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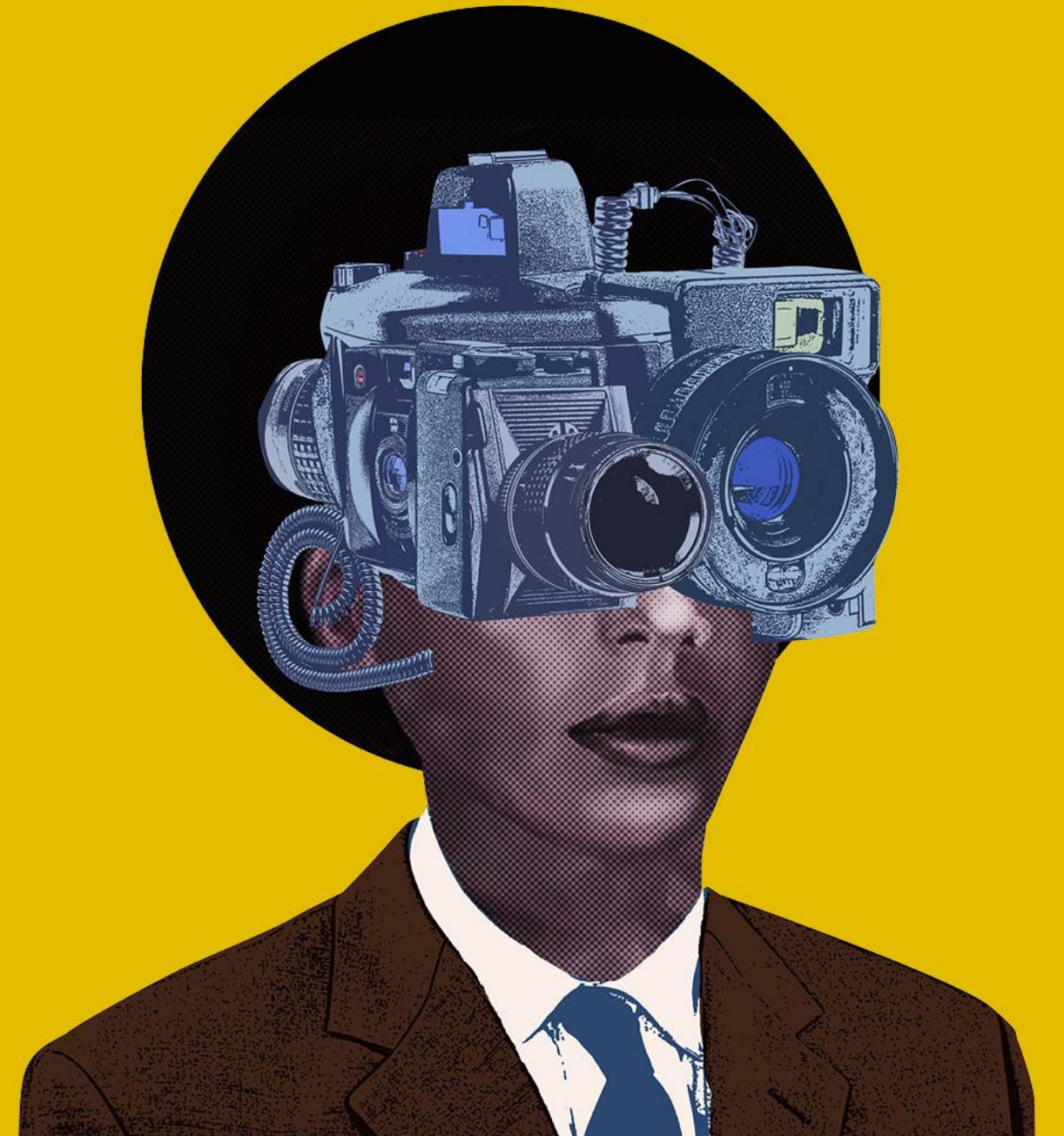
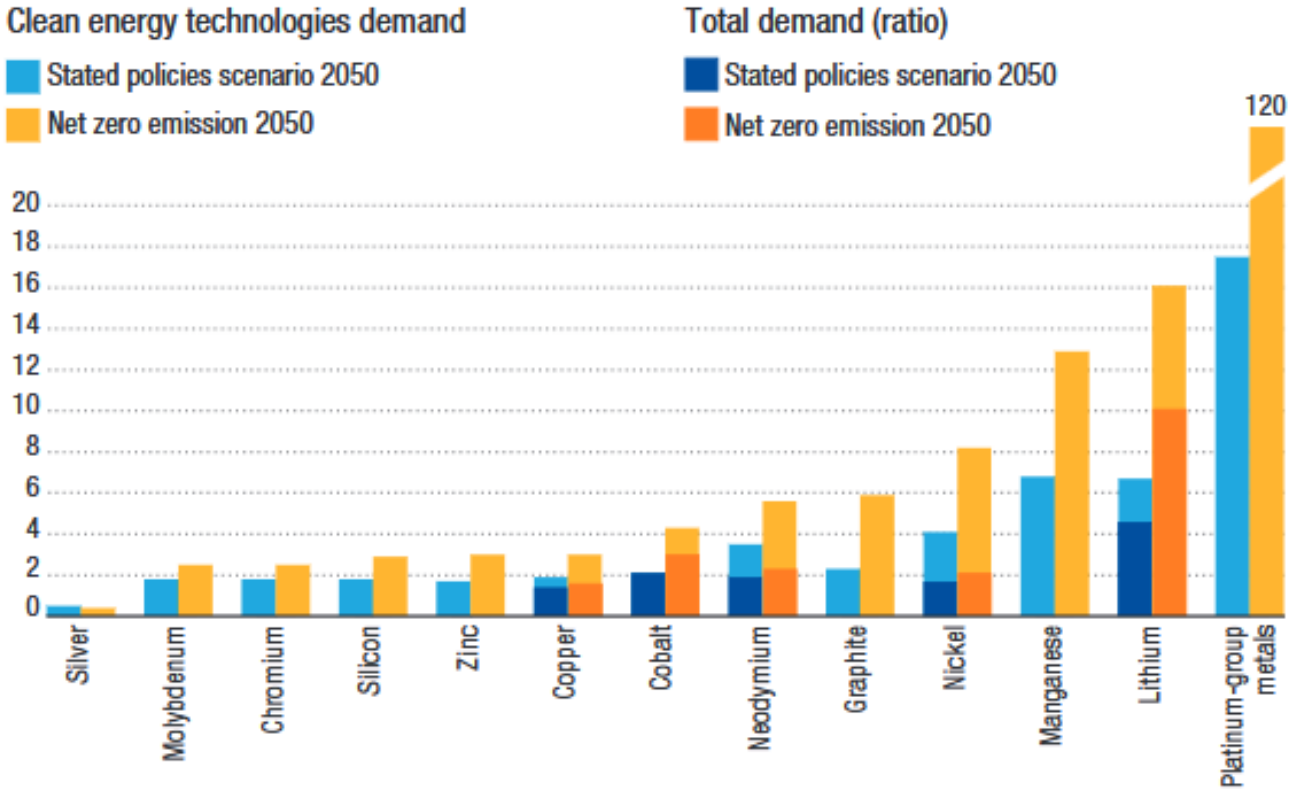
Alejandro González, Senior Researcher
Climate Justice, SOMO



The digital and energy transitions result in a soaring demand for minerals.

Figure II.9
Projected increase in mineral demand by 2050
(Ratio of 2050 to 2022 consumption)



Source: UNCTAD, based on IEA (2023c).

Note: The figure shows minerals demand estimates for clean energy technologies for all minerals. Total demand estimates are provided by IEA only for copper, cobalt, lithium, nickel and neodymium

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Minerals and metals required for low-carbon and digital technologies significantly overlap

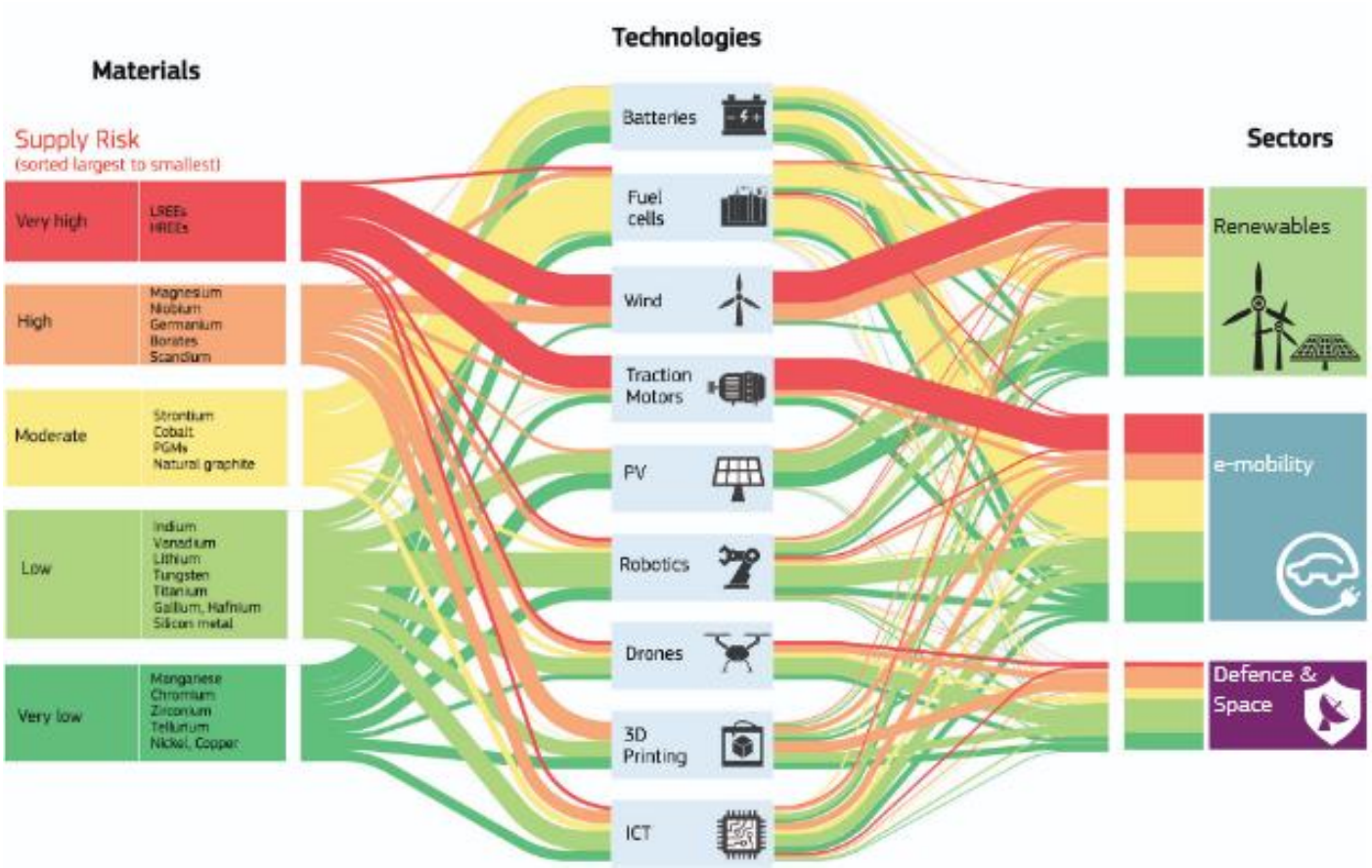
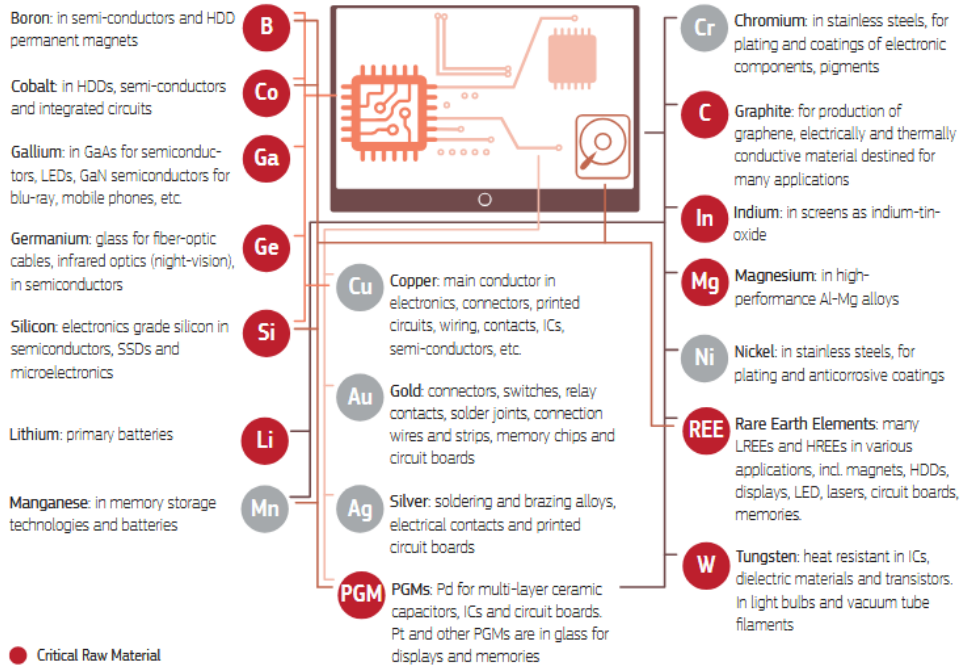


Figure 44. Raw materials in digital technologies.



Source: (BCG, 2018).

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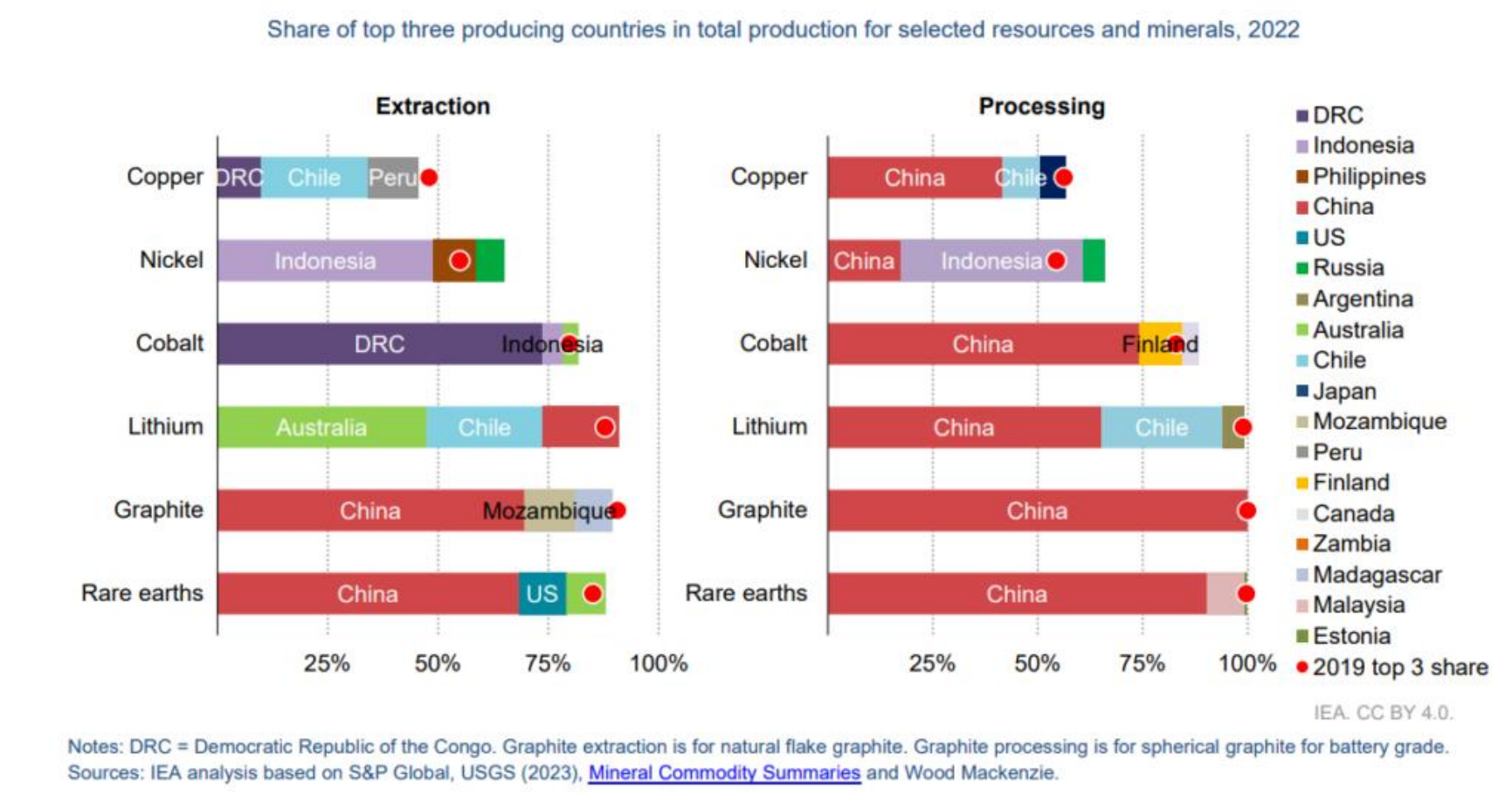
Extraction and processing for many key minerals is highly concentrated.



Notes: DRC = Democratic Republic of the Congo. Graphite extraction is for natural flake graphite. Graphite processing is for spherical graphite for battery grade.
Sources: IEA analysis based on S&P Global, USGS (2023), Mineral Commodity Summaries and Wood Mackenzie.

FIGURE S2 Key mining countries for select minerals

Cobalt	27 Co
Democratic Republic of the Congo	70.0%
Indonesia	5.4%
Russian Federation	4.8%
Australia	3.2%
Canada	2.1%
Cuba	2.0%
Philippines	2.0%
Others	10.5%

Copper	29 Cu
Chile	23.6%
Peru	10.0%
Democratic Republic of the Congo	10.0%
China	8.6%
United States	5.9%
Russian Federation	4.5%
Indonesia	4.1%
Australia	3.7%
Zambia	3.5%
Mexico	3.3%
Kazakhstan	2.6%
Canada	2.4%
Poland	1.7%
Others	16.1%

Dysprosium	66 Dy
China	48.7%
Myanmar	23.1%
Australia	7.6%
United States	2.9%
Canada	2.7%
Others	15.0%

Graphite	6 C
China	64.6%
Mozambique	12.9%
Madagascar	8.4%
Brazil	6.6%
Others	7.5%

Iridium	77 Ir
South Africa	88.9%
Zimbabwe	8.1%
Russian Federation	2.9%
Others	0.1%

Lithium	3 Li
Australia	46.9%
Chile	30.0%
China	14.6%
Argentina	4.7%
Brazil	1.6%
Others	2.2%

Manganese	25 Mn
South Africa	35.8%
Gabon	22.9%
Australia	16.4%
China	4.9%
Ghana	4.7%
India	2.4%
Brazil	2.0%
Ukraine	2.0%
Côte d'Ivoire	1.8%
Malaysia	1.8%
Others	5.3%

Neodymium	60 Nd
China	45.8%
Australia	23.1%
Greenland*	8.2%
Myanmar	7.4%
Brazil	4.4%
India	2.1%
Others	9.0%

*Kingdom of Denmark

Nickel	28 Ni
Indonesia	48.8%
Philippines	10.1%
Russian Federation	6.7%
France (New Caledonia)	5.8%
Australia	4.9%
Canada	4.0%
China	3.3%
Brazil	2.5%
Others	13.9%

Platinum	78 Pt
South Africa	73.6%
Russian Federation	10.5%
Zimbabwe	7.8%
Canada	3.1%
United States	1.7%
Others	3.3%

* latest data available as of 2023

Source: (US Geological Survey and US Department USGS, 2023b).

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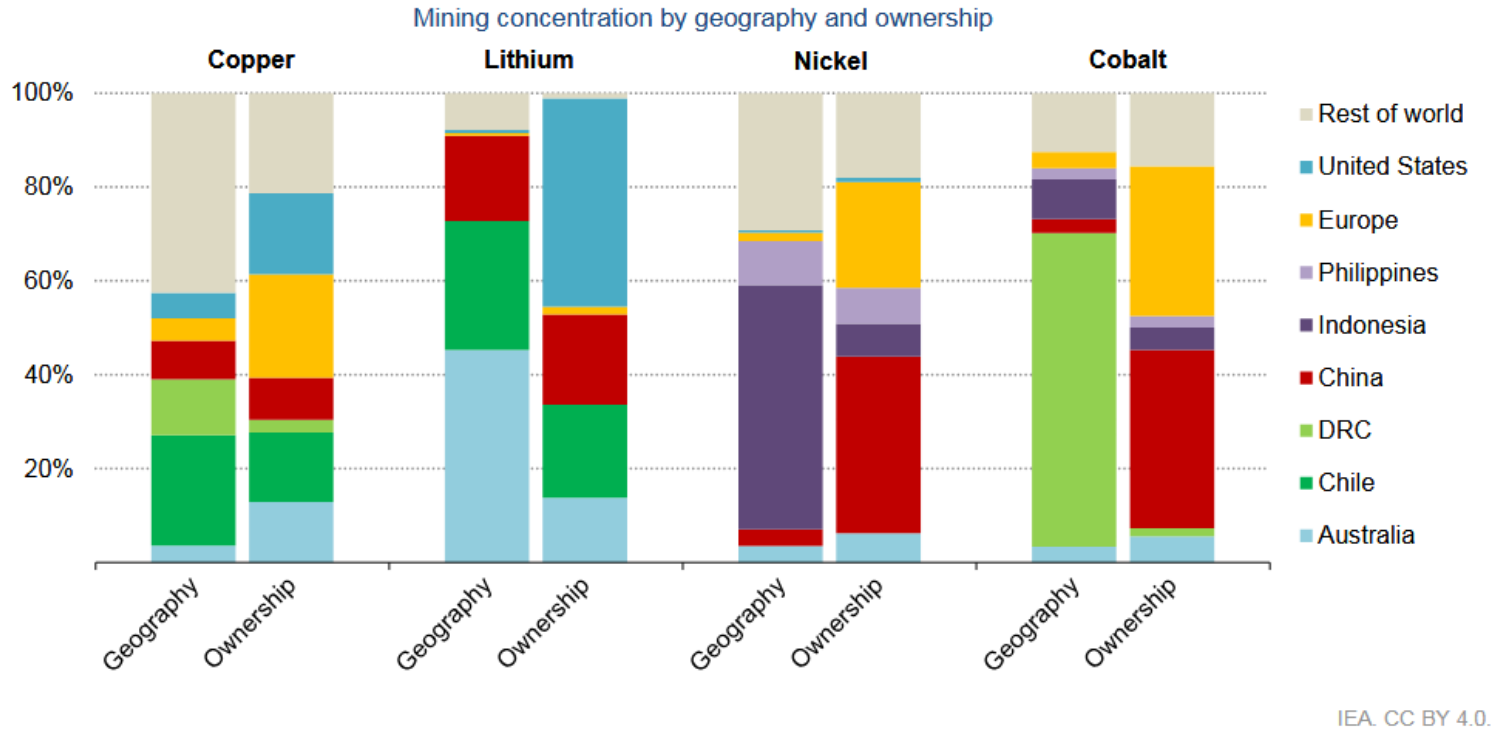
Mining concentration appears differently through asset ownership, with a greater role for the U.S. and Europe.

A few large multinationals and state-owned enterprises dominate the industry.



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Notes: Ownership based on company headquarters location. For projects run by multiple companies, production is assigned to the company with the largest share. For copper, data are on the top 20 mining companies in 2023 representing 57% of production. For lithium, data cover 100% of production in 2023; for nickel, 93% of production; and for cobalt 97% of production.

Sources: IEA analysis based on S&P Global and Wood Mackenzie.

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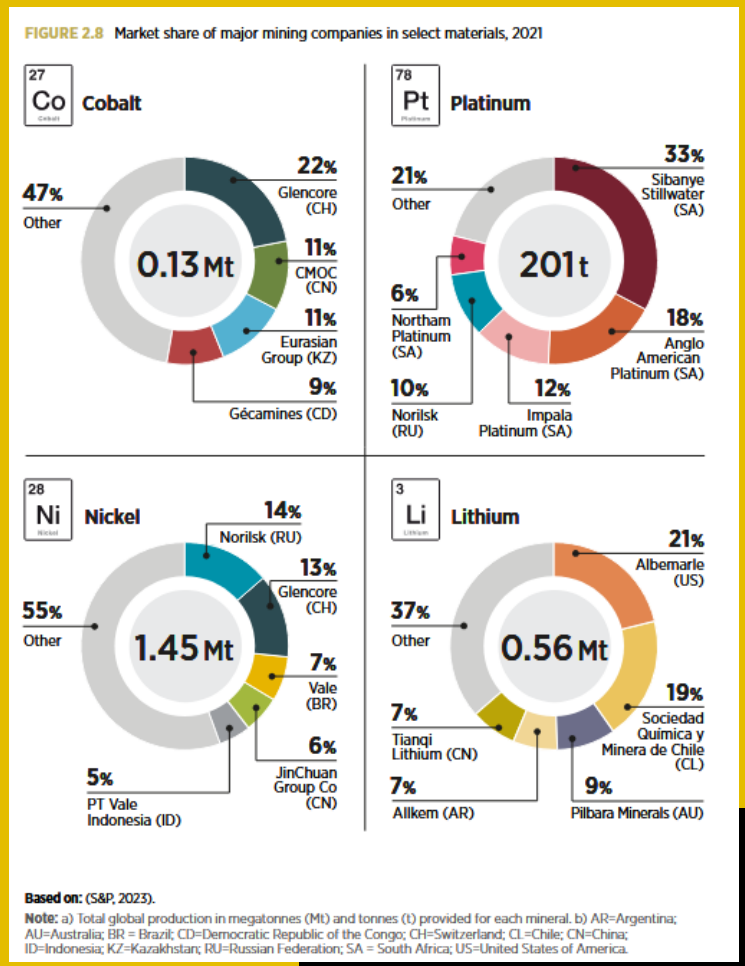

Growing concern over the social and environmental impacts of mining

Exposure to ESG and climate risks: Most minerals are exposed to high environmental risks

Risk score for exposure to ESG and climate risks – aggregate and individual dimensions

Material	Overall score	Environmental performance - Mining	Environmental performance - Refining	Social and governance performance	Exposure to water stress	Exposure to earthquake risks
Graphite	High (2.4)	Medium	High	High	Medium	Low
Nickel	High (2.4)	High	High	Medium	Low	Low
Cobalt	High (2.4)	High	High	Medium	Low	Low
Rare earth elements	Medium (2.3)	Medium	High	Medium	Medium	Medium
Lithium	Medium (2.2)	Medium	High	Low	High	Medium
Copper	Medium (2.2)	Medium	High	Low	High	Medium

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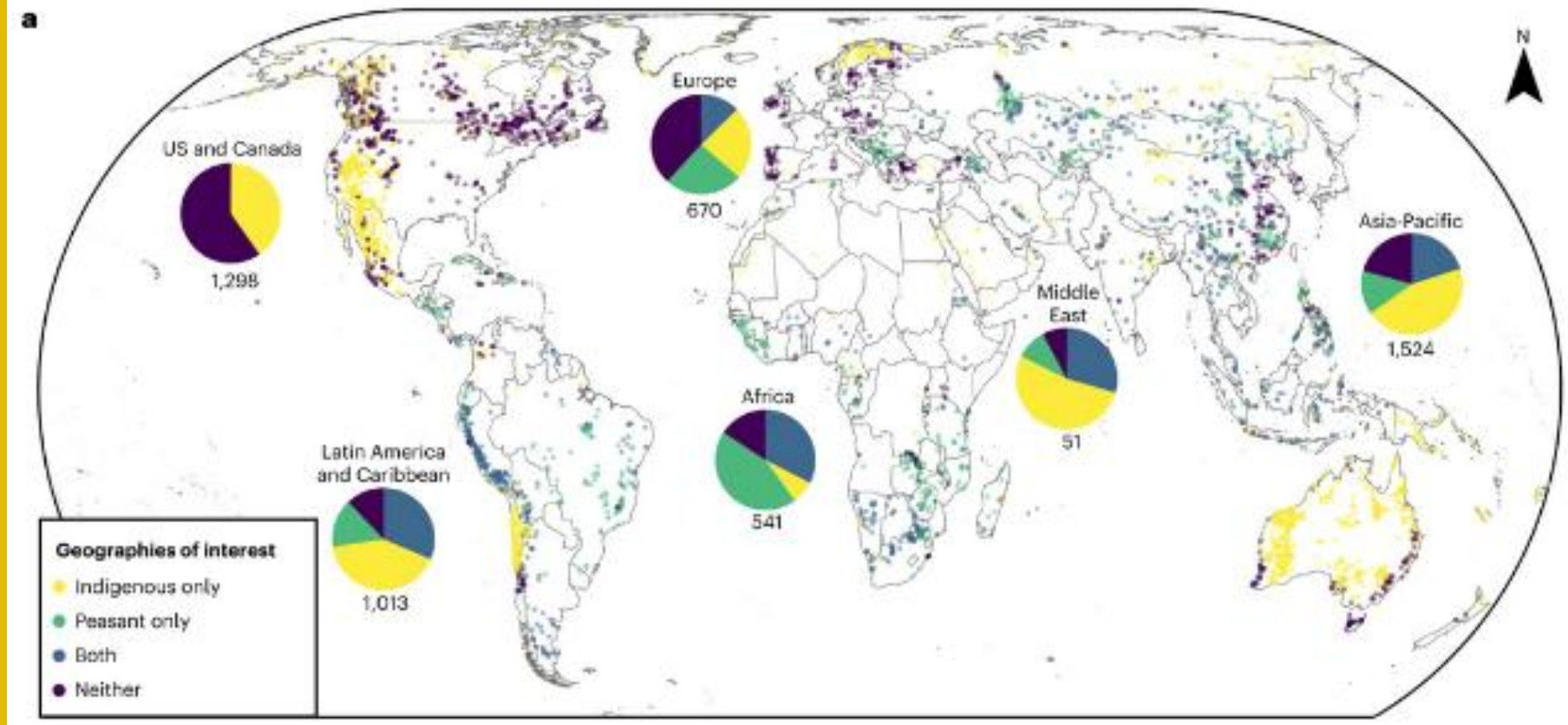
54% of the energy transition minerals lie on or near Indigenous Peoples' lands

Fig. 1: Distribution of ETMs by Indigenous peoples' and peasant land.

From: Energy transition minerals and their intersection with land-connected peoples



Source: Owen, J.R., Kemp, D., Lechner, A.M. *et al.* Energy transition minerals and their intersection with land-connected peoples.

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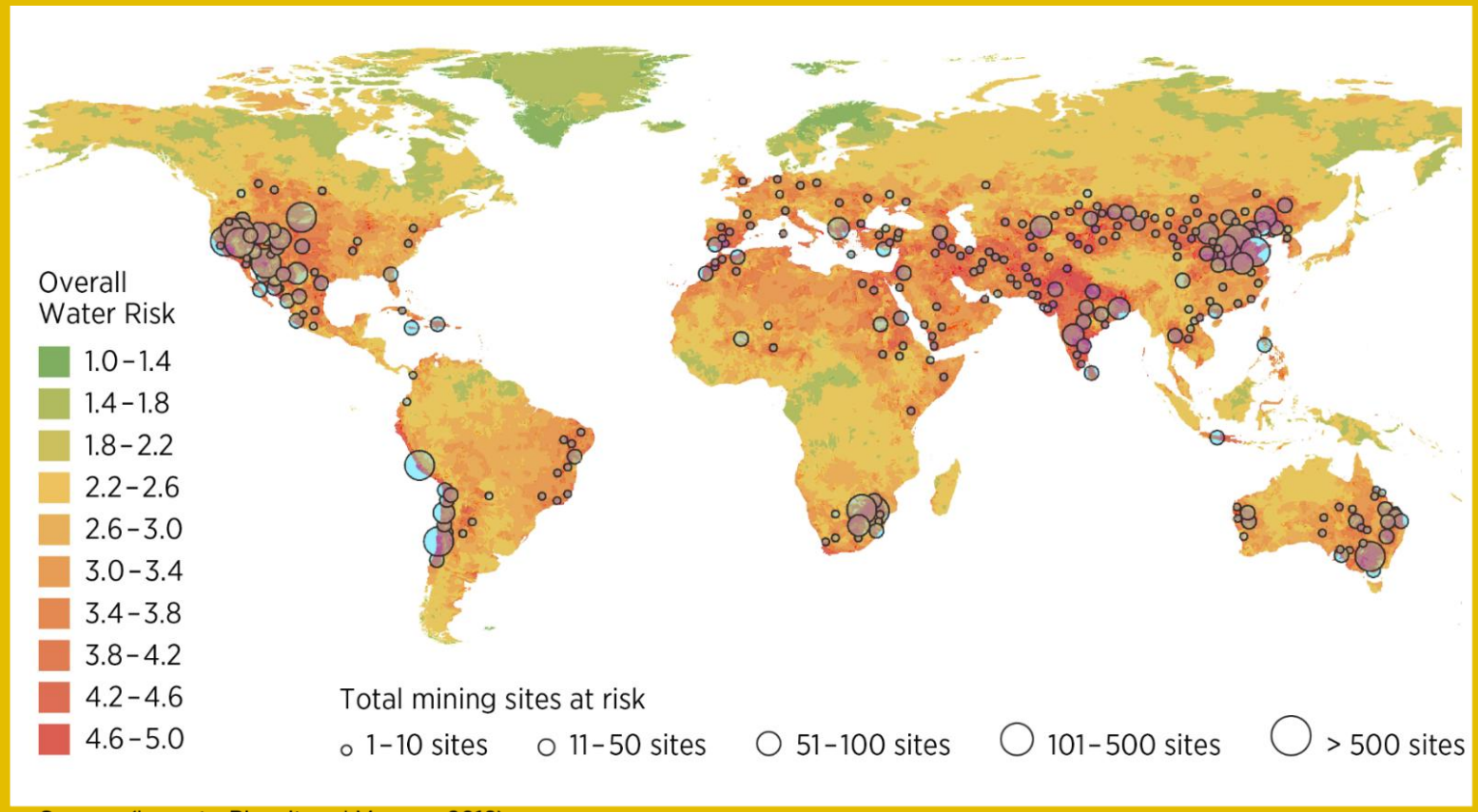
The majority of mining sites face high water risks.



Source: (Laporte-Bisquit and Morgan, 2019).

Note: The World Wide Fund for Nature's water risk assessment framework considers three types of basin and operational water risks: physical, regulatory and reputational. More information on the methodology can be found at https://riskfilter.org/water/explore/data-and-methods.

Disclaimer: This map is provided for illustration purposes only. Boundaries and names shown on this map do not imply any endorsement or acceptance by IRENA.

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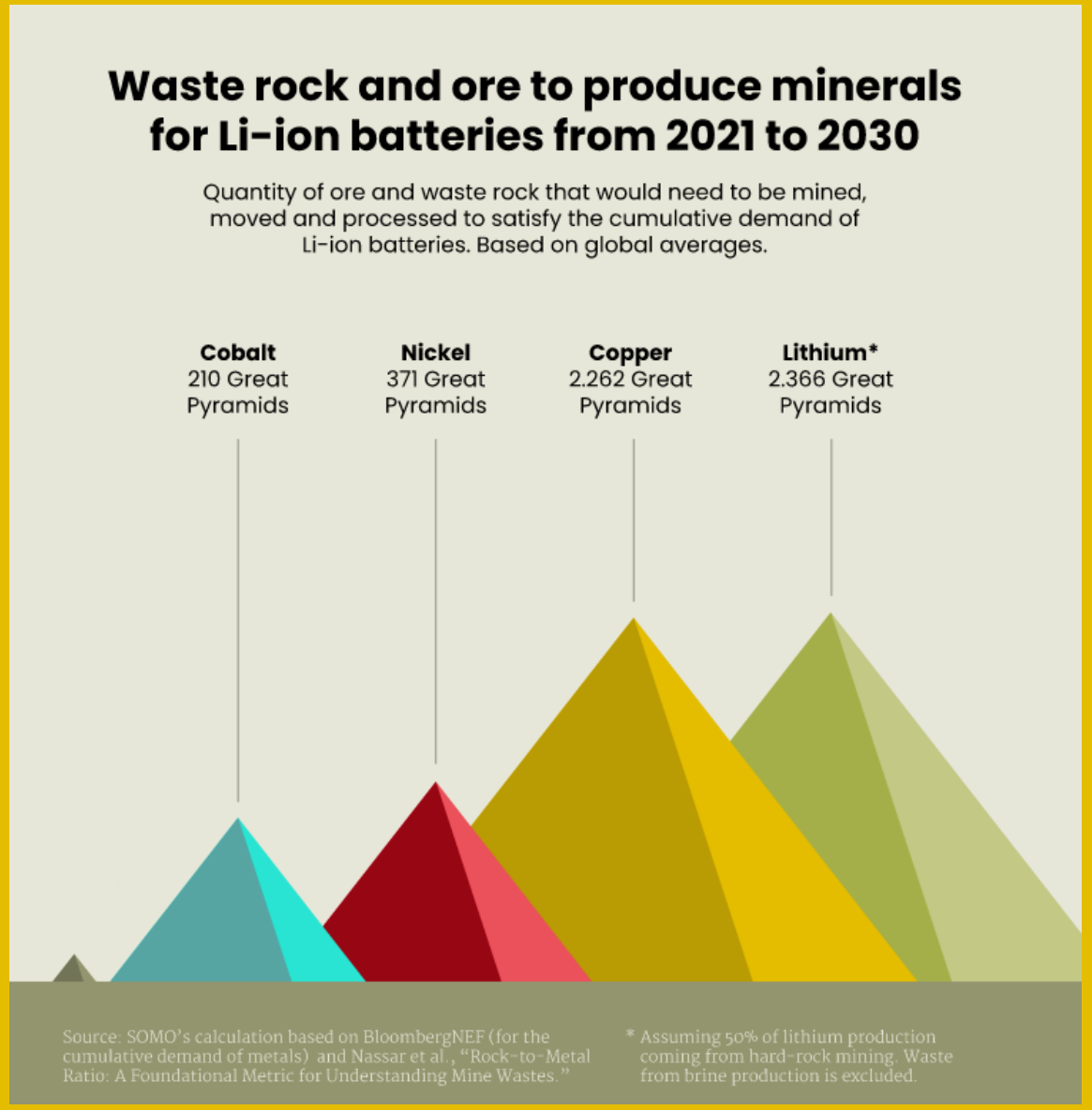
Waste (rock) is also a serious concern



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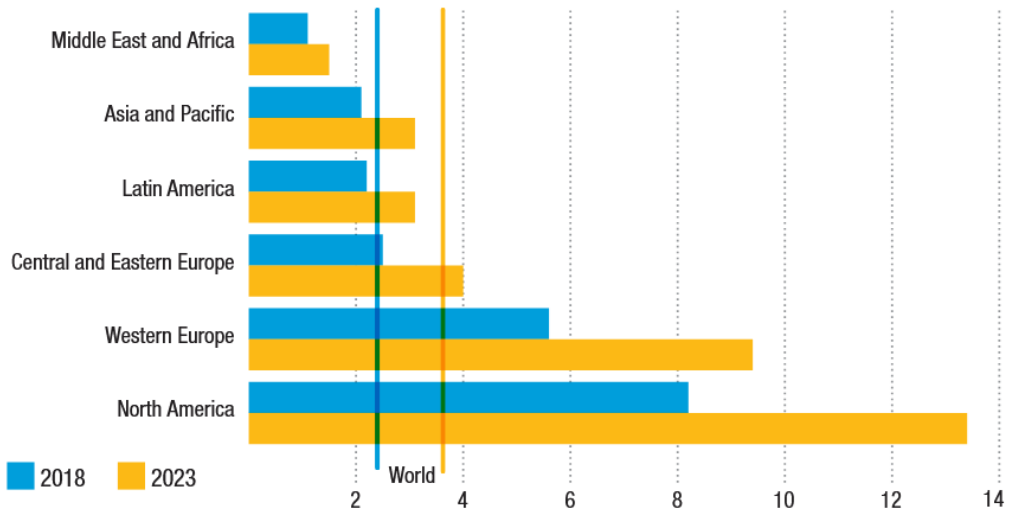
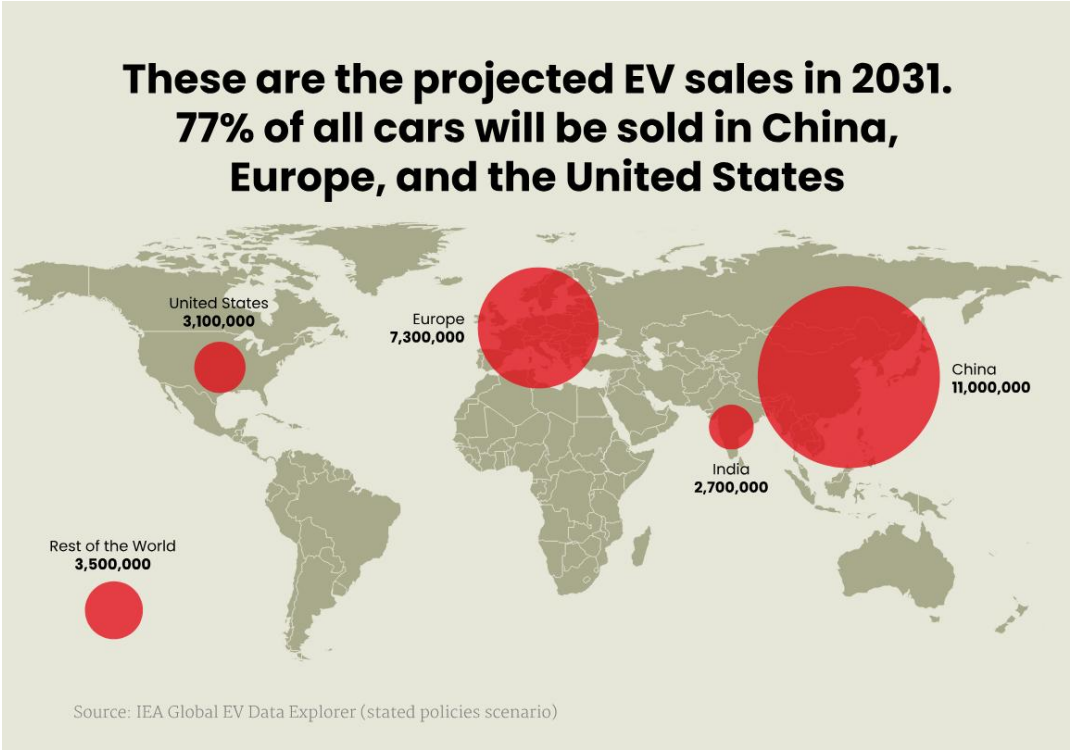
Who benefits?

Figure II.8
Average number of devices and connections per capita, by region, 2018 and 2023



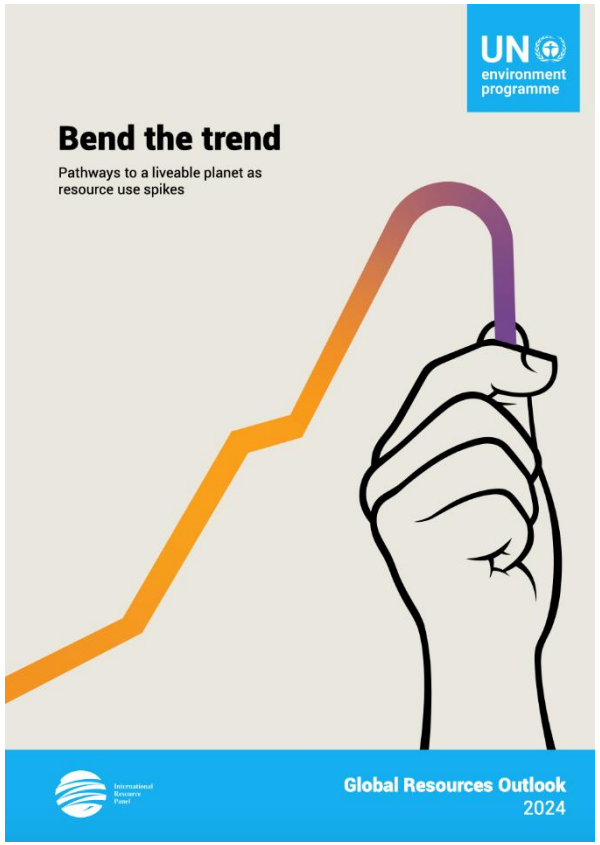
Source: UNCTAD, based on Cisco (2020).
Note: Country groupings are as defined in the source.



Unequal use of raw materials

- **Unequal Consumption**: High-income countries are responsible for 10x more climate impact but shift environmental damage to low-income countries through global trade.

- **Regional Disparities**: Africa and Latin America suffer over 50% of global biodiversity loss, yet generate less than 10% of global resource value added, while Europe and North America capture nearly 50% of the economic benefit.



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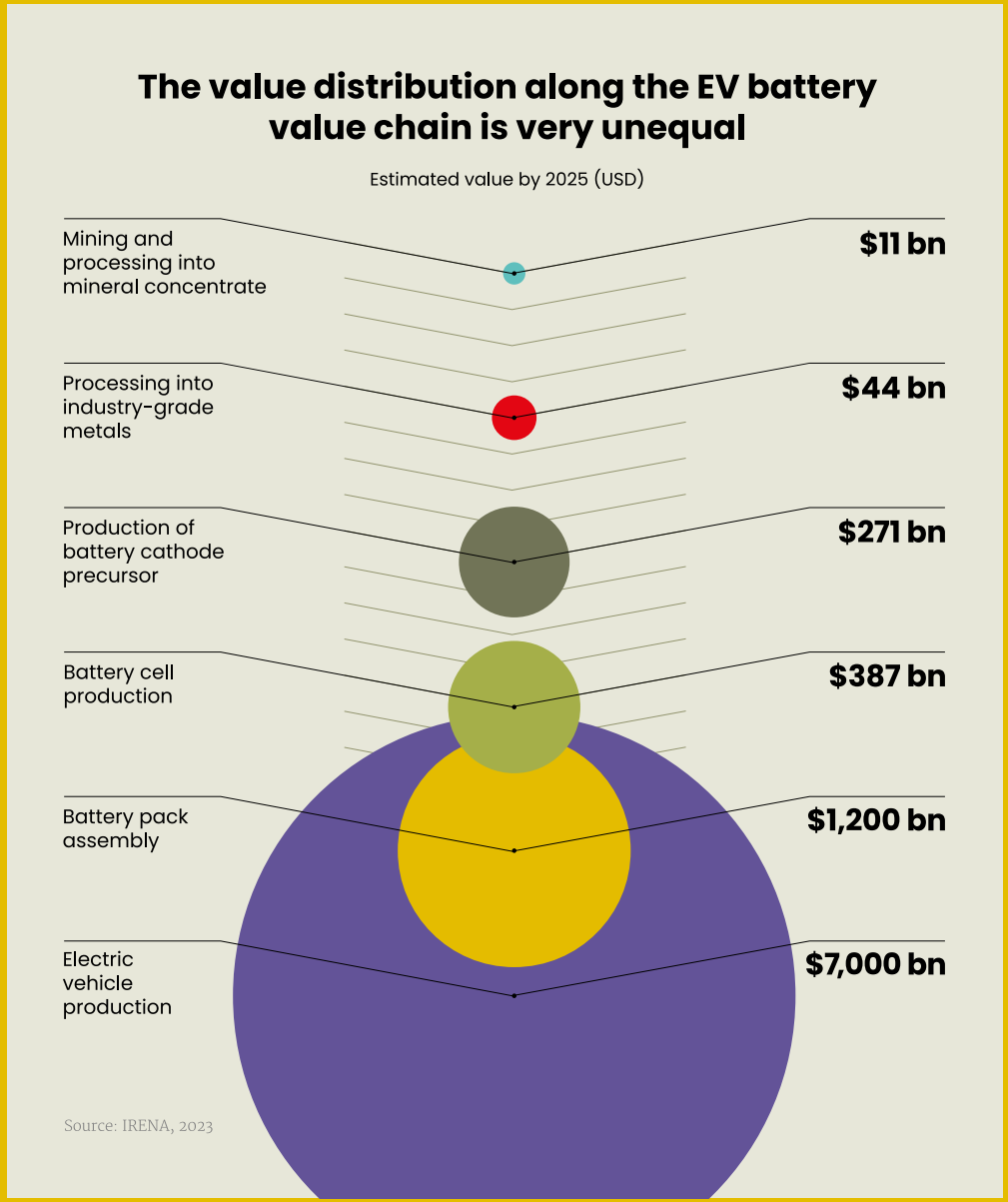
Developing countries are often relegated to parts of the global value chain with low value addition



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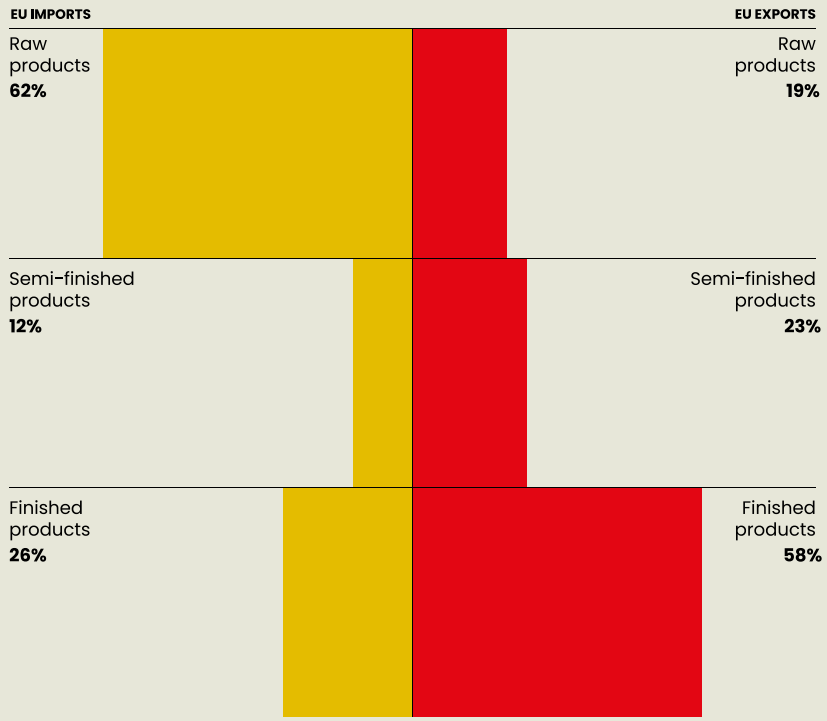
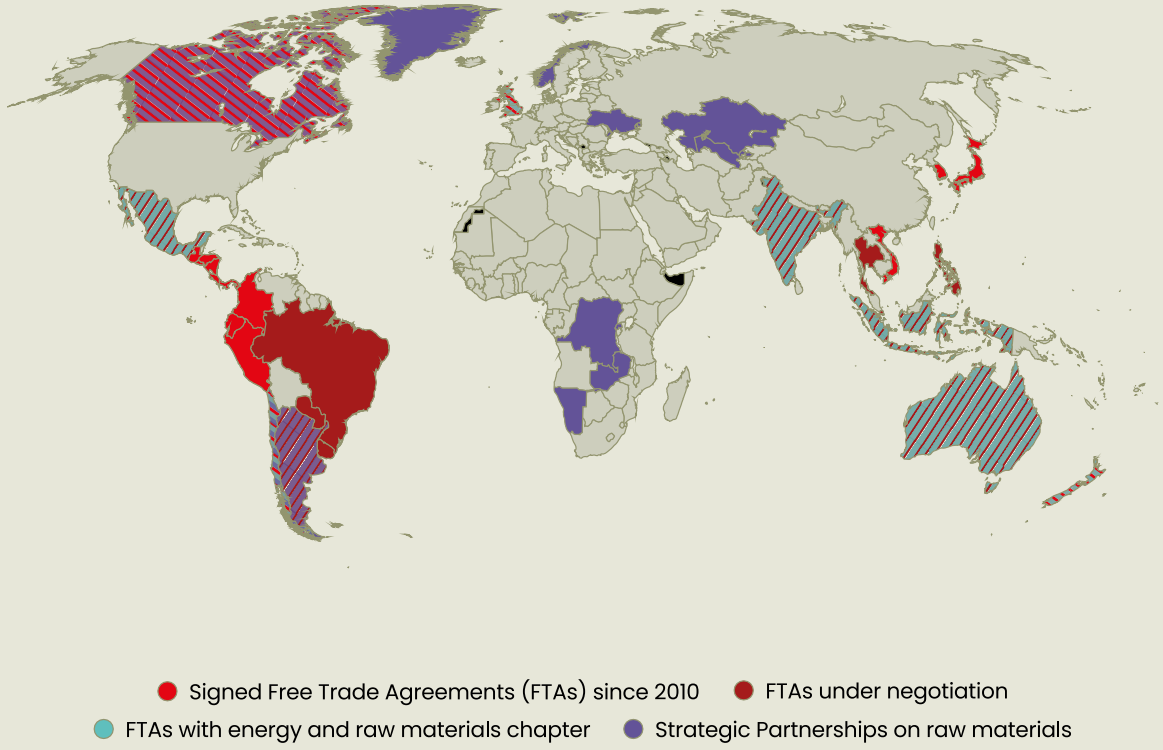
The EU primarily imports raw materials while exporting more finished products

Share of EU physical imports and exports by stage of manufacturing (2022)



Source: Eurostat

The global reach of the EU's trade and raw material strategy

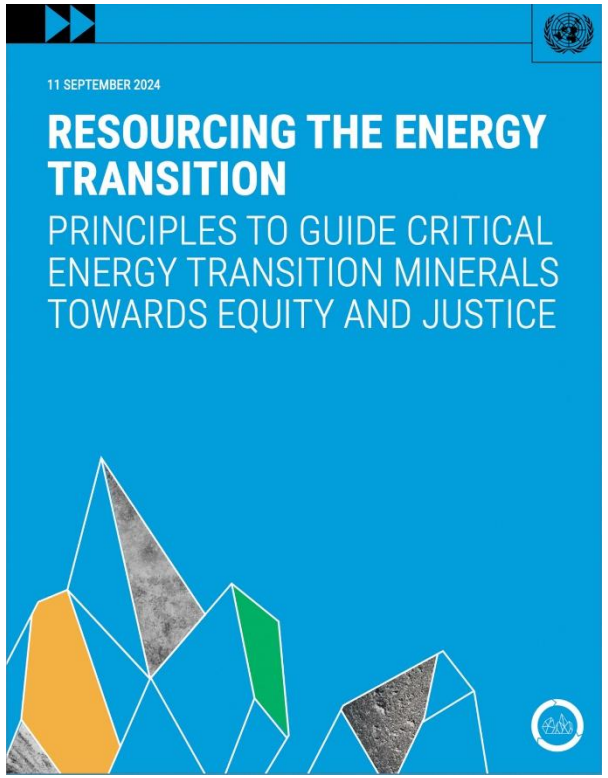


UN Secretary-General's Panel on Critical Energy Transition Minerals

- AR 1: Accelerate **benefit-sharing, value addition, and economic diversification** in critical energy transition minerals value chains, as well as **responsible and fair trade, investment, finance, and taxation**.

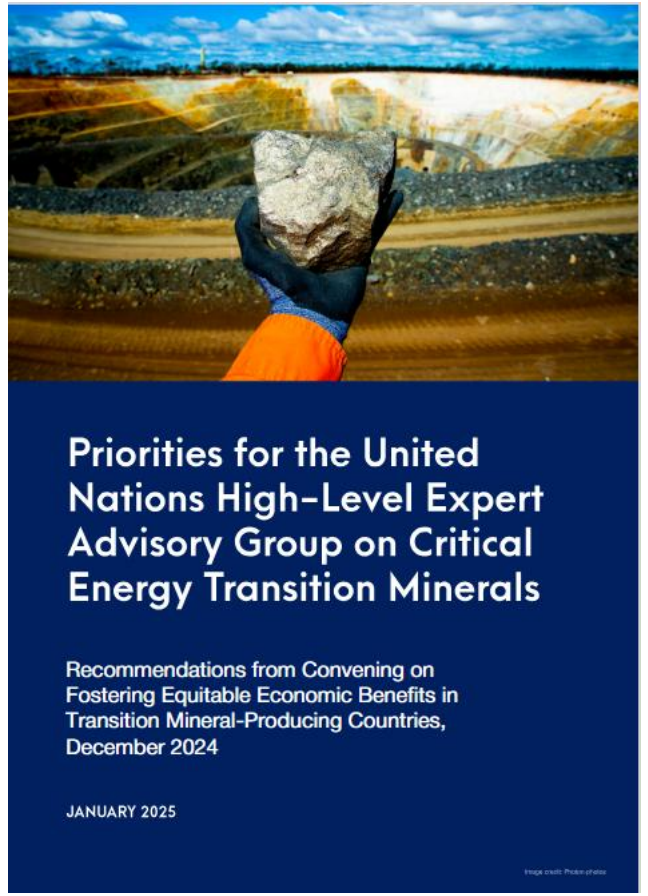
- AR2: traceability and transparency for accountability

- AR5: **material efficiency and circularity targets** to balance consumption and reduce environmental impacts



Priorities for the United Nations High-Level Expert Advisory Group on Critical Energy Transition Minerals

- A **fair share of benefits** from mining that are distributed equitably and managed well.
- **Value-addition** projects that benefit people.
- A **diversified economy** that benefits from—but does not depend on—minerals.
- **Trade, finance, and investment** that supports, rather than hinders, sustainable development and diversification of low- and middle-income mineral-producing countries and regions.



https://shorturl.at/xOhQx

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Thank you.

https://stories.somo.nl/the-big-battery-boom/

https://www.somo.nl/the-eus-critical-minerals-crusade/

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