Lithium and cobalt are key ingredients for electric vehicle batteries

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Nitesh Shah
Head of Commodities and Macroeconomic Research, WisdomTree Europe

Electric vehicles maintain strong sales growth

According to EV-Volumes1, global electric vehicle (EV) sales rose to 10.5 million in 2022, up 55% relative to 2021. That meant that EVs were 13.0% of all vehicle sales in 2022, up from 8.3% in 2021 and just 1.3% of sales 5 years prior in 2017. That rapid growth in EV sales is likely to continue. To meet the aspirations of the Paris Agreement (to limit temperature increases to just 1.5 degrees above pre-industrialised levels), decarbonising road transportation will be a key part of the plan. Wood Mackenzie expects EV market share to reach 35% by 2030, with sales up 238% relative to 2022 or a 16.5% compound annual growth rate (CAGR) in a base case scenario. In a scenario consistent with limiting temperature increases to just 1.5 degrees (that is, aligned with the Paris Agreement), we could see EV penetration rates reach close to 60% by 2030. In the European Union, the penetration rates could be even higher. In February 2023, the European Parliament voted to approve a new law banning the sale of petrol and diesel cars from 2035. Cars currently account for around 15% of all CO2 emissions in the EU. The legislation demands that carmakers cut carbon emissions from new vehicles by 100 per cent. In practice, this means no new conventional fossil fuel-powered vehicles will be able to be sold from 2035 onwards2.

Raw materials in EVs

Such strong growth in EV demand will pull higher the demand for all raw materials needed to make batteries that power the vehicles. Lithium-ion batteries are the mainstay of today's battery technology and are likely to remain dominant for most of this decade.

Figure 1 shows the raw materials used in a typical lithium-ion powered electric vehicle today. Materials like lithium, nickel, cobalt, and graphite, that don't exist in conventional cars, are needed in high volumes in electric vehicles.

Source: The Role of Critical Minerals in Clean Energy Transitions, International Energy Agency, 2021

Regardless of cathode solution, the amount of lithium in lithium-ion batteries remains similar

Figure 1 is a generalisation. Depending on cathode technology, there could be more or less cobalt used. For example, in a nickel-cobalt-magnesium (NMC) cathode, we could have, at one end of the spectrum, equal parts of each of the three metals (111) and at the other end of the spectrum, eight parts nickel, one part magnesium, and one part cobalt (811). The NMC-111 cathode will have more cobalt than the NMC 811 cathode. Some cathode solutions like lithium iron phosphate (LFP) do not use any nickel or cobalt.

However, LFP batteries offer lower energy density and, therefore, limited driving range compared to NMC batteries.

Regardless of cathode type, most lithium-ion batteries have a similar quantity of lithium.

Demand growth to outstrip supply growth

In the battery sector, demand for lithium will grow by 880% over ten years to 2030, 633% for nickel and 139% for cobalt3. However, supply of these metals will struggle to keep pace with demand, especially in a scenario where the aspirations of the Paris Agreement, to limit temperatures increases to just 1.5 degrees Celsius above pre-industrialised levels, are met. As Wood Mackenzie articulated in The 1.5 degree goal driving the energy transition, multiple decarbonisation solutions are required to deliver net zero by 2050, and one of the key areas will be in decarbonising transportation. Electric vehicles and the batteries that power them will be in greater and greater demand as a result.

In that 1.5 degree scenario, the supply gap – the extent to which supply is likely to lag demand – will widen for most metals (Figure 2). Lithium will likely have the largest gaps of the energy transition metals, with over 50% undersupply. In the 1.5 degree scenario, supply of lithium could fall short of demand by as early as 2026.

While in a base case scenario there is likely to be enough cobalt supply to meet demand, the 1.5 degree scenario presents a supply challenge with an estimated undersupply of 18%.

Source: Wood Mackenzie, 2023. CE = carbonate equivalent.

Forecasts are not an indicator of future performance and any investments are subject to risks and uncertainties.

Challenges for investors to access lithium and cobalt

While lithium and cobalt's role in the energy transition have been established for over a decade, investor access to these metals has been a challenge. Unlike copper, aluminium, zinc and nickel, where there have been liquid futures markets for decades, futures contracts for lithium and cobalt are relatively new.

The CME Group launched a lithium hydroxide cash settled4 futures contract in May 2021. Lithium futures are cash-settled based on the lithium hydroxide assessment published by Fastmarkets, which reflects the cost, insurance, and freight (CIF) spot price in China, Japan, and South Korea, where the majority of battery manufacturing capacity is concentrated today. As Figure 3 shows, trading volumes on this contract have been picking up strongly in recent months.

Source: Bloomberg, WisdomTree. 05/04/2021 - 30/03/2023. Aggregate volumes and open interest across the futures curve (that is, not a single maturity).

Historical performance is not an indication of future performance and any investments may go down in value.

A few months earlier, the CME Group launched a cobalt cash settled futures contract in December 2020. This contract also relies on Fastmarkets' assessment for cobalt metal. While the London Metals Exchange (LME) had a physically-settled cobalt contact in 2010, it was less suitable for investors, who prefer cash-settled contracts. The LME has also launched a cash-settled contract in March 2019, using Fastmarket assessment, but this contract is significantly less liquid.

Source: Bloomberg, WisdomTree. 01/01/2021 – 30/03/2023. Aggregate volumes and open interest across the futures curve (that is, not a single maturity).

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WisdomTree adds lithium and cobalt to products in its energy transition range

As trading volumes of both lithium and cobalt have picked up, there is now sufficient volume to introduce these two materials into WisdomTree Energy Transition Metals (WENT) and WisdomTree Battery Metals (WATT) due their fit with the respective strategies. WENT and WATT are two synthetic exchange-traded products launched in April 2022.

The products and indices that they track have always been designed by WisdomTree to be adaptive to market conditions: to introduce materials important to the theme when a liquid futures market develops, and change weights according to the fundamental outlooks for these metals.

However, volumes traded remain low in comparison to other metals (see Figure 5). Therefore, the indices' methodologies constrain the weights assigned to these two materials; currently the respective indices have target weights at rebalances for lithium and cobalt of 2.5% and 0.5% respectively.

As a result of the inclusion of the metals in the strategy for these investment products, we believe that this will lead to enhanced liquidity and price discovery in the wider market.

Source: WisdomTree, Bloomberg, 31/03/2023. Aggregate volumes and open interest across the futures curve (i.e. not a single maturity).

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Product overview

Before fees and expenses, WENT seeks to track the performance of the WisdomTree Energy Transition Metals Commodity Index TR, while WATT seeks to track the performance of the WisdomTree Battery Metals Commodity Index TR. WisdomTree has developed the index strategies with the holdings and weightings of the two baskets designed to capture the demand and growth of specific metals involved in energy transition technologies under the 1.5-degree scenario5. Wood Mackenzie, a leading energy transition research and consulting firm, provides WisdomTree with forecasts for the demand for energy transition and battery materials for the coming 3 years under the 1.5 degree scenario, which are used to determine the weights.

The **WisdomTree Energy Transition Metals** exchange-traded commodity (ETC) allows investors to access the key metals involved in the energy transition megatrend including electric vehicles, transmission, charging, energy storage, solar, wind, and hydrogen power production. The index was comprised of copper, nickel, aluminium, silver, zinc tin, platinum, and now also lithium and cobalt.

The **WisdomTree Battery Metals** ETC allows investors to access the key metals involved in the battery theme, a sub-set of the energy transition megatrend. The index was comprised of nickel, aluminium, copper, and zinc and now also lithium and cobalt.

The indices are reconstituted on an annual basis in January and with a quarterly review process to assess if additional commodity metals can be added or if target weights can be increased, depending on the inclusion criteria such as liquidity.

New weights

With the addition of these new materials the new target weights are as follows:

Source: WisdomTree, Weights effective as of 17 April 2023.

Product information

1 https://www.ev-volumes.com/

2 Although, following a campaign from Germany, there is a carve-out for combustion engine vehicles that run on e-fuels agreed with the European Commission (25 March 2023). That has yet to be agreed with the Council and Parliament.

3 Source: Wood Mackenzie

4 Cash settlement is a method used in certain futures contracts where, upon expiration, the seller of the financial instrument does not deliver the actual physical underlying asset but instead transfers the associated cash position. For sellers who do not wish to take actual possession of the underlying cash commodity, cash settlement is a more convenient method of transacting futures and options contracts. Cash settlement is also preferred by financial investors who bring additional liquidity reducing the bid-offer spread, and thus lowering the cost of trading.

5 The 1.5 degree scenario is consistent with the aspirations of the Paris Agreement of 2016 to pursue efforts “to limit the temperature increase to 1.5°C above pre-industrial levels.” For more information on this scenario please see The 1.5 degree goal driving the energy transition

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