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Cobalt Deficit Could Exceed 130 KT in 2035 Without Major Growth in LFP and Other Alternative Battery Chemistries

Stratas Advisors

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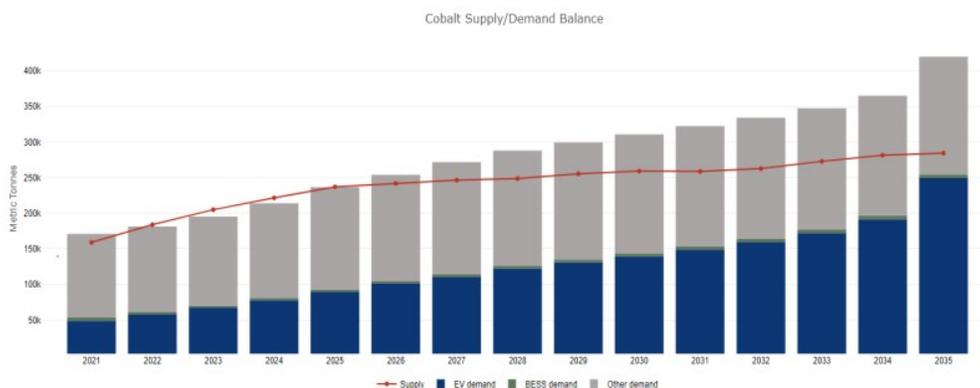
As countries around the world implement ambitious electrified vehicle (EV) and variable renewable energy (VRE) targets, an aggressive surge in battery demand is set to outstrip supply of certain battery raw and refined materials, posing key challenges to global EV and battery energy stationary storage (BESS) supply chains. In the EU, as the Union-wide ban on internal combustion engine (ICE) vehicles is implemented, sales of EVs are on track to account for over 40% of global EV sales in 2035. China will step back from its historical dominance with its market share falling to about 35% in 2035, while the US will remain relatively small compared to the EU and China. In terms of annual VRE deployment, both solar and wind power are set for strong growth in the coming years, although supply chain disruptions are set to cause a -45.5% setback in 2022 with respect to 2021 levels. The bulk of growth is projected to remain largely concentrated in China, Europe, and North America; however, growth in other regions will significantly change the global VRE picture, with particularly strong deployment in non-OECD Asia.

In this context, battery demand from EVs is projected to grow more than eight-fold over 2021-2035, driving the bulk of total battery demand growth globally. Demand for battery-based stationary storage applications will see a CAGR of 3.7% as the share of VRE deployment increases, yet the market share of BESS is set to remain negligible when compared to EVs. As battery demand grows globally, so too will manufacturing. In 2021, European EV battery production accounted for about 15% of global annual lithium-ion battery capacity, while China alone accounted for almost two thirds of total battery manufacturing. Based on probability-weighted project announcements, the share of global manufacturing will be shifting to Europe as the main demand source, while China's market share is set to decline despite remaining the global leader, with growing production stemming also from the US.

Assuming that nickel-based cathodes will continue to dominate the global EV and energy storage markets in the coming years, we can expect demand for critical materials such as cobalt, lithium, and nickel to outstrip supply over the next 2-3 years. In particular, cobalt presents the highest risk of disruption for multiple reasons. DRC holds 46% of global proved

reserves (and accounts for over three-quarters of total mined supply), while half of global refined cobalt supply originates from China, which also currently owns about 43% of the world’s cobalt mine production—much of it in DRC. Elsewhere, cobalt production usually occurs as a by-product of other materials such as copper and nickel – which makes cobalt particularly vulnerable to supply shocks as it is inherently linked to the economics of the primary commodity market.

After witnessing a slight deficit back in 2021, the restart of the Mutanda mine in DRC and the addition of new mined output in DRC and elsewhere in 2022 will allow for the balancing of supply/demand flows, with cobalt supply keeping up with global consumption until 2024. After 2025, we project production growth to plateau as older mines decrease output and long lead times restrict the rapid implementation of new projects.



Under current policies, Stratas Advisors expects the EU’s 2035 ICE ban to become the main driver pushing towards a spike in overall demand by the end of the forecast, resulting in a deficit of over 130 kt by 2035. This shortage could however increase further if growth in EVs occurs more rapidly in anticipation to the ban, and if non-EV/BESS demand continues to grow without witnessing any displacement from battery-related sectors.

Key takeaways:

- If primary mined production increases as planned, supply will be unable to keep up with growing demand after 2025 in all the scenarios, and even when accounting for declining cobalt intensities in nickel-based cathodes.
- Cobalt demand from EVs is on track to account for over half of total cobalt demand in 2035. The volume of EVs brought into the market will offset the trend to shift to nickel-rich cathodes, while a large-scale penetration of alternative battery chemistries containing no cobalt is not expected before 2030.
- Growth in cobalt demand in the BESS segment will be primarily prevented due to its low dependency on high-density technology. In fact, Stratas Advisors expects BESS to see a more rapid shift to no-cobalt chemistries including LFP in the medium term, and to alternative chemistries including Vanadium redox batteries in the longer term as costs decline.
- The industry and aerospace sectors will continue to drive a significant share of global cobalt demand over the entire forecast period, although the aftermath of the 2020 slowdown will constrain growth in the early forecast years, allowing for a positive cobalt balance. Stratas Advisors expects consumption to remain stable in these segments until

the early 2030s, when strong EV sales would partially push out non-battery demand due to tightness in supply.

- A scenario where the EU ICE ban is not accounted for would still result in a cobalt deficit of over 100 kt by 2035 as unconstrained growth from non-battery applications would make up for the reduced consumption from the EV sector.

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