

UNCTAD case study

Diversification in critical minerals value chains

**Green Transition in Latin America:
Harnessing regional integration and industrial policy to build the
economies of the future**

8-9 April, BNDES, Rio de Janeiro

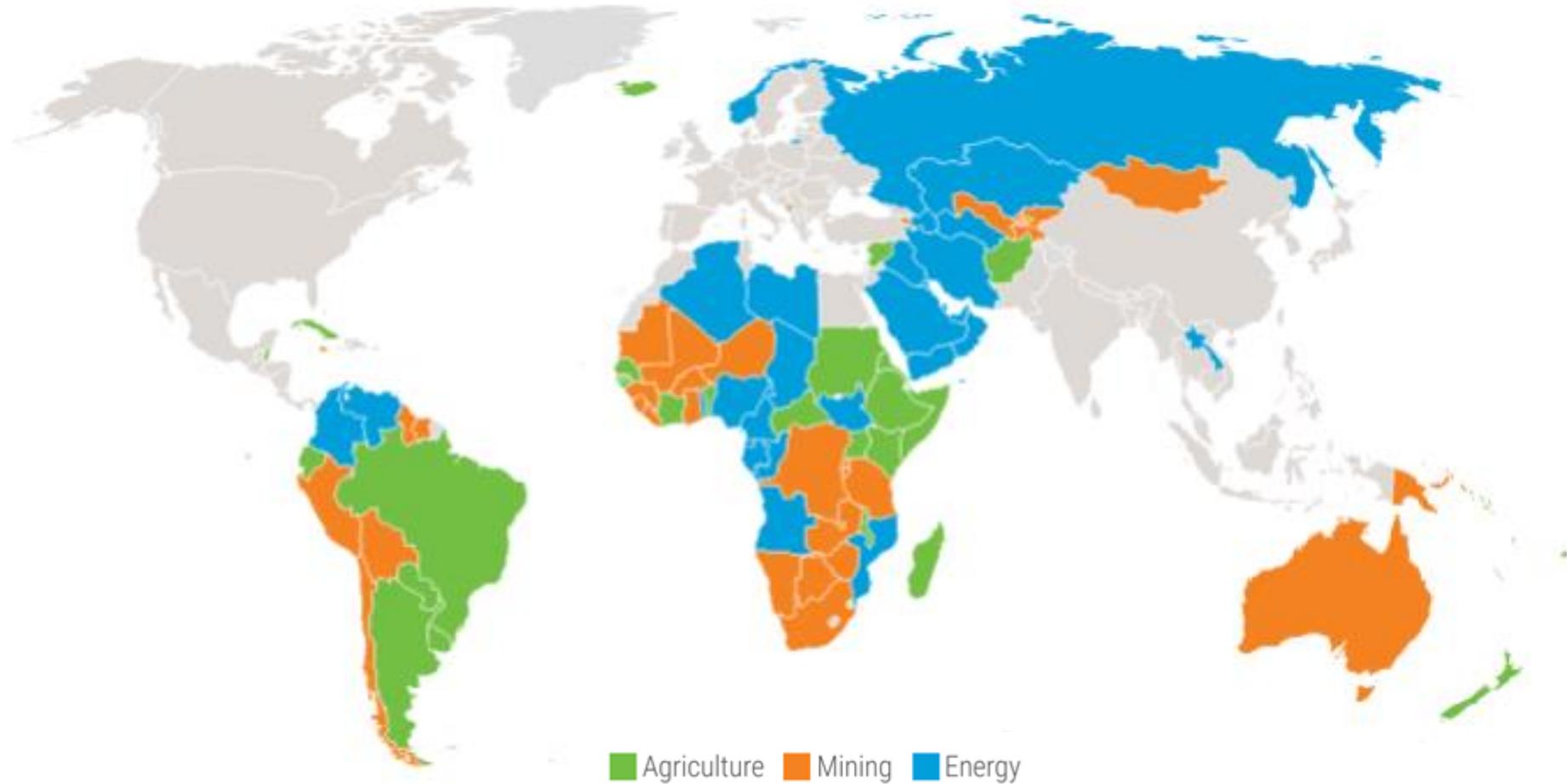
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Presentation prepared by Clovis Freire, Arthur Machado, Sofia Dominguez, Rachid Amui (Commodity Research and Analysis Section)

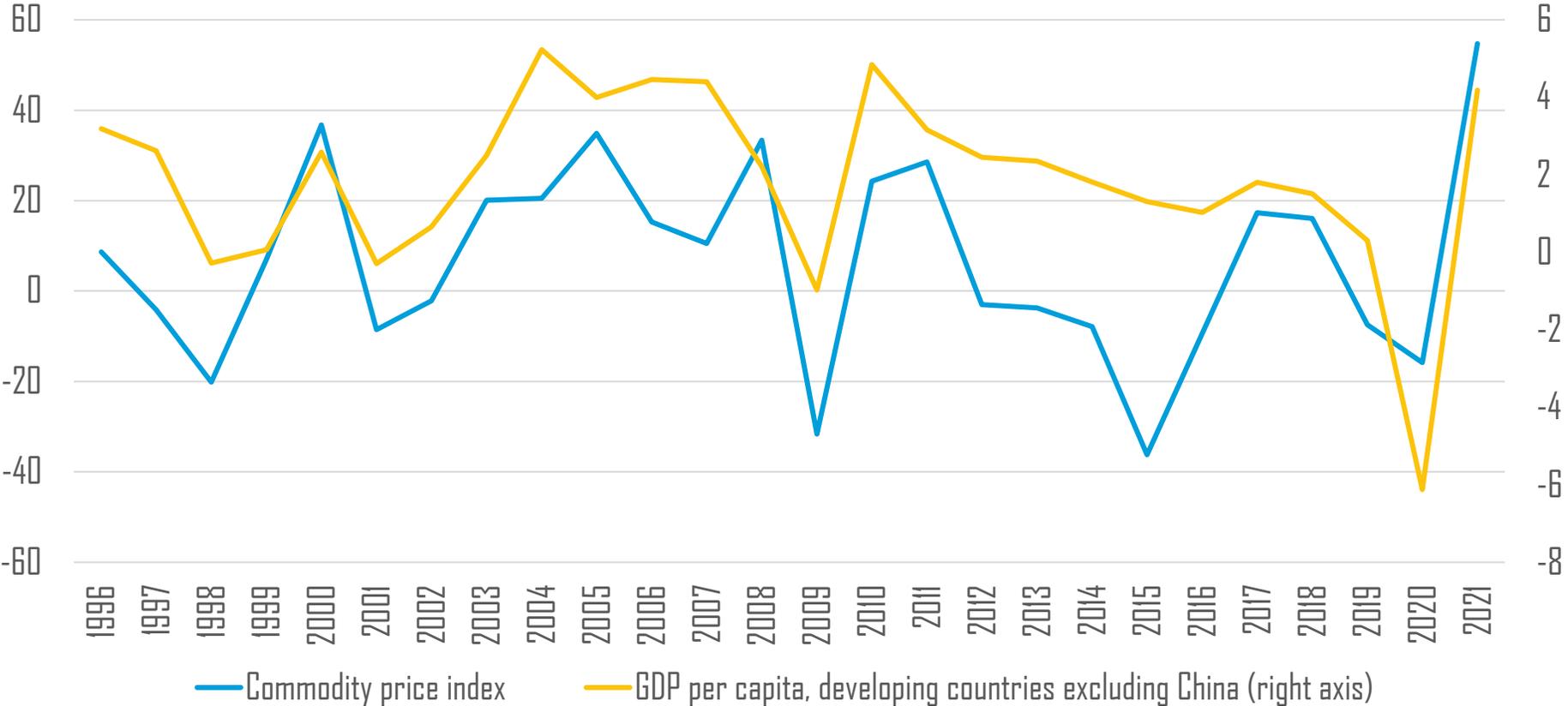
Commodity dependence remains a critical issue for developing countries

Commodity-dependent countries and their main dependency, 2019–2021



It affects economic performance and exposes countries to shocks

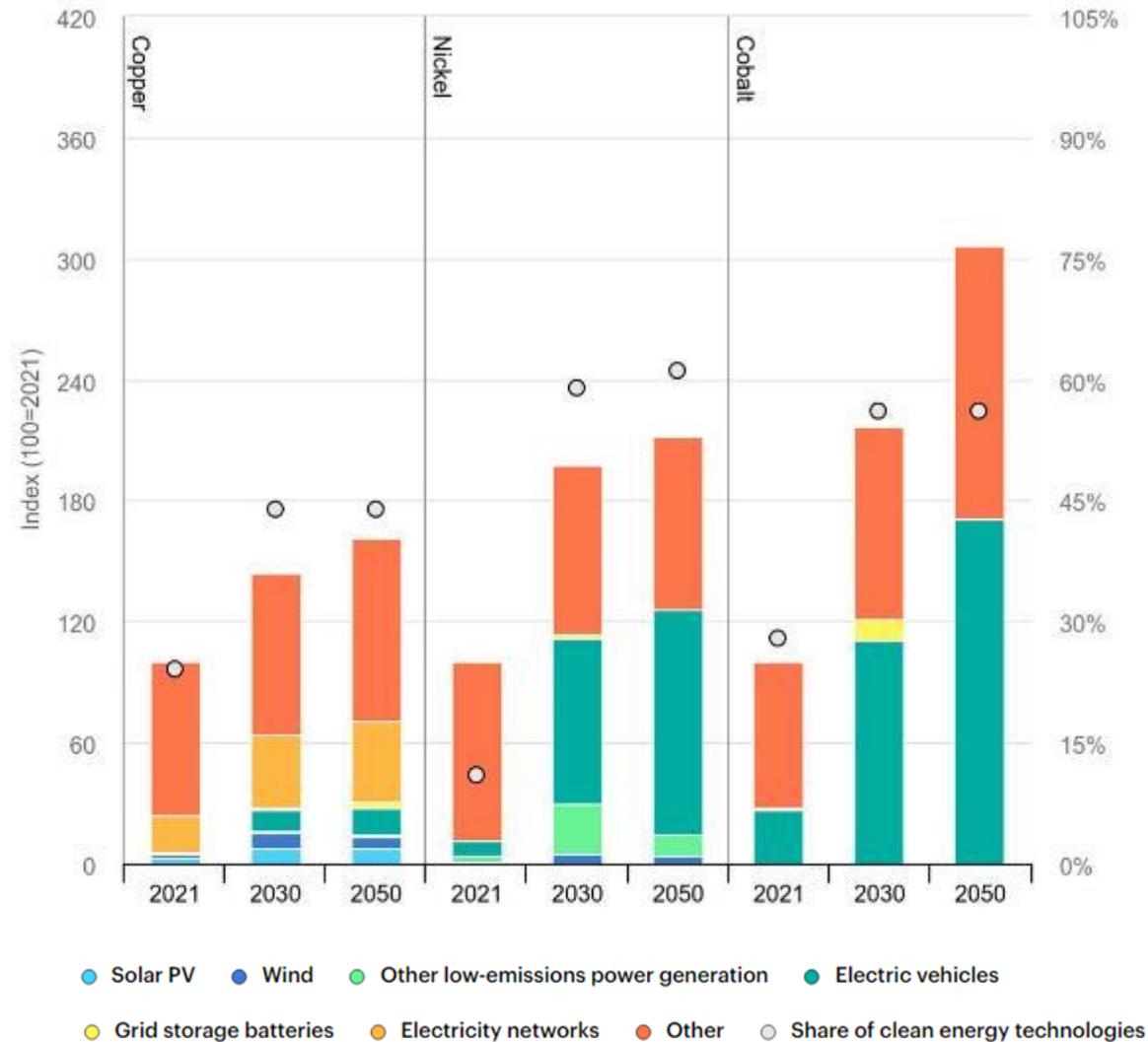
UNCTAD Commodity Price Index and GDP per capita in developing countries excluding China, 1996-2021, (annual % changes)



Correlation coefficient = 0.62

Source: UNCTAD.

Increasing demand for critical energy transition minerals may risk deepening commodity dependence

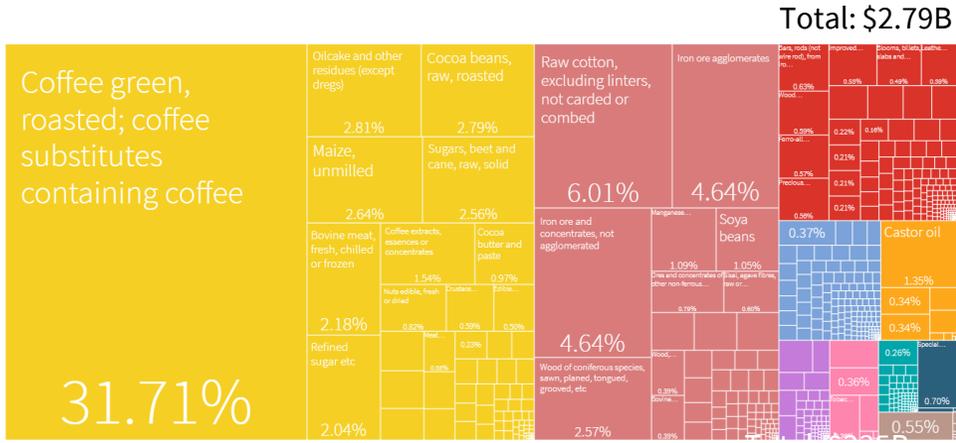


The development trajectory of two countries

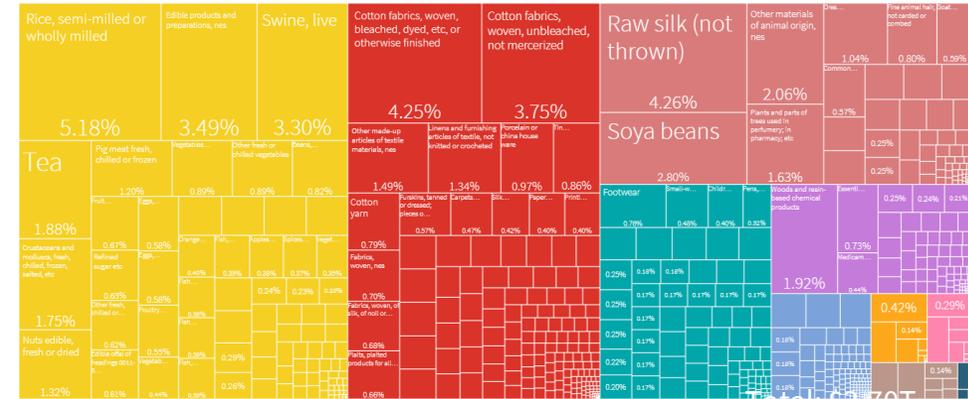
Brazil

China

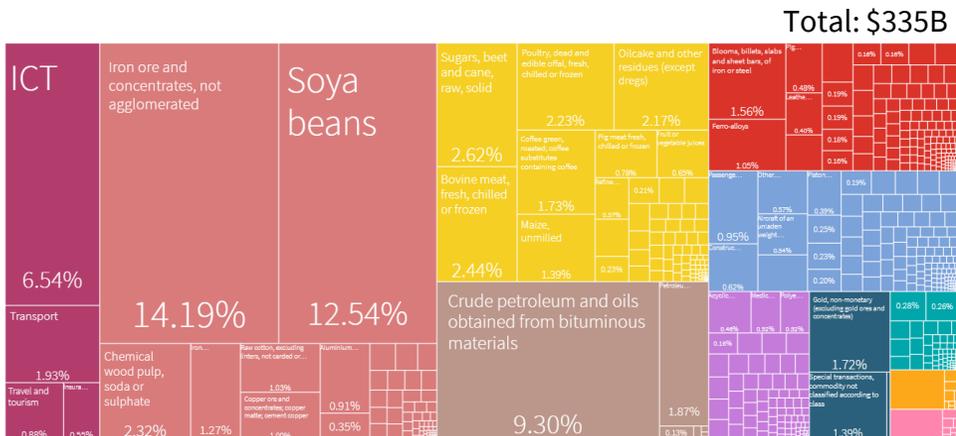
1970



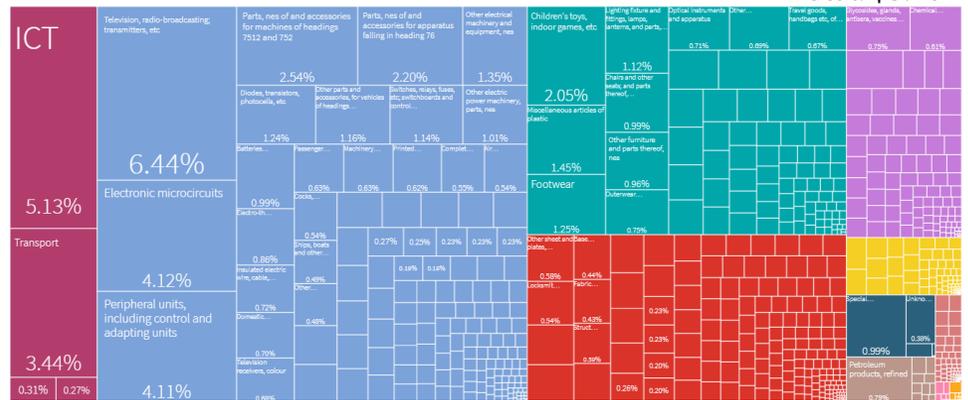
Total: \$1.57B



2021



Total: \$3.70T

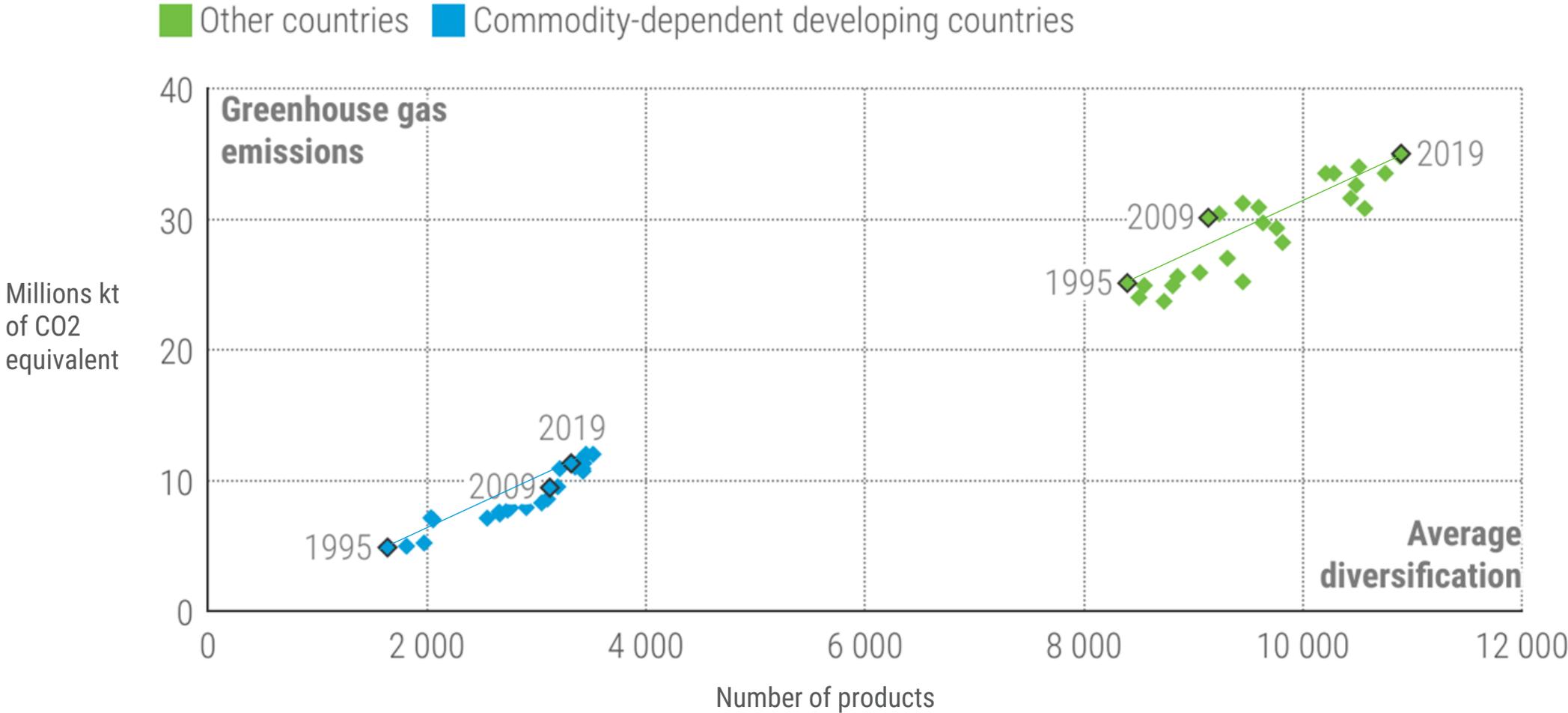


PIB per Capita (constant 2015 US\$)

1970	3 559	284
2021	8 831	11 560

Diversification associated with high CO2 emissions: Countries need to diversify through a new low-carbon path

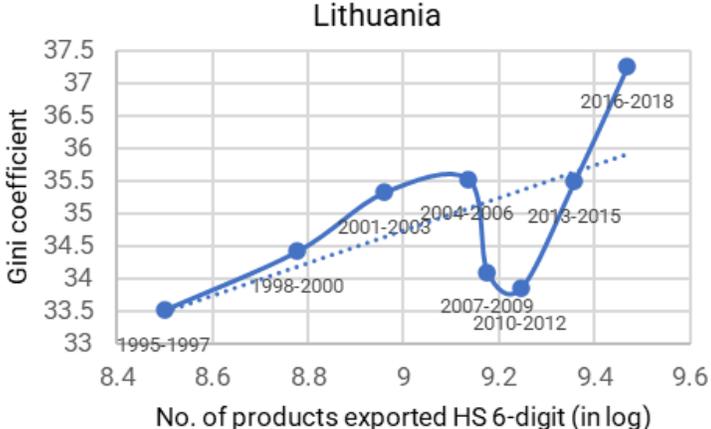
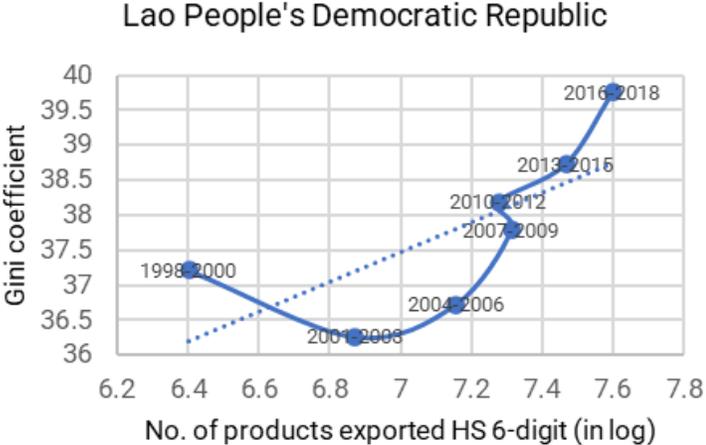
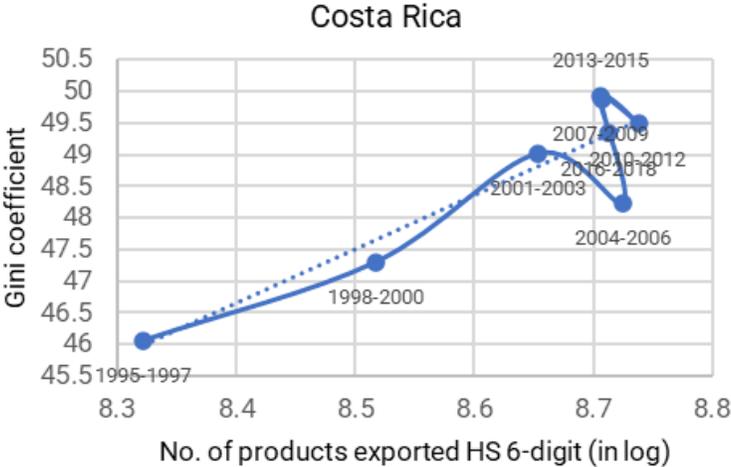
Association between diversification and carbon emissions, 1995-2019



Source: Commodities and Development Report 2023.
Note: Diversification shows the number of products exported based on the HS 6-digit classification, further disaggregated by unit value.

Across the world, increasing export diversification was usually accompanied by higher income inequality within countries

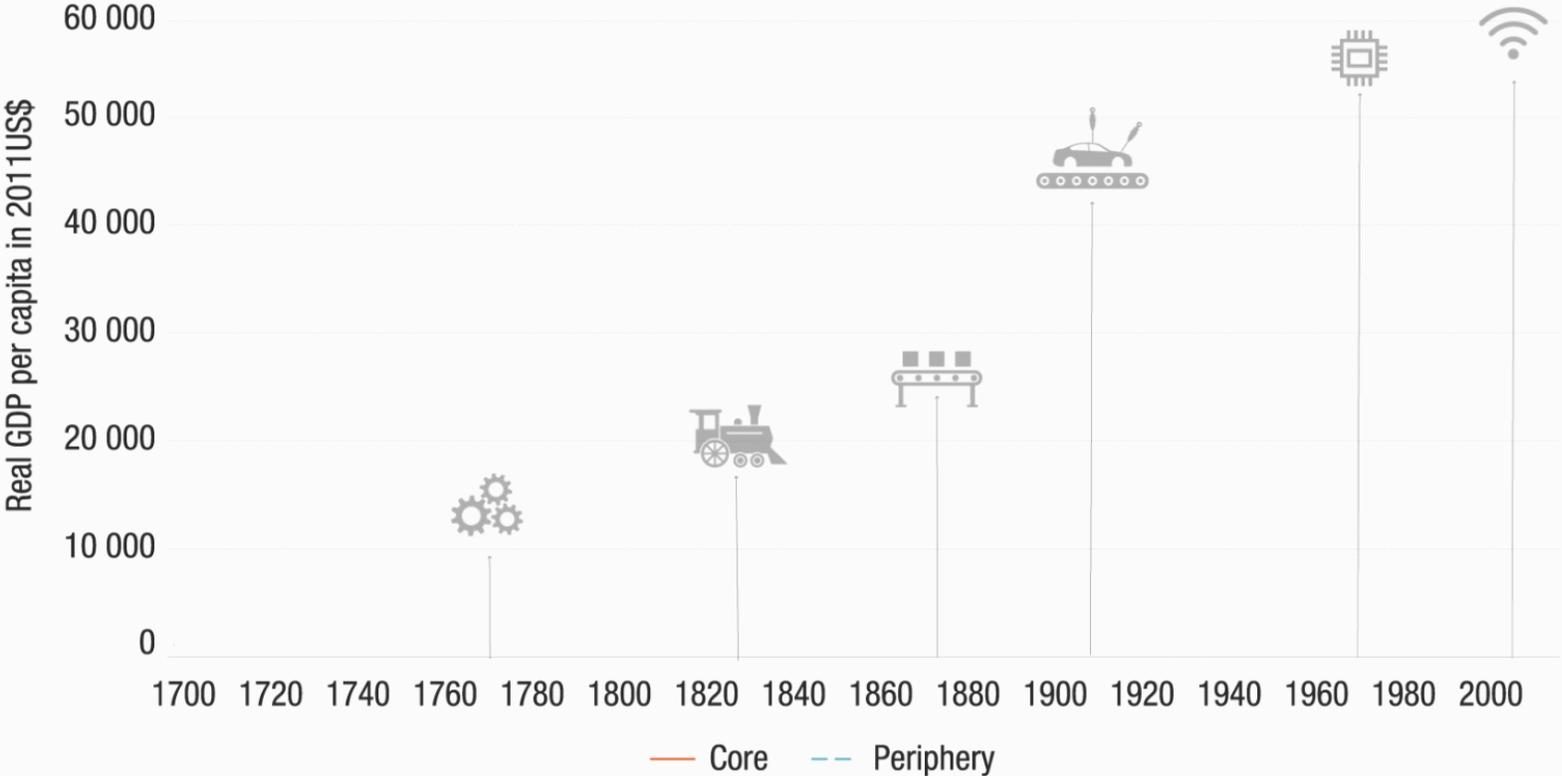
Association between diversification and Gini coefficient, selected countries



Source: UNCTAD based on calculations from UN Comtrade and World Bank Development Indicators.

Previous technological revolutions were associated with increasing inequalities between countries

Technological change and inequality through the ages



Source: UNCTAD's Technology and Innovation Report 2021

Source: UNCTAD, based on data from Maddison Project Database, version 2018, Bolt et al. (2018), Perez (2002), and Schwab (2013).
Notes: "Core" corresponds to Western Europe and its offshoots (i.e. Australia, Canada, New Zealand, the United States) as well as Japan. "Periphery" corresponds to the world, excluding the "core" countries.

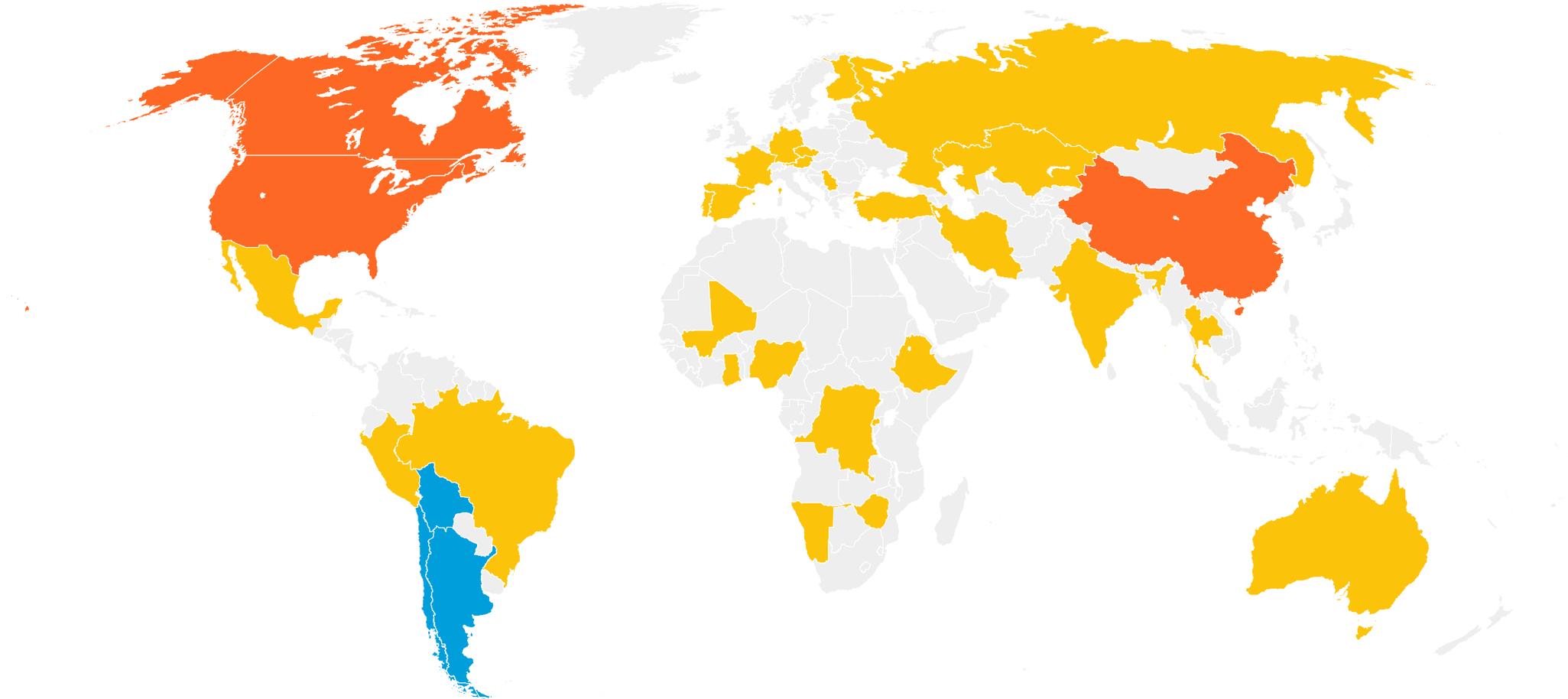
Case of Lithium trade along the electric vehicle value chain



66% of lithium is sourced from brine deposits

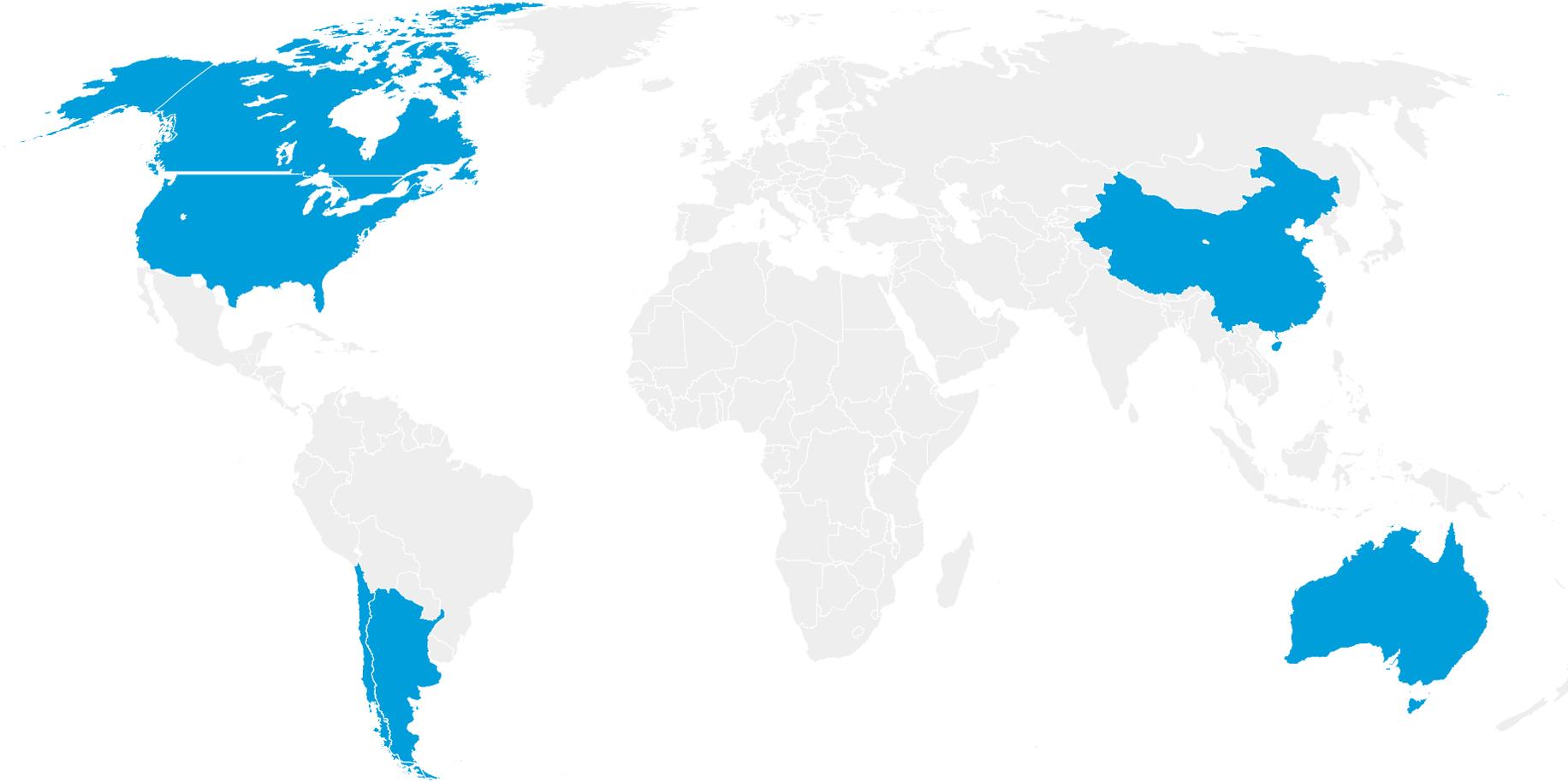
Production | Brine and mineral deposits

■ Brine-based ■ Mineral-based ■ Brine and mineral-based



Few mining companies lead lithium market

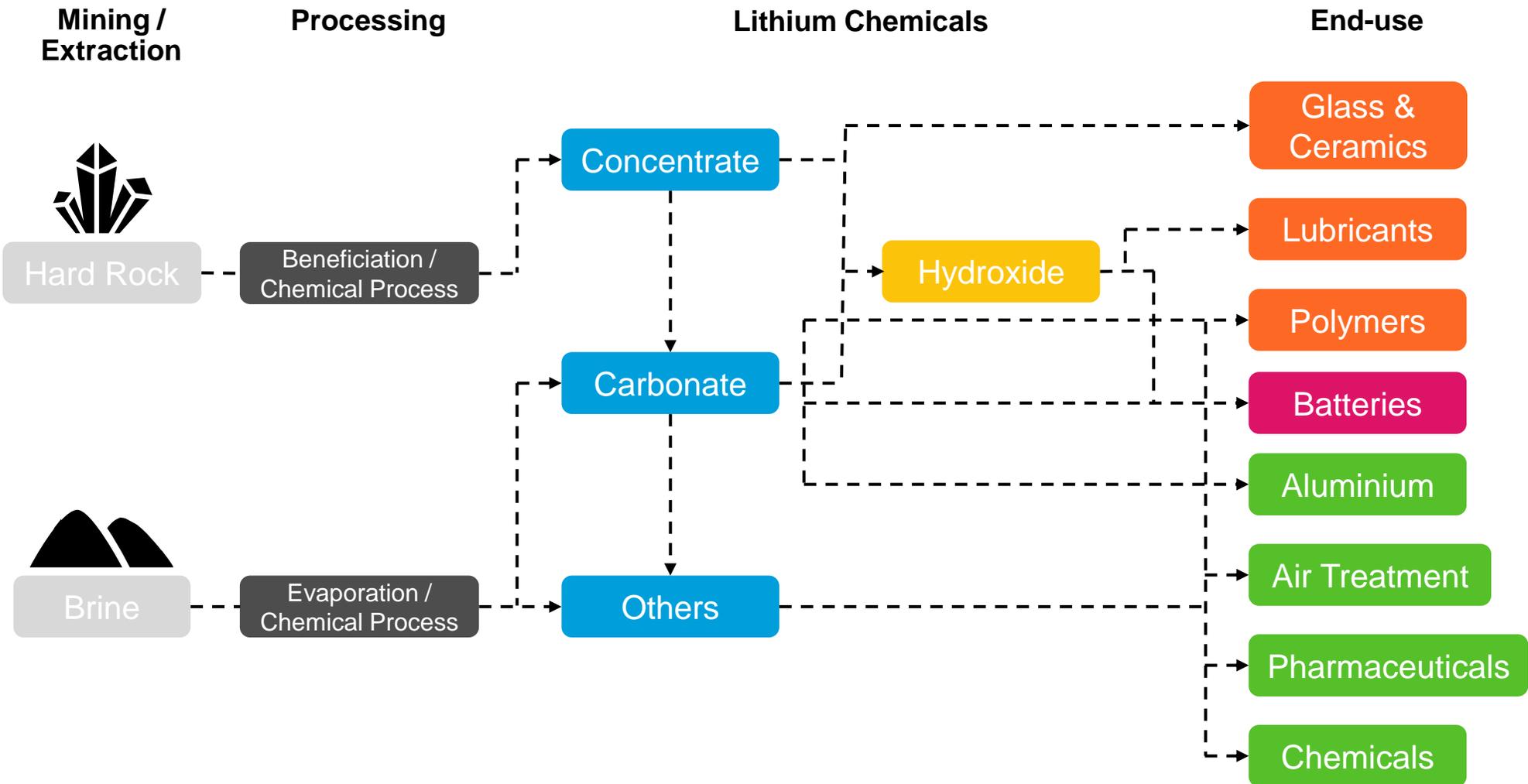
Production | Main mining companies



- Albermale (US)
- SQM (Chile)
- Ganfeng Lithium (China)
- Tianqi Lithium (China)
- Mineral Resources Ltd. (Australia)
- Pilbara Minerals (Australia)
- Allkem (Argentina)
- Livent (US)
- Sichuan Yahua Industrial (China)
- Lithium Americas (Canada)

Batteries correspond to 80% of lithium end-use

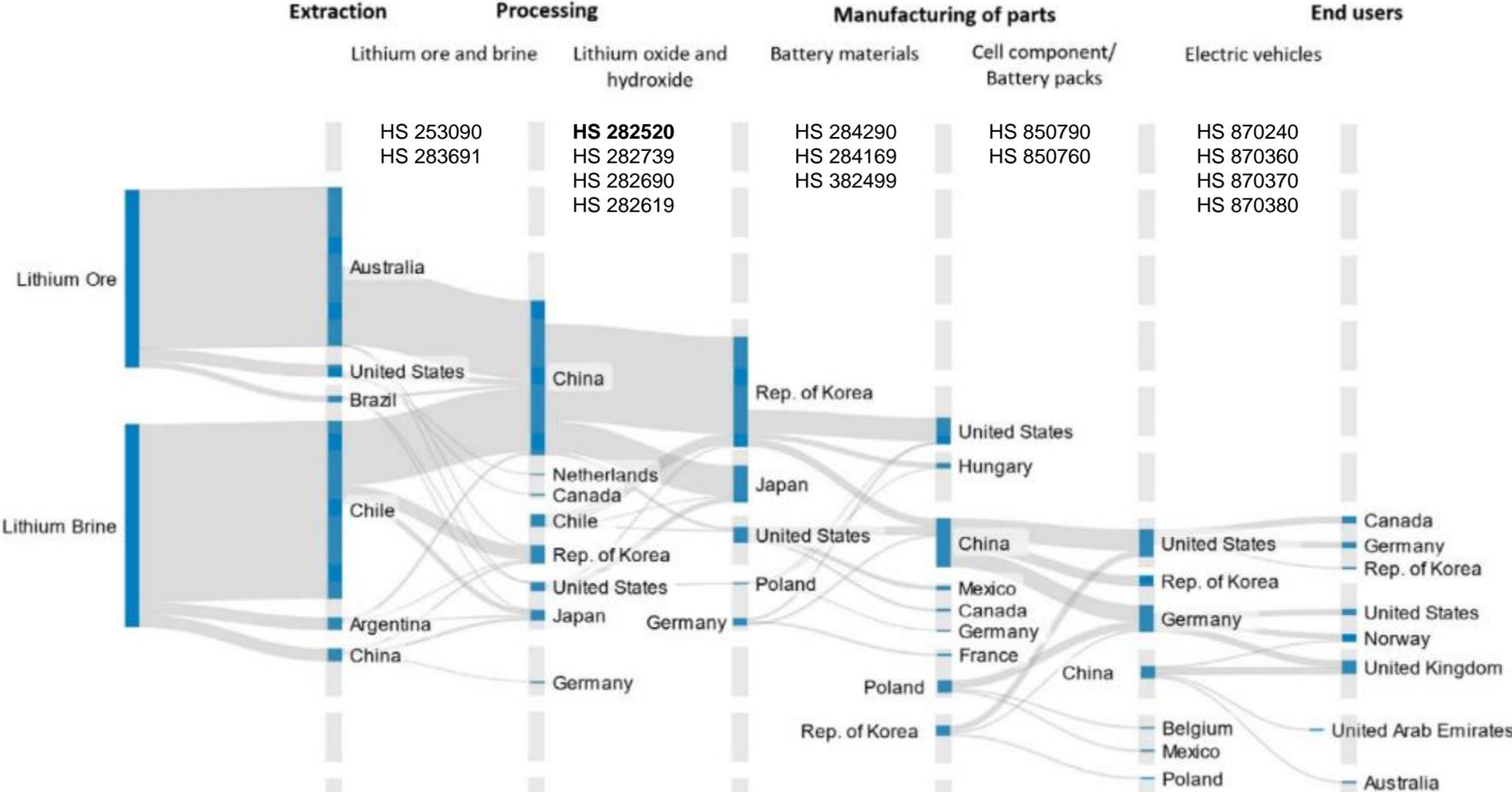
Demand | Processing routes and applications



Source: IEA, IRENA; Statista; USGS.

Trade is concentrated upstream in the value chain

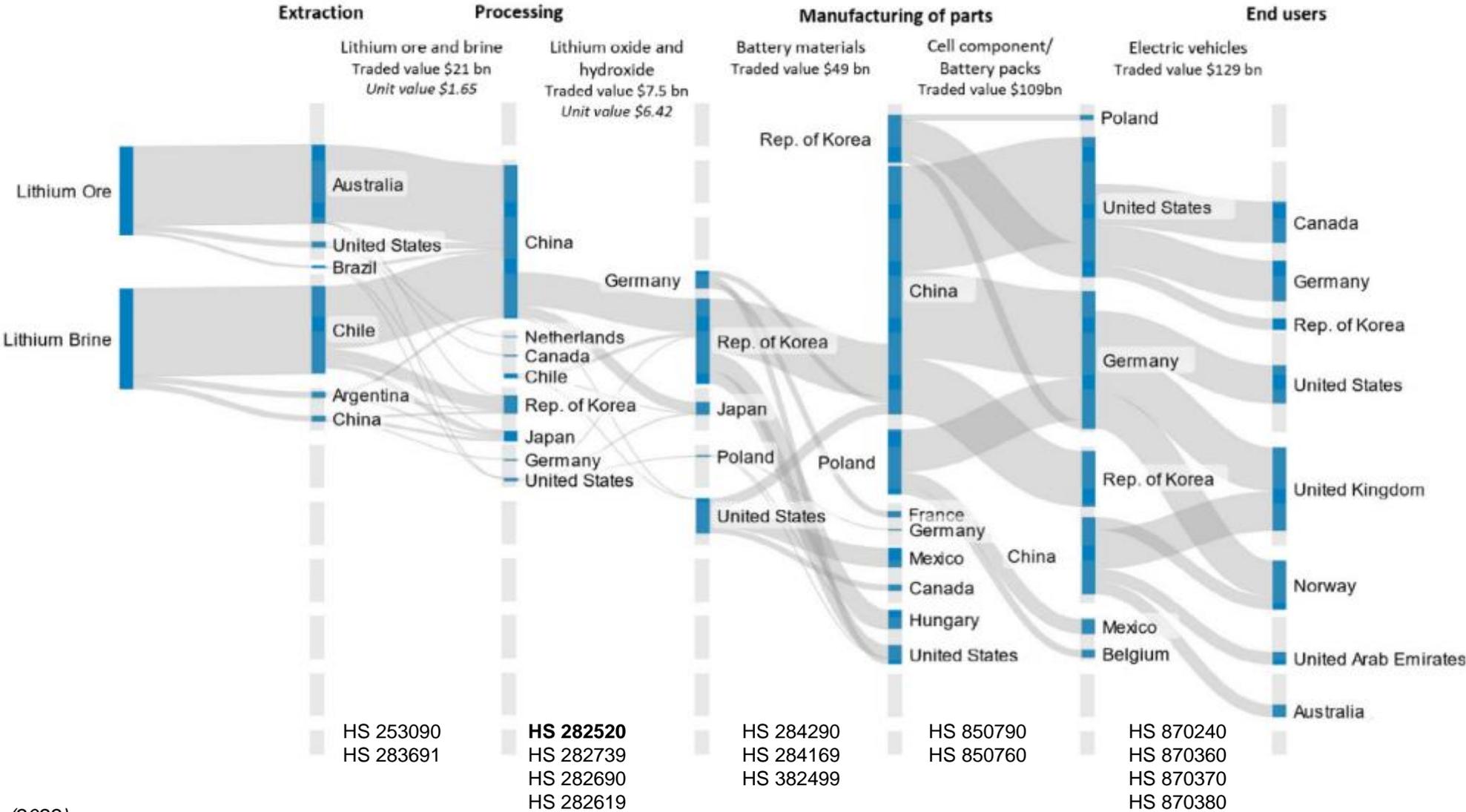
Lithium trade flows along the EV value chain, 2022 (percentage of total exports)



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

Trade values increase downstream in the value chain

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



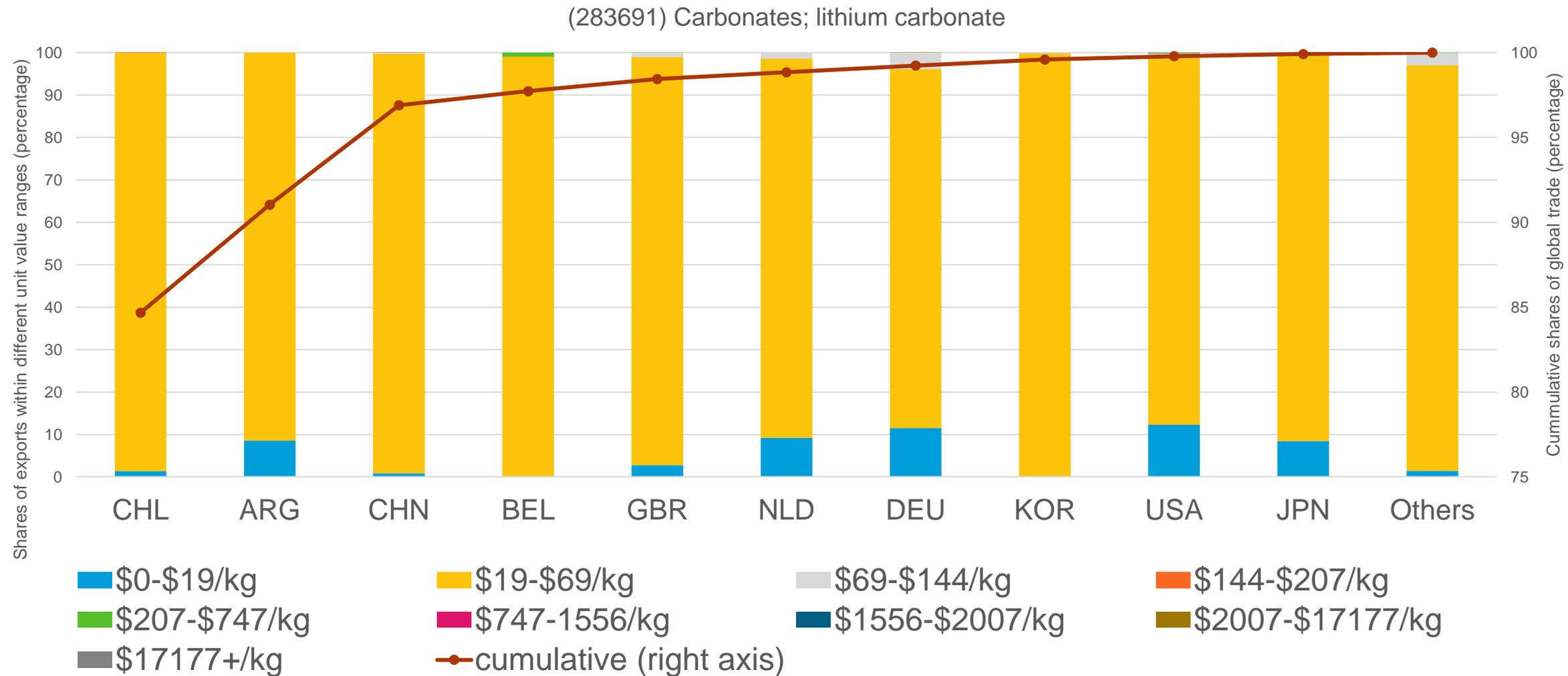
Note: export value (2022)
 Source: UNCTAD Secretariat based on calculations from UN Comtrade.

What do countries export along
the EV value chain?



Most trade upstream in the value chain is in the lower price ranges

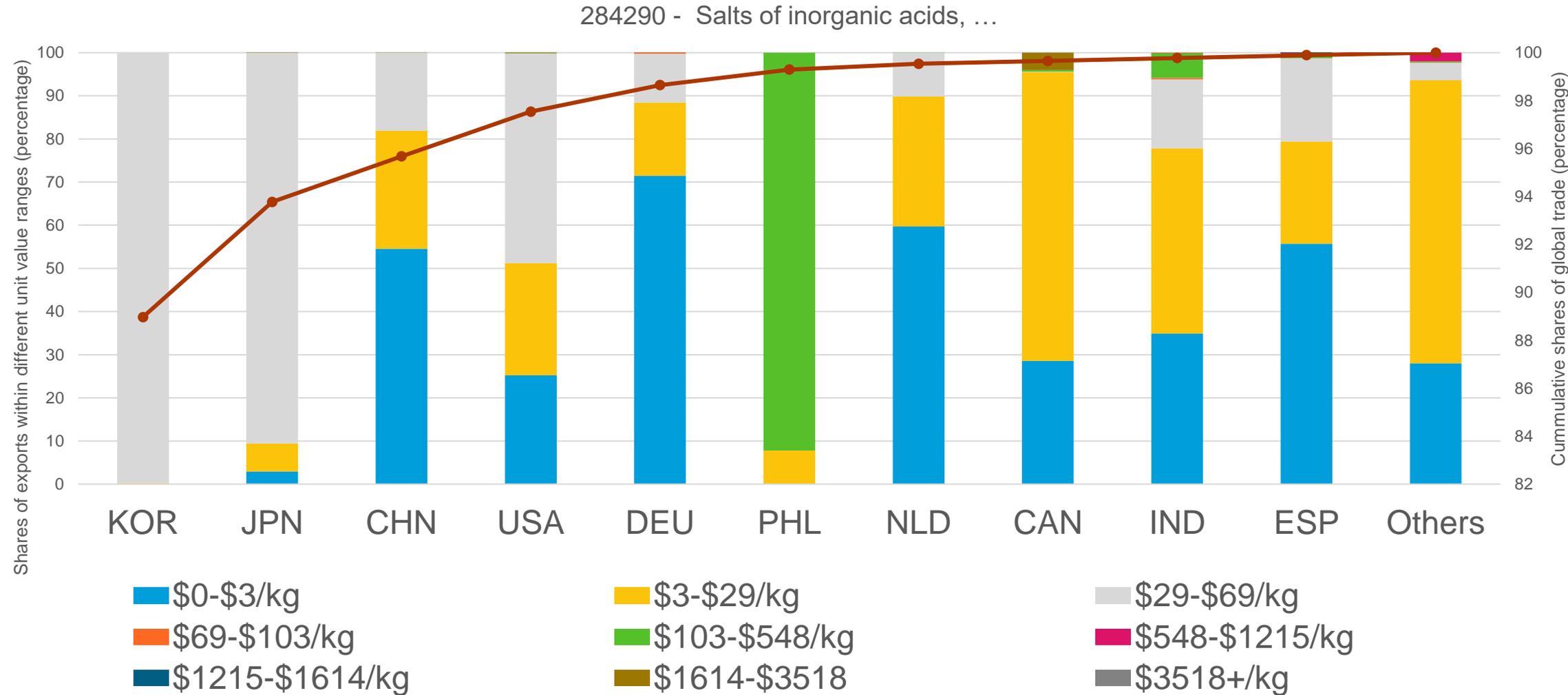
Unit value of exports| Extraction and processing of Lithium | EV value chain



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

Battery material are traded in various ranges of unit values, mainly by developed countries

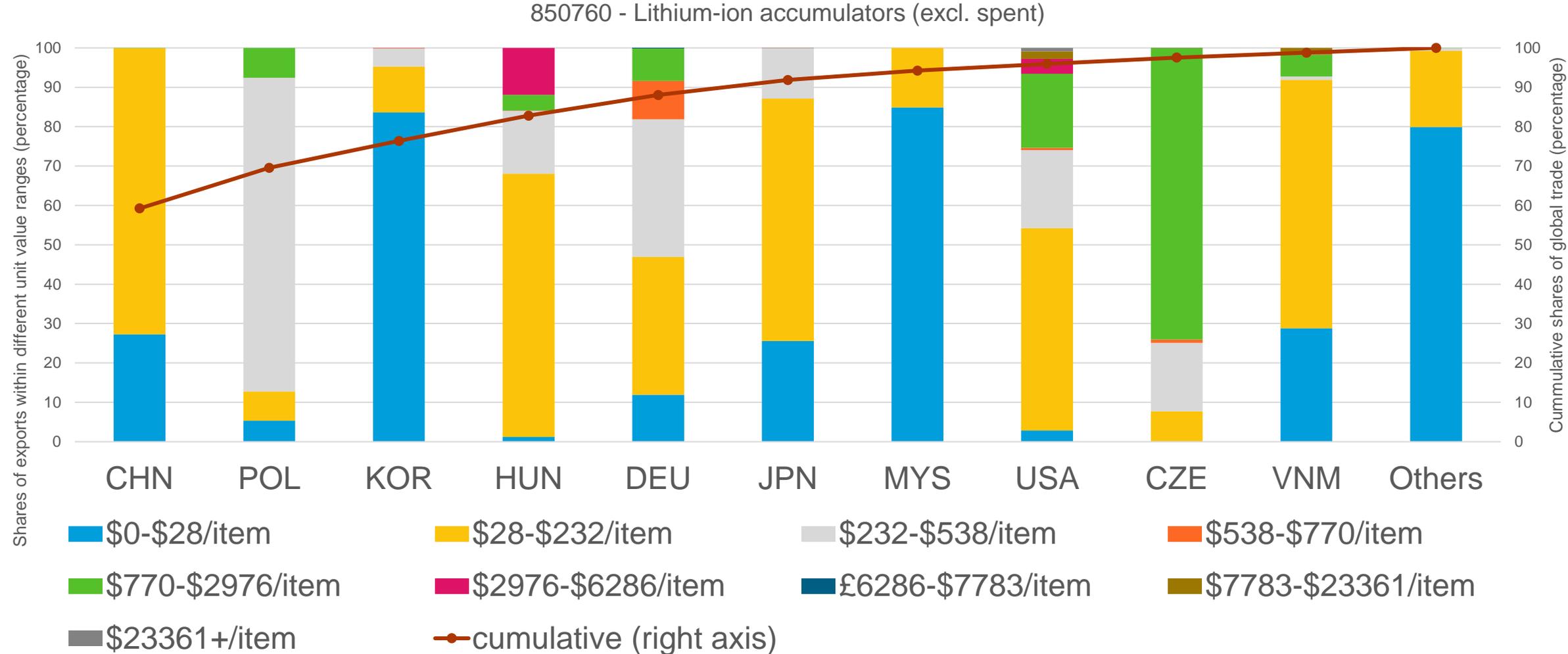
Unit value of exports| Battery material containing Lithium | EV value chain



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

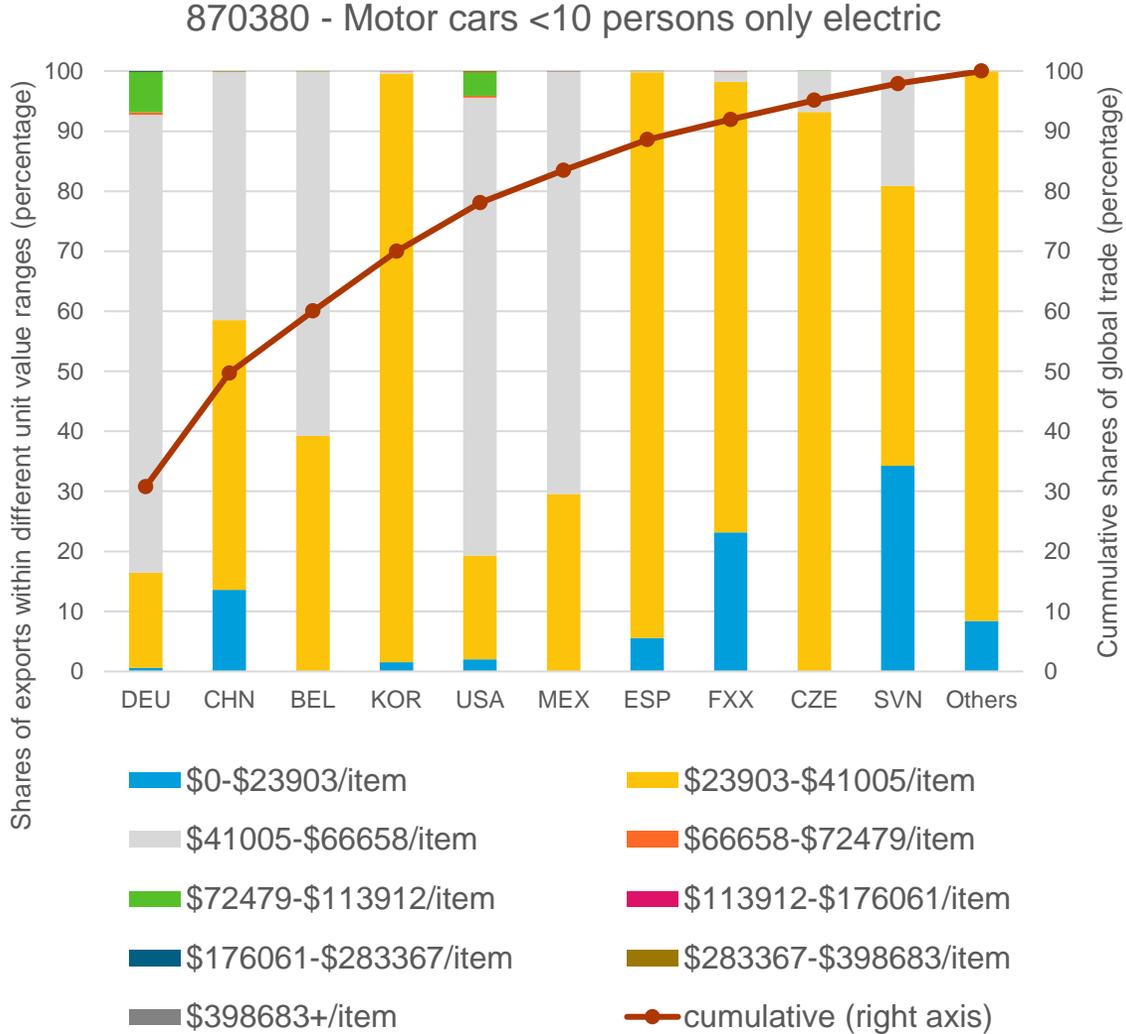
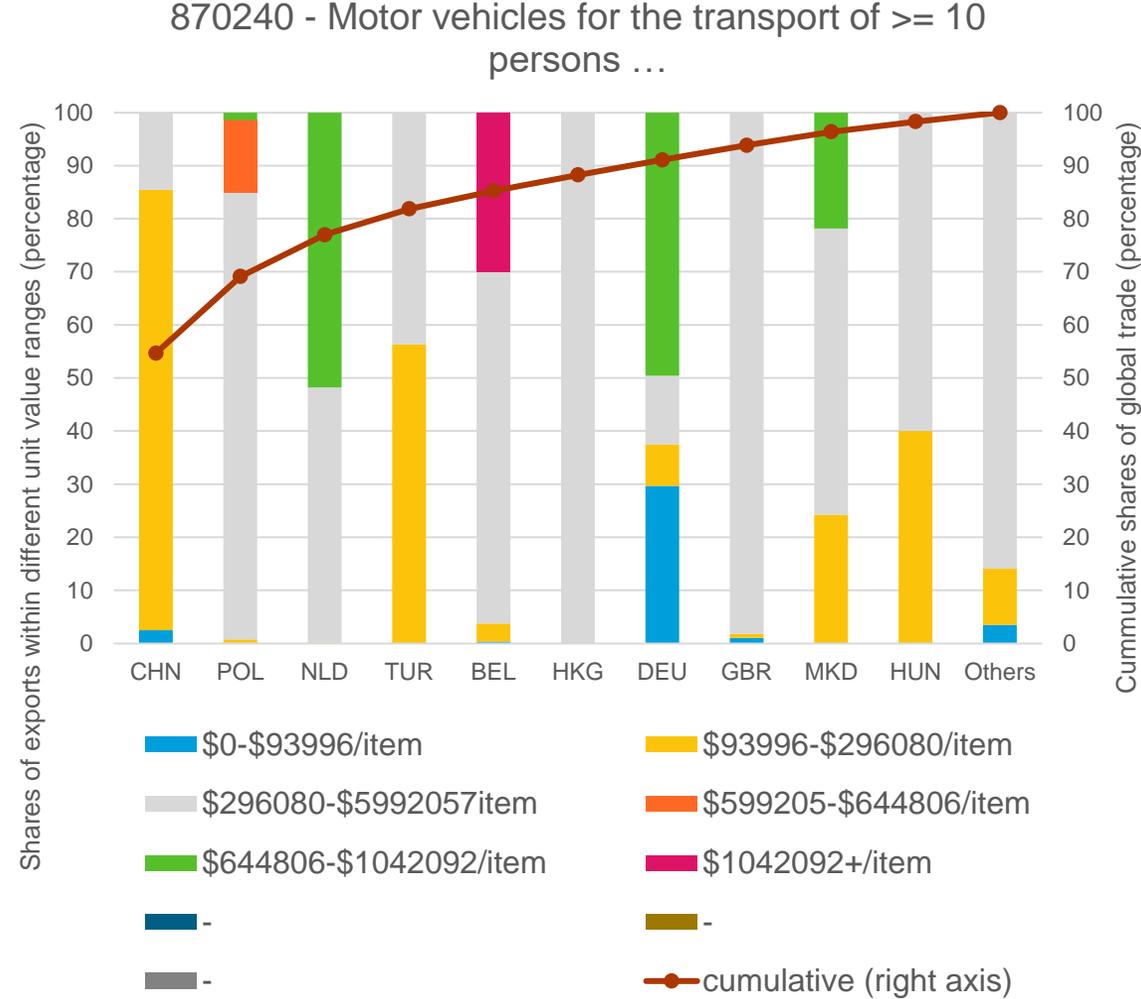
Unit value of exports| Battery packs | EV value chain



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

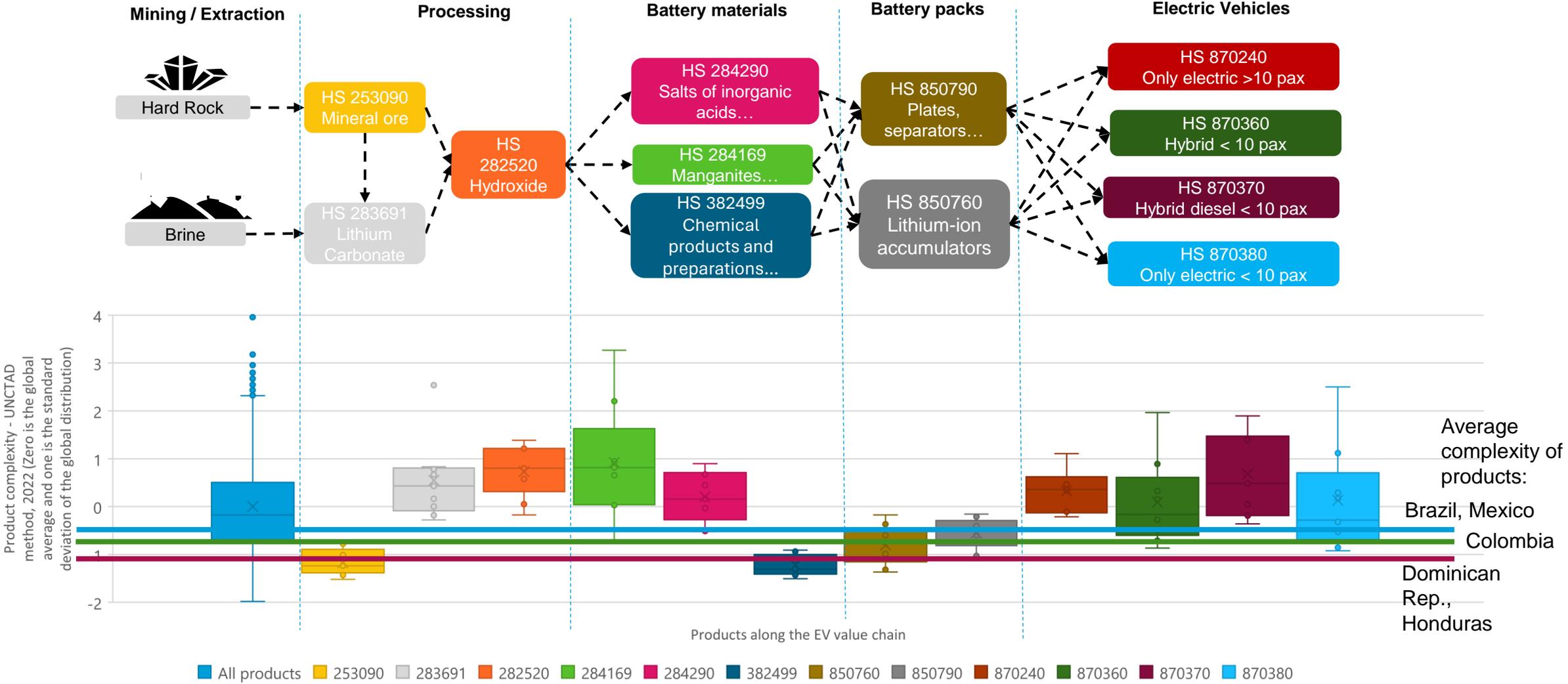
Unit value of exports| Electric vehicles | EV value chain



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



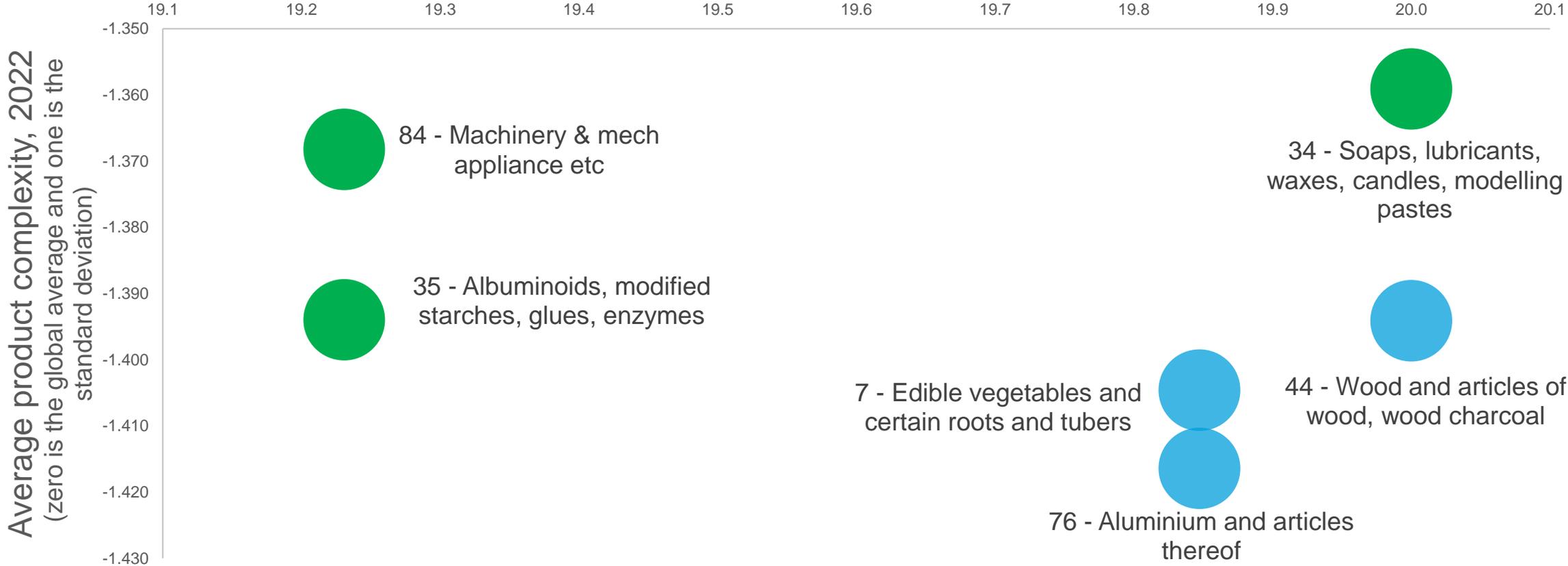
Source: UNCTAD Secretariat based on calculations from UN Comtrade.

Machinery, glue and lubricants 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)

Distance in the product space (index from 0 to 100)



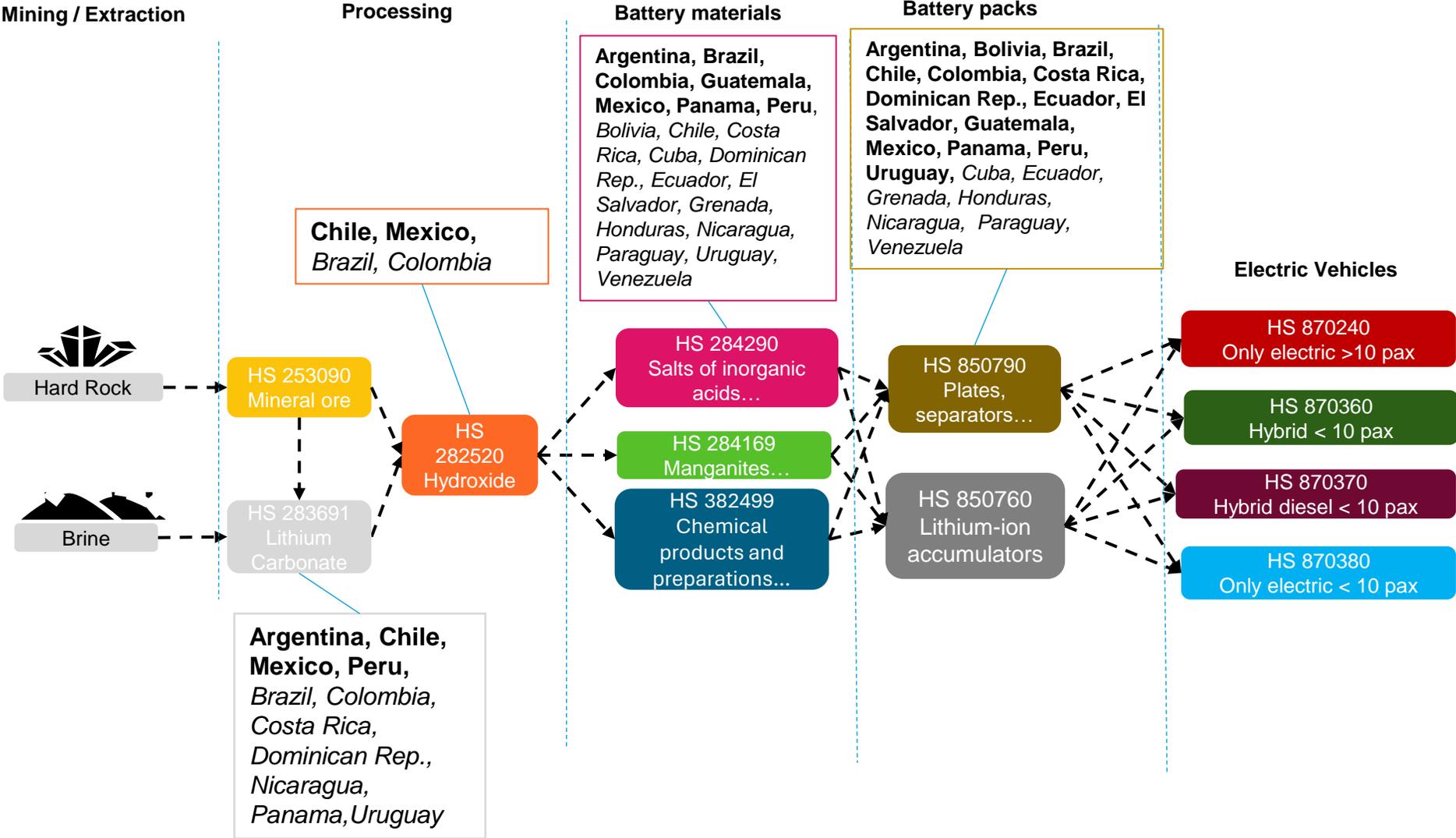
Source: UNCTAD Secretariat based on calculations from UN Comtrade.

Harnessing regional integration



Build regional value chains

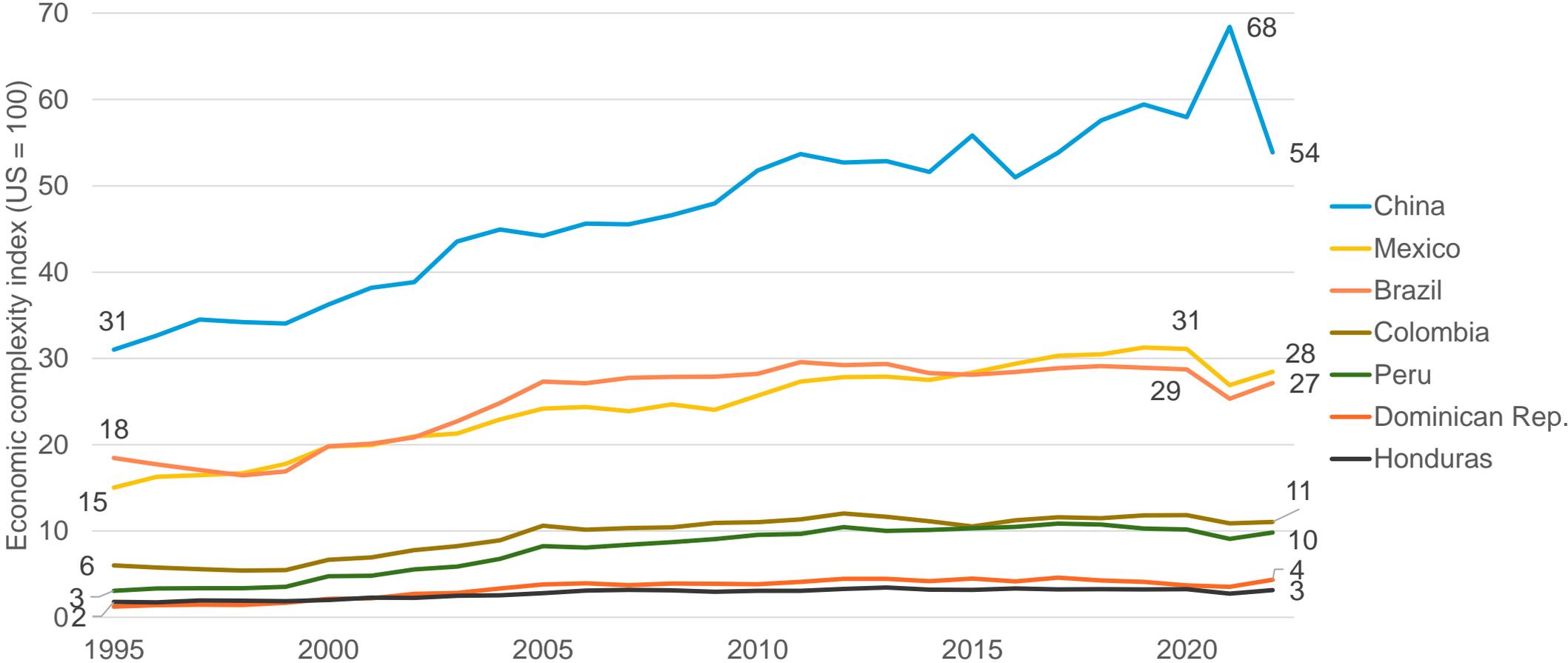
EV value chain (countries in bold are current exporters, countries in italics are potential exporters)



Source: UNCTAD Secretariat based on calculations from UN Comtrade.

Increase trade with countries at the same level of complexity

Evolution of economic complexity, selected economies, 1995-2022 (index, US = 100)

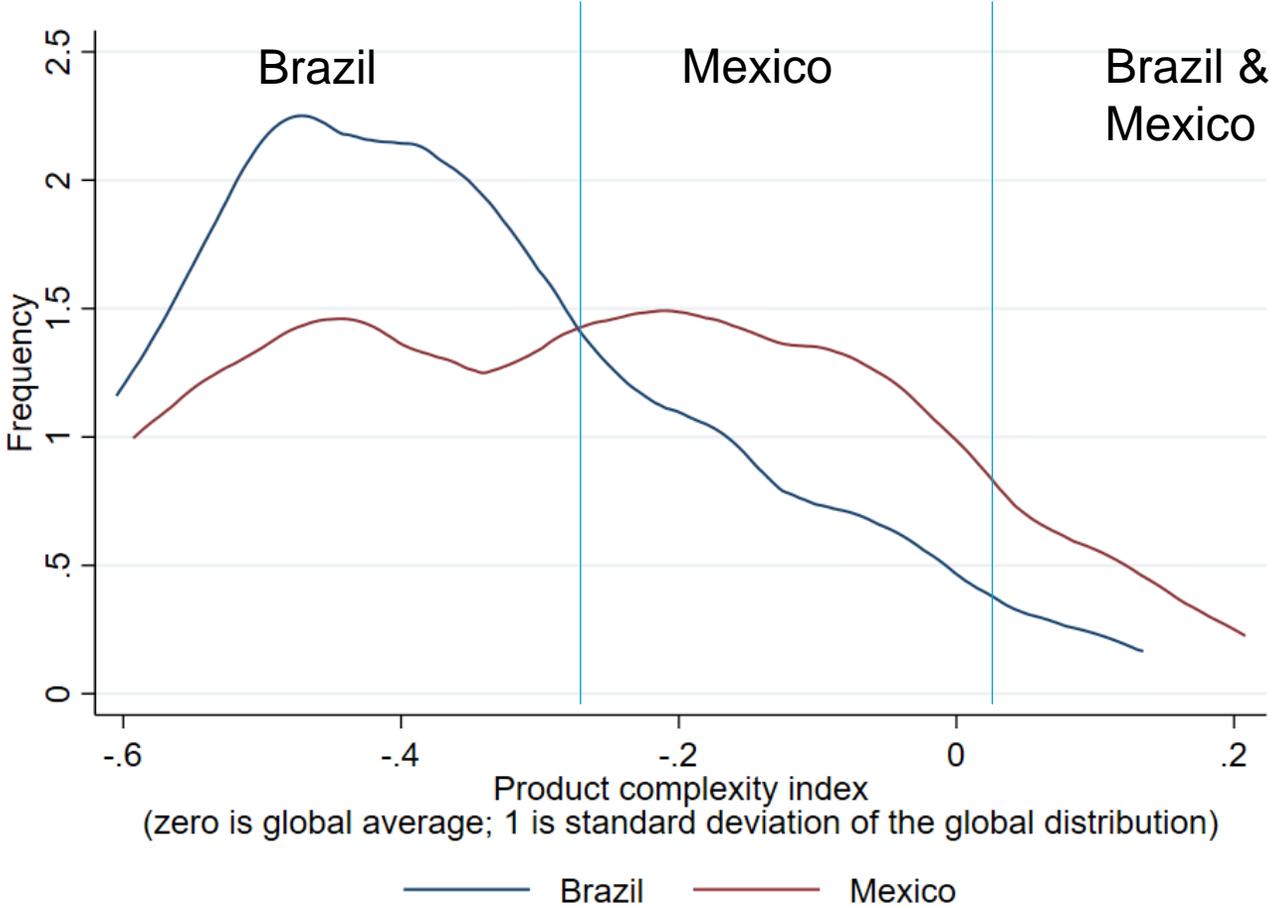


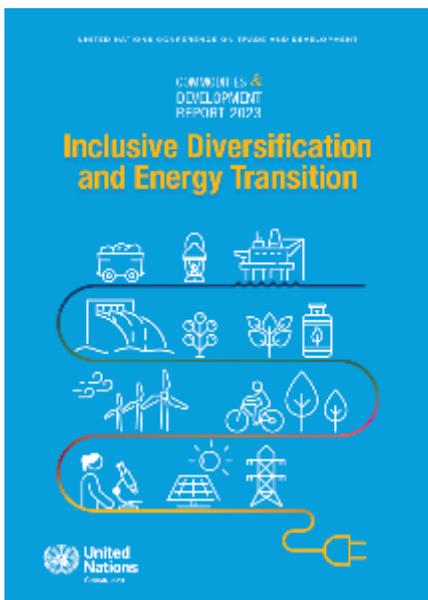
Source: UNCTAD Secretariat based on calculations from UN Comtrade.

Coordinate industrial policies

Product diversification export opportunities to the world, selected countries (Million USD)

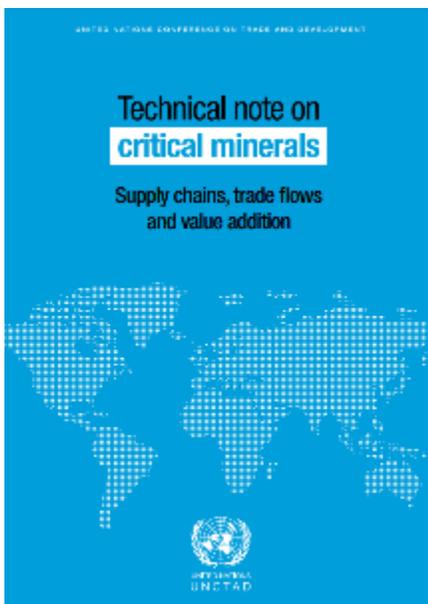
Products of machinery & mech. appliance etc





Ongoing research
available on UNCTAD's website

https://unctad.org/system/files/official-document/ditccom2023d2_en.pdf



https://unctad.org/system/files/official-document/ditcmisc2023d1_en_0.pdf

Thank you

