Plugging into electric vehicle opportunities

Thornburg
INVESTMENT MANAGEMENT

The electrification of transport is now one of the major trends in the auto industry, directly impacting key manufacturers and suppliers in the electric vehicle ecosystem.

Electric vehicles [EV] and advanced driver-assistance systems [ADAS] are now seeing rapid adoption driven by a combination of government policy, consumer preferences, climate considerations, and disruptive innovation that has improved overall affordability and product quality. These factors are contributing to a tidal change that favors robust EV growth ahead.

Thornburg estimates that new global EV sales may reach between 30 and 50 million units by 2030, presenting major opportunities for traditional original equipment manufacturers (OEMs) as well as a broad range of industries and sectors that touch the EV supply chain. We see two catalysts that will support this growth trajectory.

Catalyst #1: Improvements in battery effectiveness

Technological advancements in cathode chemistries used in battery cell design have reduced cost and improved performance. Battery costs have fallen over 18% per year for the past decade due to increasing manufacturing scale and cathode chemistry enhancements, whilethe average driving range increased from 84 miles to 256 miles per charge from 2010 to 2020.

Critical battery metals include lithium and either nickel or cobalt, while others used in manufacturing include aluminum, manganese, copper, magnesium and iron. The use of all key cathode materials should grow significantly, but which chemistry combination eventually wins out will have an outsized impact on mineral miners and suppliers. Green minerals that are battery chemistry agnostic such as lithium and copper show the greatest projected demand into 2030 at an estimated 2.25 million and 2.5+ million metric tons, respectively.

Transition into higher nickel cathodes

Over the past two decades, the most popular chemistry combination in cathodes made outside of China was the "low nickel battery" that comprised 40% nickel, 30% cobalt, and 30% manganese. The trend has been to substitute nickel for the more expensive and ethically challenged cobalt and manganese. Higher nickel batteries also come with improved power density and battery range. Given significantly lower input costs and much better power density, higher nickel batteries should replace lower nickel ones by the middle of the 2020s.

While the shift from low to high nickel content cathodes is clear, there is some uncertainty around just how strong market penetration can be for higher nickel cathodes overall. LFP (lithium, iron, and phosphate) cathode chemistry which has no cobalt, is dominant in China, the world's largest auto and EV market. The nickel and cobalt cathodes could face significant substitution risk should LFP chemistry overcome its power density hurdles and win market share.

Lithium stands out

Lithium is a key component in the production of all batteries, regardless of the chemical makeup producers choose. Additionally, there is almost no variation in the amount of lithium used in batteries and miners are rushing to expand lithium production capacity. Over the next five years, Bloomberg expects the production of lithium to surpass 1.6 million metric tons, far outpacing cobalt, manganese, and even nickel. Additionally, the EV market currently contributes to roughly 70% of the demand for lithium, and this is projected to grow to over 90% by 2030. Despite the additional production, our estimates show that lithium supply will still fall short due to the surge in EV demand.

Copper shows promise

Another resource that may experience a significant supply shortfall is copper. Copper is used in electrical wiring within the car and charging infrastructure. Today, green materials represent only 3% of the total copper demand, but we expect this to increase to 17.5% of demand by 2030.

However, copper mines takebetween five and seven years to come online. As a result, to overcome the projected shortage starting in 2025 new projects would need to break ground today. Our research has found little evidence of this occurring.

Catalyst #2: Demand for more safety features and driving automation

Demand for advanced driver-assistance systems (ADAS) and car safety features has been supercharged by changes in consumer preferences as well as a shift towards EVs. For example, in 2018, the Cameron Gulbransen Kids Transportation Safety Act required all new vehicles in the US to include backup cameras to increase safety. This new requirement prompted many consumers to demand even more safety features to be added. As a result, in 2020, more than five million cars were sold with semi-automation features or more, and we expect that demand to rise.

With each incremental automation incorporated into cars comes the need to develop additional technologies such as sensors, radar systems, cameras, etc. Consequently, the average electric vehicle uses about twice the amount of semiconductor components as a conventional vehicle.

One particularly exciting area in the EV market is the management system used to optimise battery usage, which is growing at a 60% CAGR according to one industry leader. Auto semiconductor companies that can compete in both battery management systems and ADAS will be poised to enjoy growth.

Conclusion

The movement toward electrifying vehicles will continue to be supported by both innovations and changing consumer preferences. The race among the supply side companies to provide the best chemistry for the components, as well as technology at acceptable costs, is too early to call. However, the overall growth trend remains compelling for companies that can become key players in this space.

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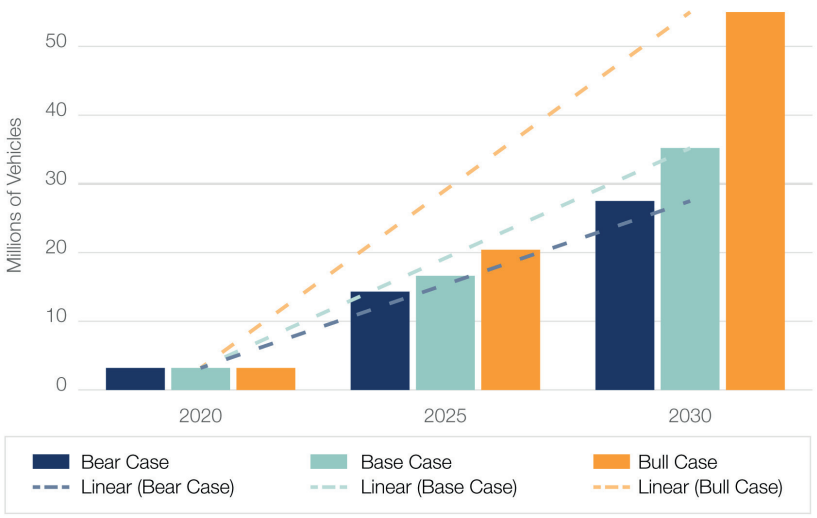
Figure 1: Electric vehicle sales projection
Electrical vehicle sales forcasts under three scenarios (2020-2030)



Source: Thornburg Investment Management as of 6/30/2021.

Footnote: 1 About 70 percent of global cobalt production is from The Democratic Republic of Congo (DRC), where human rights groups have documented severe issues amongst artisanal miners, such as violent ethnic conflict, corruption, numerous fatal accidents and forced child labor.