QUARTERLY COBALT MARKET UPDATE 2022 Q4

Q4 saw souring sentiment and slow growth weighing on prices

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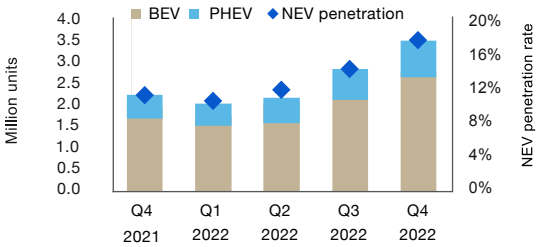
EV PENETRATION CONTINUED TO INCREASE IN A CHALLENGING MACRO

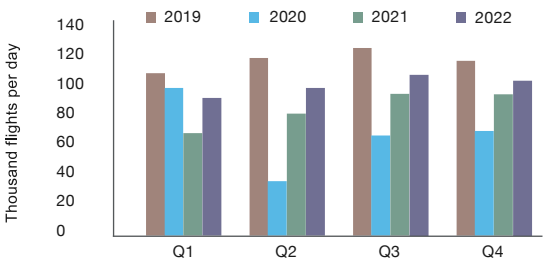


Global NEV sales rose by 56% year-on-year to **3.5 millions units**. NEV penetration reached **nearly 20% by December.**

2022 saw an **increased share of cobalt-free chemistries** in EV battery formulations. LFP represents **over 30% of the total market.**

Despite the reduced cobalt intensity per vehicle, cobalt consumption in EVs **jumped by over 60% year-on-year in 2022**.

THE PACE OF AEROSPACE RECOVERY SLOWED BUT THERE WAS IMPRESSIVE ANNUAL GROWTH OVERALL



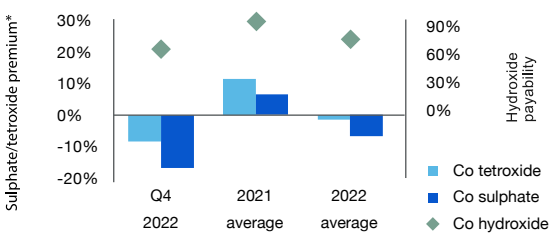
The commercial aviation sector faced headwinds from:

High inflation | **Increased jet fuel costs** | **The Covid-19 resurgence**

In aggregate, the aerospace sector has demonstrated remarkable resilience in the wake of Covid with **air travel up 18% year-on-year in 2022.**

This increased demand has **supported alloy cobalt demand** and driven **strong financial performance** from major superalloy manufacturers.

CHEMICAL PRICES PLUNGED DUE TO FALLING FEEDSTOCK COSTS AND ELEVATED STOCKS



Cobalt metal prices **tumbled by 20%** over Q4 2022 as **elevated energy prices** and **rising inflation** continued to hurt demand.

The feedstock market remained **relatively quiet** over Q4. High stocks and improved logistics dragged **hydroxide payables down to the high 50s.**

The souring sentiment also extended to chemical markets with prices for both cobalt sulphate and tetroxide **plunging through Q4 2022.**

RISKS TO THE COBALT OUTLOOK

SHORT TERM

◀▶ The positive economic impact of easing Covid restrictions in China happens faster than currently forecast.

▲ The Tenke dispute remains unresolved, affecting hydroxide shipments and production which in turn tightens spot availability in the global market.

◀▶ Global EV growth slows due to further Covid outbreaks in China and the end of subsidies.

▲ The deepening Ukraine crisis worsens the macroeconomic outlook, leading to a plunge in demand for computers and smartphones.

▲ Major Congolese producers or Indonesian HPALs, or both, expand and ramp up quicker than expected, pushing stocks higher.

LONG TERM

▲ Greater and faster EV adoption globally, putting increased strain on cobalt sulphate availability.

▲ Accelerated energy transition requires more cobalt in areas such as power generation and energy storage.

◀▶ ESG concerns around artisanal mining, emissions and waste disposal slow copper and nickel developments in the DRC and Indonesia, therefore tightening mine supply.

▲ Stricter environmental policies in China and Europe delay the procedure to build up processing capacity, pushing up production costs.

◀▶ Copper or nickel demand, or both, rises sharply, increasing Cobalt by-production well above required levels.

▲ ESG and cost concerns or disruptive battery technologies trigger faster Cobalt substitution across battery applications.

▼ Battery recycling exceeds our base case, suppressing demand for virgin materials.

+ UPSIDE FACTORS

– DOWNSIDE FACTORS

Source: Wood Mackenzie Cobalt Market Service

Note: BEV = battery electric vehicles; PHEV = plug-in hybrid electric vehicles; NEV = new energy vehicles; LFP = lithium ion phosphate | *premium over metal prices/payable of metal prices
▲ HIGH ◀▶ MEDIUM ▼ LOW probability of risks occurring;EV = electric vehicles; ESG = environmental, social, and governance.v

Please do not hesitate to get in touch if you have any questions:

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