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# THE METALS THAT STAND TO WIN THE VEHICLE ENERGY TRANSITION

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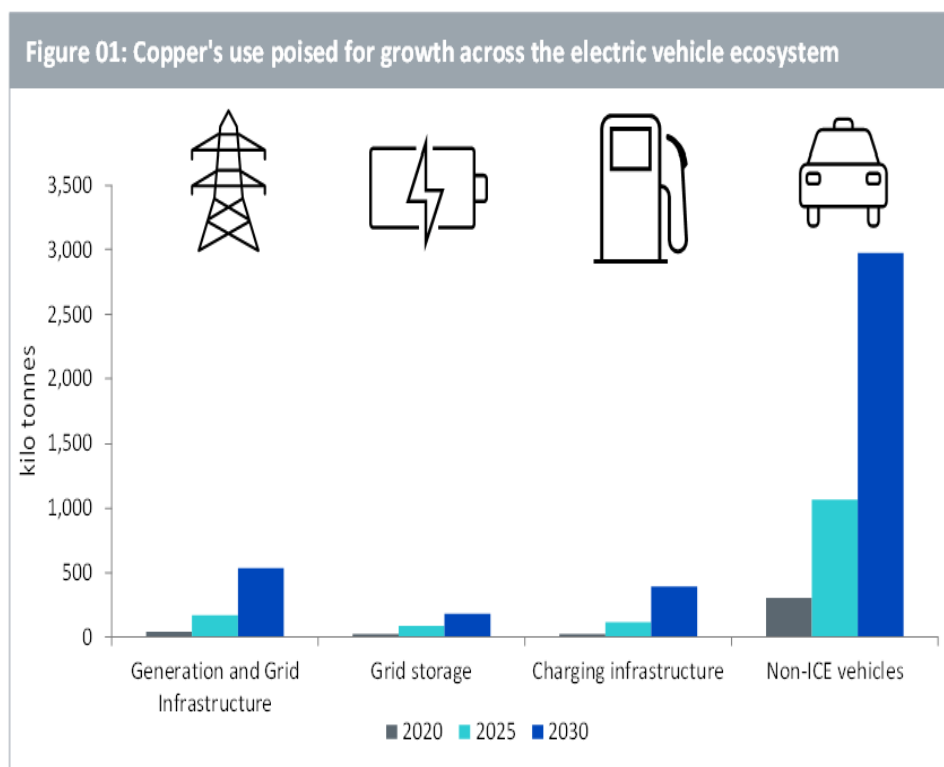
## The metals that stand to win the vehicle energy transition

The electric vehicle (EV) revolution has already hit the road. Wood Mackenzie forecast that by 2040, EVs will account for half of all passenger car sales globally (Wood Mackenzie, forecasts from 2018). This prediction seems entirely plausible given the pace at which emission standards are tightening and technology, in response, is evolving. And what about the all-important factor that facilitates the widespread adoption of technology – cost? Battery costs, according to Wood Mackenzie, are expecting to halve within the next decade, while batteries continue to improve and become more efficient.

Commodity investors have a potential opportunity to ride the electrification megatrend by investing in the raw materials expected to propel the technology onwards. Copper, nickel, silver, and platinum are some of the key elements which could stand to win as the vehicle energy transition accelerates.

### Copper – core to the EV ecosystem

As highlighted in [Copper – Inducing a Sustainable Future](#), copper's strong electrical conductivity and energy efficiency make it an integral component across the entire EV ecosystem. Copper's demand is expected to experience strong growth from its increasing usage in power generation; grid and charging infrastructure; and the manufacturing of vehicles (see figure 01 below). According to the International Copper Study Group (ICSG), electric vehicles contain around 4 times more copper than an internal combustion engine (ICE) vehicle. Battery electric vehicles use around 83kg of copper compared to a petrol or diesel vehicle which uses around 23kg, with hybrid variants using quantities somewhere in between. A battery-powered electric bus uses between 224-369kg of copper. Similarly, each fast charger may require up to 8kg of the metal. It is therefore clear that as the technology gathers charge, copper's demand will be invigorated.

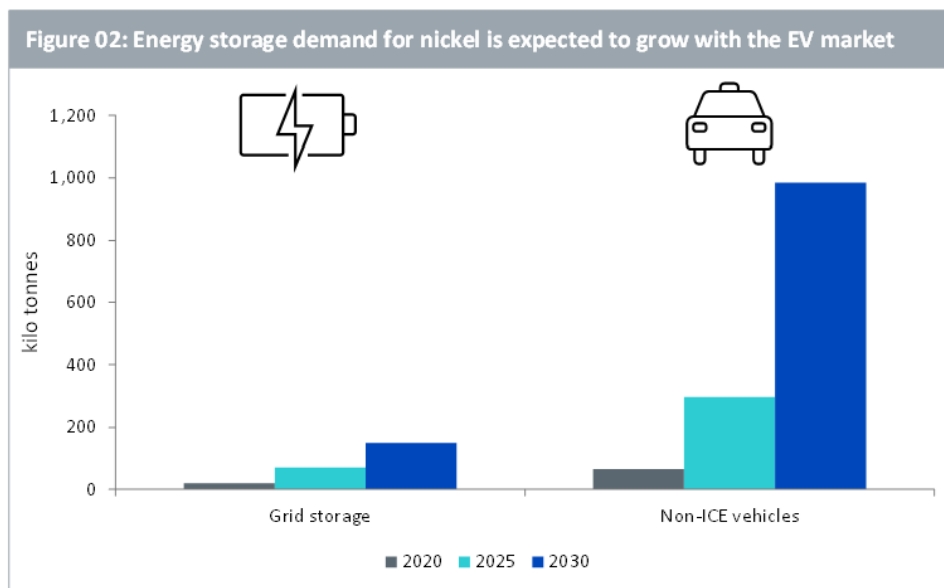


Source: Glencore 2017 Report, "Electric Vehicles - A disruptive force underpinning our commodities". ICE refers to 'Internal Combustion Engine'.

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

### Nickel – energised by battery demand

As discussed in [Nickel's role in electrifying cars](#), improvements in battery technology are critical for the adoption of electric mobility in the future. Nickel has electrifying prospects as it is an essential element in EV batteries. Nickel-based cathodes – a principal component of the dominant lithium-ion batteries – are expected to account for more than half of all cathode solutions by 2025 and almost 90% by 2030 (source: Avicenne Energy 2019). Higher nickel content in batteries not only increases the energy density and vehicle range, it also reduces the reliance on cobalt – which can experience price volatility on account of its supply concentration in the Democratic Republic of Congo. Figure 02 shows the projected increase in absolute demand for nickel over the next decade from electric vehicles and grid storage.



Source: Glencore 2017 Report, "Electric Vehicles - A disruptive force underpinning our commodities". ICE refers to 'Internal Combustion Engine'.

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### Silver and platinum – held precious by carmakers

Most electrical connections in cars use silver-coated contacts for functions ranging from igniting the engine, controlling power windows and seats, defogging windshields, and operating electronic user interfaces. Therefore, even as internal combustion engine (ICE) vehicles become more electrified, they are expected to demand larger quantities of silver reaching 2350 tonnes by 2040 – up from 1491 tonnes in 2018 (London Bullion Market Association, LBMA in 2018). But as electric vehicles swiftly increase their market share, they are expected to become the sector with an even faster growth for silver demand. LBMA predict that, if electric vehicles account for almost half of the global market share, they will demand 2200 tonnes of silver by 2040.

Another technology which may turn the fortunes around for platinum is the emergence of fuel cells. This technology helps create power without the need for recharging as electricity is generated when hydrogen (inside the cell) reacts with oxygen (in air) utilising a catalyst such as platinum. It is also worth noting that platinum is used to make the hydrogen used in fuel cell vehicles. While the prospect of fuel cell electric vehicles is exciting due to both environmental and economic reasons, the technology is yet to gain steam. But if the technology becomes adopted more widely, platinum may find a new source of demand in addition to being an autocatalyst in diesel cars.

### Metals – A solid choice for investors

Metals, typically seen as cyclical assets, therefore have exciting growth prospects from emerging technologies. Thematic investors seeking exposure to such technological megatrends and looking to make the world greener, have the option to invest in the raw materials expected to boost the trend. The widespread adoption of electric vehicles is one such trend which has already taken off. Copper, nickel, silver, and possibly platinum, are expected to be the beneficiaries of this in the years to come.

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