



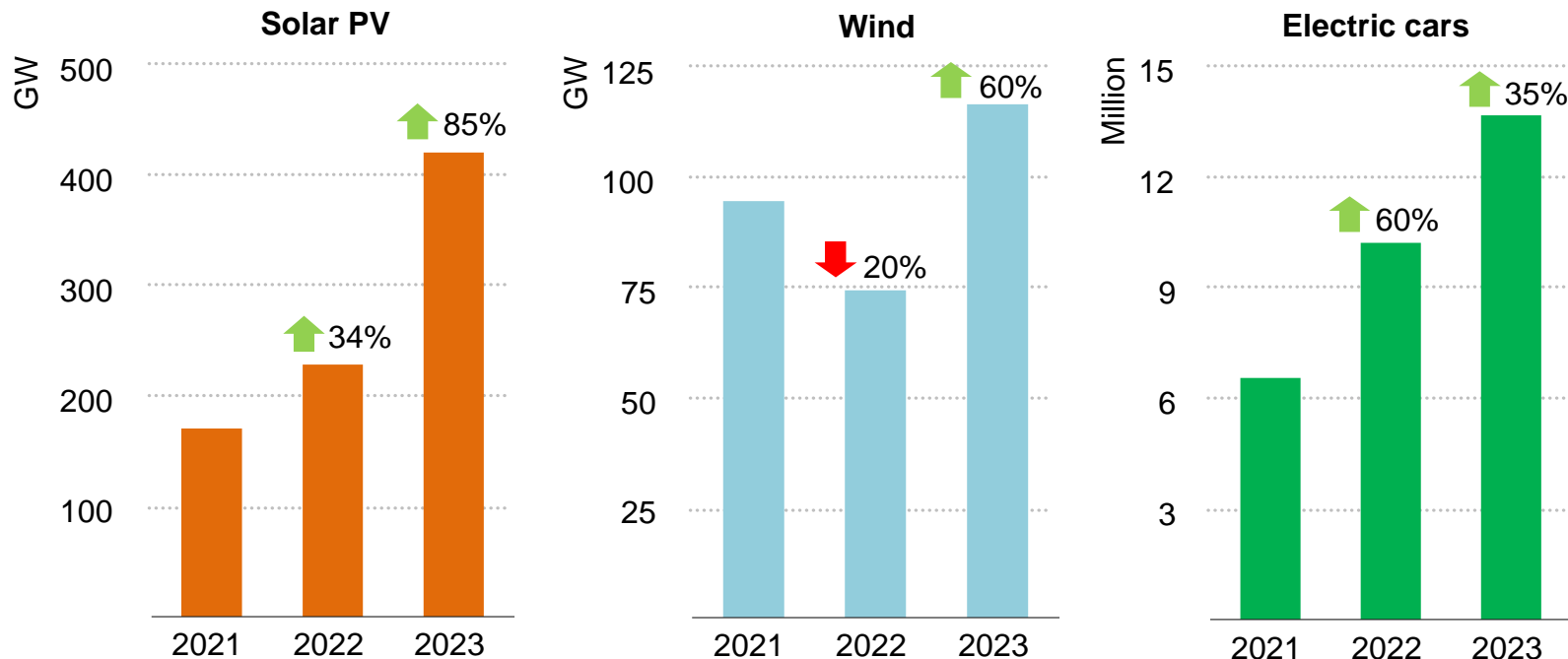
Global market perspectives on critical minerals

Trade and Development Commission, UNCTAD

Tae-Yoon Kim
23 April 2024

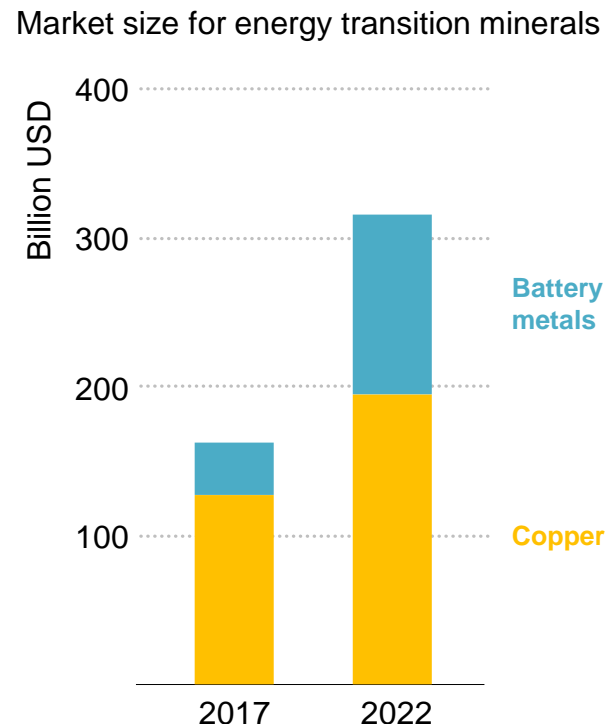
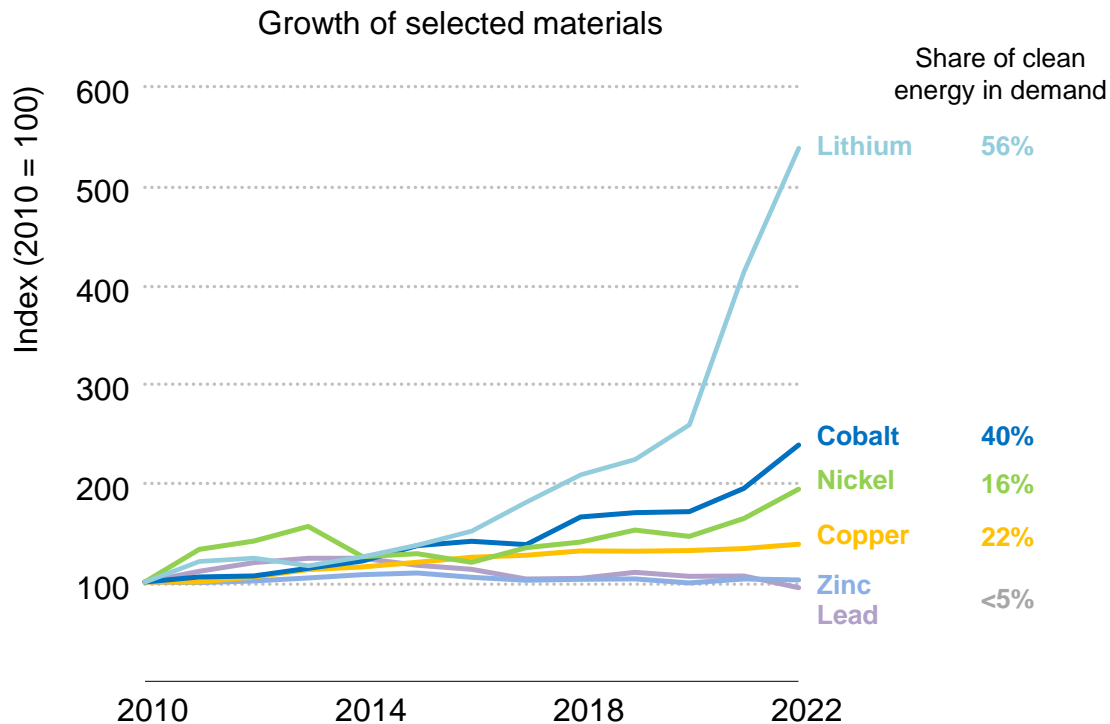
Clean energy transitions happening at a faster pace than expected

Annual capacity additions for selected clean energy technologies



Clean energy technology deployment continued its upward march in 2023, with momentum expected to continue through 2024 and beyond

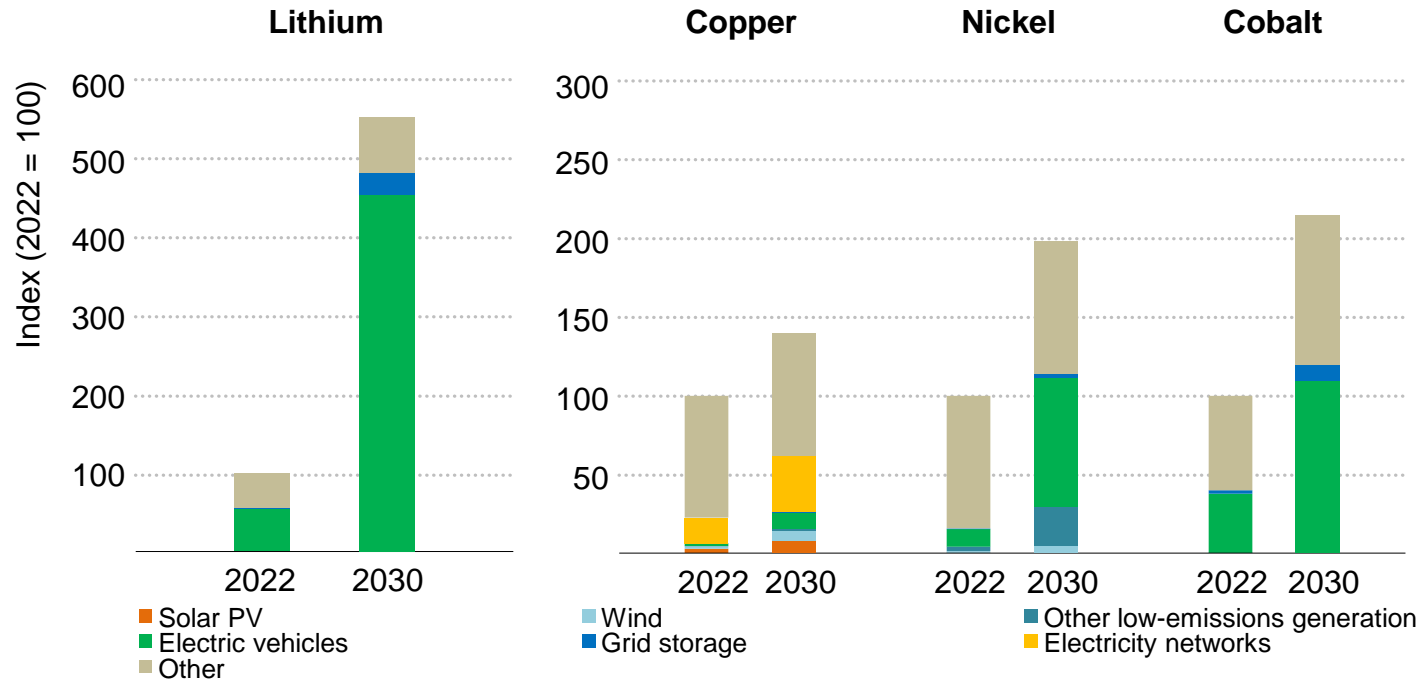
Clean energy is driving unprecedented growth for critical minerals



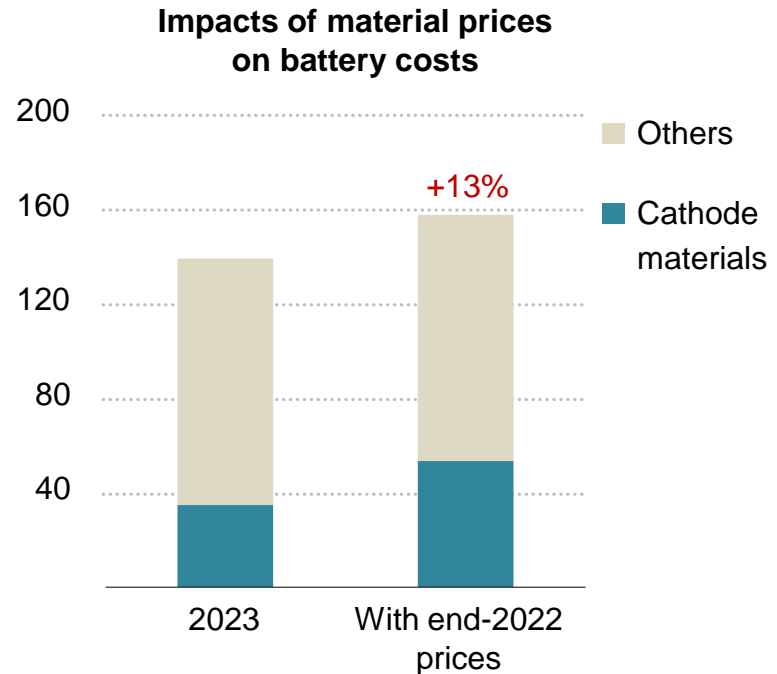
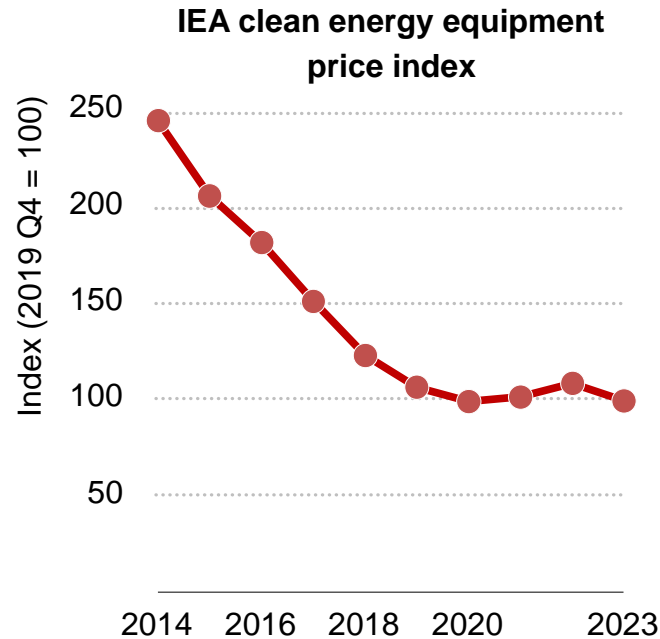
Rising deployment of EVs and renewables has underpinned major growth in mineral demand, leading to a doubling of market size for key energy transition minerals over the past five years

Meeting climate goals means further rapid growth this decade

Total demand for key critical minerals in the Net Zero Emissions by 2050 (NZE) Scenario



Getting on track to limit global warming to 1.5°C would mean a further rise in mineral demand for clean energy by up to four times to 2030

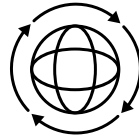


**Prices for critical minerals tend to be volatile, often more so than for fossil fuels;
Rising costs of key materials could make batteries 13% more expensive, if not compensated by other cost reductions**

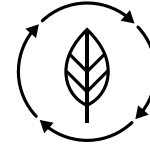
Three supply-side challenges



Can future supplies keep up with the rapid pace of demand growth in climate-driven scenarios?



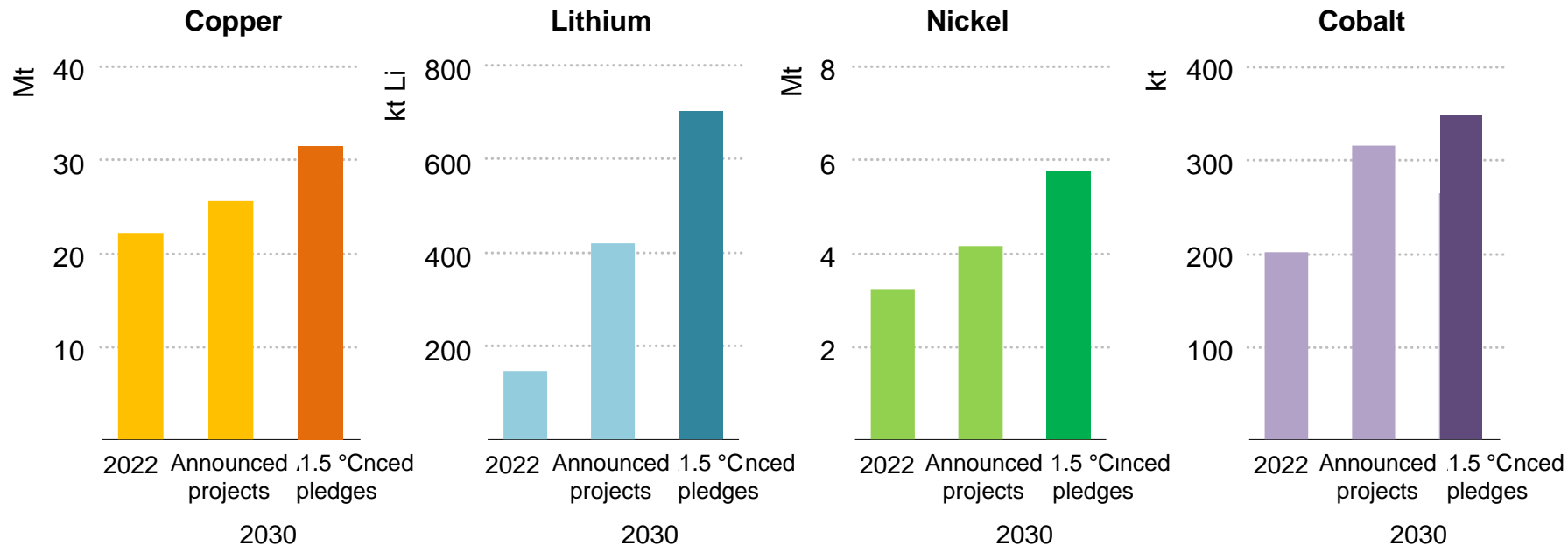
Can those supplies can come from diversified sources?



Can those volumes be supplied from clean and responsible sources?

Announced projects are matching announced climate ambitions

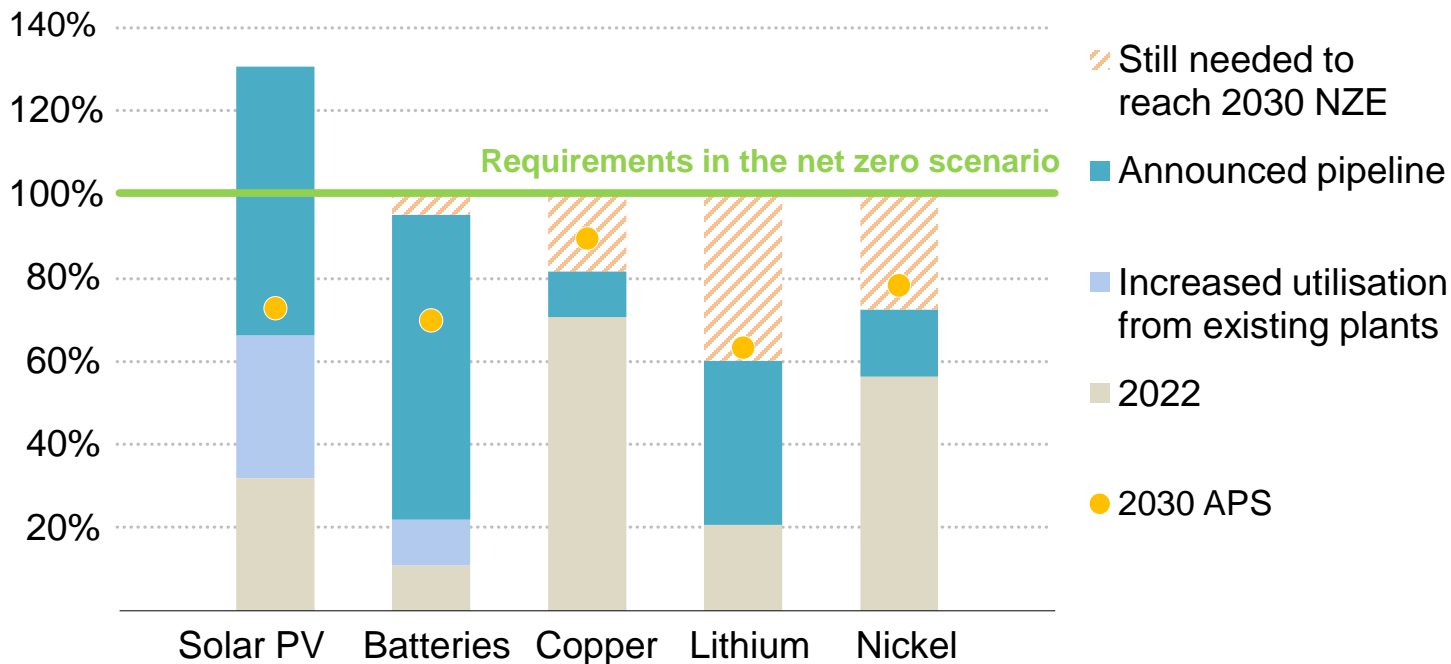
Anticipated supply from announced projects and primary supply requirements in different scenarios



A host of newly announced projects, if implemented as planned, would be sufficient to meet countries' clean energy ambitions for some minerals, but the adequacy of future supply is far from assured

Uneven progress for clean energy supply chain developments

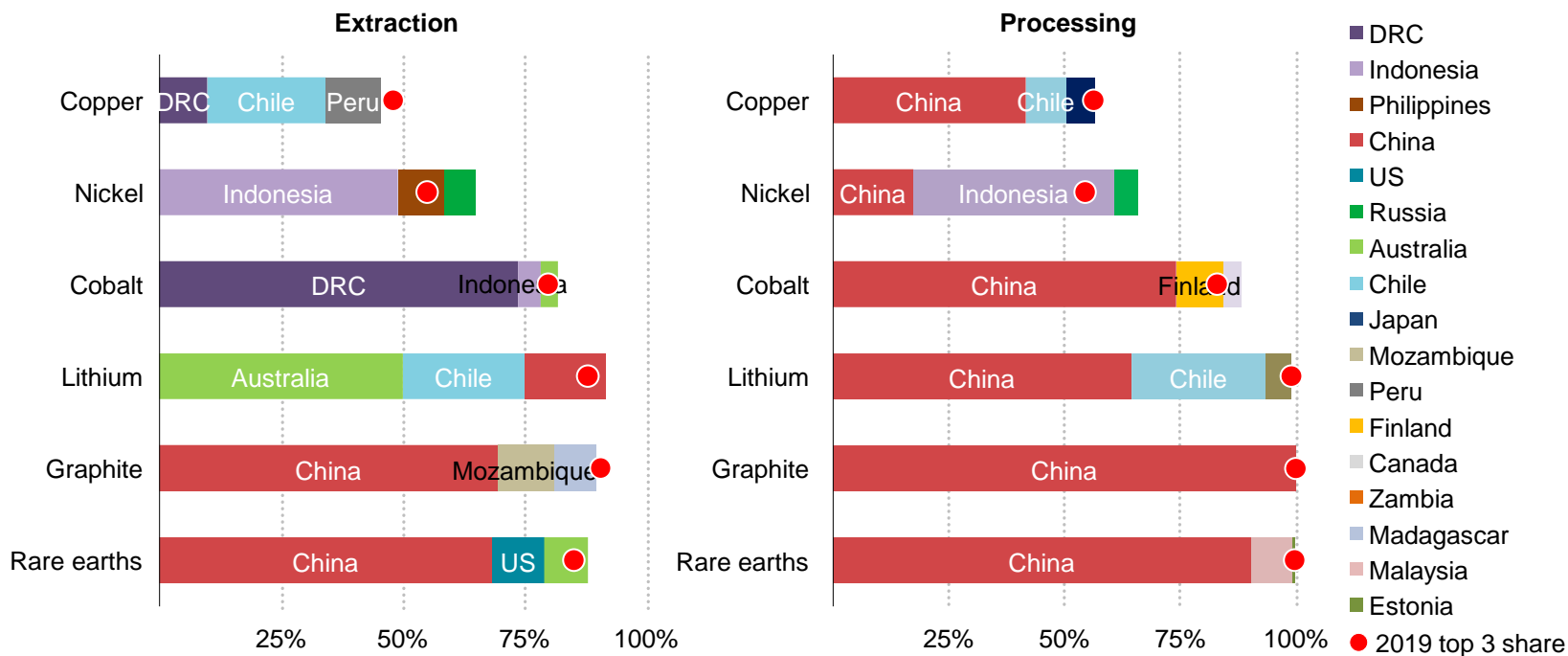
Announced project throughput and deployment and supply needs for key clean energy technologies and minerals in 2030



Announced plans to scale up clean energy manufacturing capacity help to put the world on track with a 1.5 °C pathway, but not all parts of the value chain are moving at a similar pace

Concentration of supply remains stubbornly high

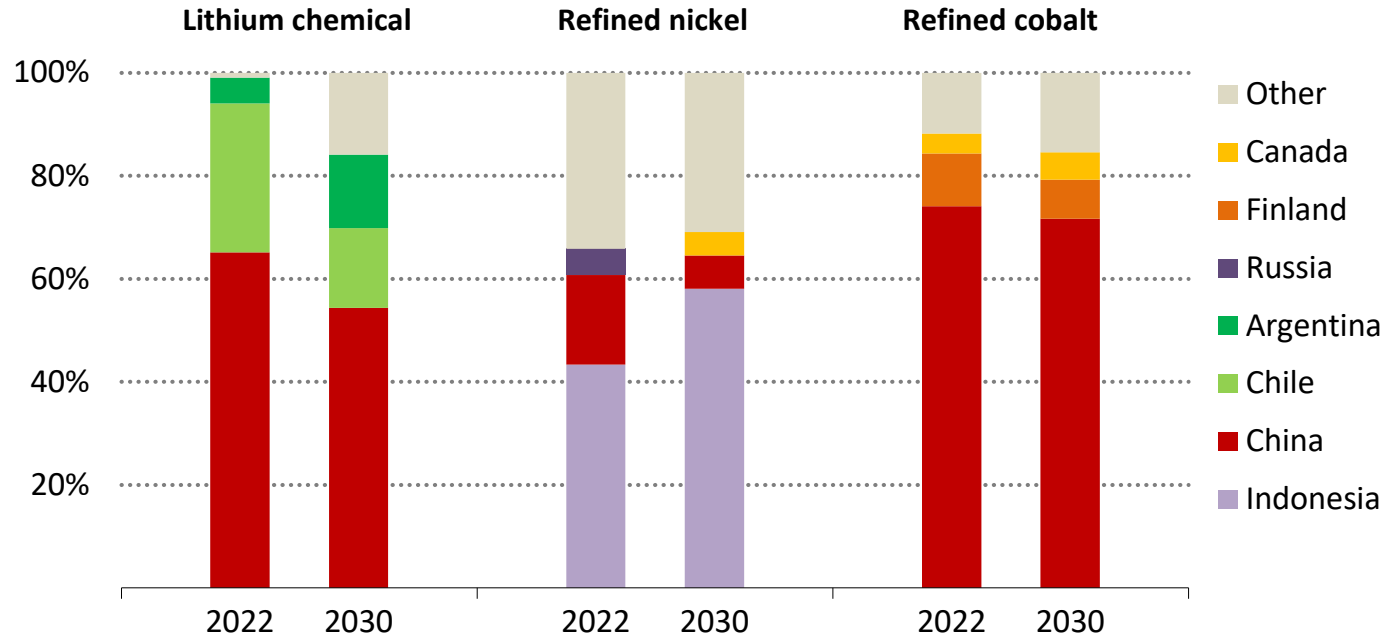
Share of top 3 producing countries in total production for selected resources and minerals, 2022



Limited progress has been made to diversify supply sources in recent years and, in some cases, the level of concentration has risen

Today's refining project pipeline does not imply diversified supplies

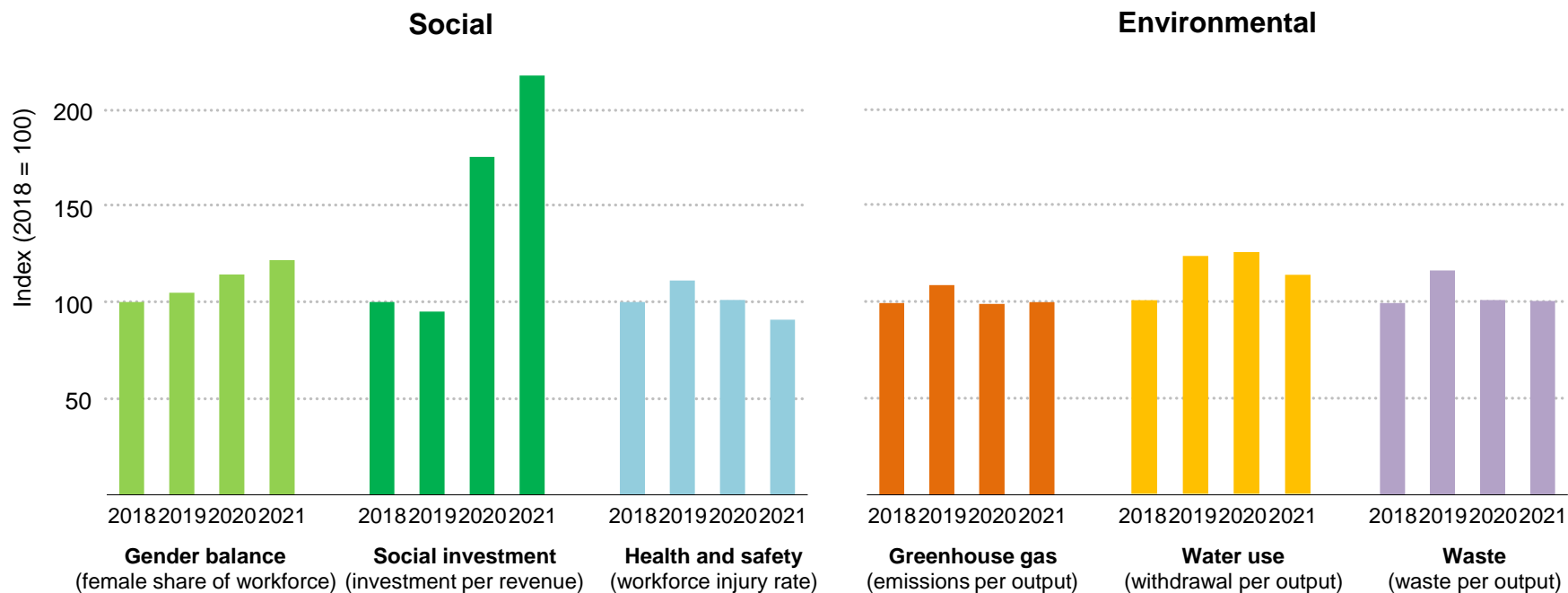
Geographic concentration of refined key mineral supply in 2022 and in 2030 based on announced projects



Project pipelines indicate that, in most cases, the geographical concentration of mineral refining operations is likely to remain high to 2030

Mixed progress towards sustainable and responsible mining

Aggregate social and environmental indicators for major mining companies

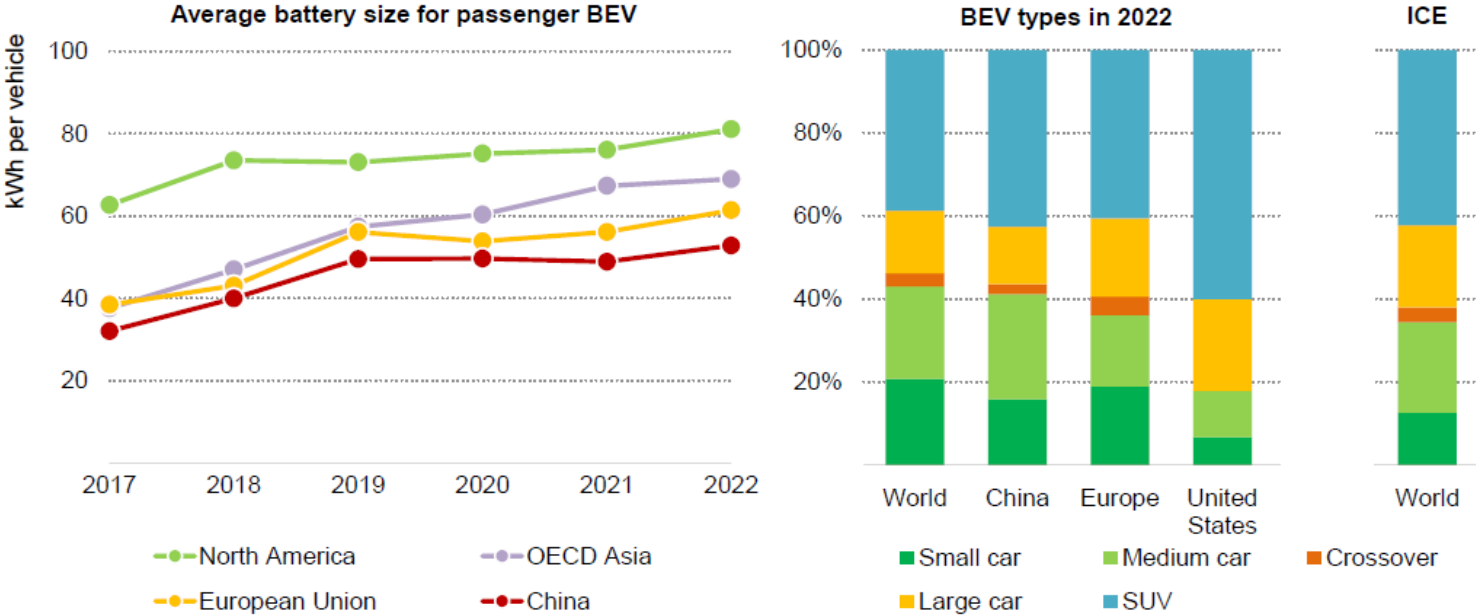


There are some signs that responsible social practices are taking hold across the mining industry, but industry-wide progress is still missing in key areas, especially on environmental sustainability

- 1 Accelerate progress towards diversified minerals supplies:** Participants emphasised importance of developing new projects in diverse geographical regions – especially in processing and refining sectors
- 2 Unlock the power of technology and recycling:** Clear need to expand research, development and deployment on supply technologies and ensure utilisation of all potential sources of recycled materials
- 3 Promote transparency in the markets:** Participants called for efforts to improve price transparency, and expand supply chain due diligence and traceability practices
- 4 Enhance the availability of reliable information:** Need to strengthen market monitoring and explore international data-sharing mechanism to enable stakeholders to gauge risks and identify bottlenecks
- 5 Create incentives for sustainable and responsible practices:** Enhance regulatory protections and embed environmental and social considerations in investment decisions to reward good performance
- 6 Foster efforts on international collaboration:** Improve coordination and collaboration among governments, industry, civil society and international organisations, including on supply security

EVs are getting bigger

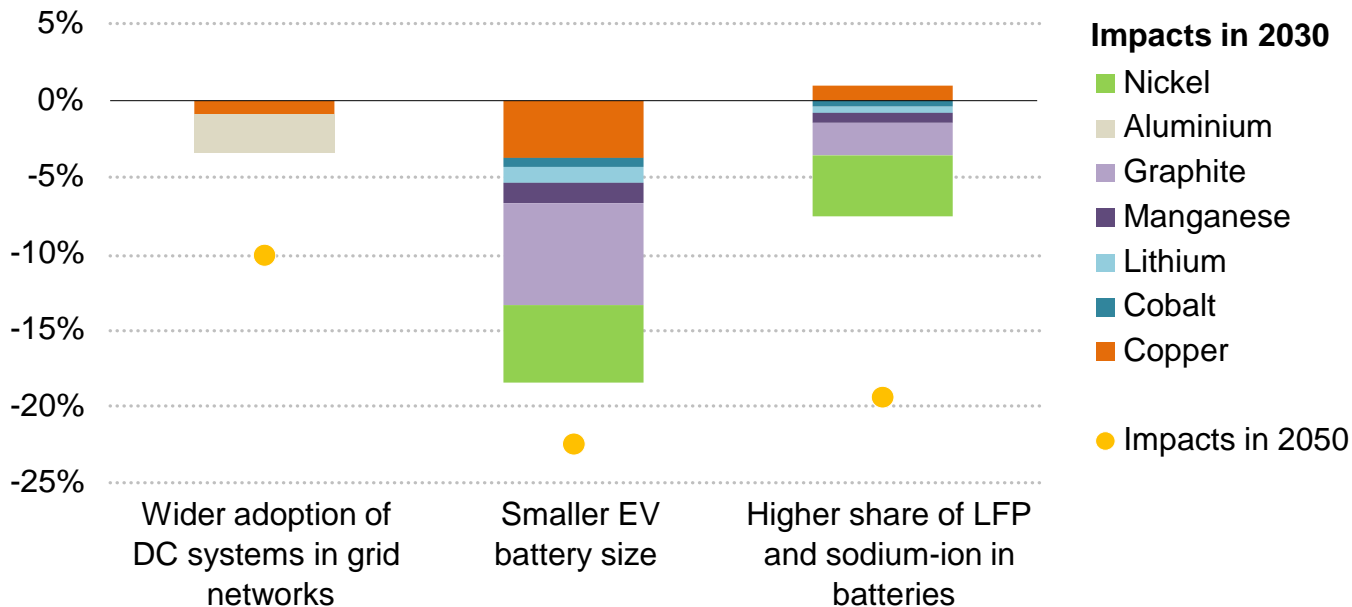
Developments of average battery size in key regions (left) and car model availability by segment (right)



A consumer preference for bigger conventional cars is being replicated in the EV sector, pushing up the average size of batteries

Technology innovation can play a major role in reducing risks

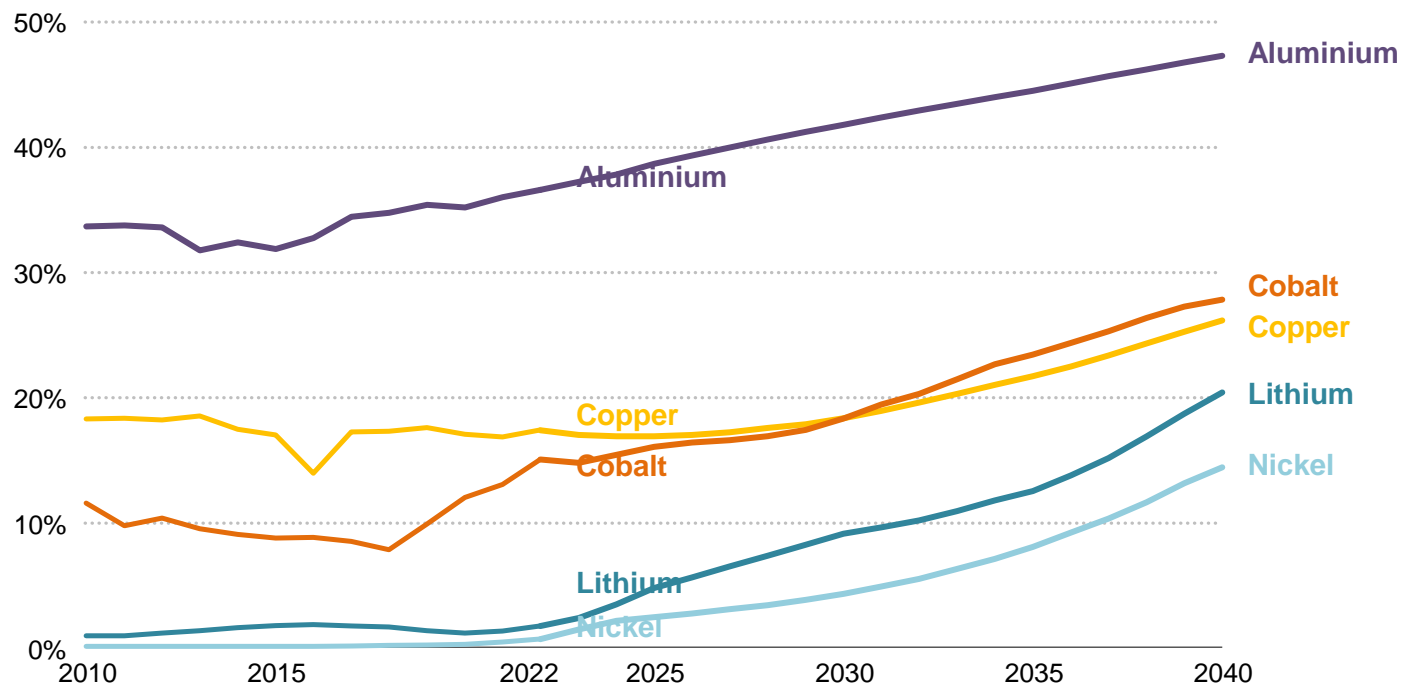
Impacts of technology and behavioural changes on material demand in the NZE Scenario, 2030 and 2050



Technology innovation and consumer behaviour provide scope to alleviate potential supply strains by reducing demand

Time for step-change in recycling rates

Share of secondary supply (from recycling) in total supply by commodity in the NZE scenario



Recycling becomes a significant source of supply after 2030, alleviating pressure on primary supply; It reduces combined primary supply requirements by 15-30% by 2040, alongside other environmental benefits



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