December 2022

South Korea and the Clean Energy Battery Sector

Ross Cameron, Portfolio Manager from our EM specialist investment partner, Northcape Capital, recently spent two weeks on the road in South Korea and Japan. The main focus of the trip was to research the electric vehicle (EV) and battery supply chains. Our portfolio has a direct exposure to this attractive structural growth opportunity through investments in Samsung SDI, Techtronic, Delta Electronics and Voltronic Power Technology.

This information has been prepared by Northcape Capital, the underlying investment manager for the Warakirri Global Emerging Markets Fund.

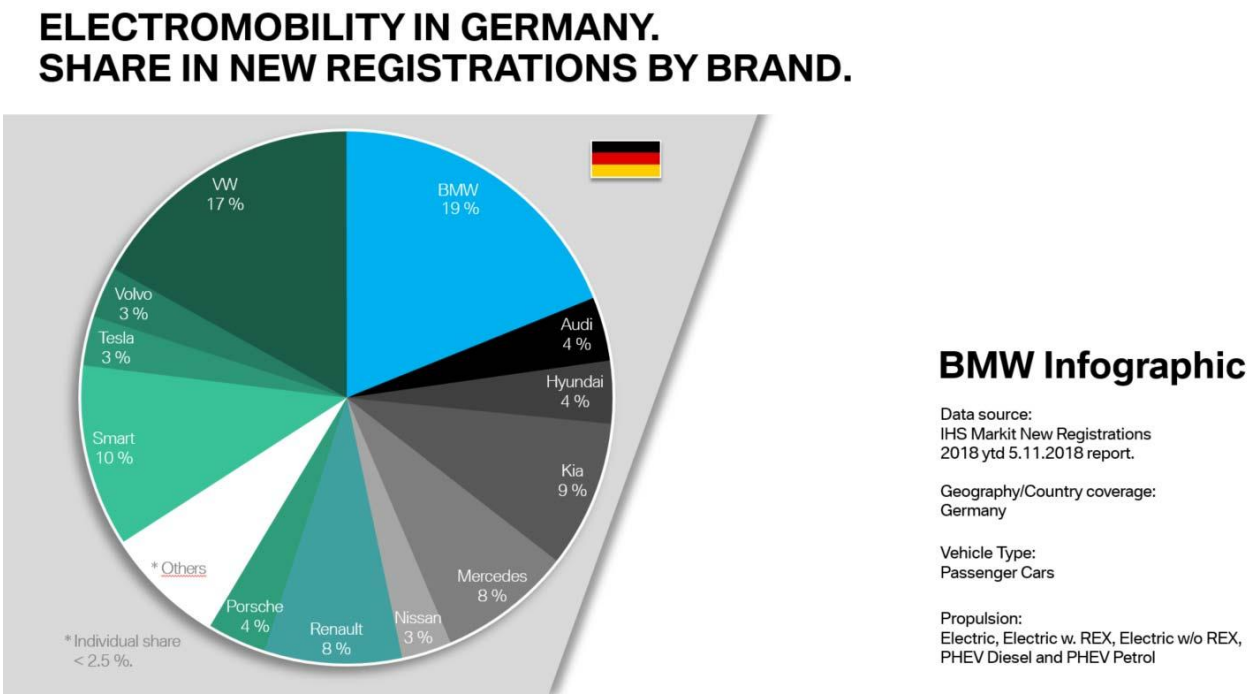
Transport is a major source of CO2 emissions, accounting for roughly 21% of total annual CO2 emitted globally. And nearly 30% in the European Union (EU) and the US, with the road transport sector contributing around 70-80% to total transport GHG emissions. Consequently, passenger vehicles (PVs) are estimated to comprise approximately 10% of total global GHG emissions. Whilst this alone is not enough to meet aggregate emission reduction targets, PV is one of the easiest categories to decarbonise.

Unlike categories such as cement and livestock, where CO2 emissions are an inevitable biproduct and hence GHG reduction strategies must focus on either carbon capture or complete substitution (for example, lab meats), we already have the technology for eliminating emissions in PVs. In fact, the first production electric car was built in 1884 by English inventor Thomas Parker (who, incidentally, was also credited with electrifying the London Underground), predating mass production of internal combustion engine (ICE) cars.

This makes electrification of PVs an "easy win" for regulators seeking to reduce aggregate GHG emissions, particularly if electricity generation can be shifted to renewable sources. As such, the European Commission is seeking to have at least 30 million electric vehicles on the road by the end of this decade – a massive increase from the 1.4 million EVs on European roads today.

Europe in fact lags China in the adoption of EVs; nearly a quarter of all cars newly registered in China are now electric or plug-in hybrid vehicles, and half of EVs produced globally are sold in China. China has an additional and more pressing motivation for electrifying its cars: air pollution. According to China's Ministry of Ecology and Environment, vehicle emissions were to blame for about 45 percent of Beijing's air pollution in 2018.

Exhibit 1: EV's in Europe – BMW dominates, but all major European vehicle manufacturers are present



A study by the Health Effects Institute found that poor air quality led to roughly 1.42 million premature deaths in China in 2019 alone. Consequently, the Chinese government has heavily subsidised EV purchases for more than a decade. There are many other perks of owning an EV in China too. In Liuzhou, for example, authorities have allowed EV owners to drive in bus lanes. EV drivers in Shijiazhuang get access to free parking spaces.

The US is the next "cab off the rank", so to speak, and the prospects for EV sales in the US received a major boost from the Inflation Reduction Act (IRA) that was signed into law on the 16th of August 2022. In addition to a $7,500 EV tax credit for new electric vehicles (given certain criteria are met, including a minimum proportion of "onshore" production), the IRA also establishes a credit for used EVs. The used EV tax credit is for $4,000 or up to 30% of the vehicle price (whichever is lower and, like the new car credit, subject to a number of terms and conditions).

Estimates on EV uptake vary wildly, but most companies in the supply chain that we spoke to in Japan and Korea think that 30% of new vehicle sales globally will be full EV by 2030, with a further significant proportion being hybrid. The fuel efficiency and emissions standards of gasoline cars will also continue to improve; Suzuki – who we met in Tokyo, given our investment in Maruti Suzuki – already sells some family cars with engine capacities below 900cc, roughly half the size of the engine in a typical Harley-Davidson motorcycle!

The two main constraints on EV adoption are charging infrastructure and cost. On the latter, the sticking point is the battery, which at current prices renders EVs more expensive than like-for-like gasoline cars. Although there continues to be incremental efficiency improvements in lithium-ion batteries – in the order of five to ten percent per annum. According to Samsung SDI – the constraint on a large decline in costs has become the mineral content, particularly lithium, which now makes up some 20% of the cost of an average EV battery.

Although lithium is relatively abundant (for example, the estimated lithium reserves in Chile alone are approximately 200 years' worth of current annual global production) it does not naturally occur in elemental form due to its high reactivity and is therefore costly to mine and process. Although Chile and Bolivia have abundant lithium, it is mainly in the form of brine deposits, which are accumulations of saline groundwater that are enriched in dissolved lithium, and there is a long lead time to increase supply. Australia, where lithium is extracted from a mineral known as Spodumene, remains the world's biggest supplier, but also struggles with challenges in rapidly increasing supply.

Consequently, most industry participants expect demand for lithium to exceed supply for at least the next two to three years and as such battery prices to remain high. Samsung SDI is well insulated, however, as demand from auto original equipment manufacturers (OEMs) is largely price inelastic for two main reasons.

First, consumers largely view EVs as the future and hence an auto company that doesn't have an EV offering risks doing damage to its brand value (in the words of Automotive News Europe, "selling electric cars is perceived to be image boosting"). For European OEM customers (which are the most important segment for SDI) there is an additional and even more important reason to produce EVs: regulation. EU car companies are heavily fined for not meeting overall fleet emissions targets; the EU has set a benchmark of 15 percent of all sales to be either electric or plug-in hybrid (below 50g/km of CO2) by 2025 and 30 percent by 2030.

Car makers such as BMW and Porsche are rumoured to lose money on every EV sold, which is subsidised through gasoline car sales. These rules are intended to spur investment into EVs and hence ultimately eliminate the current cost disadvantage of EVs, consequently, as shown in Exhibit 1, every major European auto OEM now has an EV offering.

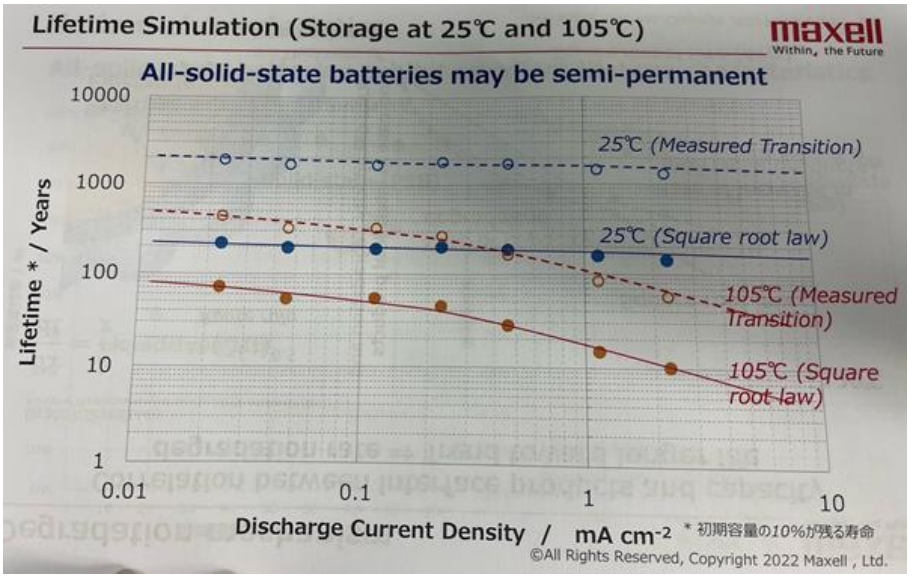
The upshot is that SDI's customers – the auto OEMs – ultimately bear the lithium cost risk, and hence SDI's revenue is largely insulated from raw material price pressure.

The battery industry is for now focused on incremental cost containment measures such as reducing the amount of cobalt and lithium via the use of more nickel. In the longer term, there are potential technology step changes which hold the promise of dramatically improving cost efficiency. Although Chinese manufacturers claim to be close to commercialising the use of sodium as a substitute for lithium in EV batteries, none of the industry participants we spoke to across the two-week trip were optimistic about a breakthrough on this front in the next few years. Instead, the next likely major development in the battery industry is the commercialisation of large solid-state batteries.

On the trip we met Maxell (6810 JT), the current world leader in solid state batteries. Maxell already commercially manufacturers solid state (SS) lithium batteries in large volume; the only issue is the largest SS battery the company has developed so far is roughly the size of a matchbox. Our EM portfolio investment in Samsung SDI (006400 KS) is another first mover in the area of solid-state batteries and expects to have a SS EV battery in mass production by 2028. This is good news for the environment, because current applications suggest that solid state batteries may be semi-permanent, with virtually unlimited charge/recharge cycles and a useful life potentially running into hundreds or even thousands of years, as shown in Exhibit 2.

As such, costly recycling and associated non-recyclable waste will cease to be an issue, as the SS batteries can essentially be used and reused indefinitely. Given there will be no replacement cycle, Maxell currently believes that the revenue model will be subscription based, where the battery remains property of the auto OEM and the user leases it for the duration of their car ownership.

Exhibit 2: At Normal Usage Temperatures, Solid State Batteries Appear to be Semi-Permanent



Samsung SDI's competitive advantage stems from two interconnected features of the industry.

First, supply chain in the manufacture of EV batteries is highly complex, with many specialised players focused on specific niches within the process. On Northcape's recent trip we met with many such niche players, each focused exclusively on a single component or process of the battery supply chain. Suppliers of critical components typically enter long-term (3 to 5 year) supply contracts with battery companies in order to underwrite capacity expansion.

For example, W Scope (6619 JT), who we met at the company's head office in Tokyo, supplies separators to Samsung SDI. Although only 3% of the cost of an EV battery, separators are critical to the safe functioning of the battery and hence the car. SDI now accounts for more than half of W Scope's total revenue, and the companies recently signed a supply deal that involves W Scope building a new production plant in Hungary, co-located with SDI's factory.

The plant will be devoted exclusively to SDI, with W Scope's associated capital expenditure effectively underwritten through a five-year supply contract that stipulates a minimum volume to be purchased, at a price with is negotiated annually based on input costs. This dynamic gives an advantage to established players, with strong customer (i.e. auto OEM) relationships and the ability to reserve exclusive capacity with suppliers.

The second advantage for established players with strong reputations is the importance of safety. Auto OEM customers are risk averse, as safety issues with batteries can cause significant brand damage. As such they are unlikely to give orders to new entrants, or battery makers who try to compete only on price.

Samsung SDI in particular has positioned itself as a leader in battery safety – a perception that was consistently held across the various suppliers we met over the two-week trip, who noted that the depth of SDI's due diligence before handing out contracts to suppliers far exceeded that of competitors. This is a key reason why Samsung SDI is the battery supplier of choice for blue chip OEMs such as BMW.

Beyond EV batteries, Samsung SDI is also excited about the opportunities in the power utility industry. The company expects sales of batteries to power utilities to grow at around 25% p.a. in coming years, and to be used in large scale battery storage facilities such as the one shown in Exhibit 3.

Exhibit 3: Example of a Battery Storage Station in Finland

Source: Fluence

Renewable sources of power tend to be intermittent and peak generation hours are often not aligned with the timing of power demand. As such efficient energy storage is essential. So far Europe has been the main driver of this business for Samsung SDI but going forward the company believes the United States will be the key source of utility demand for batteries. In addition to high growth, demand from electrical utilities is uncorrelated with the auto industry, creating a resilient profile for Samsung SDI's earnings going forward.

Finally, as the penetration of EVs continues to increase, the economics of residential batteries connected to rooftop solar improves dramatically for the occupier, which will hence underpin another leg of growth for lithium-ion batteries.

Certain EM sectors are attractive for long-term investment, such as clean battery energy, particularly when the opportunity is domiciled in some of our preferred sovereigns, such as South Korea and Taiwan.

As part of our investment process, it should be noted that we observe and interpret the carbon intensity of our individual companies. As such, over time we have developed a deeper understanding of how GHGs will trend in the years ahead across each company in the portfolio. We can then assess of the effectiveness of company strategies to mitigate the negative impacts of climate change, and importantly gauge the overall risk of this crucial issue across the entire EM portfolio.

For more information, please contact us on 1300 927 254 or visit warakirri.com.au