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Global perspectives and outlook for critical minerals

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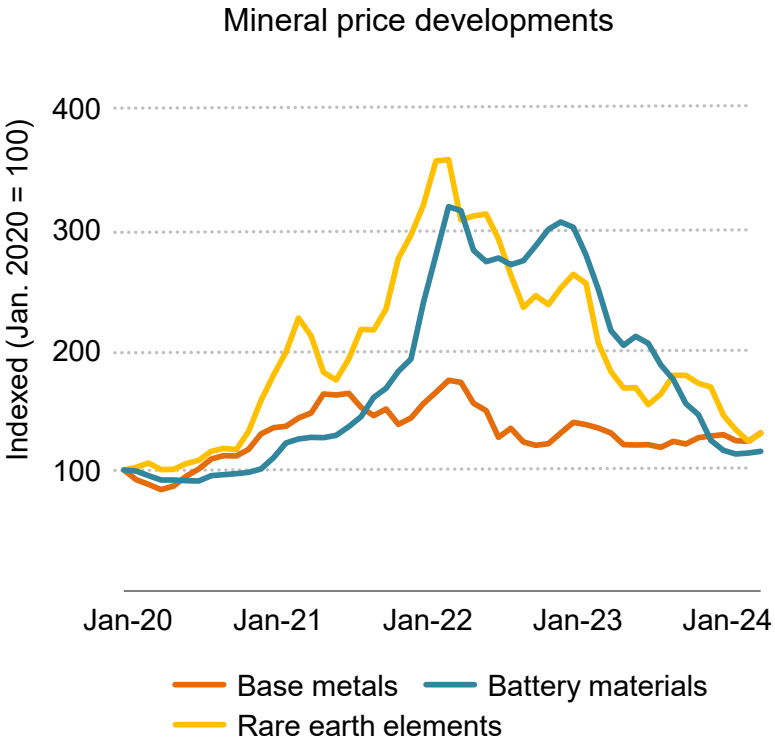
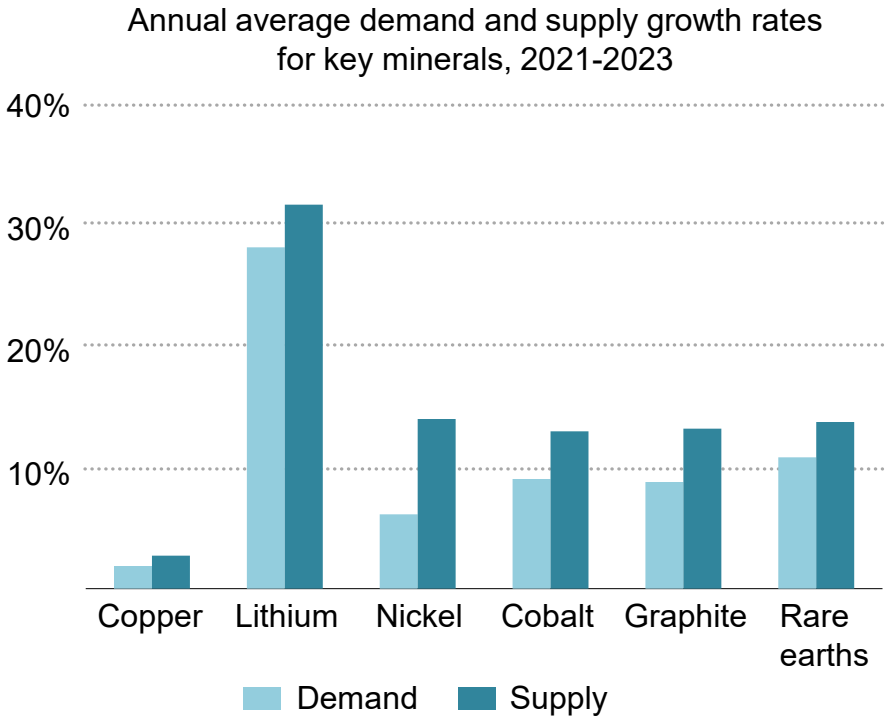
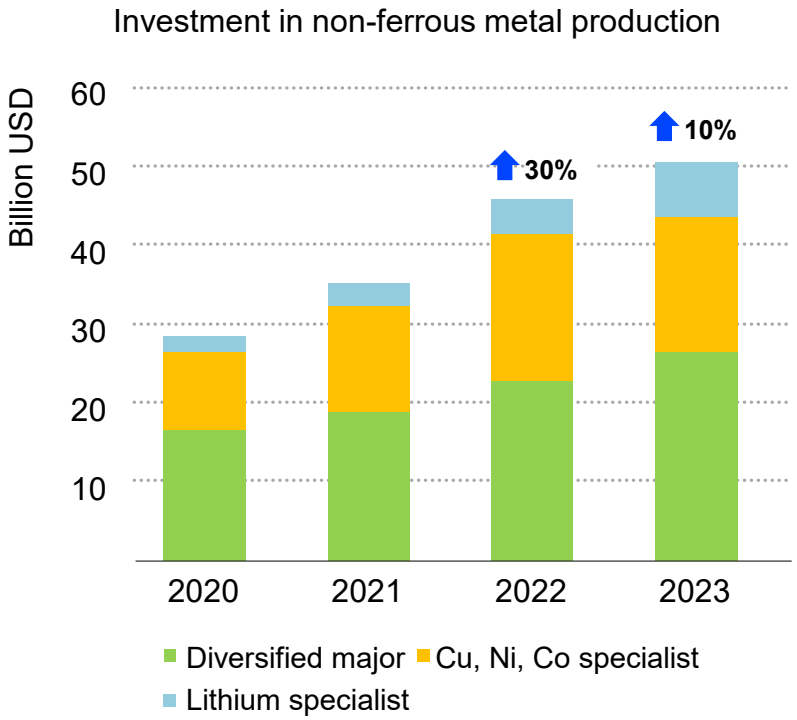
The main story of 2023 – falling prices

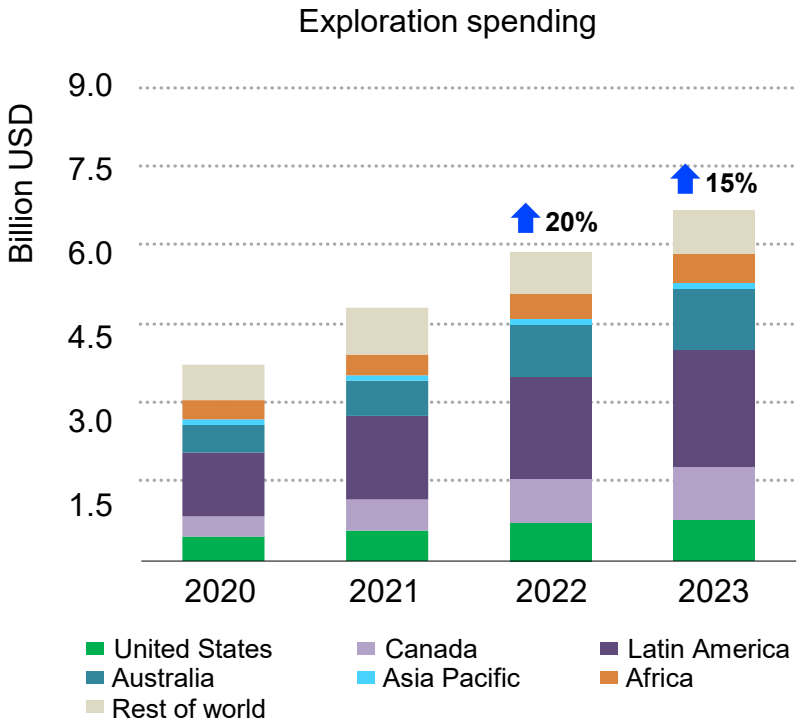




Following two years of dramatic increases, prices for critical minerals experienced a widespread decline in 2023, with battery materials experiencing particularly sharp reductions

The pace of investment growth slowed, but still healthy



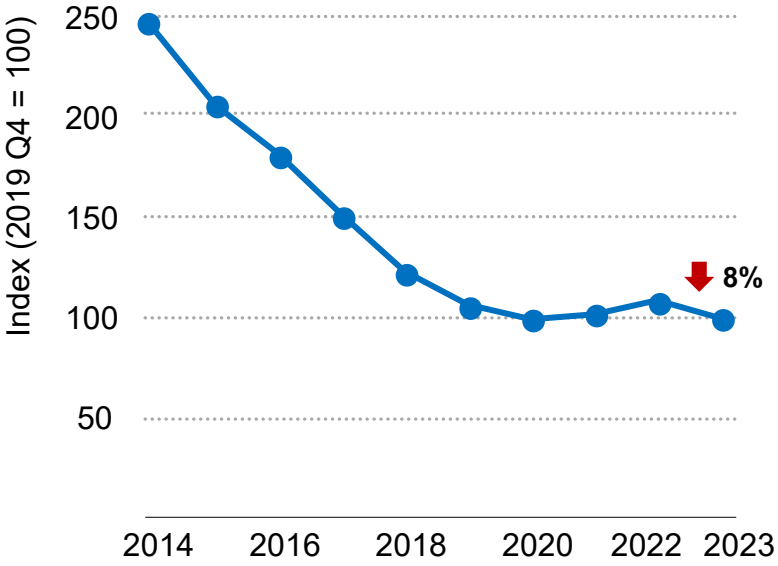


The recent fall in prices has affected investments in new mineral supply, but they are still growing; investment by lithium-focused companies saw a sharp rise of 60%, despite lower prices

Two sides of price declines

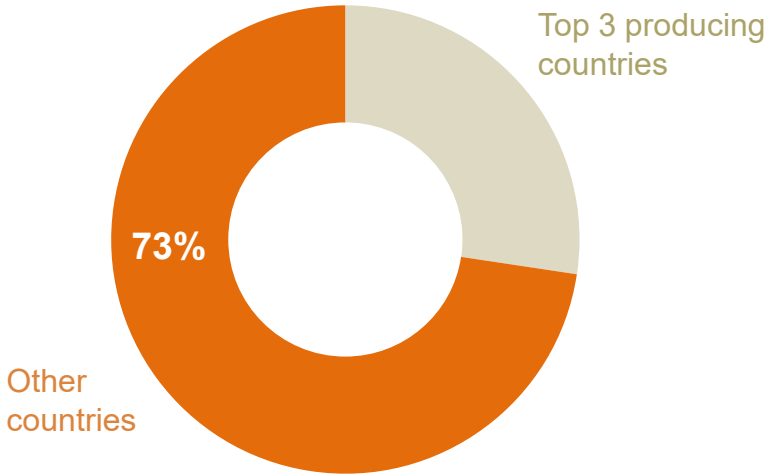
A boon for clean energy deployment

IEA Clean Energy Equipment Price Index



A bane for mineral investment and diversification

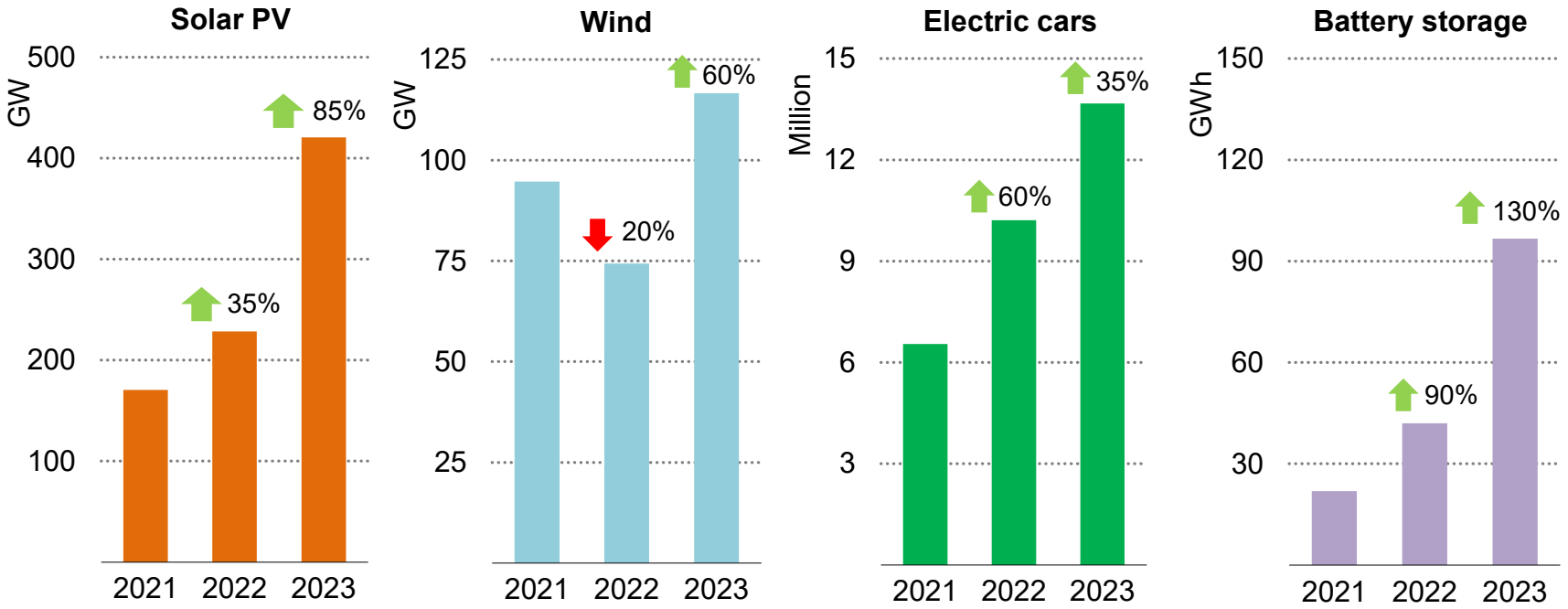
Nickel mine production at risk



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

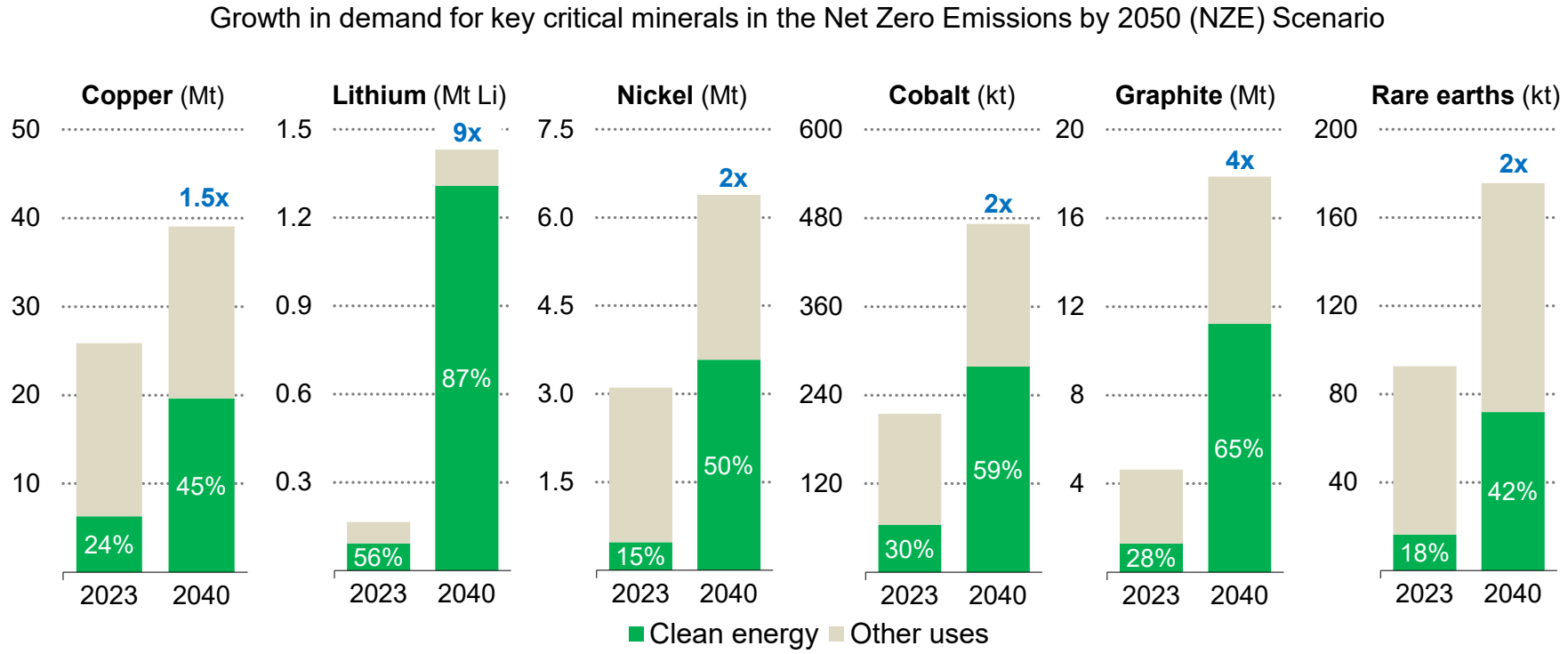
Robust momentum for clean energy deployment…

Annual capacity additions for selected clean energy technologies, 2021-2023



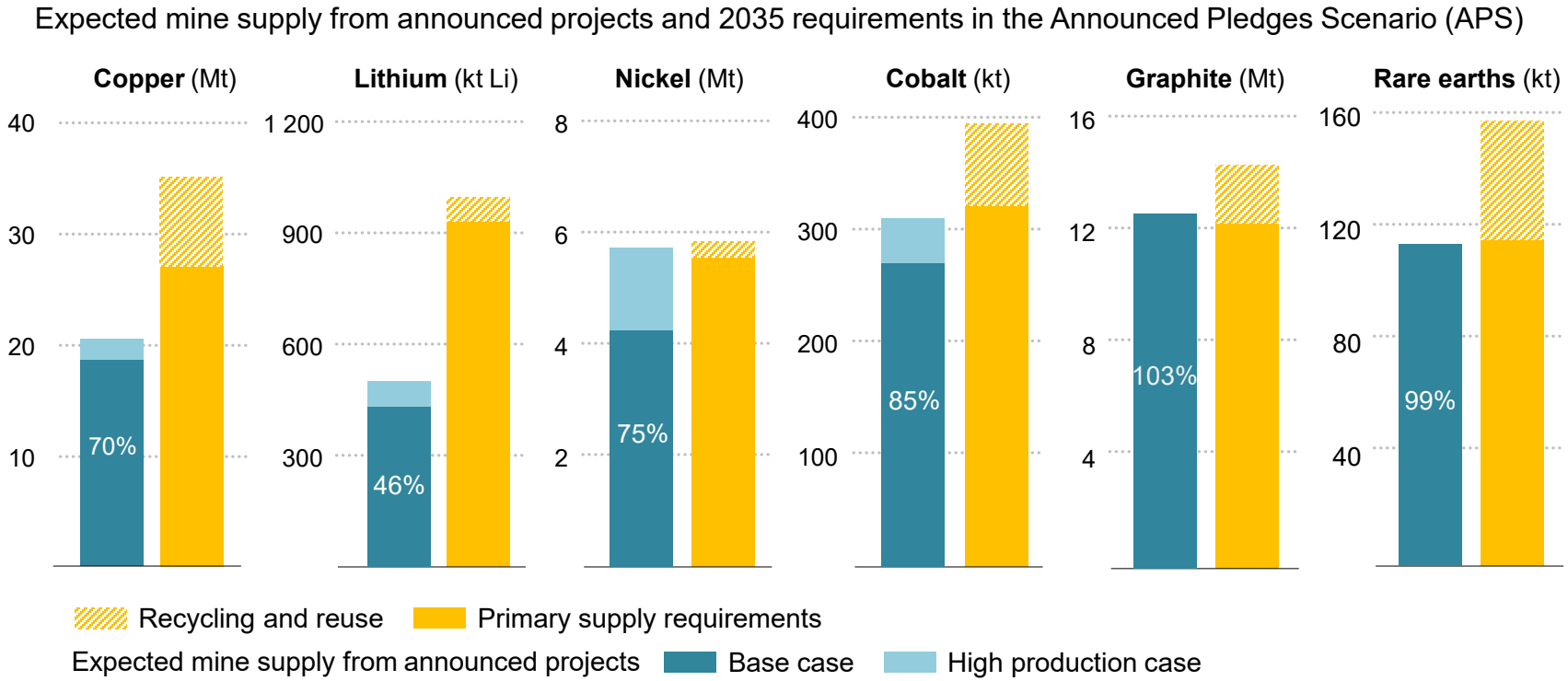
Clean energy deployment continues to advance in all our scenarios for the future, including a strong growth story for solar, wind, EVs and battery storage

….brings strong demand for critical minerals



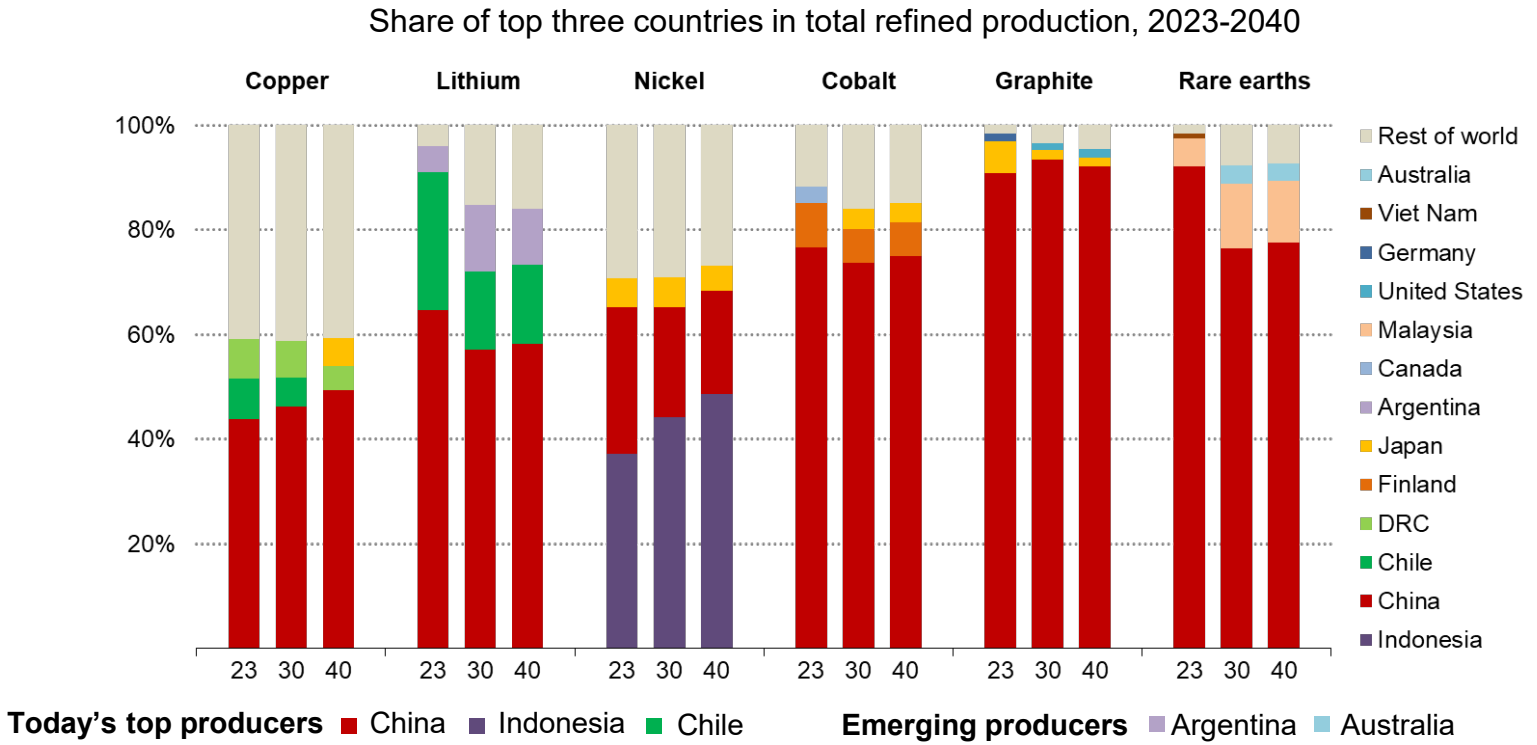
Today's well-supplied market may not be a good guide for the future as demand for critical minerals continues to rise in all IEA scenarios; it almost triples by 2030 and quadruples by 2040 in the NZE Scenario

Mixed picture for future balances between demand and supply



Expected 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

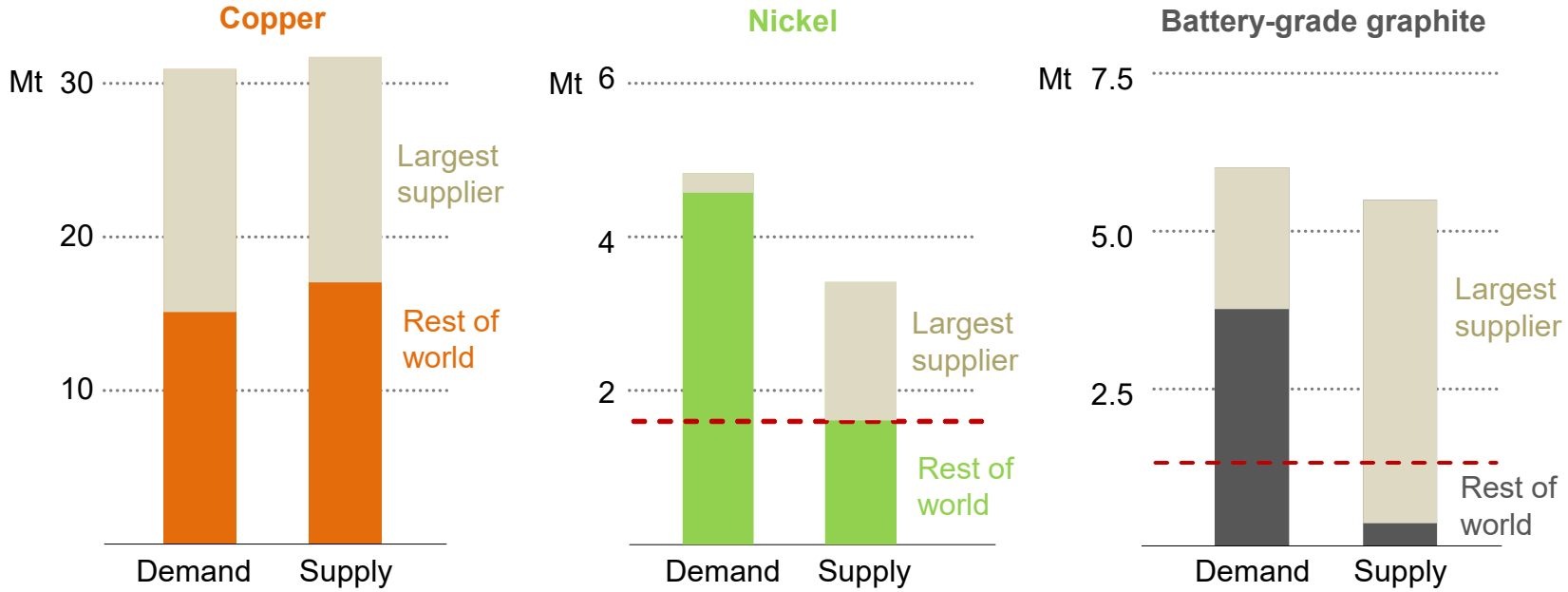
Limited progress in diversifying supply



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

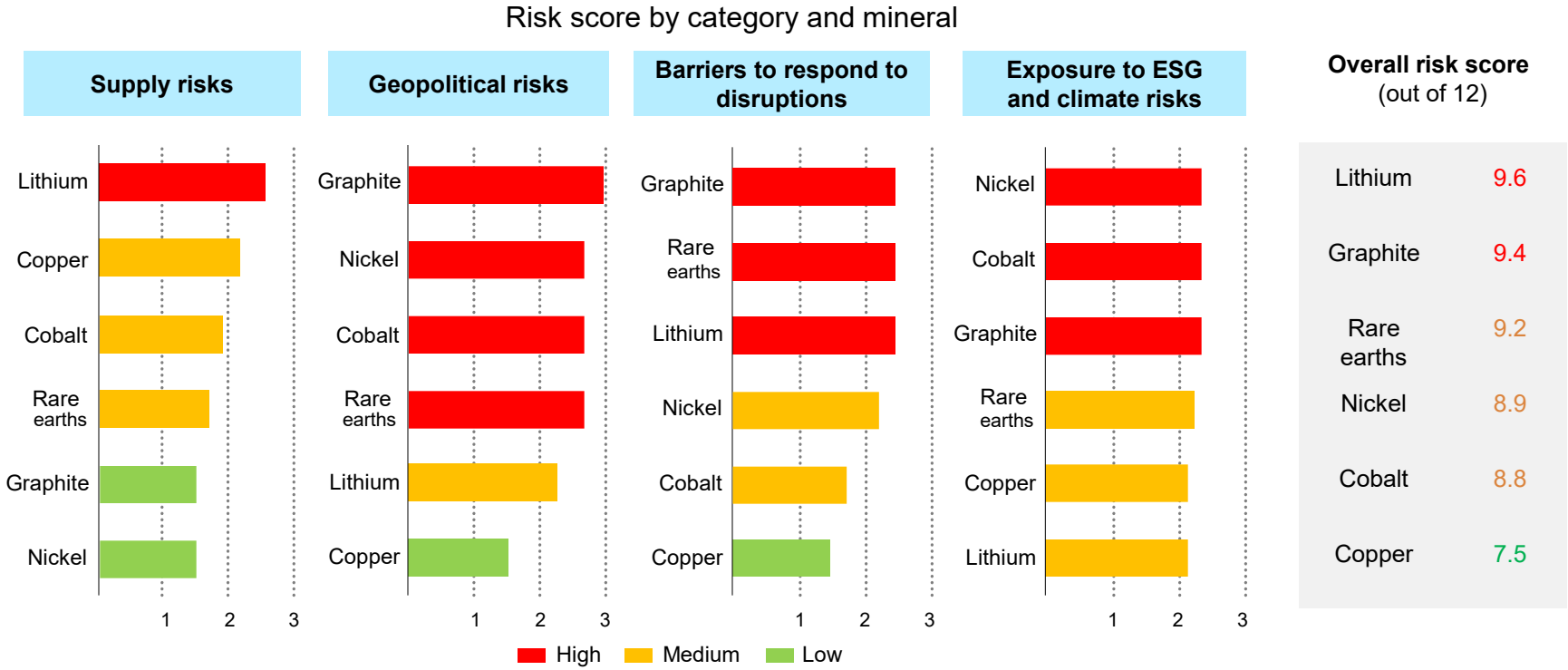
Resilience analysis reveals significant vulnerabilities

Mineral demand and supply outside of the largest supplier in the APS, 2030



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

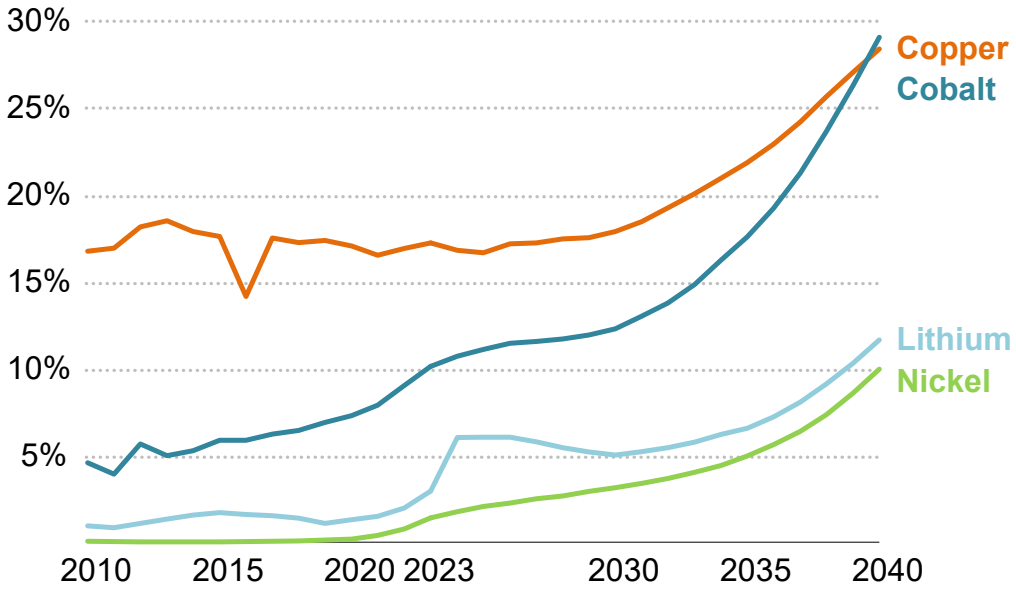
Mineral-specific “clean energy transition risk assessment”



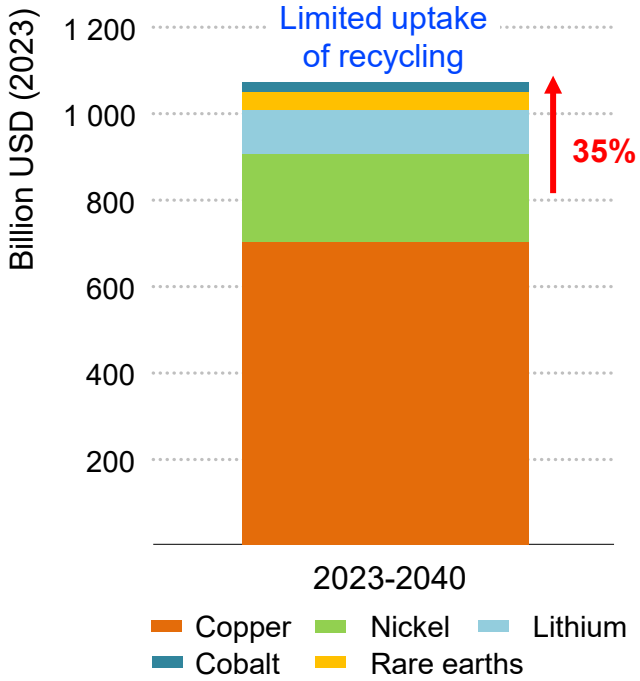
Lithium and copper are more exposed to supply and volume risks whereas graphite, cobalt, rare earths and nickel face more substantial geopolitical risks

Vital to step up efforts on recycling, innovation and behavioural change

Share of recycling in total supply in the NZE scenario



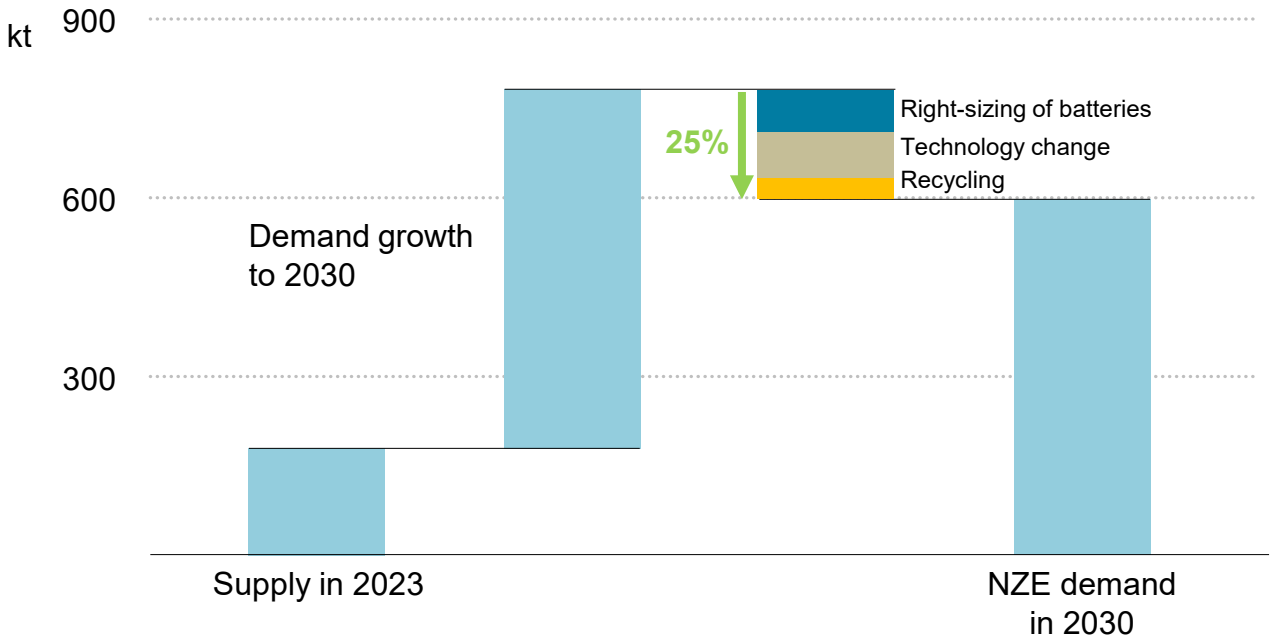
Mining capital requirements in the NZE Scenario



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

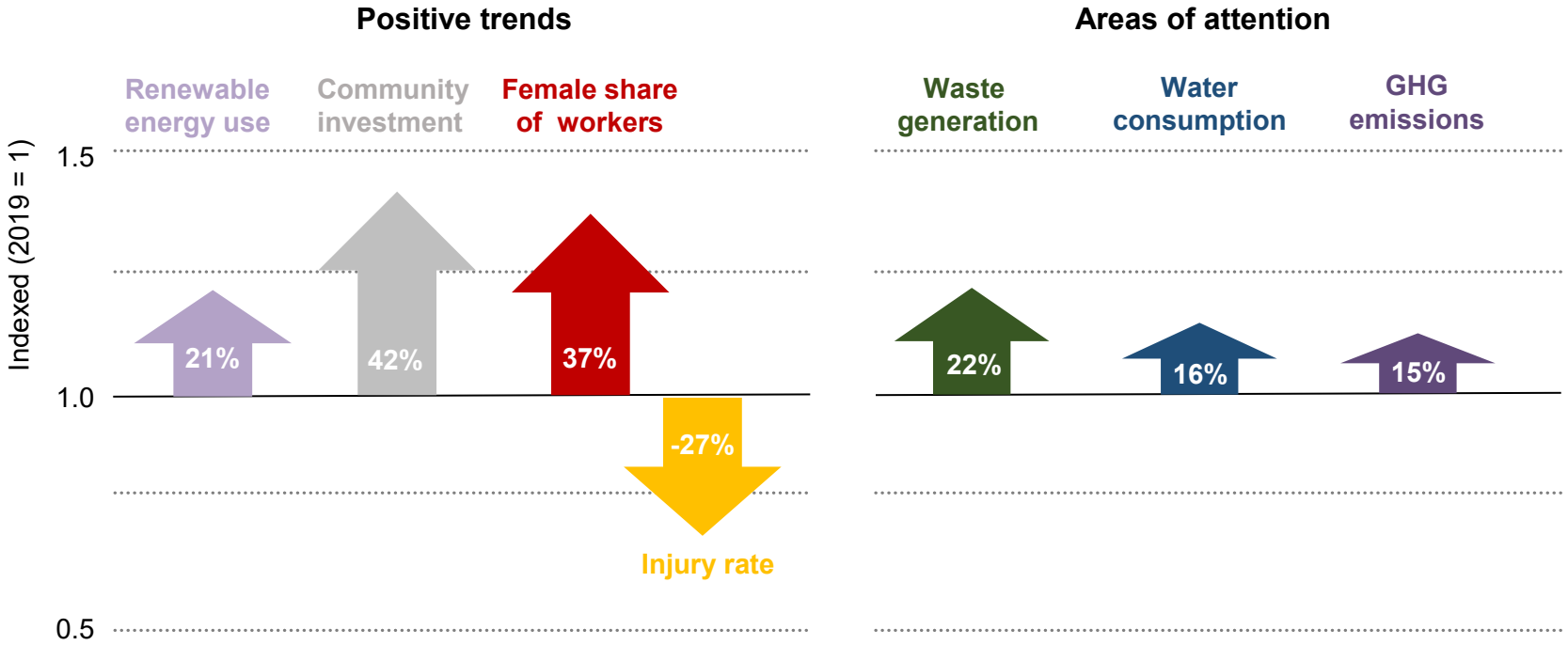
Global lithium chemical supply in 2023 and NZE demand for lithium used in EV and storage batteries in 2030



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

Change in selected ESG performance indicators, 2019 to 2022



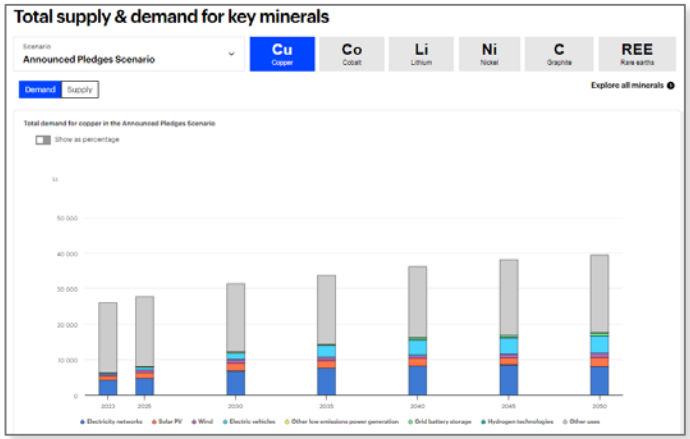
Although the industry is making progress on sustainability reporting, it paints a mixed picture with some positive trends but substantial room for improvement

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

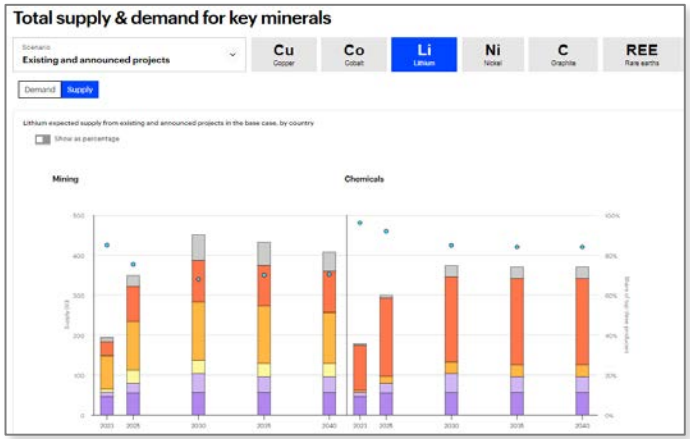
IEA Critical Minerals Data Explorer

- 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

Total demand for focus minerals



Supply projection results



https://www.iea.org/data-and-statistics/data-tools/critical-minerals-data-explorer