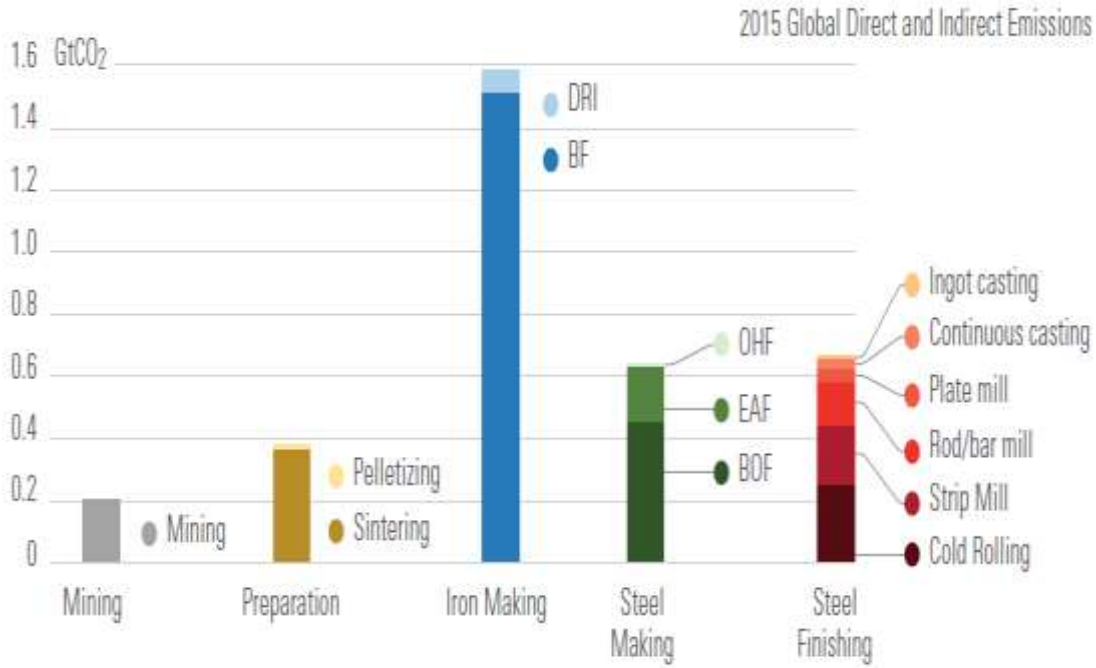
Lowering Emissions

## $CO_2$ emissions in Mining




Credit: Hasanbeigi

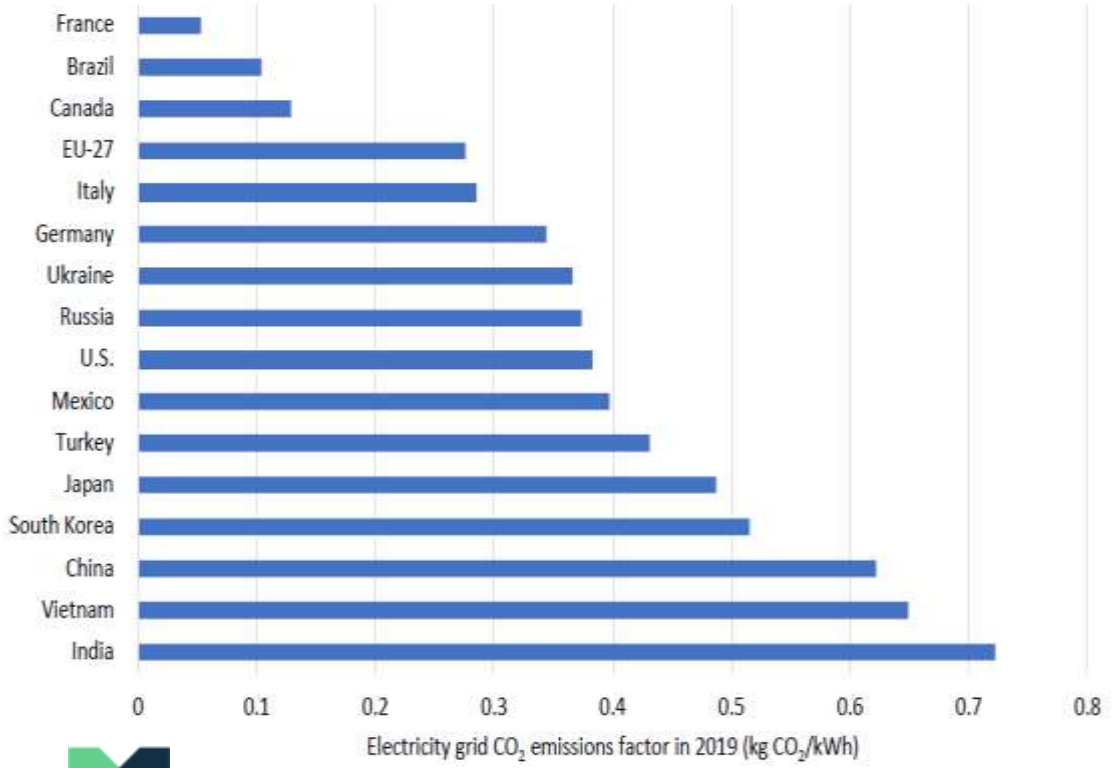
## $CO_2$ emission across ore to metal



# $CO_2$ Emissions

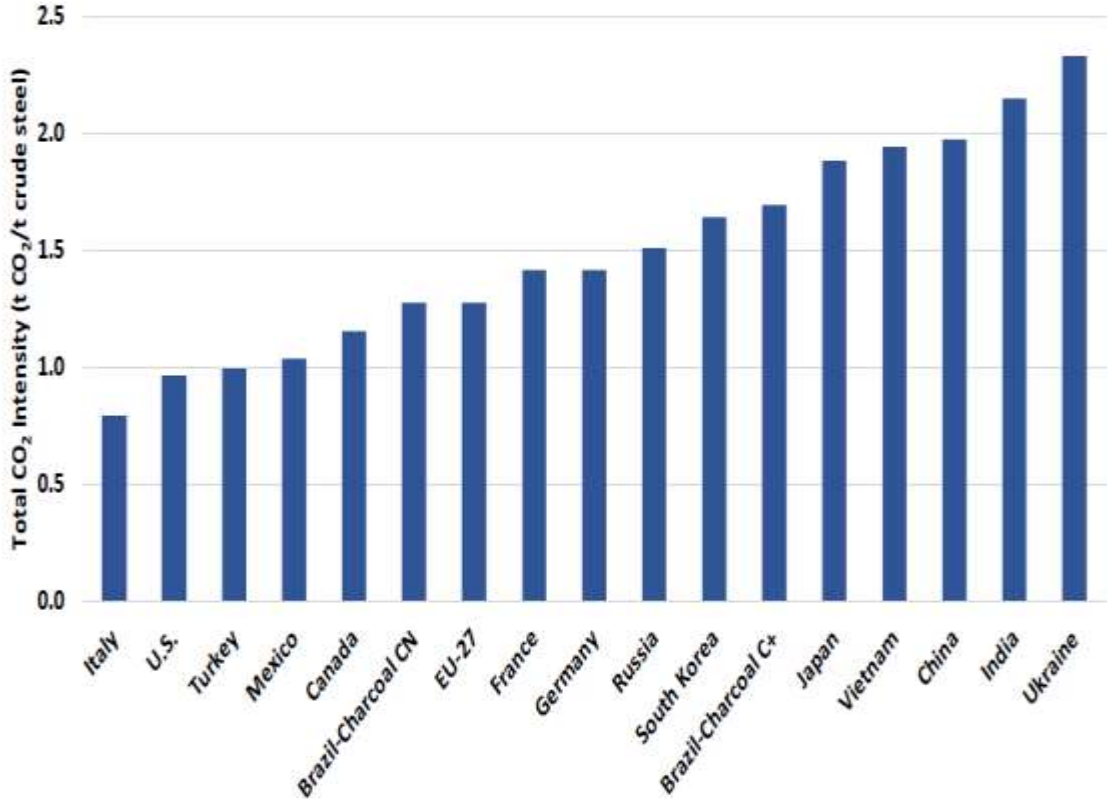
Lowering Emissions

## India is highest $CO_2$ emitter per unit of electricity generation




Credit: IEA

## India ranks 2nd in $CO_2$ emissions per unit Steel production




Credit: Hasanbeigi

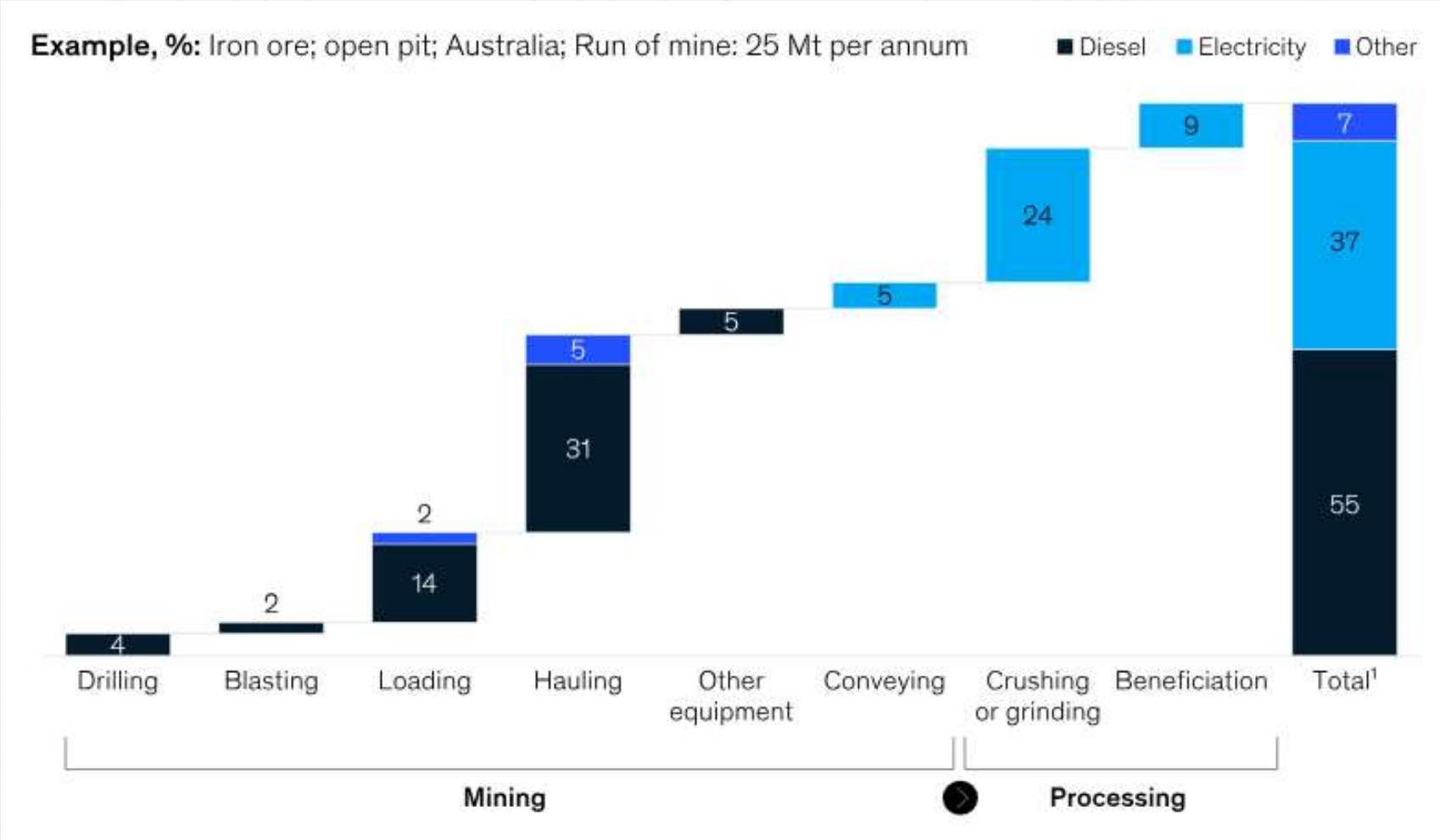
# Case Study: Emission of Different Sources

Lowering Emissions

Emissions within mining can be broken down into three broad types

- Scope1. Emissions from diesel
- Scope2. Emission from Electricity generation
- Scope3. Emissions from the supply chain and transport

Today 40-50% of CO2 emissions come from diesel used in mobile equipment, with another 30-35% from non-renewable electricity.

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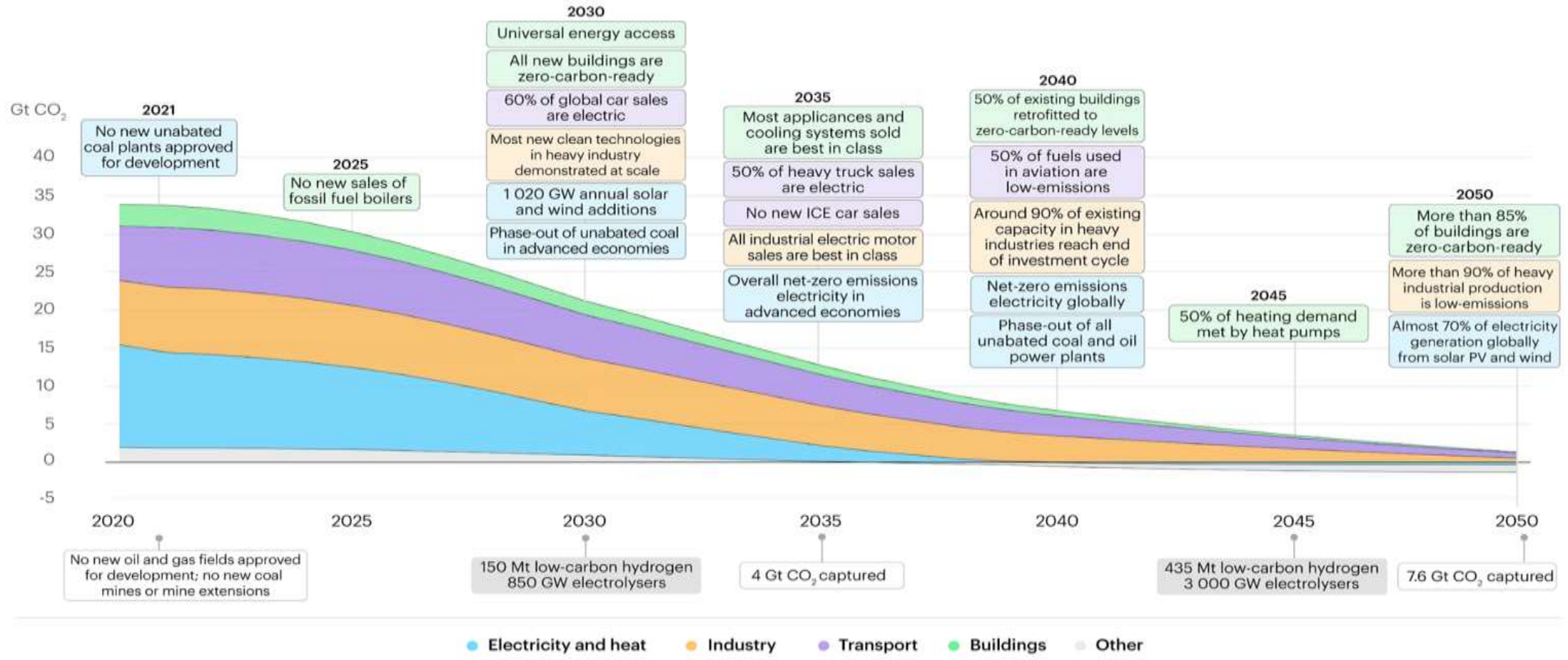
# Pathway to Net Zero Emission

Lowering Emissions



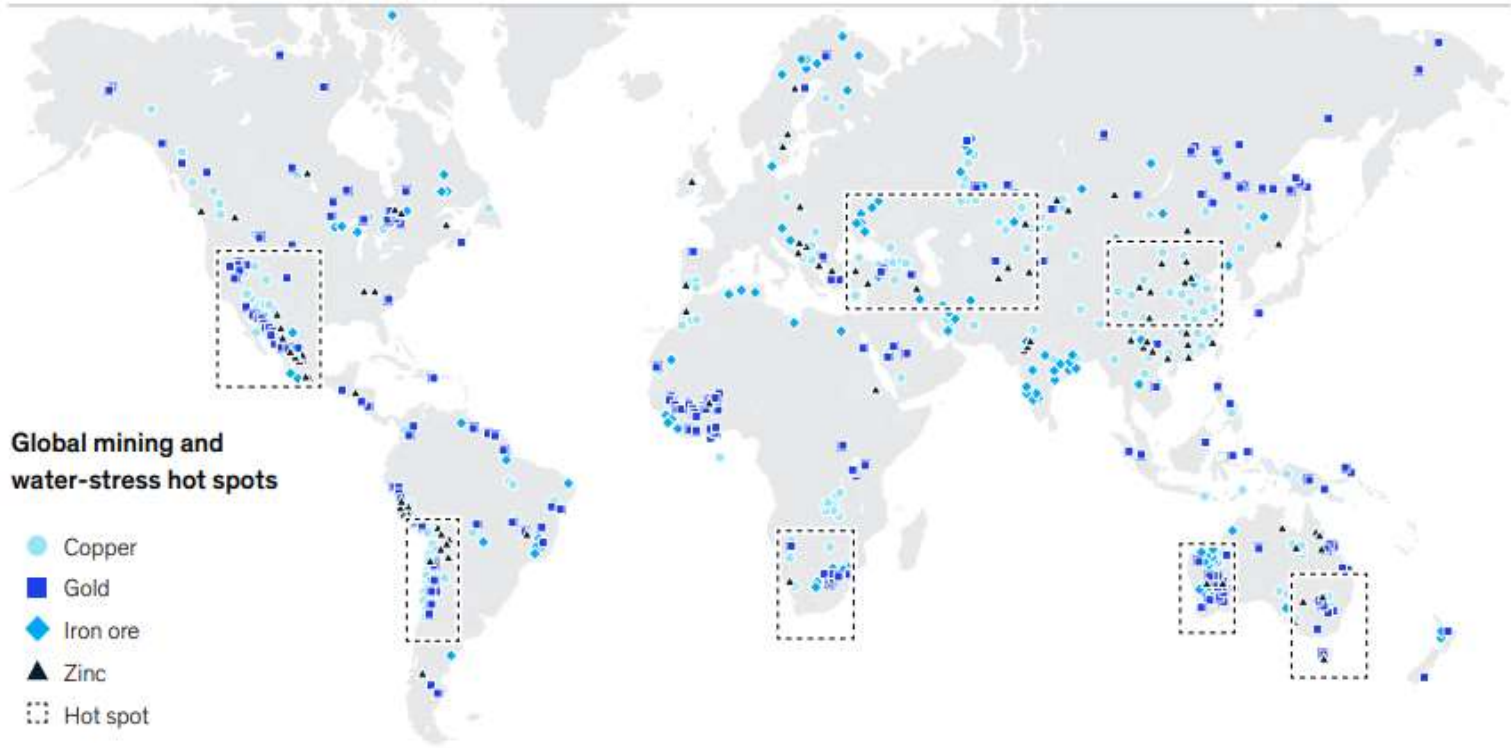

Source: IEAGHG

To improve resiliency, companies can reduce the water intensity of their mining processes.

# Water stress and mining sites

Conserving Water

- Companies can reduce the water intensity of their mining processes.
- Recycle used water and Reduce water loss from evaporation, leaks, and waste. E.g. *Anglo American improved evaporation monitoring at its Drayton mine dam in Australia*
- Creating - New water infrastructure, such as embankments, dams and desalination plants, is sometimes necessary.
- Companies may sometimes need to adopt flood-proof mine designs that improve drainage and pumping techniques. E.g. Trapbags, Diversion barriers, Gravity Walls etc.

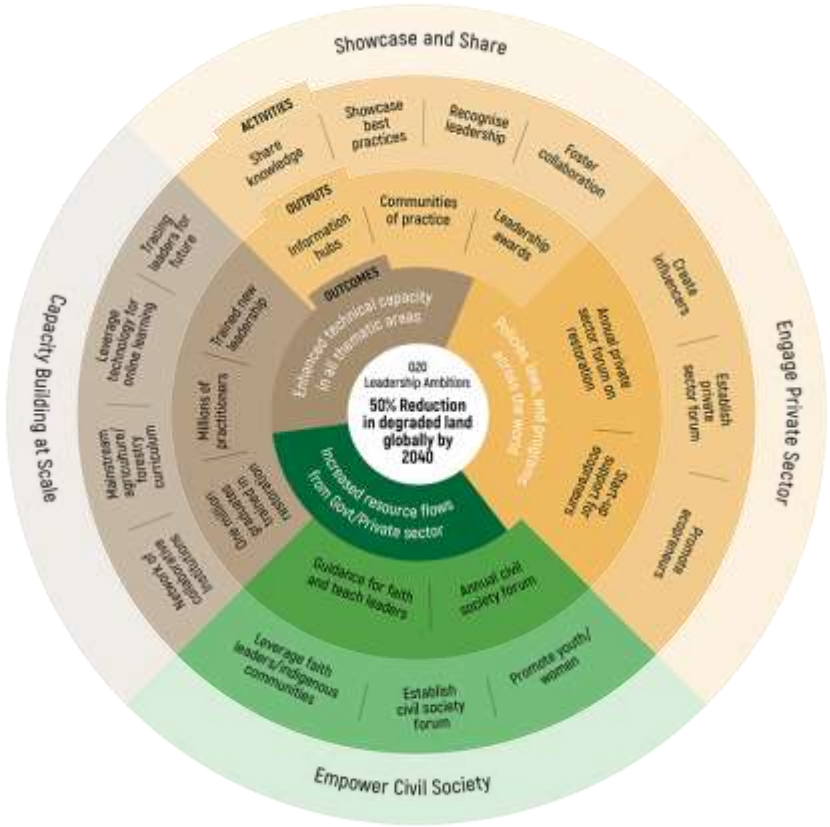



[1]Water stress defined as ratio of water demand to supply.

Source: Aqueduct Water Risk Atlas, World Resources Institute, 2015, wri.org; MineSpans by McKinsey

Source: McKinsey

# Global Initiative for Reducing Land Restoration



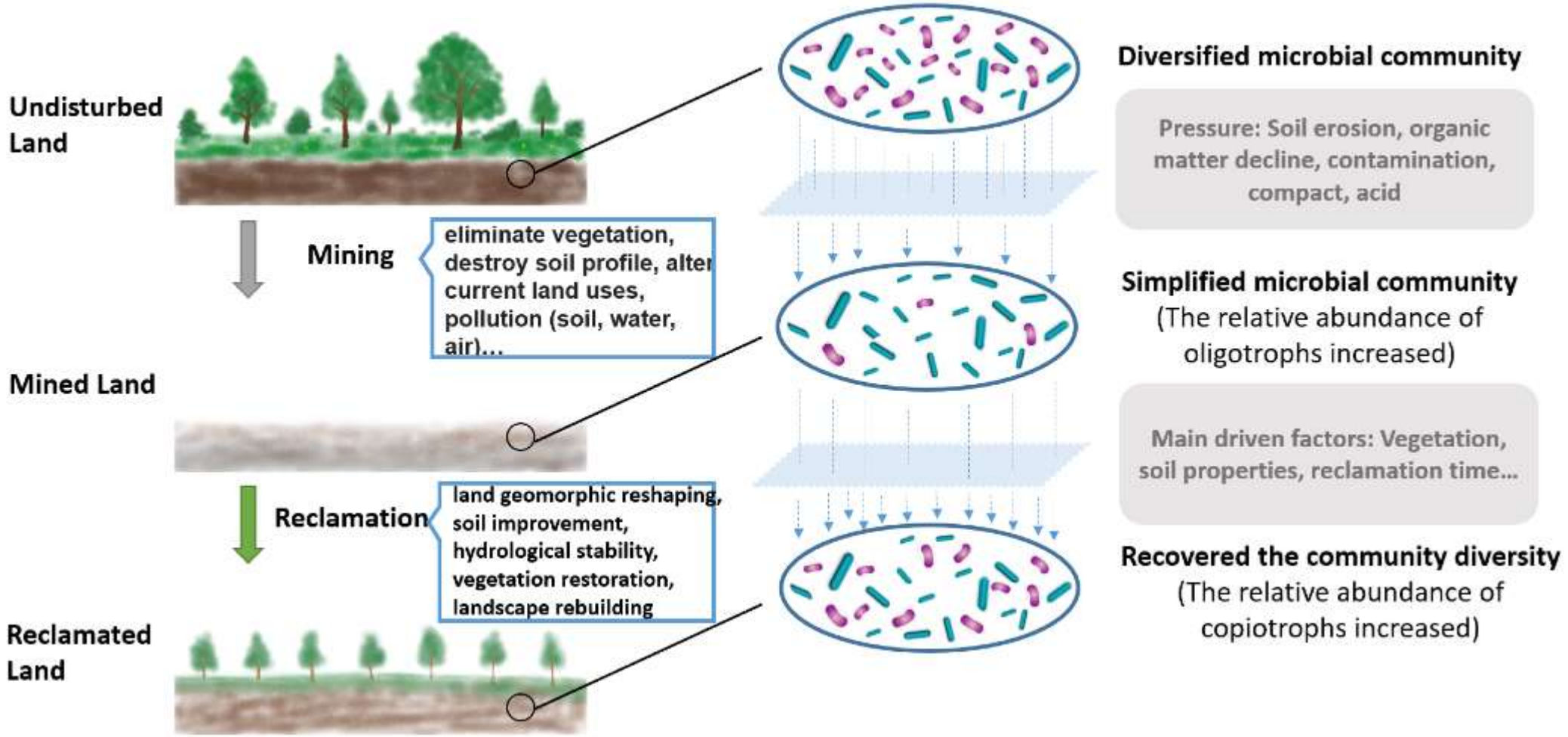

## To achieve 50% reduction in land degradation by 2040 – G20

- The Global Restoration Information Hub will provide easier access to information on land degradation, conservation, restoration, and sustainable land management.
- Collaboration and broader the engagement of various stakeholders in land conservation and restoration
- Enhancing Conservation of Terrestrial Habitats

Source: Global Restoration Inf Hub

# Responses of soil microbial community to reclamation.

Restoring Land




Credit: MDPI Journal

# Case studies of Reclamation

Restoring Land


Source: Intechopen

Flambeau Mine Site: a) before mining (1991), b) during mining (1996), and c) after mining (2002)


a) The original Jarrahdale crusher circle 1998, and b) After rehabilitation circle site at Jarrahdale, 2012 (Alcao)

We can't solve problems
by using the same kind of thinking
that we used when we created them.

# Global head count in mining

## Mining work force

- 7 million direct employment in mines
- 1–2 % of total employment in a country
- when indirect and induced employment is included, this can jump to 3–15 %
- 40 million artisanal miners
- 1 million child labour globally in mining

# Principles of Community Development

Supporting Communities


| | |
|---|---|
| Participation | Engage community members in all stages of the process |
| Empowerment | Strive to empower individuals and communities to make decisions and turn them into actions |
| Capacity Building | Focuses on improving the abilities & skills within the community to help them address their own issues |
| Social Change | Aims to tackle the root social issues impacting communities, promoting equality and justice |

# Case study : Mineral Foundation of Goa

Supporting Communities

Mineral Foundation of Goa

## Mission

"To promote social investment programmes through capacity building of stakeholders, participatory decision making, support ongoing efforts and to improve the natural environment for the sustainable development of the mining belt of Goa"


मिनरल फाऊंडेशनचे सहकार्य : शिरगाव जत्रेत विक्रेत्यांना कागदी पिशव्यांचे वाटप

विद्यार्थ्यांकडून प्लास्टिकविरोधी जागृती

प्लास्टिकचा वापर टाळावा


Chief Minister Dr. Pramod Sawant inaugurated the training workshop for BDOs and Secretaries organized by Mineral Foundation. CM appealed the secretaries, BDOs to prioritize the people's benefit with a proactive approach and congratulated the Mineral Foundation for their consistent work towards the society.

Source: MFG

# Case Studies of Private Organization

**Supporting Communities**

## Vedanta Aluminium

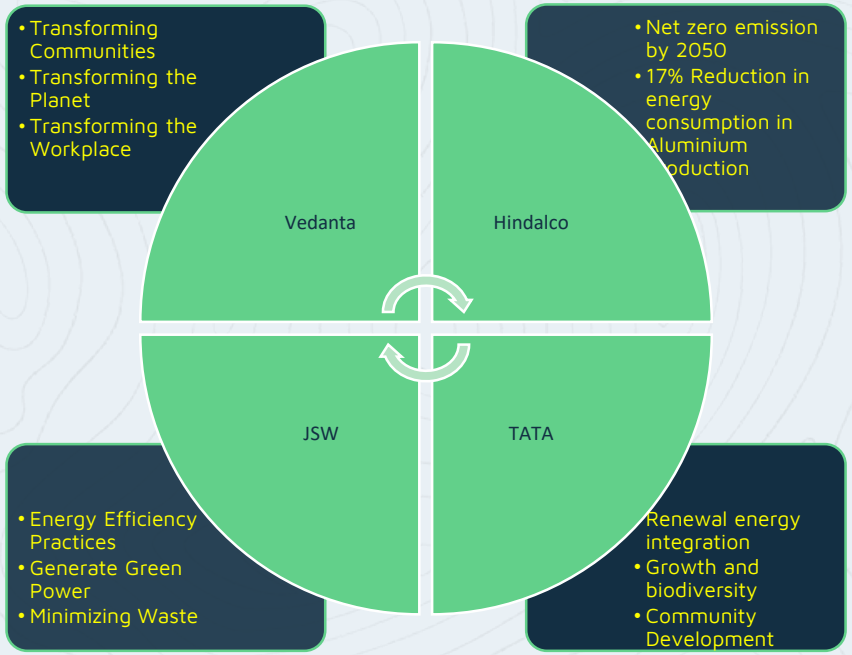
- 21% Reduction of t $CO_2$ emission intensity from 2012
- 93% of Mines out area rehabilitated
- 16.5% Million $m^3$ water recycled
- 118% ash utilization

## JSW Cement

- Emission intensity of 173 kg/tonne, significantly below global and national averages.
- 1,56000 $m^3$ harvested rain water consumed
- 9 MW Solar power plants utilized at Nandyal and Salboni Mines

## HINDALCO

- Development of Bio-Parks in Bagru Bauxite Mines, Hindalco, Jharkhand
- Installation of solar PV panels at the IV/4 coal mine – reduce carbon emissions by 5.12 million kg of $CO_2$ annually.

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# Sustainable Mining Practice

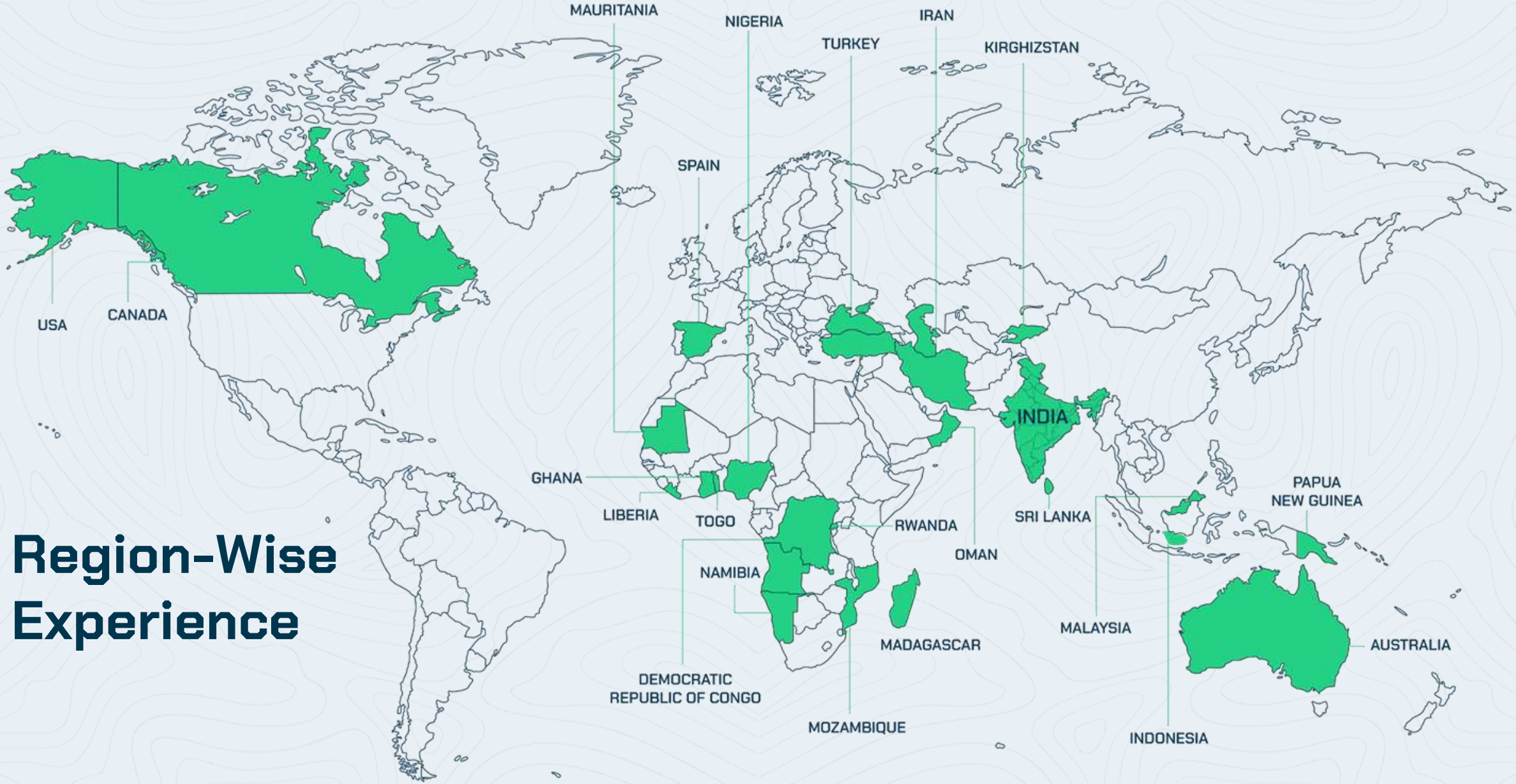
Conclusion


| | |
|---|---|
| Minimizing Environmental Footprint | • Reduced Water and Energy Consumption<br>• Waste Management<br>• Air and Noise Pollution Control |
| Land Rehabilitation and Reclamation | • Planning for Post Mining Land Use<br>• Rehabilitation Techniques |
| Social Responsibility | • Ccommunity Engagement<br>• Social Impact Assessment<br>• Workforce Development |
| Technology Innovation | • Precision Mining:<br>• Clean Technologies:<br>• Automation and Digitalization |
| Transparency and Accountability | • Environmental and Social Impact Reporting<br>• Independent Verification |

# The Minception Story

- ✓ 80 years of experience in Mining Industry
- ✓ Legacy of Quality and Trust
- ✓ Forward-thinking innovation
- ✓ Designed to solve complex problems for M&M Sector
- ✓ Strong Consulting Team

# Region-Wise Experience

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# Capabilities, Driving Growth & Expansion

## 12 million+ Hectares

of prospecting for multi-metal commodities.

## 90,000+ Metres

of drilling, core logging, and subsurface data interpretation

## Commodities and Reporting

as per the International Reporting Standards.

## 130+ Projects Valuations

as per the international standards – JORC code.

## 25+ Projects

for multi-metal resource assessment

## 1,400+ Hectares

of detailed geological mapping

## 85+ Mining Plans

with progressive mine closure plans.

## Global Mineral Asset Due Diligence

for diverse mineral assets worldwide

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# Minception Service Catalogue

**MINCEPTION the leading service provider for Mining and Metals industry across the globe.**

## Exploration & Survey

- Geological mapping,
- Geochemical sampling
- Planning of drilling program
- Resource modelling
- Topographic survey
- 3D terrain model generation
- Cut & fill volume survey

## Advisory Services

- Feasibility studies
- Due diligence of mineral assets
- Economic evaluations & risk assessment
- Valuation of mineral projects
- Mineral commodity studies
- Bid advisory and Auction Support
- Policy and Regulatory Advisory Support

## Engineering Services

- Mining plan
- Mine planning & design
- Process optimization
- Metallurgical testing & development
- Process engineering of plant designs & flow sheets

## Trading & Logistics Services

- Mineral Commodity Market Assessment
- Forward pricing contracts
- Logistic & Value Chain Analysis
- Flexible post-fixture operation
- KYC & documentation Support
- Networking and Market Entry Strategy
- Contract Administration Support

## Technology Enablement and Innovation Support

- Operation Review and Technology roadmap for ops improvement
- Agile, tech-empowered mining process and Global benchmarking
- Cost-efficient operations that priorities environment & worker safety
- Access to our technology partners
- Pilotable solutions and customization based on client need
- Industry-first technologies
- Open Innovation Support for specific clientele

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# Thank you


Contact

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