Global Critical Minerals Outlook 2024

Launch webinar

28 May 2024
The main story of 2023 – falling prices

Following two years of dramatic increases, prices for critical minerals experienced a widespread decline in 2023, with battery materials experiencing particularly sharp reductions.

Mineral price developments

Annual average demand and supply growth rates for key minerals, 2021-2023

Following two years of dramatic increases, prices for critical minerals experienced a widespread decline in 2023, with battery materials experiencing particularly sharp reductions.
The pace of investment growth slowed, but still healthy

The recent fall in prices has affected investments in new mineral supply, but they are still growing; investment by lithium-focused companies saw a sharp rise of 60%, despite lower prices.
Two sides of price declines

Lower prices have been good news for consumers, bringing clean technology costs back on a downward trajectory, but they also make spending to ensure diversified supply less appealing to investors.
Robust momentum for clean energy deployment…

Clean energy deployment continues to advance in all our scenarios for the future, including a strong growth story for solar, wind, EVs and battery storage.
Today’s well-supplied market may not be a good guide for the future as demand for critical minerals continues to rise in all IEA scenarios; it almost triples by 2030 and quadruples by 2040 in the NZE Scenario.
Mixed picture for future balances between demand and supply

Expected mine supply from announced projects and 2035 requirements in the Announced Pledges Scenario (APS)

- **Copper (Mt)**
  - Expected mine supply: 40
  - 2035 requirements: 1,200

- **Lithium (kt Li)**
  - Expected mine supply: 8
  - 2035 requirements: 600

- **Nickel (Mt)**
  - Expected mine supply: 6
  - 2035 requirements: 300

- **Cobalt (kt)**
  - Expected mine supply: 16
  - 2035 requirements: 1,600

- **Graphite (Mt)**
  - Expected mine supply: 4
  - 2035 requirements: 80

- **Rare earths (kt)**
  - Expected mine supply: 4
  - 2035 requirements: 40

**Expected supply from announced projects is within range of projected 2035 requirements to reach national and global climate goals, with the major exceptions of copper and lithium**
Limited progress in diversifying supply

As many refining projects are being developed in today’s dominant producers, refined material production is set to remain highly concentrated in a few countries.
Lens of asset ownership reveal a different picture

US and European companies play a major role for copper and lithium supplies whereas Chinese companies have a greater role for nickel and cobalt production than the geographical location of mines indicates.
Who captures the benefits?

Announced projects indicate that Latin America, Africa and Indonesia see a growing market value from their mining operations; nearly 50% of the market value from refining is concentrated in China by 2030.
Resilience analysis reveals significant vulnerabilities

If the largest supplier and its demand are excluded from market balances, available "N-1" supply of all key energy transition minerals would fall significantly below material requirements.

If 35% non-single-origin threshold of the EU CRM Act.

- **Copper**
  - Demand: 30 Mt
  - Supply: 20 Mt

- **Nickel**
  - Demand: 6 Mt
  - Supply: 4 Mt

- **Battery-grade graphite**
  - Demand: 7.5 Mt
  - Supply: 5.0 Mt

Mineral demand and supply outside of the largest supplier in the APS, 2030
Mineral-specific “clean energy transition risk assessment”

### Risk score by category and mineral

<table>
<thead>
<tr>
<th>Supply risks</th>
<th>Geopolitical risks</th>
<th>Barriers to respond to disruptions</th>
<th>Exposure to ESG and climate risks</th>
<th>Overall risk score (out of 12)</th>
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#### Lithium and copper are more exposed to supply and volume risks whereas graphite, cobalt, rare earths and nickel face more substantial geopolitical risks
Vital to step up efforts on recycling, innovation and behavioural change

Recycling rates increase substantially with growing policy attention and the rise of battery recycling; Without the uptake of recycling and reuse, mining capital requirements would need to be one-third higher.
Addressing supply challenges will need a focus on demand

Global lithium chemical supply in 2023 and NZE demand for lithium used in EV and storage batteries in 2030

Besides investments in supply, demand-side measures also help bridge the gap: right-sizing EV batteries, scaling up recycling and continued investments in technology innovation reduce lithium demand by 25% in 2030.
Progress towards sustainable and responsible supplies

Although the industry is making progress on sustainability reporting, it paints a mixed picture with some positive trends but substantial room for improvement.
IEA Critical Minerals Data Explorer

- An interactive online tool that allows users to easily access the IEA's scenario data for critical minerals
- Provides full access to the demand projections under various energy scenarios and alternative technology cases
- **New additions:** mining and refining supply projections based on existing and announced projects

https://www.iea.org/topics/critical-minerals