IRENA
International Renewable Energy Agency

Roundtable: Trade in Minerals Critical for Climate Transitions and the Green Economy: Developing Country Perspectives and Pathways for International Cooperation

UN environment programme

UN trade & development UNCTAD

12 July 2024

TESS Forum on Trade, Environment, & the SDGs

Critical Materials for the Energy Transition

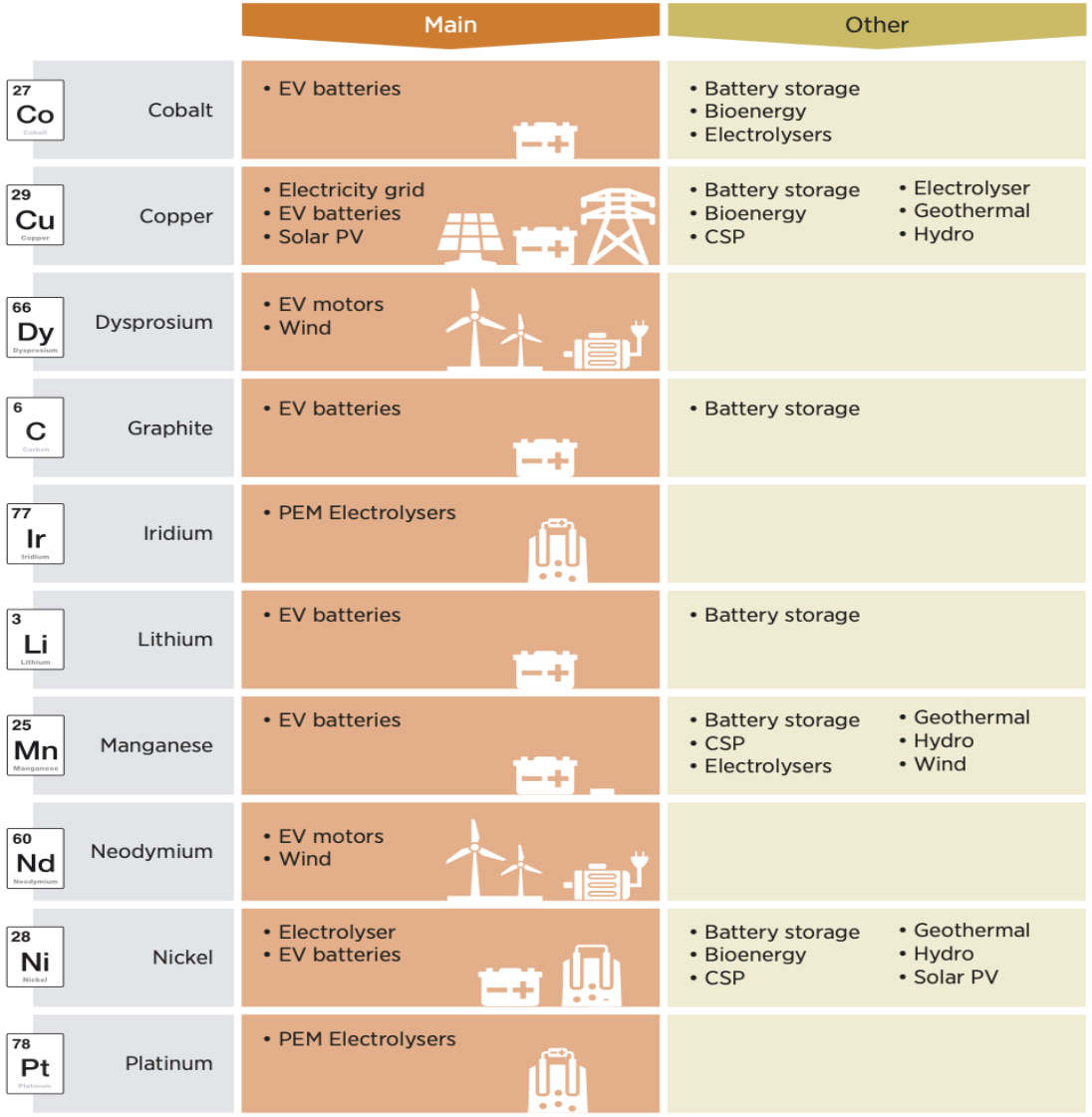
The complete decarbonization of our energy systems will require substantial quantities of critical materials.

Why Critical?

- Complexity of extraction and refining process,
- Scarcity and proximity of supply,
- Lack of viable substitutes,
- Concentration of supply.

Criticality is dynamic and location-specific

- Unique economic structures,
- Industrial needs,
- Geopolitical risks,
- Resource endowments.



Source: (RENA, 2023)

Critical Materials for the Energy Transition

In the long-term, the availability of resources is not a constraint for the energy transition.

Comparison of the estimated 2030 demand for selected critical materials with the estimated identified resources

Material	Estimated annual demand in 2030 (Mt/year)	Estimated Resources (Mt)	Resource-to-Annual Demand Ratio
Lithium	1.7 – 2.3	560	240 - 330
Cobalt	0.24 – 0.39	25	65 – 105
Graphite	6.5 – 7.4	800	1110 – 1200
Nickel	3.9 – 4.7	350	75 – 90
Copper	31.3 – 38.1	2,100	55 - 70
Phosphorous	28.2 – 29.2	30,000	1,030 – 1,060
Manganese	22.5 – 26.0	17,000	660 - 760

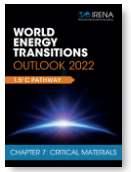
Source: Estimated resources based on (HAlM`an, 2023; USGS, 2024).

However, **efforts are needed** to mitigate **supply risks,** and to timely and effectively **scale up production** to meet growing demand in the **short-to-medium term.**

Timeline of the Collaborative Framework on Critical Materials

21 March 2022

Launch and 1st meeting of the Collaborative Framework



WETO 2022

1st meeting of **WG I** – Observatory (6 July 2022)

1st meeting of **WG II** – De-risking the supply (9 June 2022)

1st meeting of **WG III** – ESG and mining (12 Sep 2022)

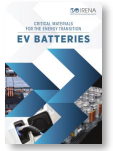
Geopolitics of the Energy Transition: Critical Materials

Webinars on lithium, rare earths, and deep-sea mining.

Ministerial Roundtable on Critical Materials at IRENA's 13th Assembly (Jan 2023)

12 October 2023

2nd meeting of the Collaborative Framework



EV Batteries: Critical Materials

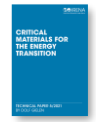
IRENA Innovation Week: Session on Future Materials for EV Batteries (Sep 2023)

4 April 2024

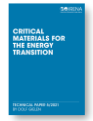
3rd meeting of the Collaborative Framework

Q3/Q4 2024

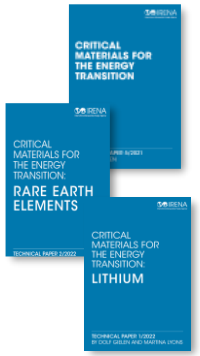
4th meeting of the Collaborative Framework



Constructing a Ranking of Critical Materials for the Global Energy Transition



Critical Materials for Renewable Energy: Improving Data Governance



Critical Materials For The Energy Transition

Critical Materials For The Energy Transition: Lithium

Critical Materials For The Energy Transition: Rare Earths

Thank you for your attention!

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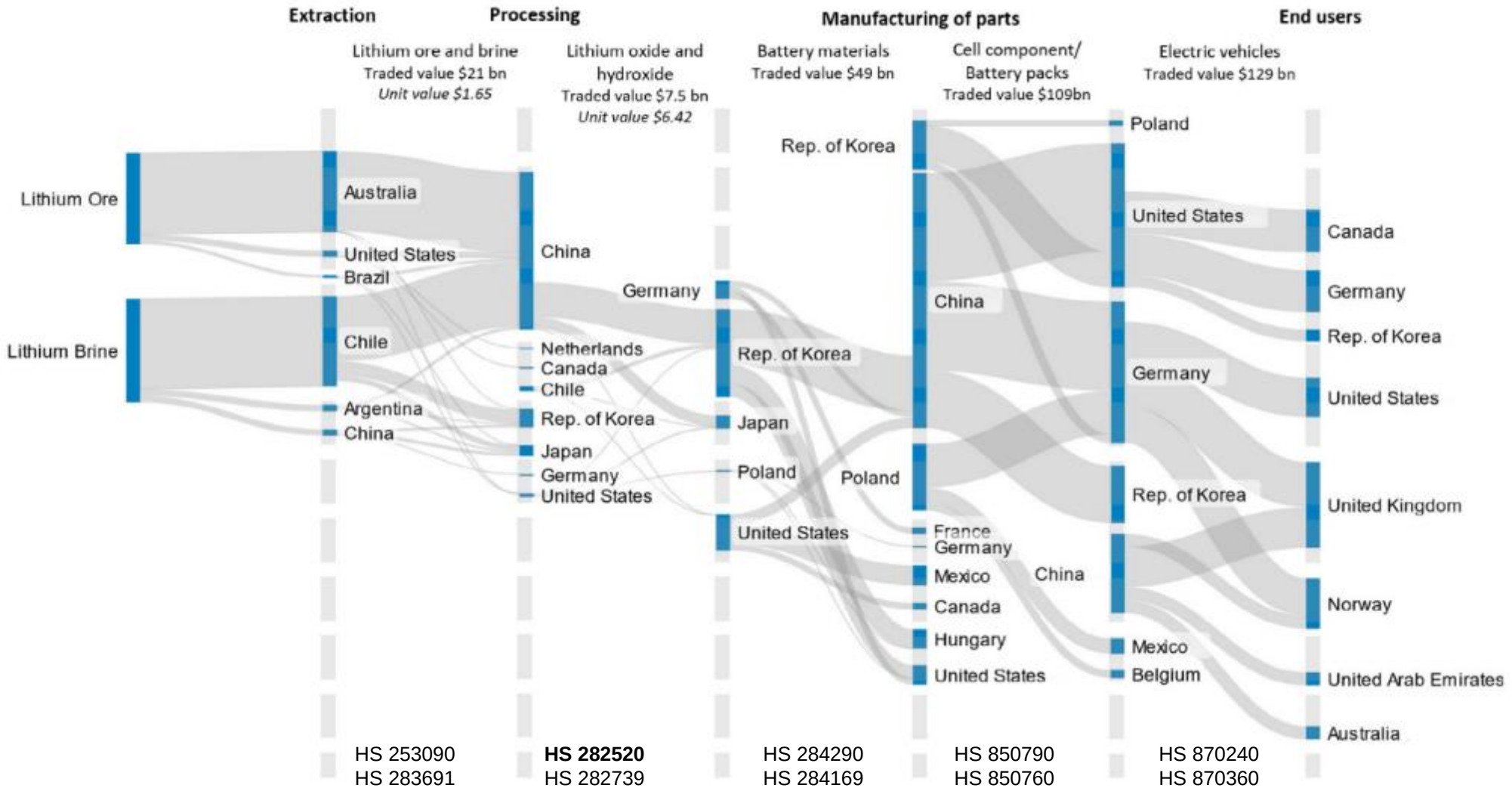
Concentration upstream and higher trade amounts downstream

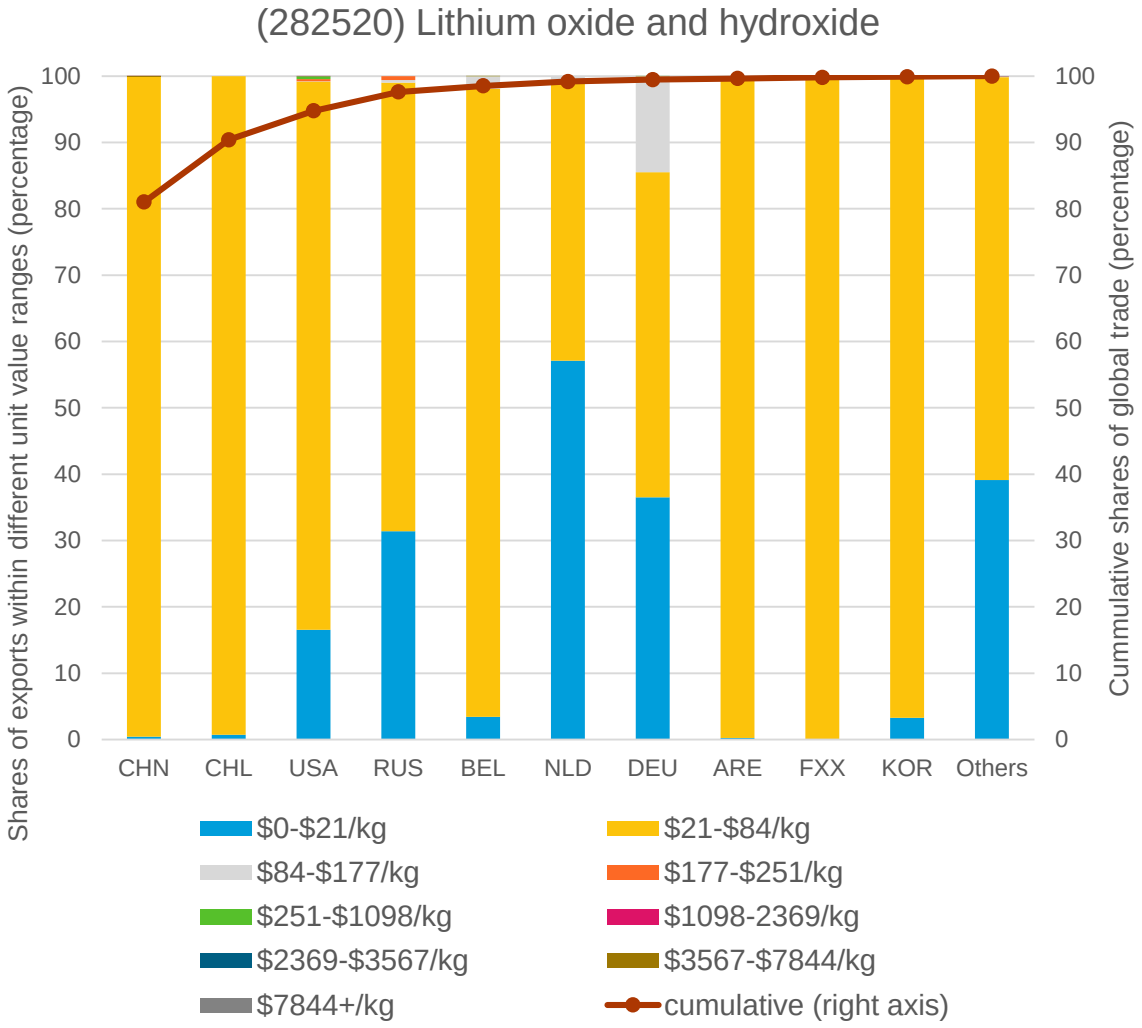
Lithium trade flows along the EV value chain, 2022 (USD)

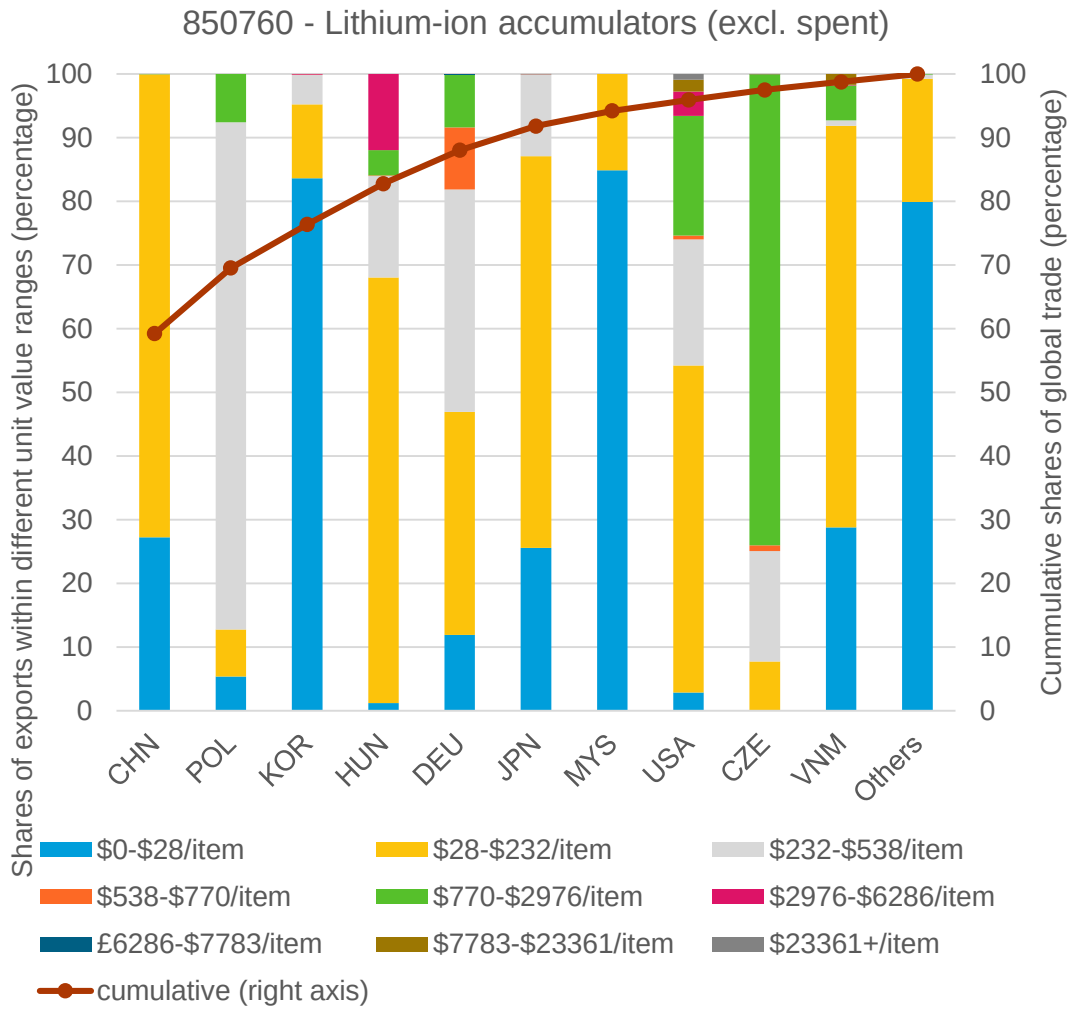


Note: export value (2022)
Source: UNCTAD Secretariat based on calculations from UN Comtrade.

Products are traded in a wide range of values associated with different markets

Unit value of exports| Extraction and processing of Lithium | EV value chain

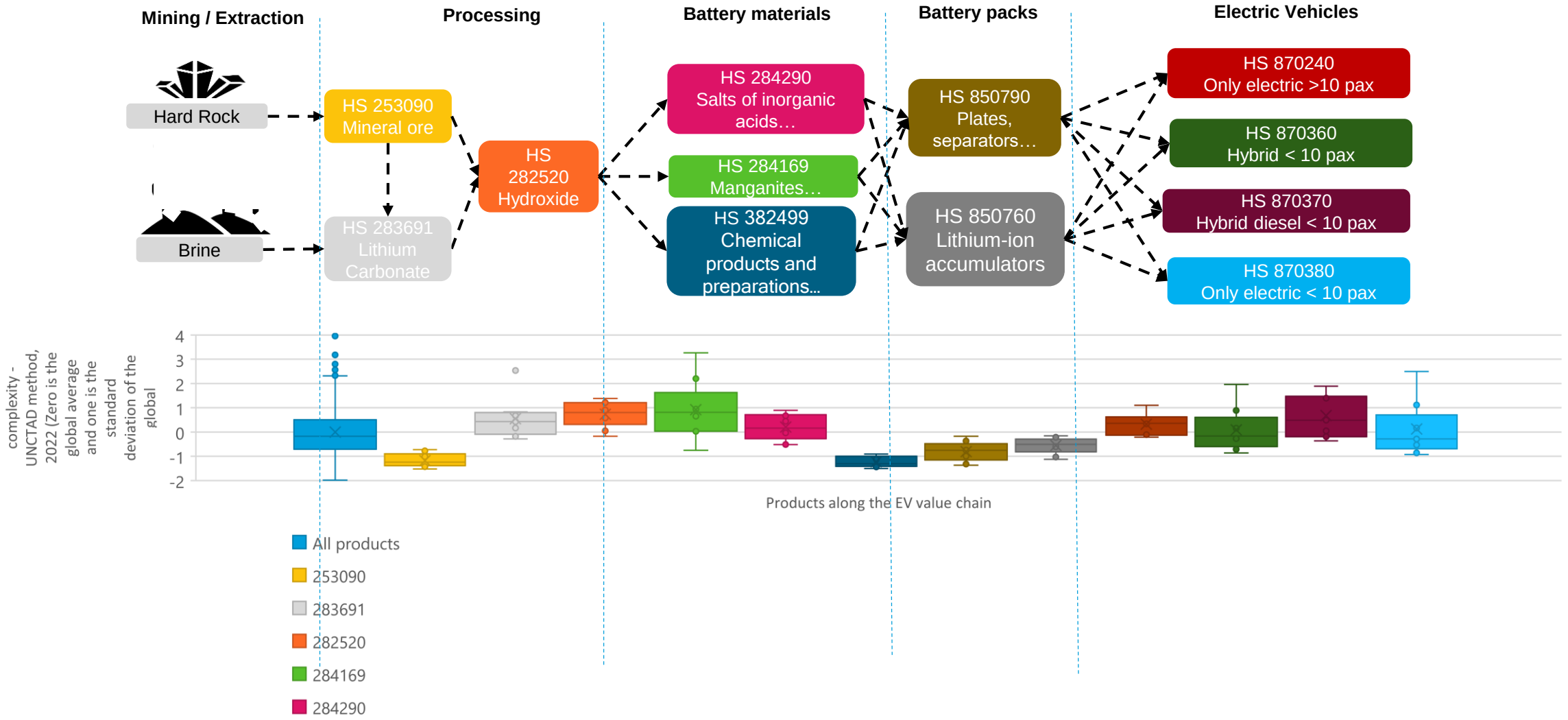




Note: export value (2022)
Source: UNCTAD Secretariat based on calculations from UN Comtrade.

Some upstream products are more complex than downstream ones: Value addition requires strategic policy interventions

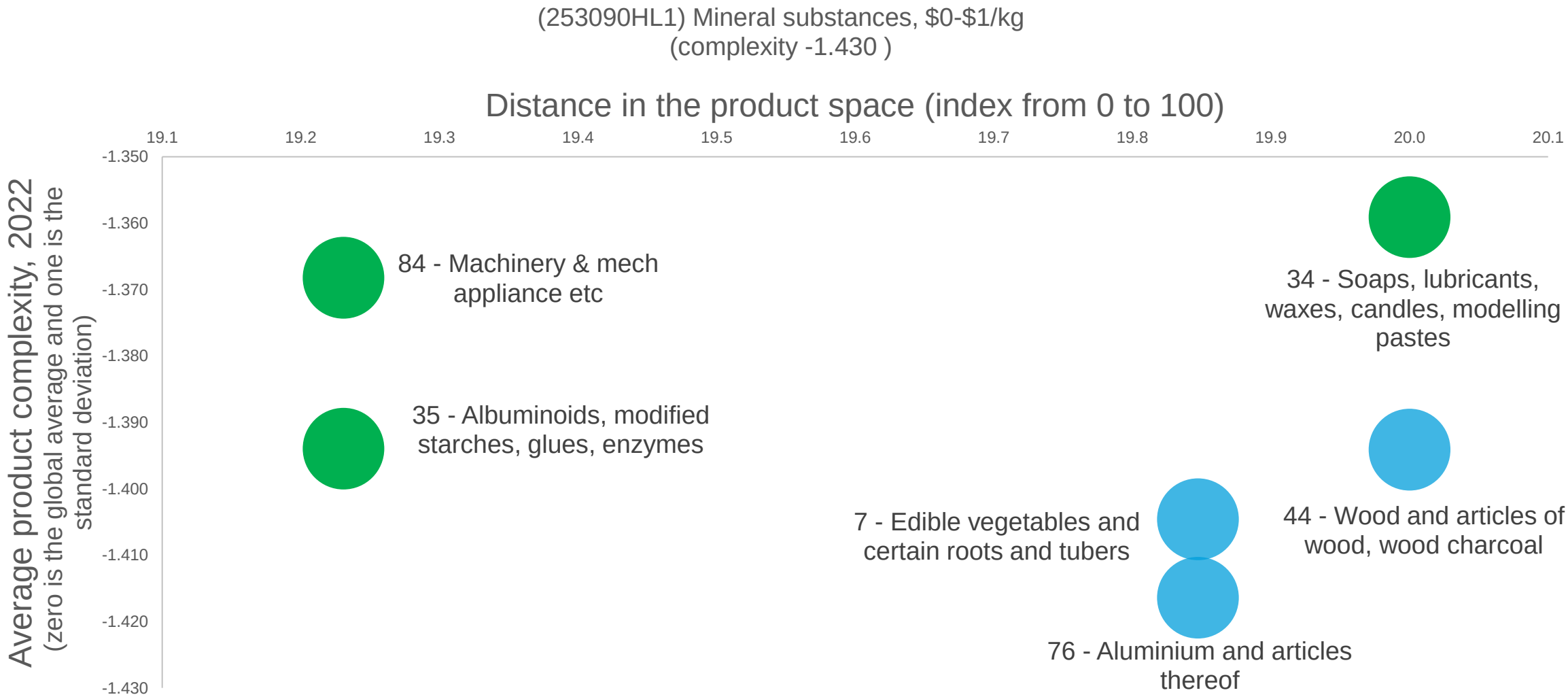
Product complexity (UNCTAD method) | Products traded within all unit ranges | EV value chain



Source: UNCTAD Secretariat based on calculations from UN Comtrade.

Possibilities for diversification outside of the value chain:
E.g. Machinery, glue and lubricants are potential diversifications out of lithium ore

Product complexity (UNCTAD method) | Potential new products close by in the product space



Source: UNCTAD Secretariat based on calculations from UN Comtrade.

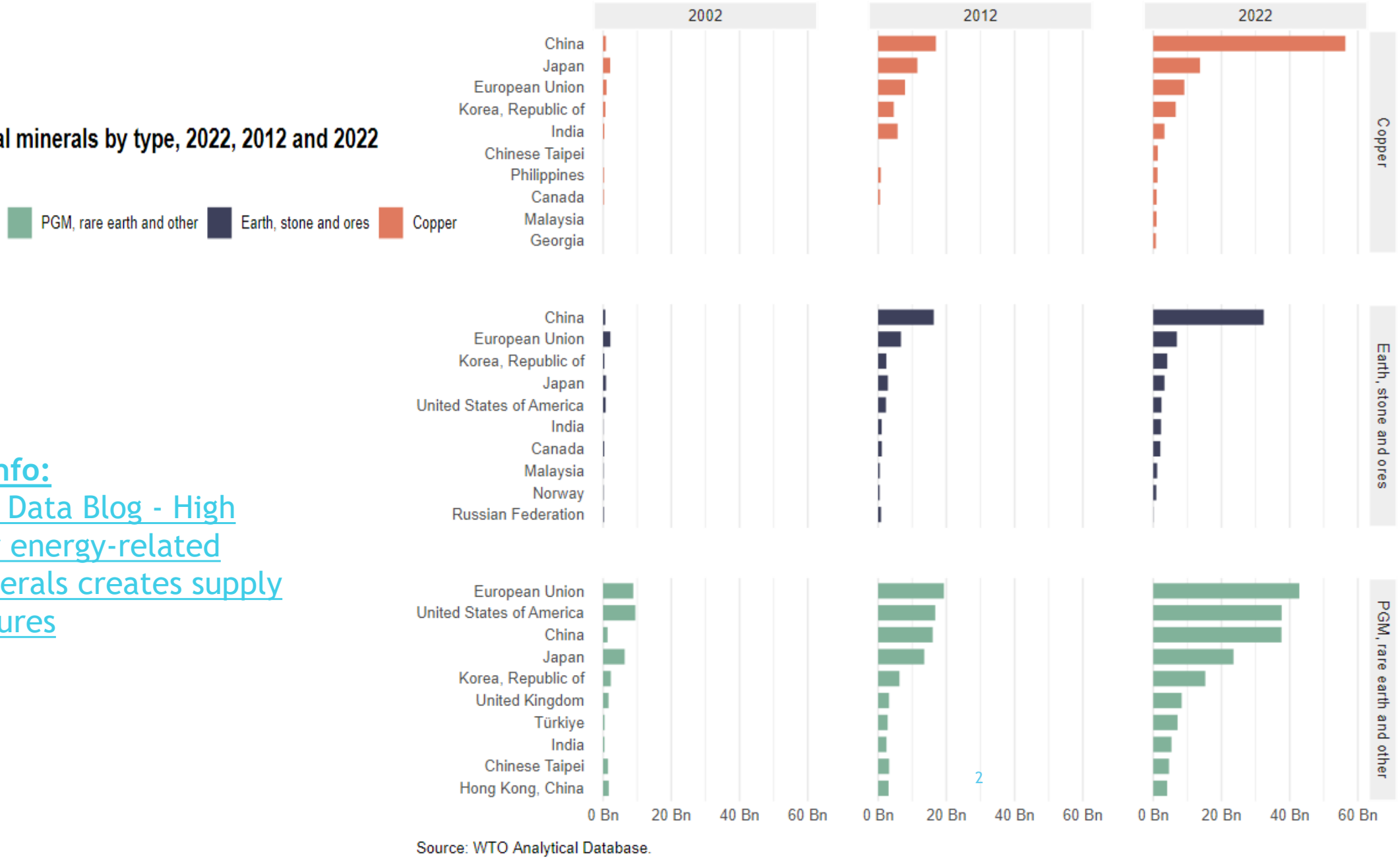
Trade data on Critical Minerals

WTO

TESS workshop, 12 July 2024

Trade data on Critical Minerals

Figure 3: Importers of critical minerals by type, 2022, 2012 and 2022
(US$ billions)

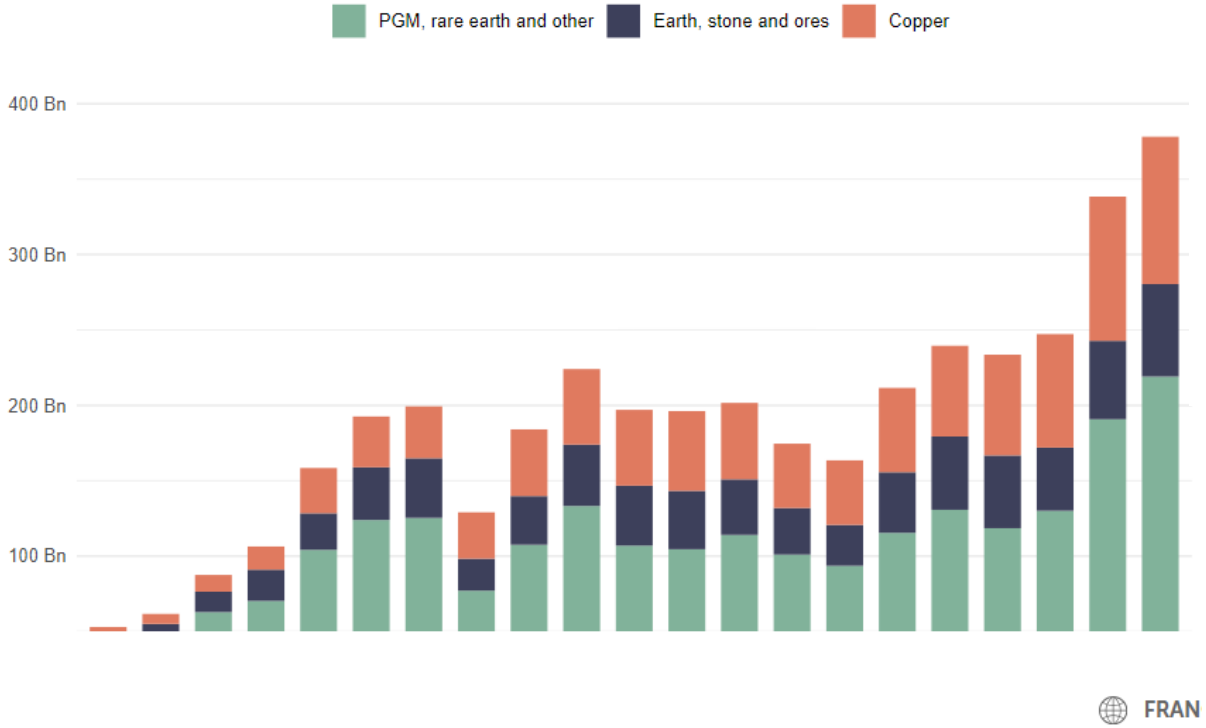


Source: WTO Analytical Database.

For more info:
WTO Blog | Data Blog - High demand for energy-related critical minerals creates supply chain pressures

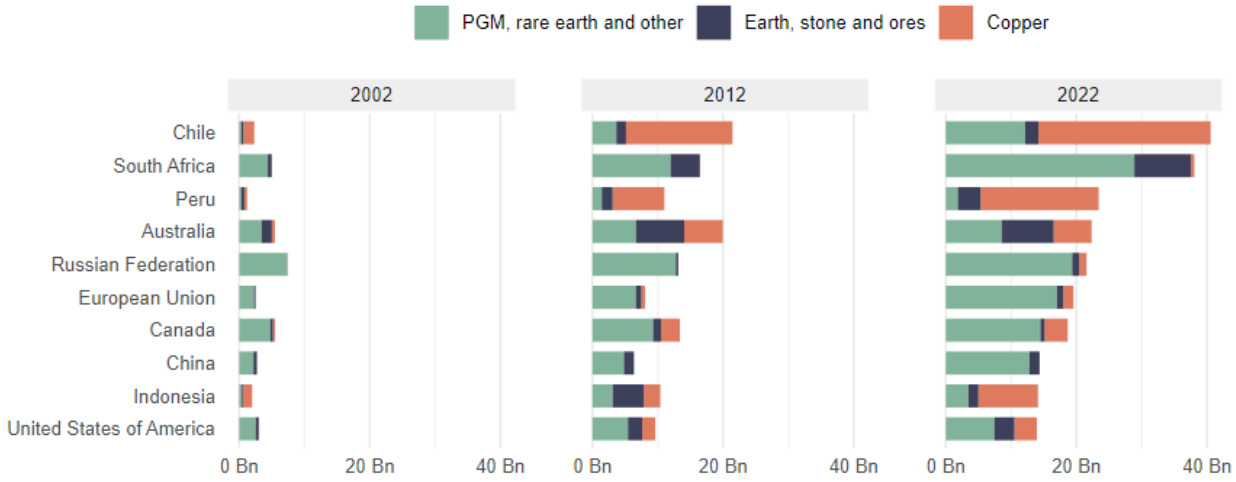
Trade data on Critical Minerals

Figure 1: Imports of critical minerals, 2002-22
(US$ billions)



Source: WTO Analytical Database.

Figure 5: Top exporters of critical minerals, 2002, 2012 and 2022
(US$ billions)



Source: WTO Analytical Database.

For more info:
WTO Blog | Data Blog - High demand for energy-related critical minerals creates supply chain pressures

Unlocking Potential, Facing Challenges, Achieving Sustainable Value Addition in Critical Minerals Supply Chains

Hari Tulsidas

UNECE

Local Value Addition is Vital for Developing Countries

CRITICAL MINERAL VALUE CHAIN

EXPLORATION AND MINING

Extracting resources demands investment, offers innovation opportunities. Few countries are primary sources, geopolitical risks arise. Environmental and social impacts pose challenges for sustainability.

REFINING AND PROCESSING

Transforming raw materials to intermediate requires advanced skills, know-how, and quality standards. Technological and regulatory gaps pose challenges for some countries.

MANUFACTURING AND ENGINEERING

Manufacturing and engineering of strategic sectors like renewable energy and ICT require innovation, competitiveness, and quality. Challenges include safety hazards, research, critical minerals, and price volatility.

RECOVERY AND RECYCLING

Recovering and recycling raw materials from waste streams reduces environmental impact, but low collection and recycling rates of critical minerals are a challenge. Complex products require costly and sophisticated technologies.

DISTRIBUTION AND TRADE

Efficient logistics, infrastructure, and market access are needed to transport, store, and sell raw materials and their products. Trade barriers and supply chain transparency are challenges for critical mineral trade.

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S W O T

Strenghts

- Abundant and diverse
- Key enablers of the energy transition
- Recyclability, enabling circular economy
- Significant potential for value addition.

Weaknesses

- Infrastructure, human capital, and governance
- High environmental and social impacts and risks
- Low bargaining power and competitiveness of smaller producers.

Oportunities

- Growing global demand and prices for critical minerals
- Value-added products and services
- Demand for responsible and low-carbon sourcing
- Emerging regional and international cooperation and dialogue
- Foreign investment, technology transfer, and market access.

Threats

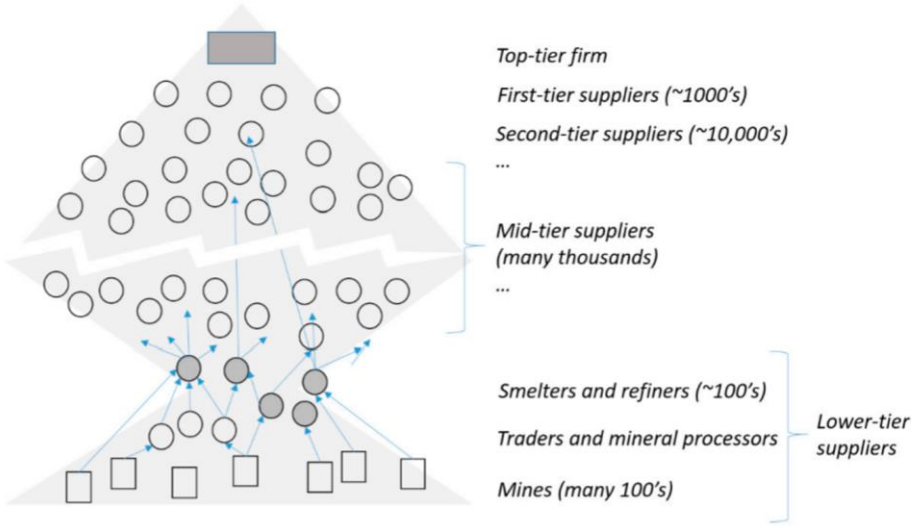
- Volatility and uncertainties
- Competition and conflict
- Regulatory and policy barriers and gaps.

Knowledge of Global Value Chains and Strategic Partnerships are Essential

Global Value Chain Complexity

Challenges and Opportunities

Collaborative Solutions



Young, S. B., Fernandes, S., & Wood, M. O. (2019). Jumping the chain: How downstream manufacturers engage with deep suppliers of conflict minerals. *Resources*, *8*(1), 26.

UNRMS Provides a Robust Framework for Sustainable Value Addition

- **Comprehensive Frameworks**: UN Resource Management System (UNRMS) embed environmental, social, and economic factors in resource management, ensuring a balanced and sustainable approach.
- **Case Studies and Implementation**: Successful implementations in Africa, such as AMREC under PARC, showcase the effectiveness of these frameworks in promoting sustainable development.
- **Driving Sustainable Practices**: By adhering to UNRMS and UNFC, countries can enhance value addition through sustainable and responsible mining and processing practices, aligning with the 2030 Agenda for Sustainable Development.

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More about UNFC and UNRMS:
reserves.energy@un.org
https://unece.org/sustainable-energy/sustainable-resource-management

Thank you!

Hari Tulsidas
Technical Advisor UNFC & UNRMS
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Date 12 I 07 I 2024, Geneva

UNFC and UNRMS

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Trade in Minerals Critical for Climate Transitions and the Green Economy: Developing Country Perspectives and Pathways for International Cooperation
12 July 2024

Trade-related Initiatives and Policy Trends in Critical Minerals: Implications for Africa

Nimrod Zalk
Chief Research Officer: Climate and Economic Development
Nelson Mandela School of Public Governance
University of Cape Town

Contextualising Critical Mineral Value Chains

- Many African countries: long-term export dependence on minerals and energy products
- 2000's commodity "super-cycle": growth without structural transformation
- "Race" for critical minerals in the context of geopolitical, industrial and technological contestation over low carbon and digital technologies
- Advanced economies
  - Surge of unilateral trade and industrial policy measures
  - Emphasis on diversification through "ethical supply chains" and shared benefits
- ESG: everywhere except in the fixed investment data

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Implications for African countries

- African countries
  - Trade related instruments are relevant …
  - … but need industrial capabilities and economies of scale
  - Agency: ambitious but feasible industrial polices
- Advanced economy-led “ethical supply chains”
  - Packaging financing and OEM investment
  - Market access: e.g. extending IRA benefits to AGOA countries
- Sino-African linkages
  - Investment to overcome direct import hurdles to advanced economies

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TESS-UNEP-UNCTAD Trade Minerals and Climate Action

Dabre Guillaume, **Project Specialist**

International Trade and Investment – World Economic Forum

Trade-related policies and measures

An overview of some critical raw materials (CRM) partnerships.

CRM Partnerships

1**. Investment-focused**

- **Minerals Security Partnership (MSP)**: US-led initiative with other countries like Canada, Japan, and EU member states to support CRM projects aligning with high environmental, social, and governance (ESG) standards.
- **EU Global Gateway**: Mobilizing €300 billion for sustainable projects, including CRM initiatives in the DRC and Zambia.

2. Policy alignment and/or Market access

- **Japan-US Critical Minerals Agreement**: Facilitating market access and aligning policies to reduce dependency on single suppliers like China.

3. Domestic legislation

- **US Inflation Reduction Act**: Strengthening internal regulations to support sustainable CRM supply chains.
- **EU Critical Raw Materials Act (CRMA):** Ensuring secure and sustainable supply chains for CRMs, targeting EU extraction, processing, and recycling capacities.

4. **Shared data collection and analysis**

- **IEA Voluntary Critical Minerals Security Programme**: Promoting collaborative data collection and market transparency to support informed policymaking.

Challenges

What "good" CRM partnerships should include:

FIGURE 2 | **Advancing development gains in CRM partnerships**

Transparency

Consultation with Indigenous groups and civil society before and during project development

Skills

Joint capacity-building on skills and services

Market access

Shared definition of materials in scope and commitment to develop joint projects; commitment to open markets

Investment

Transparency on measures affecting CRM investments and practical guidance on investment, streamlined administrative procedures and joint investment facilitation activities

Standards

Shared conception of ESG standards, expectations for ESG performance, assurance from producers and due diligence from investors and buyers

Technology transfer

Cooperation on research and development, with a focus on low-carbon technologies

Circularity

Policy exchange and cooperation on areas such as standards, product labelling and recycling economies of scale

Source: World Economic Forum