

# Diversification opportunities for CETMs, the case of lithium

**Short courses for Permanent Missions in Geneva**  
Thursday, 7 March 2024

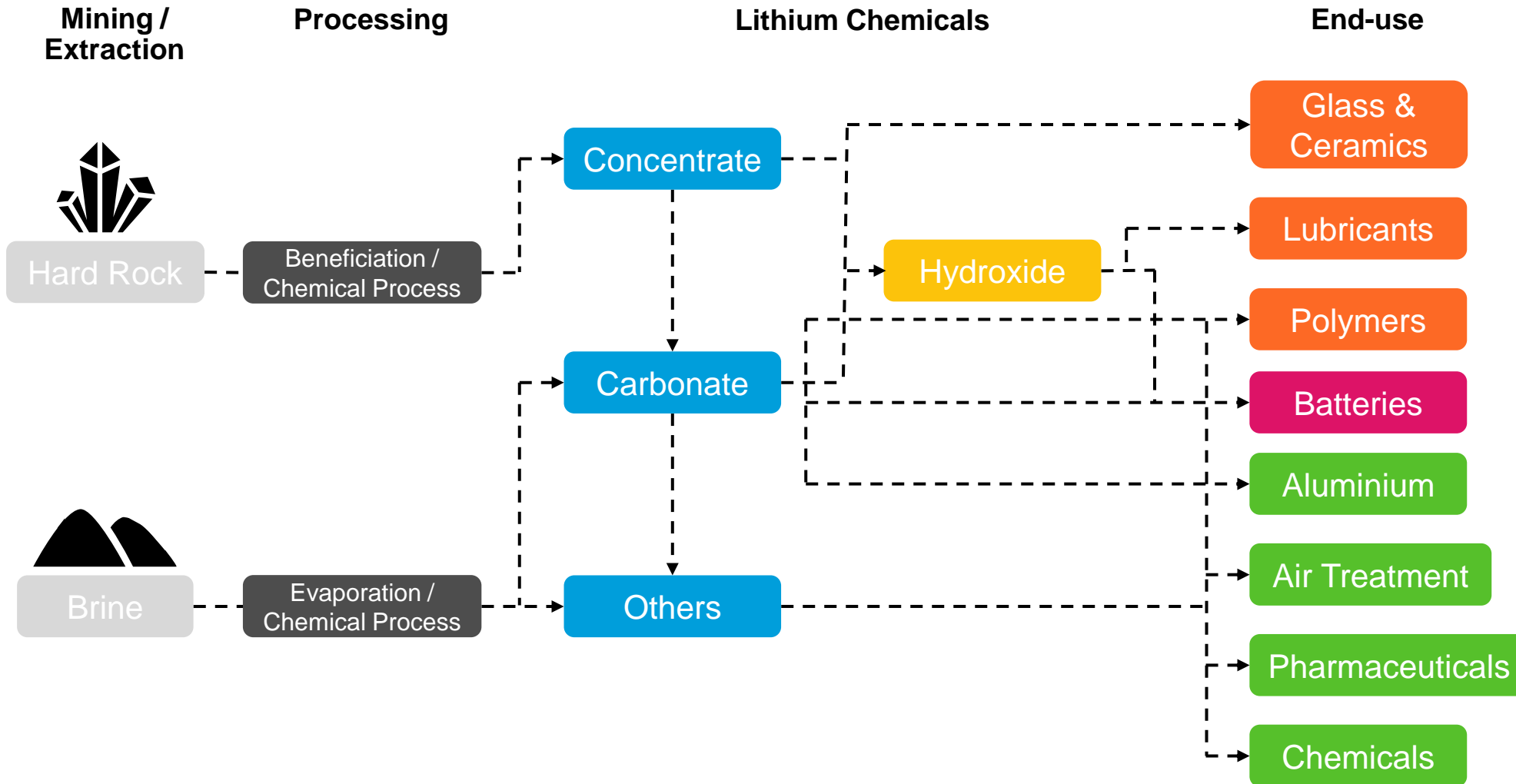
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# Batteries correspond to 80% of lithium end-use

*Demand | Processing routes and applications*



Global end-use markets for lithium resources are vastly dominated by batteries, which correspond to 87% of the total. Other applications are glass and ceramics (4%), lubricants (2%), continuous casting mold flux powders (1%), air treatment (1%); medical (1%); and other uses (4%).

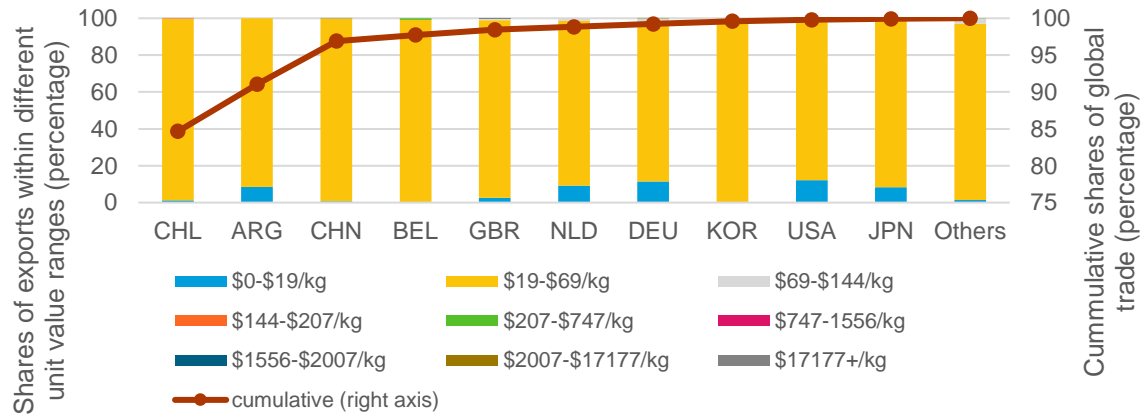
Regarding its use in lithium-ion battery, although demand is currently driven mainly by laptops and cell phones, the scenario is forecasted to undergo significant changes, with electrical vehicles (EVs) in the forefront of demand.

As of 2021, global lithium demand was estimated around 500 thousand metric tons, an annual increase of 63.9%.

# Products are traded in a wide range of values, but most trade upstream in the value chain is in the lower price ranges

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

(283691) Carbonates; lithium carbonate



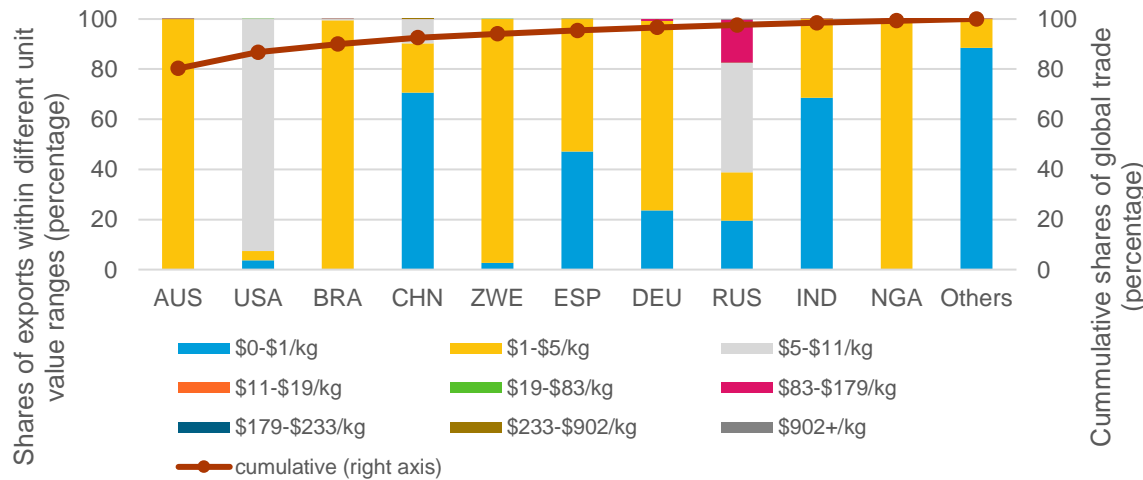
There is a large variation in the unit value of bilateral trade flows of all products along the EV value chain, including critical energy transition minerals.

In the case of lithium carbonate, for example, a kilogram was traded in 2022 from almost \$0 to over \$17,177. However, most trade ranged from \$19 to \$69 per kg.

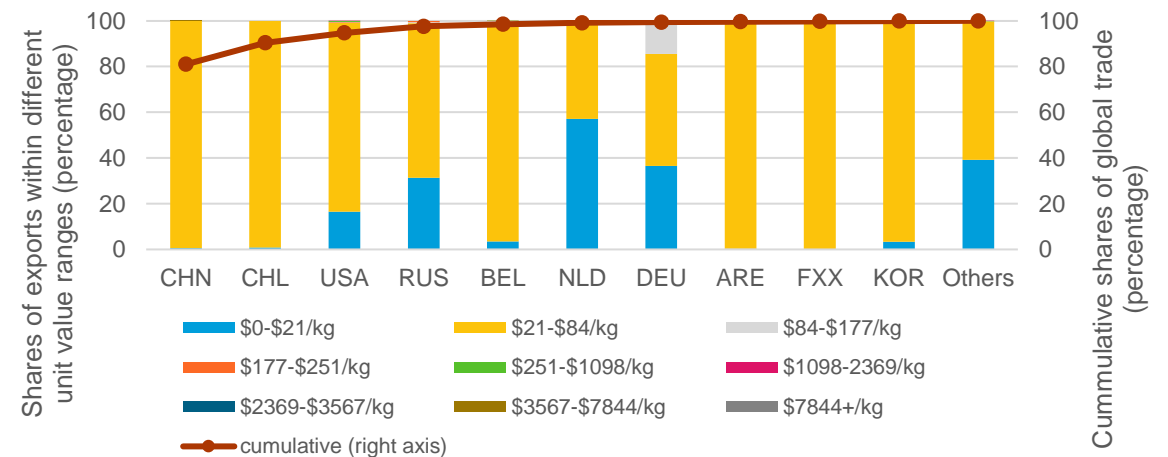
Spodumene (a mineral ore source of lithium), is classified under HS 253090, which includes other mineral substances. Most of the trade ranged from \$1 to \$5 per kg.

In the case of lithium oxide and hydroxide (HS 282520), most of the trade was in the \$21 to \$84 per kg range in 2022.

(253090) Mineral substances; n.e.c. in chapter 25



(282520) Lithium oxide and hydroxide



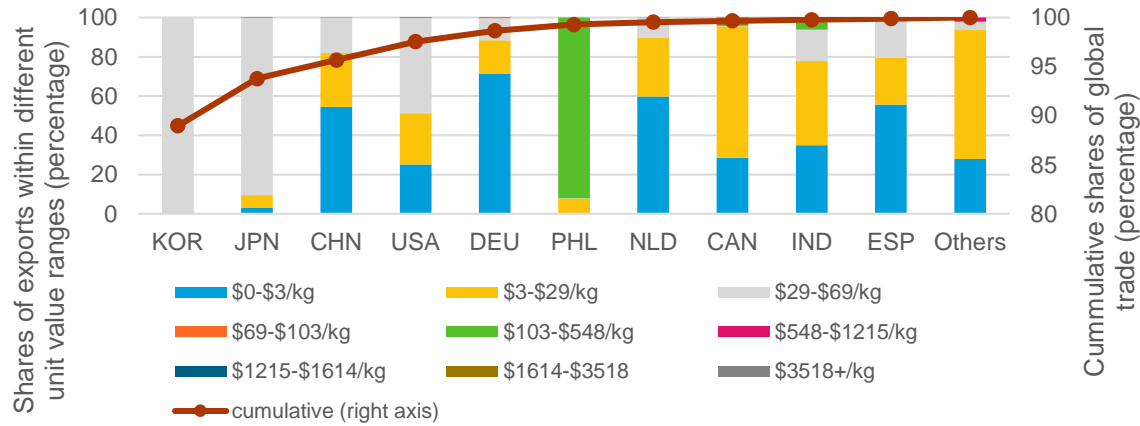
Note: export value (2022)

Source: UNCTAD Secretariat based on calculations from UN Comtrade.

# Larges shares of battery material are traded in various ranges of unit values, mainly by developed countries

Unit value of exports| Battery material containing Lithium | EV value chain

284290 - Salts of inorganic acids, ...

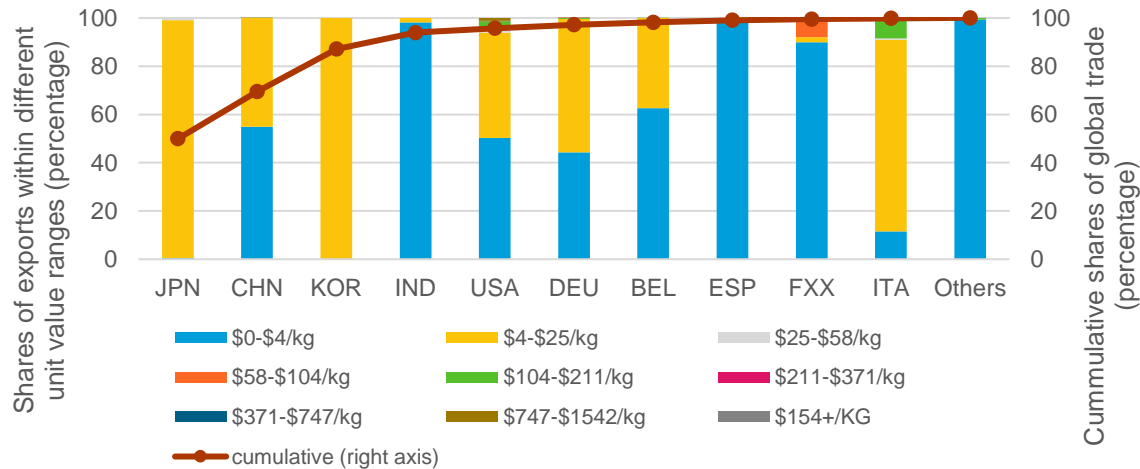


Germany, Japan, the Republic of Korea, the United States and other developed countries are major exporters of battery material containing lithium.

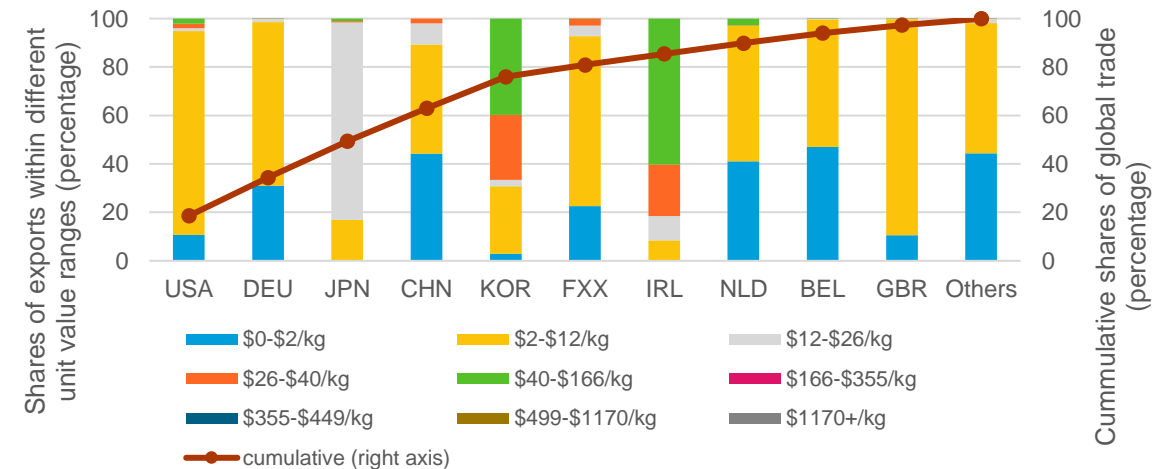
China is also a major exporter but it's not among the top three when considering the three HS codes included in the analysis. Argentina accounts for 10 per cent of lithium processing globally but is not included in the diagram because it exports only a negligible amount of refined lithium.

China, India and the Philippines are the only developing countries among the major exporters. China and India usually trade in the lower ranges of unit value. Most of the exports from the Philippines (HS 284290) are in a higher range of unit value (\$103 to \$548 per kg).

284169 - Manganites, manganates, ...



382499 - Chemical products and preparations ...

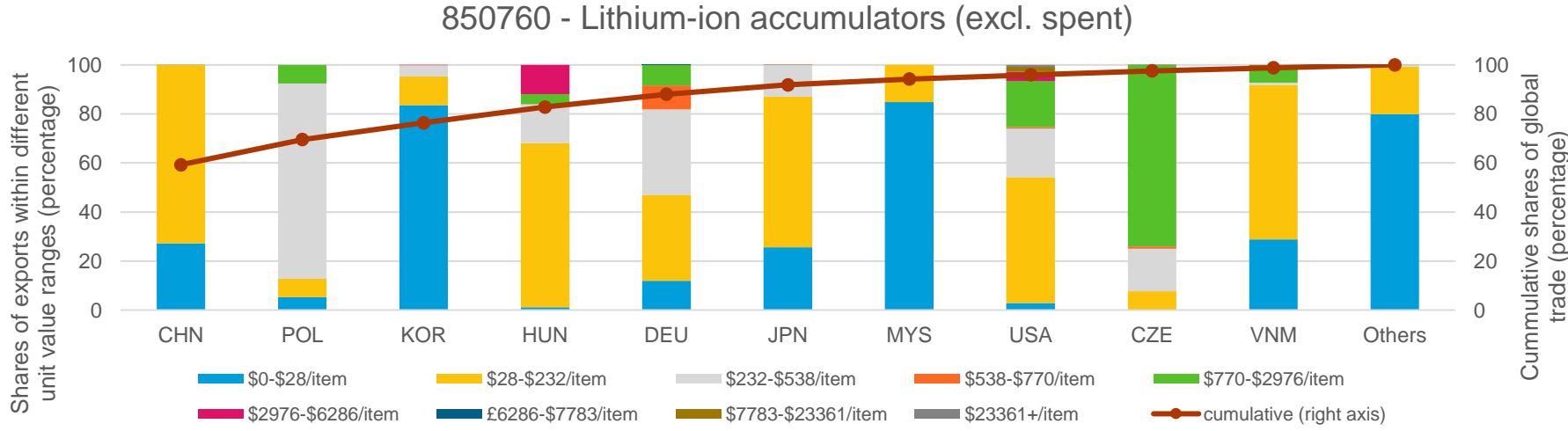
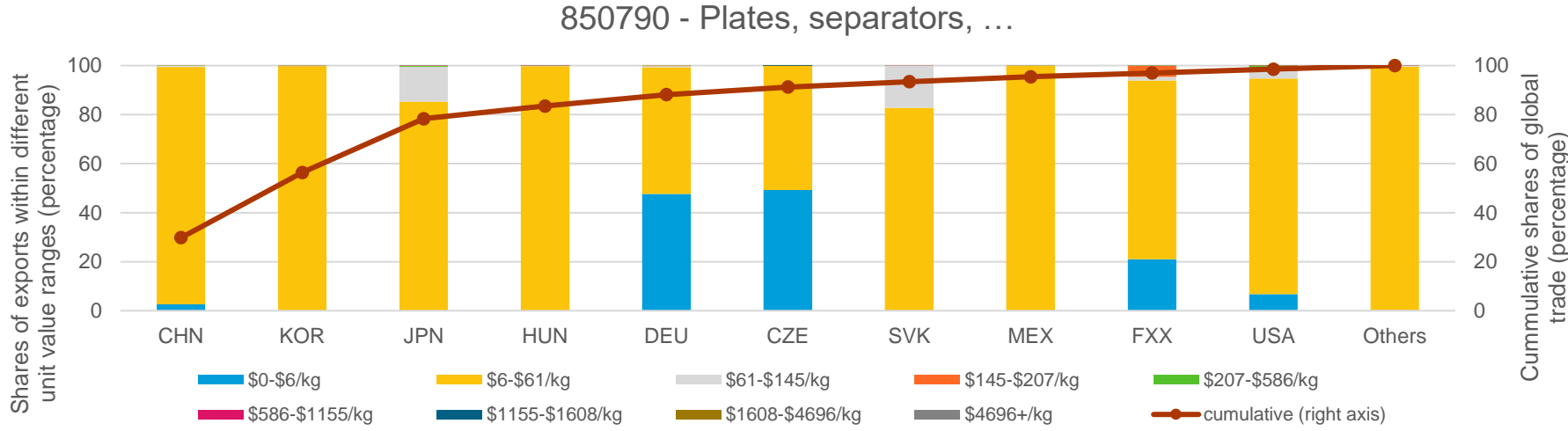


Note: export value (2022)

Source: UNCTAD Secretariat based on calculations from UN Comtrade.

# China is the major exporter of battery packs, mostly in the second to lowest unit value range

Unit value of exports| Battery packs | EV value chain



China is the major exporter of battery packs. Other significant exporters are Poland, Germany, Japan, Hungary and the Republic of Korea. Malaysia, Mexico and Viet Nam are the developing countries among the major exporters.

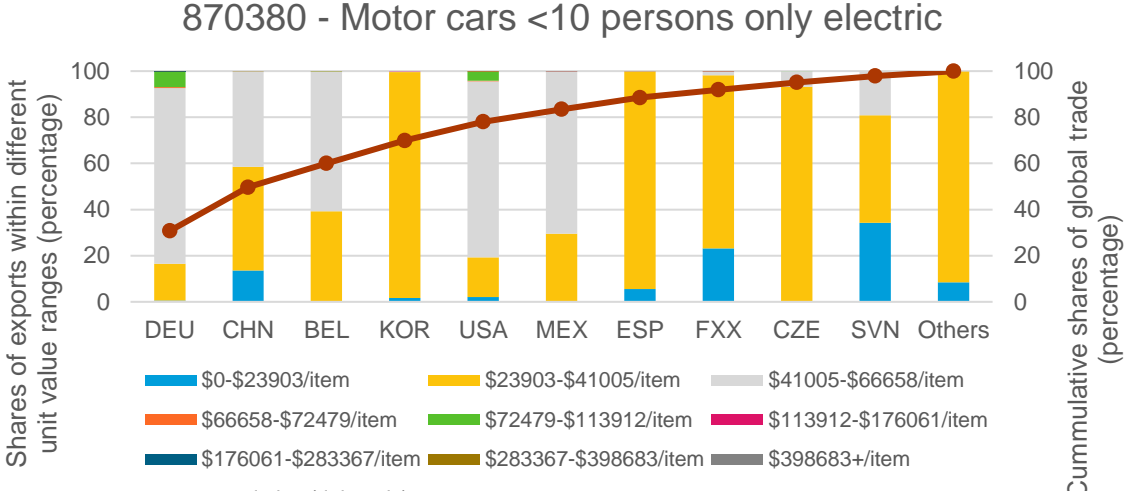
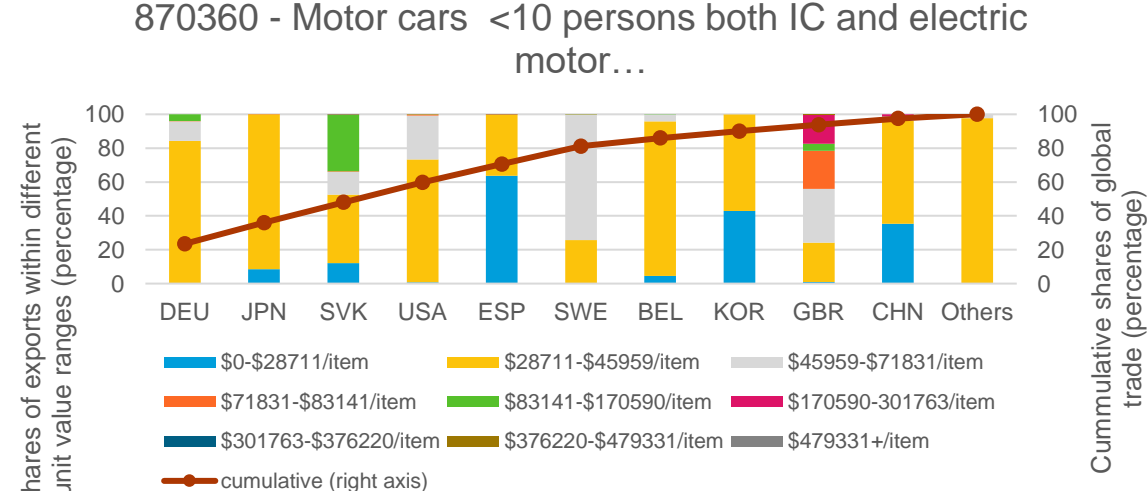
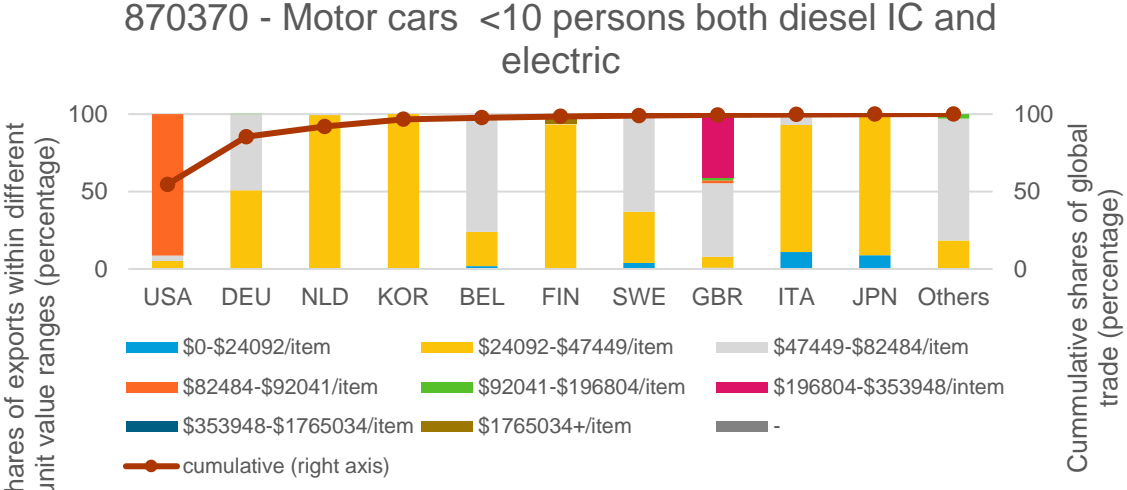
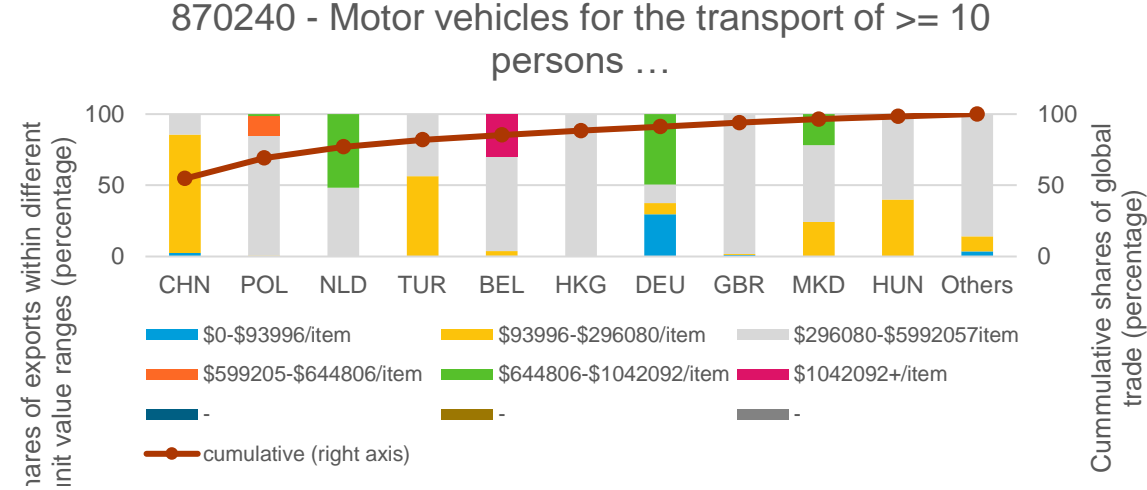
In the case of plates and separators (HS 850790), most exports are in the range from \$6 to \$61 per kg. On the other hand, lithium-ion accumulators (HS 850760) are mainly in the range from \$28 to \$232 per item for exports from China, \$232 to \$538 per item for exports from Poland, and up to \$28 per item for exports from the Republic of Korea.

Notably, most exports from Czechia are in the \$770 to \$2976 per item range.

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

# China, Japan and the Republic of Korea export EVs in the lower unit value ranges, while the US, Poland, Mexico, the Netherlands and the UK target higher unit values

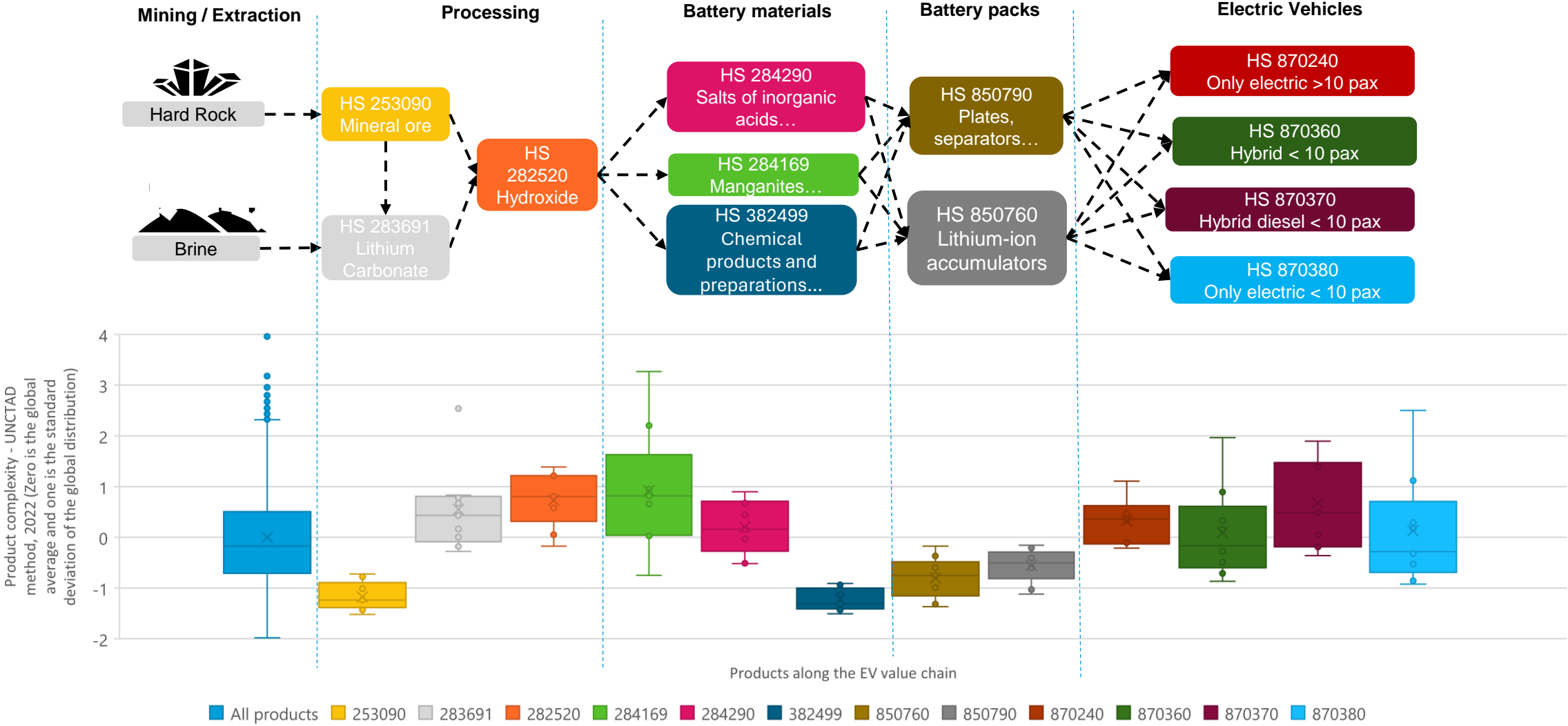
## Unit value of exports| Electric vehicles | EV value chain



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

# Some upstream products are more complex than downstream ones

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

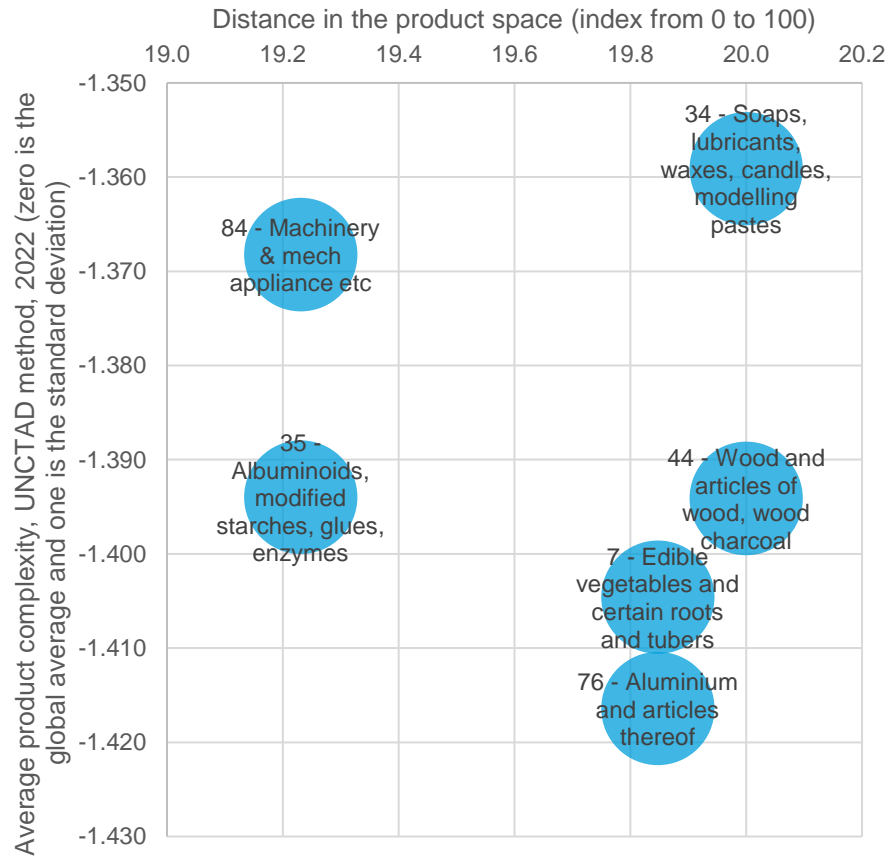


Source: UNCTAD Secretariat based on calculations from UN Comtrade.

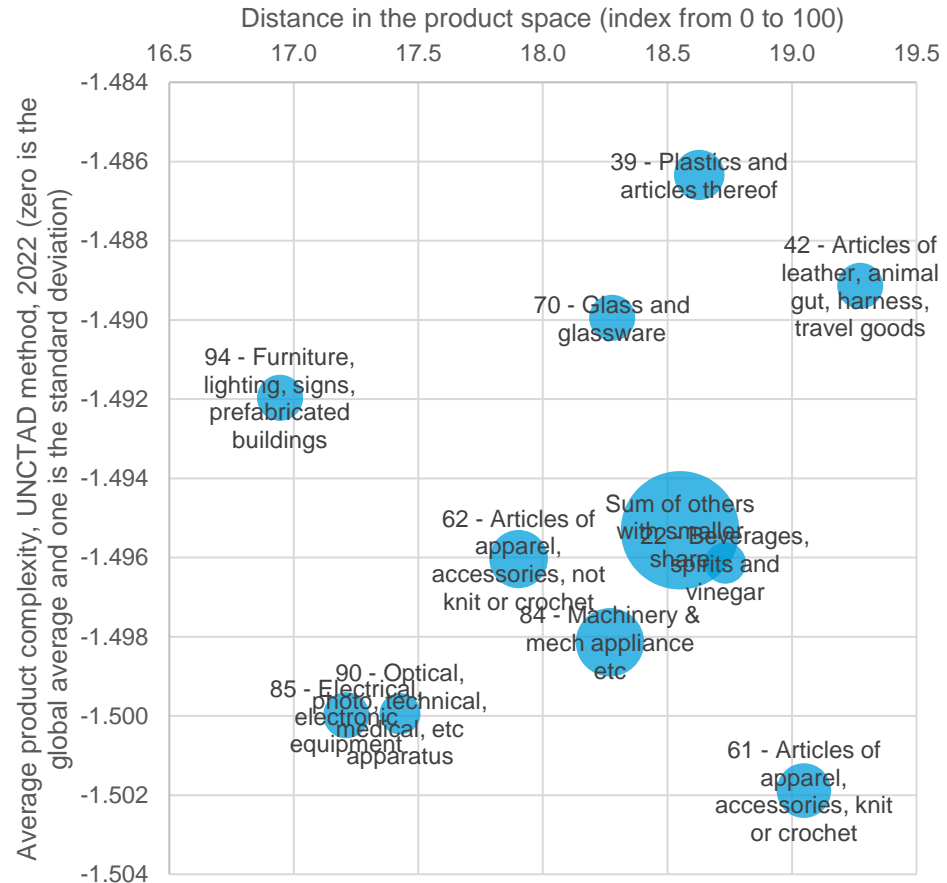
# Machinery, glue and furniture are potential diversifications out of lithium ore

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

(253090HL1) Mineral substances, \$0-\$1/kg  
(complexity -1.430)



(253090HM1) Mineral substances, \$1-\$5/kg  
(complexity -1.519)



We use the product space to find potential new products for diversification that are “close by” to the lithium-related products along the EV value chain.

The analysis considers products that have an 80% probability of being exported by the same country. The measure of distance is normalized from 0 to 100, where 0 is the closest (100% probability of two products being exported together).

In the analysis, there were no products close by to Lithium carbonate and lithium hydroxide.

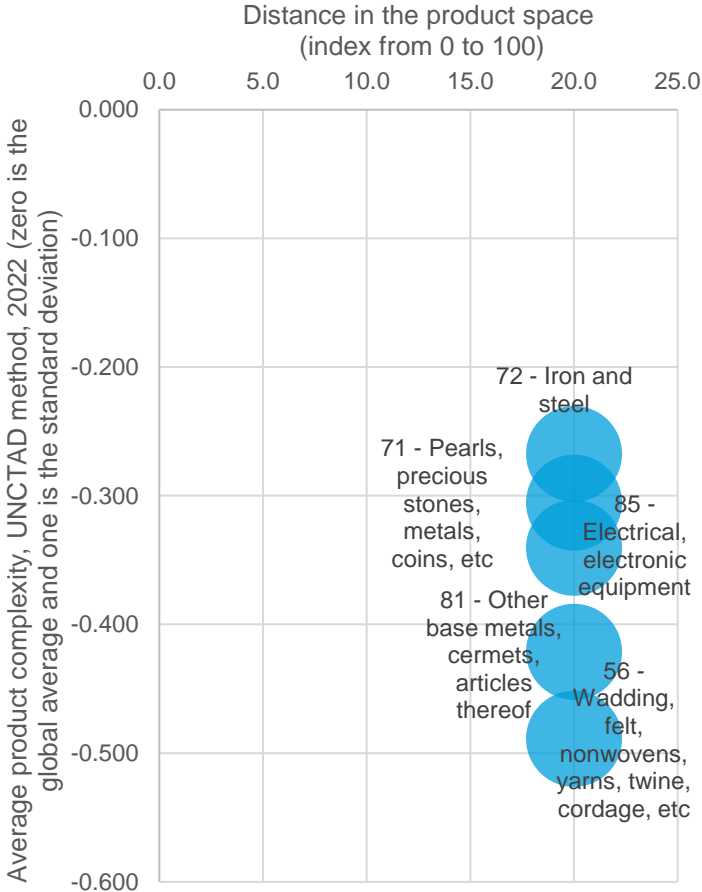
We consider only the potential new products that have higher product complexity. The size of the bubbles in the graphs represents the number of products under the aggregated sector.



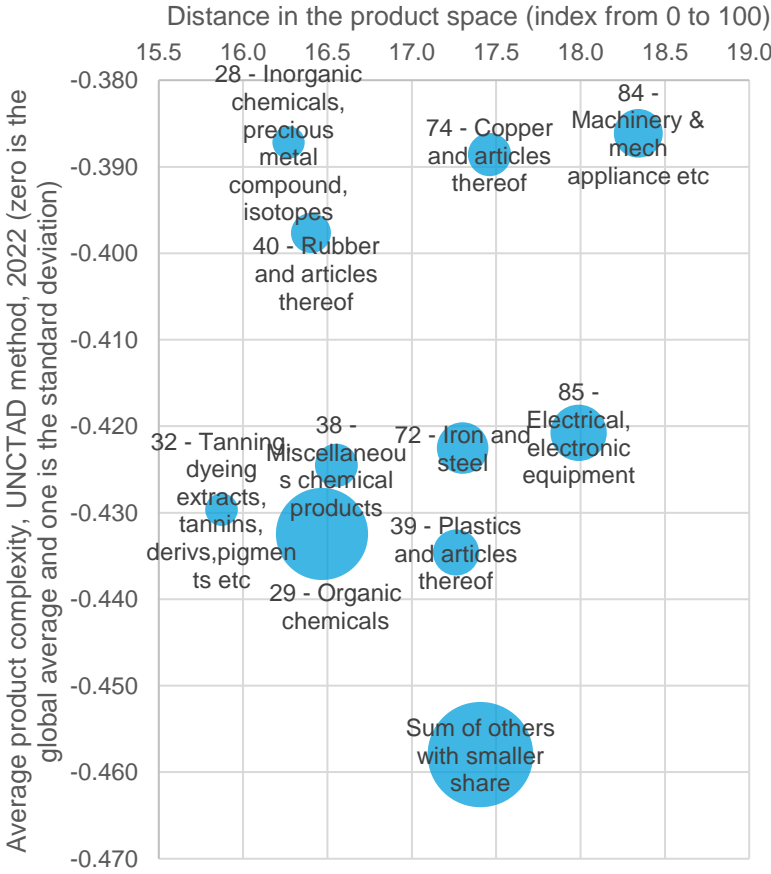
# Inorganic and organic chemicals, articles of rubber, and dyeing extracts are potential diversifications out of battery materials (HS284290)

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

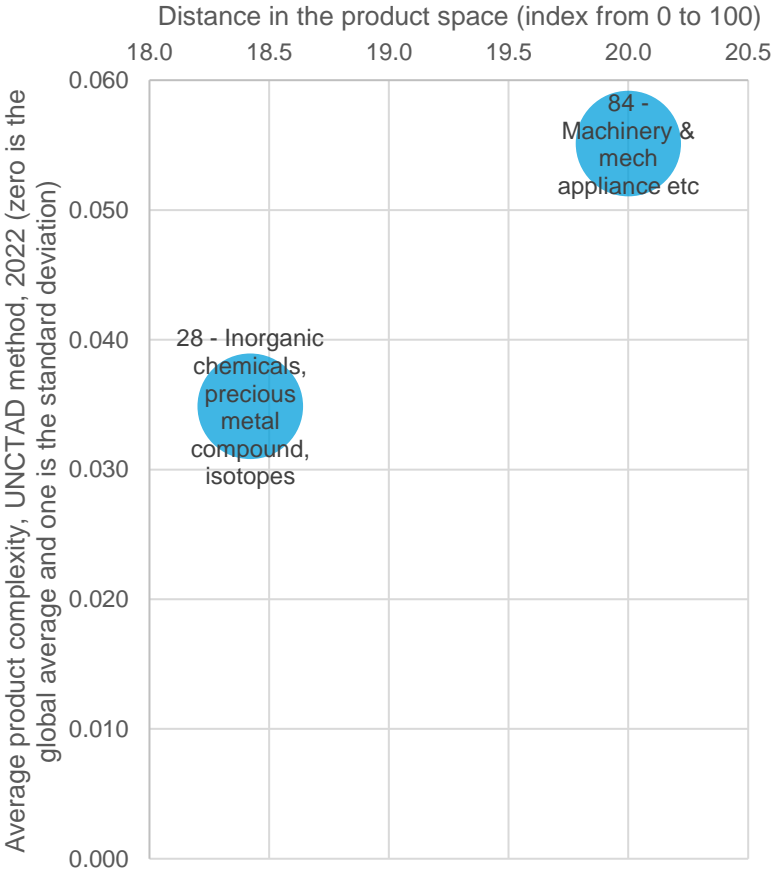
(284290HL1) Salts of inorganic acids, \$0-\$3/kg (complexity -0.514)



(284290HM1) Salts of inorganic acids, \$3-\$29/kg (complexity -0.516)



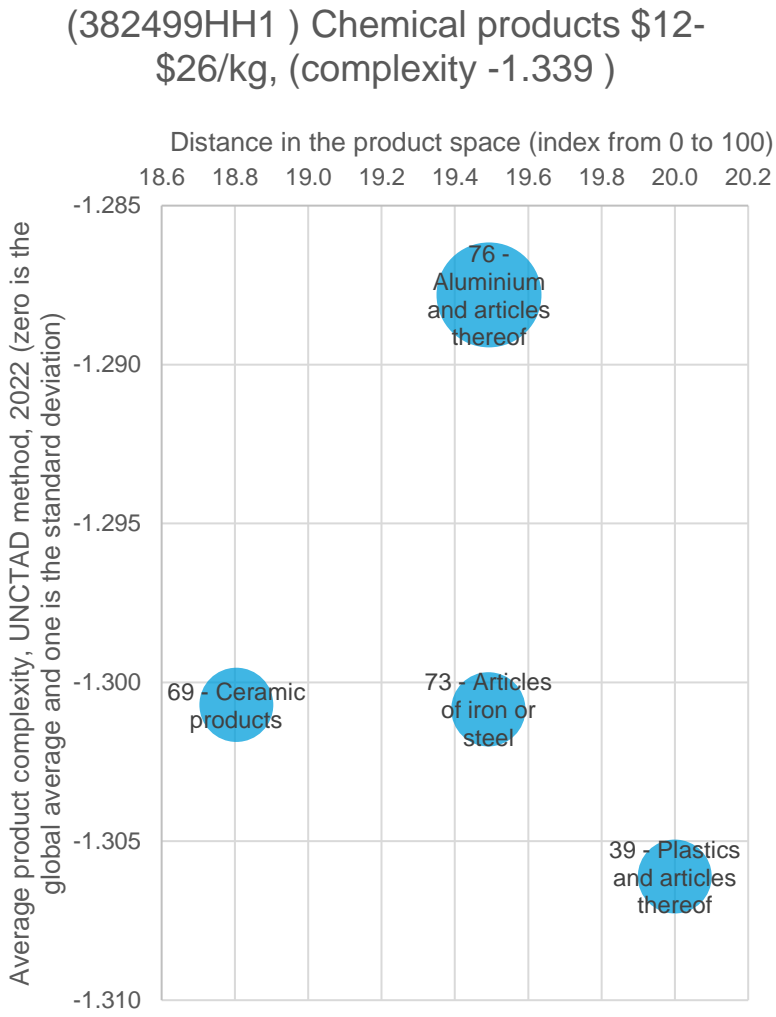
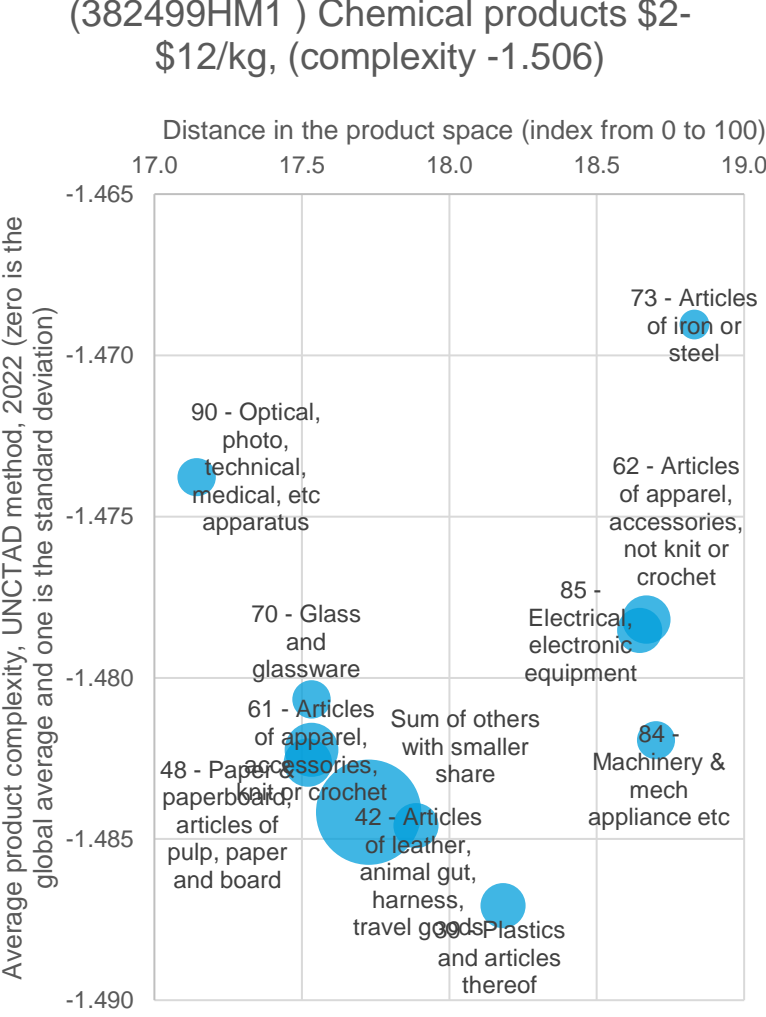
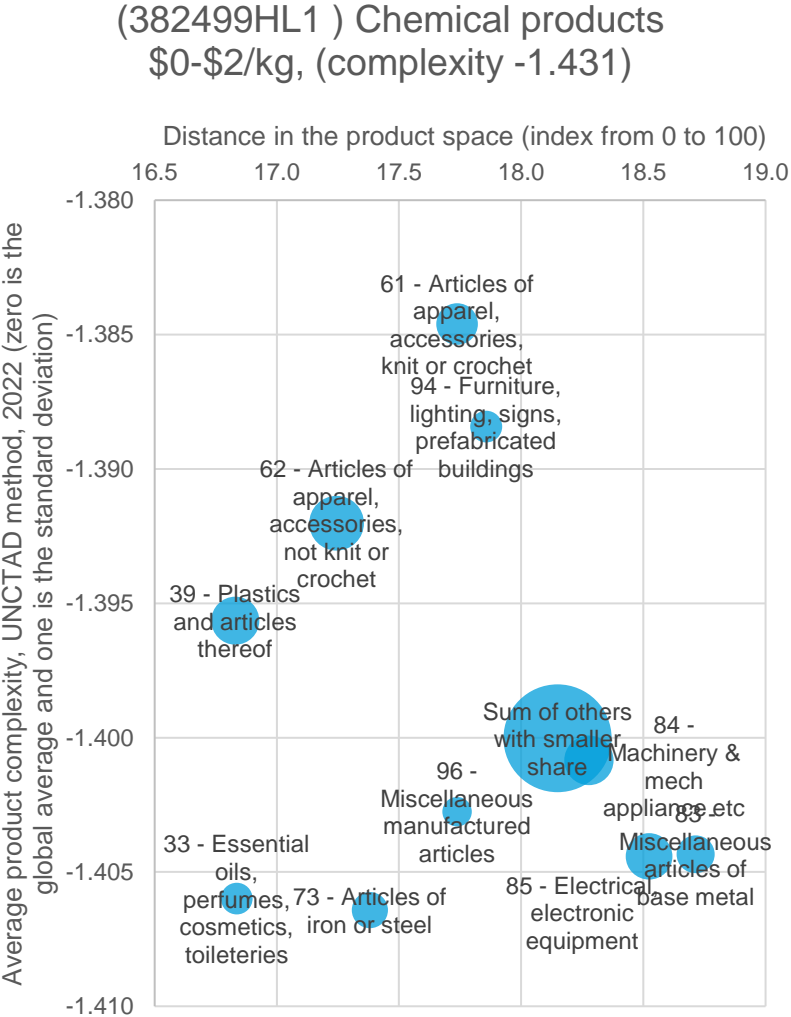
(284290HH1) Salts of inorganic acids, \$29-\$69/kg (complexity -0.012)



Source: UNCTAD Secretariat based on calculations from UN Comtrade.

# Apparel, plastics, essential oils, optical photo apparatus, and ceramic products are also potential diversifications out of battery materials (HS 382499)

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



Source: UNCTAD Secretariat based on calculations from UN Comtrade.

Lithium ore  
(253090)



>80% probability

## Diversification to products nearby in the product space

(841451) Fans; table, floor, wall, window, ceiling or roof fans, with a self-contained electric motor of an output not exceeding 125W, \$26-63

(841459) Fans; n.e.s. in item no. 8414.51, \$0-32

(841480) Pumps and compressors; for air, vacuum or gas, n.e.s. in heading no. 8414, \$174-1359

(841490) Pumps and compressors; parts, of air or vacuum pumps, air or other gas compressors and fans, ventilating or recycling hoods incorporating a fan, \$0-15

(841821) Refrigerators; for household use, compression-type, electric or other, \$243-449

(841829) Refrigerators; household, electric or not, other than compression or absorption-type, \$172-336

(843143) Boring or sinking machinery; parts of the machinery of item no. 8430.41 or 8430.41, \$12-63

(846729) Tools; for working in the hand, with self-contained electric motor; other than saws and drills, \$77-180

(847150) Digital processing units; other than those of subheadings 8471.41 or 8471.49, whether or not containing in the same housing one or two of the following types of unit: storage units, input units or output units, \$0-339

(847180) Data processing machines; automatic, units thereof n.e.s. in heading no. 8471, \$110-827

(848790) Machinery parts; not containing electrical connectors, insulators, coils, contacts or other electrical features, n.e.c. in chapter 84, \$0-20

# Implications for CETM-endowed commodity-dependent developing countries

- CDDCs need to quickly leverage their critical minerals because:
  - This advantage will not last forever due to changing technologies
  - Need a strategy: avoid dependence from one commodity to another (critical mineral)
- Building domestic or regional value chains
  - Create more value within economy; better than CSR, ESG, or voluntary guidelines
  - 'On-site' transformation: more sustainable, secure, transparent
  - Economies of scale; e.g., AfCFTA in Africa with South Africa and Morocco as hubs
  - Contributes to inclusivity of energy transition
- Need to strategically consider the possibilities for diversification along the values chain and also outside of the value chain (using the rent from resource extraction)

Thank you

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