

# Battery Mineral Security and the Energy Transition

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## Abstract

*Concerns about the security of EV battery mineral supplies arise because China has a large market share in processing most of the necessary minerals. Geopolitical risks reflect the possibility of supply cuts aimed at individual countries due to conflicts. However, China's ability to control the market allocation of battery minerals is unlikely to be sufficient to sustain targeted supply cuts. A greater concern is China's exercise of market power over foreign buyers to increase profits. However, the record on such actions by China is mixed. A costly build-up of non-Chinese capacity for battery mineral processing will be needed to mitigate market power.*

Global increases in production of battery-powered electric vehicles (EVs) as part of the “energy transition” implies growing demands for the critical minerals used in EV batteries (cobalt, graphite, lithium, manganese, and nickel). Concerns about the security of battery mineral supplies arise because China has a large market share in processing most of the critical minerals needed for EV batteries. (In contrast, extraction of most battery minerals is more geographically diverse; see [https://media.rff.org/documents/Report\\_23-19.pdf](https://media.rff.org/documents/Report_23-19.pdf)). For example, China refined 76 percent of global lithium as of 2020. Its refining capacity grew sevenfold from 2013 to 2020, while refining capacity in the rest of the world (ROW) expanded by only 10 percent.

Two types of concerns have been expressed in relation to China's large market shares:

- **Geopolitical risks:** The possibility of supply cuts aimed at individual countries due to conflicts.
- **Market power:** Manipulation of mineral prices to increase profits while imposing economic costs on dependent buyers. This can include restricting output to inflate prices or flooding markets to deter competitors.

## What Evidence do We Have About Geopolitical Risks?

Concerns about geopolitical risks have exerted a strong influence over critical mineral policy generally. At least for EV battery minerals, however, it would be challenging for China to selectively target supply reductions, given the numerous bilateral agreements between mineral processors and buyers. China would have to effectively limit reallocation of supplies across entire markets.

A 2010 dispute between China and Japan led China ostensibly to reduce supplies of certain rare earth minerals, the announcement of which provoked a price jump that persisted well into 2011. However, as we document in our recent RFF report ([https://media.rff.org/documents/Report\\_25-06.pdf](https://media.rff.org/documents/Report_25-06.pdf)), examination of relevant trade statistics by other researchers has revealed

no reduction in supplies to Japan during that period, nor any evidence of selective supply cuts to any buyer over 2010-2019. It remains to be seen if the intent to cut supplies of certain rare earth minerals to the United States announced by China in December 2024, and subsequent export licensing restrictions, might be more effective.

## What Evidence do We Have About the Exercise of Market Power by China?

The accompanying figure (also taken from our recent RFF Report) shows how lithium prices surged between 2015 and 2018 due to growing demand. This would have been an attractive opportunity to restrict production and slow refining capacity expansion to drive prices even higher. However, the figure shows that Chinese production of lithium continued to grow rapidly during this period. Even as lithium prices declined from 2018 to 2020, China continued to expand its production. A broadly similar pattern is observed during the lithium price run-up of 2021-2022, and during two cobalt price run-ups in 2006-2008 and 2016-2018.

However, these observations do not rule out China using market power to charge foreign customers more than domestic customers (price discrimination). This would be China's preferred form of market power, since withholding supplies from the market as a whole would raise prices for domestic customers, and the impacts of that would be inconsistent with China's industrial policy for the EV sector.

China has been found responsible for practicing international price discrimination with certain rare earths in a 2012 WTO case resolved in favor of the United States in 2014 (see [https://www.wto.org/english/tratop\\_e/dispu\\_e/cases\\_e/ds431\\_e.htm](https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds431_e.htm)). China's claim that it needed to restrict exports but not domestic uses to mitigate resource depletion was not accepted. China also has more recently imposed export restrictions for some minerals to meet domestic mineral requirements, consistent with a “China First” approach to protecting domestic supply chains for critical minerals (<https://www.iea.org/policies/17933-announcement-on-the-optimisation-and-adjustment-of-temporary-export-control-measures-for-graphite-items>).

Unfortunately, obtaining domestic Chinese sales prices to compare with international prices is not easy. All we can say is that price discrimination could again become an issue. It will be less of an issue to the extent that battery mineral spot markets grow in volume and lead to greater price transparency in other processed mineral trade agreements.

There is also concern about China flooding critical mineral markets to drive down prices and thereby

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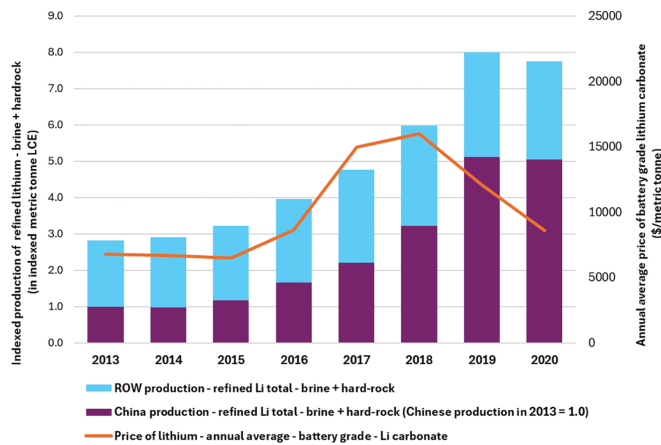


Figure: Refined Lithium Production (Normalized, China and ROW) and Price of Lithium, 2013-2020.

Note: Production numbers are indexed as follows: (a) in 2013, Chinese production is indexed to 1.0 and ROW production was normalized relative to that; and (b) for 2014–2020, both production quantities are constructed by using the ratio of current to previous-year values.

deter international competitors. However, a plausible alternative explanation for China's actions is that they reflect a frequently observed Chinese tendency toward capacity overshooting. Expanding EV production is a national priority for China, and that has led to a strong emphasis on building up domestic mineral refining capacity to secure its own EV supply chains. The emphasis on avoiding too little capacity inherently biases planning toward excess capacity.

### Policy Implications

Issues of supply diversity, market power, and investment cost are the considerations that should be driving battery minerals policy in the context of the energy transition. To reduce China's market power

over battery minerals, other nations must make substantial investments in battery mineral refining capacity. With lithium, for example, the United States and other countries could be investing in processing capacities for hard rock lithium ore from Australia and lithium-containing brines from Latin America. (As noted, the priority for most battery minerals is diversifying processing versus extraction, given the geographic diversity of the latter.) However, it will be challenging for the rest of the world to do so profitably given China's experience in the sector and its provision of various types of support for investment costs. Potentially costly policy support may well be needed. Thus, care is needed to be confident that the benefits of geographically diversifying battery mineral processing capacity – primarily, reduced Chinese market power – will justify the costs.

It is also important to keep in mind that there are inherent limits to China's market power as demands for battery minerals grow. If it pursues trade restrictions and price increases too aggressively, China will induce more rapid countervailing investment in processing capacity by the rest of the world. Once that capacity is in place, it would be costly for China to try to undercut its use, and its market advantage would be upended.

### Data sources

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