

Department of Energy Request for Information on
Critical Materials Market Dynamics
2024-08391

May 20, 2024

The Alliance for Automotive Innovation (Auto Innovators)¹ hereby submits comments on the U.S. Department of Energy's (DOE) request for information on Critical Materials Market Dynamics (the RFI).² We appreciate DOE's initiative to solicit feedback from stakeholders on this subject.

Our comments below are in response to questions posed in the RFI and are focused on critical material market dynamics as they relate to electric vehicles (EVs).

Responses to RFI questions:

1. *For a given critical material, are there particular market dynamics DOE should be aware of?*
 - a. *Are there specific critical materials that have experienced significant market volatility and price instability?*

Yes. Specific to EV battery critical materials, nickel and lithium have experienced market volatility. For nickel, following the Russian invasion of Ukraine, the London Metals Exchange (LME) suspended nickel trading due to a significant price surge of over \$100,000 per ton.³ Lithium saw the most significant price volatility in 2021-2023 with a near-400% increase from around \$20/kg to \$80/kg. Prices are now back down to \$15/kg in 2024. This massive price volatility is driven by supply chain impacts from China lockdowns, supply and demand imbalance due to the rapid increase in the need for battery materials, and lack of battery-grade lithium refiners.⁴ Other materials that face price volatility are raw materials that are subject to export restrictions, e.g., rare earth elements, gallium, and germanium.

- b. *For a given critical material, are there differences in cost of production domestically versus cost of production in other countries? How are those differences in cost of production reflected in prices?*

The economic extraction and processing of certain raw materials is in part heavily dependent on energy and electricity prices. Additionally, compliance with ESG requirements has an impact on

¹ From the manufacturers producing most vehicles sold in the U.S. to autonomous vehicle innovators to equipment suppliers, battery producers and semiconductor makers – Alliance for Automotive Innovation represents the full auto industry, a sector supporting 10 million American jobs and five percent of the economy. Active in Washington, D.C. and all 50 states, the association is committed to a cleaner, safer and smarter personal transportation future.

www.autosinnovate.org.

² <https://www.federalregister.gov/documents/2024/04/19/2024-08391/notice-of-request-for-information-rfi-on-critical-materials-market-dynamics>

³ <https://www.barrons.com/news/why-nickel-is-smashing-records-after-the-ukraine-war-01646761808>

⁴ <https://www.fastmarkets.com/insights/lithium-price-volatility-will-lesser-andrea-hotter/>

production costs, although it is not possible to conclusively assess whether these additional costs are reflected in the prices of LME and other trading houses.

- c. What, if any, impact has market volatility and price instability had on various market participants?*

Market price volatility impacts the cost to manufacture EV batteries, which in turn has a direct impact on the price of electric vehicles. Additionally, metal pricing volatility has had an impact in the recycling space. It is more challenging to make long-term commitments and create stable positive value for battery recycling. Post-processing takes significant time and capital, and the volatility hinders the ability to execute those plans.

Projects will not move forward with low prices and market volatility. However, agreements with cost-plus pricing, which occurs when off-takers pay suppliers their costs plus a premium, provides stable profits for producers to ensure bankability. This reduces risks for debt providers and helps suppliers receive affordable financing terms and government grants.

- d. For those critical materials that have experienced significant market volatility and price instability, what are the underlying causes?*

Volatile geopolitics and market concentration are two main causes of market volatility. For example, almost all EV battery material processing occurs in China.⁵ When there is a shortage or lockdown, the rest of the world sees more volatility. Additionally, downstream demand fluctuations, i.e., EV sales, result in critical material price volatility.

- e. Are there particular critical materials where processing, refining, or recycling projects struggle to attract investment specifically because of demand-side uncertainty and/or lack of firm offtake (vs., e.g., concerns about competitiveness on price or lengthy qualification processes)?*

Recycling post-processing (refining) operations are capital-intensive and have struggled to attract capital investment due to high CAPEX costs (\$1B+) and lack of guaranteed battery scrap feedstock. Also, there are demand-side issues to qualify recycled materials to battery grade specifications.

- f. How do these market dynamics implicate the ability of domestic critical material producers to sign offtake agreements with end users? How does this impact DOE investments in the critical material industry and the path to securing a resilient supply chain?*

Critical material producers must contract with precursor materials to cathode active materials (pCAM) suppliers for offtake agreements. pCAM suppliers then hold leverage in terms of qualification testing and the timeline to complete such analysis. pCAM suppliers are also direct competitors in some cases as pCAM suppliers often are also in the critical mineral refining and

⁵ <https://source.benchmarkminerals.com/article/more-raw-material-price-volatility-to-come-this-decade-benchmarks-chief-data-officer-warns>

recycling operations. pCAM suppliers and cathode active material (CAM) suppliers are almost entirely based in Asia.⁶

2. *What measures can DOE take to promote market stability within a given critical material market?*

a. *How can DOE facilitate market adoption and maturity as a stakeholder (e.g., facilitating market information sharing, encouraging price transparency, supporting consortiums)?*

DOE should take a holistic approach with like-minded countries, e.g., via Mineral Supply Partnerships (MSPs). Targeted investments in critical raw materials with allies will help with price transparency. Additionally, DOE can support standardization of recycled material pricing, i.e., black mass pricing based on metal content.

b. *How can DOE support critical material projects beyond capital grants and loans? Are there particular programs or policy mechanisms DOE should leverage with existing statutory authority to support critical material projects and successful project offtake? Are there particular aspects of the supply chain that DOE should focus on?*

DOE should focus on mining, refining, and recycling projects. Funding support for early-stage projects can help cover engineering and project developments costs prior to projects being construction-ready. This will help ensure that start-ups have a viable path to bring new production through the end of the decade.

4. *What are the benefits and drawbacks of physical offtake of critical material products for stockpiling compared to other measures that do not involve physical offtake? What existing mechanisms could be used and what concerns should be considered in terms of implementation?*

While stockpiling is already being used by companies in the supply chain, not all materials can be stockpiled, and it only provides limited relief. Resilience in the supply chain can only be achieved through diversification and reduction of primary raw materials with a simultaneous increase of secondary raw materials. Additionally, there are hazards associated with storing some forms of materials, e.g., black mass, sulfates, etc.; depending on the material classification, it may not be possible to store the material for long periods of time.

5. *How would setting up alternative market exchanges or indices with international partners for critical materials enable price transparency, market stability, and/or reduce emissions from critical material production?*

a. *What premium would firms be willing to pay for validated attributes such as ESG standards and supply chains sourced from domestic/allied countries? How could*

⁶ <https://source.benchmarkminerals.com/article/pcam-in-charts-china-retains-cathode-precursor-dominance-as-it-drives-capacity-expansions>

DOE or the Federal Government support greater demand for higher standard materials?

There are approaches to this in the EU, like the Joint Purchasing Mechanism under the European Critical Raw Materials Act,⁷ that may provide a guide for a framework.

- b. How might environmental, social, and governance (ESG) standards or critical material grades specific to energy applications be incorporated into an exchange and what are the conditions needed for successful implementation?*

A successful implementation of ESG standards will require a uniform basis for the verification of the requirements through standards or frameworks.

- 6. What other tools outside of market exchanges could support price transparency, market stability, and/or reduce emissions from critical material production?*
- a. What actions could the United States take in collaboration with its international partners to enhance price transparency and stability?*

The U.S. could look to standardize information on the composition of prices, clarify rules for moving materials across borders, and provide better transparency as to what an ESG premium would be and standardize that with our allies and trade partners.

- b. Which country partners would be ideal collaborators?*

Allied nations with like-minded ESG priorities, for example, South Korea, Japan, France, and Germany.

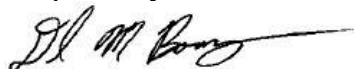
- c. Are there established international fora that are better suited to have an impact on these challenges? (i.e., International Energy Agency, G7, OECD, etc.)*

Material supply partnerships are one opportunity to have an impact on these challenges, and other fora should cooperate to ensure a uniform approach.

Conclusion

Auto Innovators thanks the Department of Energy for the development of this RFI, and we stand ready to work with the Administration, Department of Energy, and other federal agencies on policies that will provide stability to the critical material market.

Respectfully submitted,



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⁷ https://ec.europa.eu/commission/presscorner/detail/en/ip_23_1661