Lithium: Does Rising Demand Mean Rising Prices?

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Introduction

It is generally accepted that lithium demand will grow significantly over the next 10 years, driven by both increased penetration of electric vehicles (EVs) and increased storage capacity from renewable energy. A fairly natural outcome has followed on from this, in that, as the full scale of potential future lithium demand has emerged the valuations of lithium-producing companies appear to be on an ever-increasing trajectory. However, more recently there has been some share price weakness which has prompted reassessment of the investment case. Edinburgh Partners' analysts covering the Automotive, Battery Technology, and Metals & Mining sectors have collaborated to produce a long-term supply/demand study to examine the key commodity pricing environment under a range of different assumptions. This is a follow-on from a large-scale research project on renewable energy and battery technology and provides a framework for monitoring share prices in order to flag when these companies might provide attractive opportunities for investment. It is an area where great care is required since, whilst the trend of growth is relatively clear, there will continue to be sustained periods where profit potential may be exaggerated. Some of the key points are discussed below.

Battery Demand

Driven largely by environmental concerns and government support, investment in clean energy technology is growing. In order to take advantage of renewable energy's elasticity of supply in comparison to other energy sources, new innovations in battery technology have resulted in its increasing use for bulk energy storage applications, including electric vehicles (EVs) as well as backup electricity storage systems - an optimal means of balancing intermittent, renewables-dominant grids of the future. With costs declining, demand for batteries has started to increase rapidly, particularly for electric and hybrid vehicles.

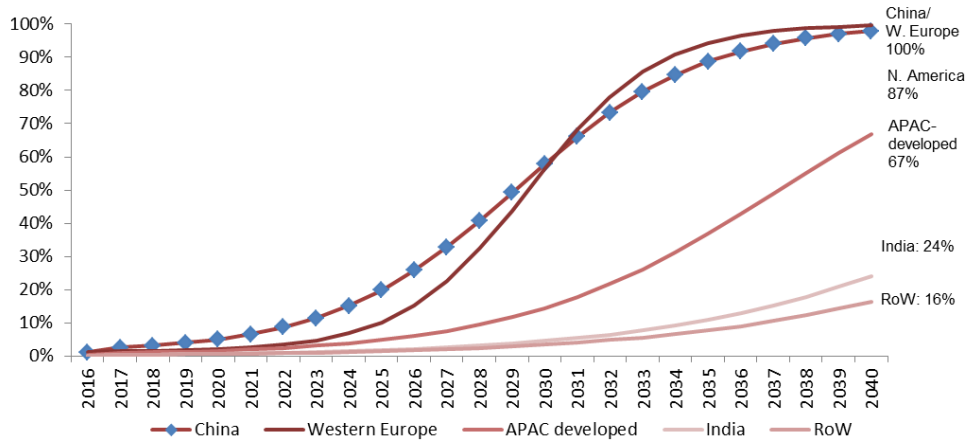
Reasons for EV Demand

Ongoing advances in battery technology are stimulating increasing consumer interest in EVs as the range of attractive EV models on the market grows and diversifies. Modifications of Lithium-ion battery chemistries mean that many EVs are now capable of travelling distances that satisfy the vast majority of drivers' daily range needs before recharging is required. Moreover, relative to conventional engines, battery drivetrains provide drivers with smoother and faster acceleration as well as lower costs for refuelling and maintenance. As battery costs fall closer to price parity with traditional powertrains and governments phase out petrol and diesel engines, EV demand is expected to grow rapidly over the following decades. Stricter emissions regulations will also have a sizeable impact, increasing conventional engine compliance costs and, in turn, allowing EVs to become economically favourable much sooner.

EV Penetration

Estimates for EV penetration vary widely but the broad consensus is that it will increase significantly over the next 20 years. Figure 1 shows EV penetration forecasts in which all of Western Europe and China are assumed to follow the example of France/ the UK to ban petrol vehicles by 2040.

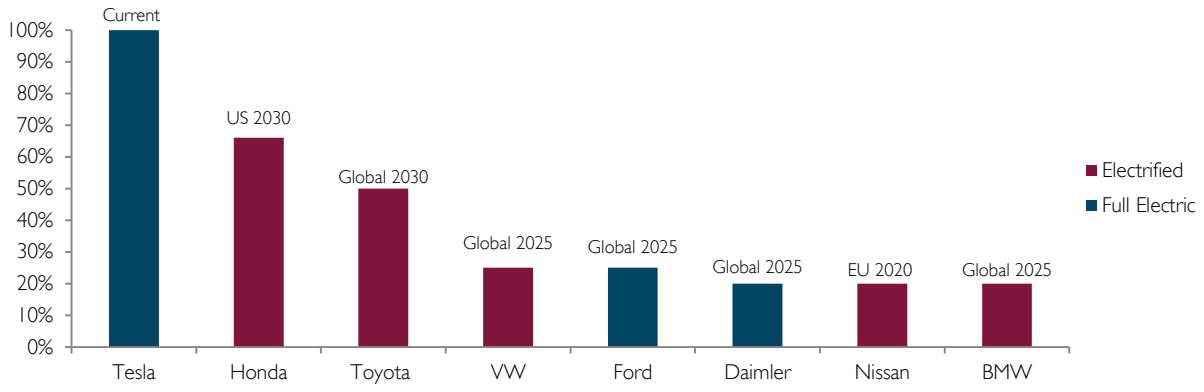
Figure 1 – Global EV Penetration



Source: Bernstein

EVs are not the province of one manufacturer but are increasingly being adopted by all the major players. Auto manufacturers are preparing for this transition and expect EVs to make up a significant proportion of their total car sales by 2020-2030:

Figure 2 – Annual EV Sales Projected in 2020-2030 by Vehicle Manufacturer



Source: Company Investor Presentation

The companies shown in Figure 2 represent 65% of the global auto market, based on the number of vehicles sold in 2017. Other major automakers are less specific in their EV sales targets but demonstrate commitment in plans to expand product ranges with the addition of several new EV models. The broad

range category of 'electrified' vehicles includes models with a vast range of battery sizes. Mild-hybrids can have battery capacities as small as 1kWh for braking and coasting applications, whereas the batteries in the longest range pure EVs can reach sizes of 100kWh. Forecasting EV demand and, in turn, the demand for EV materials, will therefore depend not only on the number of EVs but also the mix between mild-hybrid, plug-in hybrid and full-electric.

Has the Battery Battle Been Won?

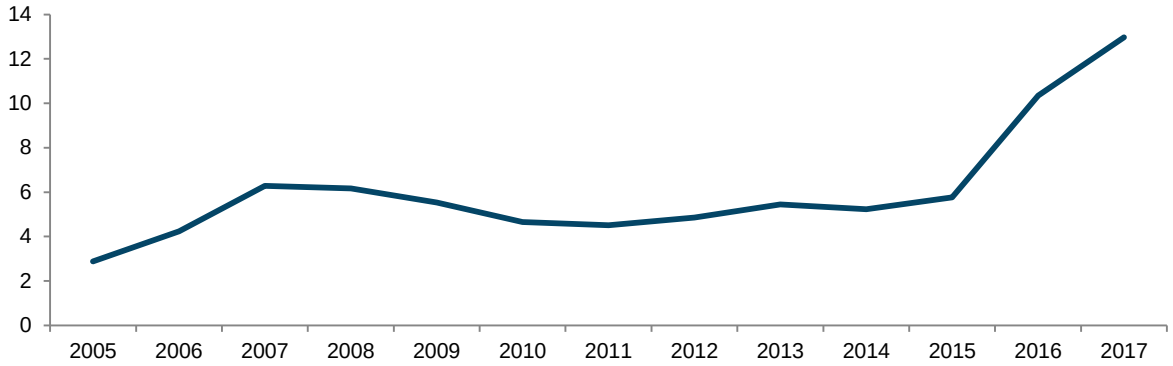
Lithium-ion technology is currently the leading rechargeable battery technology due to its light weight, much higher energy density, longer cycle life, and ability to provide deep discharges. With its provision of greatest vehicle range per unit of cost, it is almost certain that Lithium-ion batteries will remain the dominant technology platform for EVs over the next decade. Looking further ahead, it seems likely that Lithium-ion batteries will eventually be replaced by Lithium-metal batteries to continue cost and density improvement – a technology with lower graphite and higher lithium content.

Edinburgh Partners' battery technology research hypothesised that, among the major Lithium-ion battery chemistries, NMC (Nickel Manganese Cobalt) batteries appear to be best positioned to meet the strong demand growth from EV adoption due to their superior performance potential. NMC batteries have greater potential for energy density improvement, particularly via increasing their nickel content while lowering the share of more expensive cobalt and magnesium. Another winning factor of NMC is its higher cycle life compared to competing technologies such as NCA (Nickel Cobalt Aluminium), meaning less severe rates of charging capacity deterioration. Auto manufacturers' choices of battery technology vary by model; however, there has been a tendency towards NMC chemistries in recent years and there is strong consensus that NMC will remain the global market leader.

Interest in Lithium

As battery technology evolves and electric vehicle penetration accelerates, demand for EV metals (Lithium, Cobalt, Nickel and Copper) will increase. According to Edinburgh Partners' battery research, when compared to current demand levels, the biggest potential demand uplift from EVs appears to be in the lithium market where a major proportion, approximately 30-35%, is already for battery applications. Positive sentiment about EV demand and tight supply have led to a significant increase in the price of lithium over the past 2 years, as shown in Figure 3. The current spot price is now hovering around USD 16,000 per ton of Lithium Carbonate Equivalent (LCE). Previous to this sharp increase, prices had been range bound between USD 3,000 and USD 6,000 per ton for several years.

Figure 3 – SQM Realised Lithium (USD k/Ton LCE)

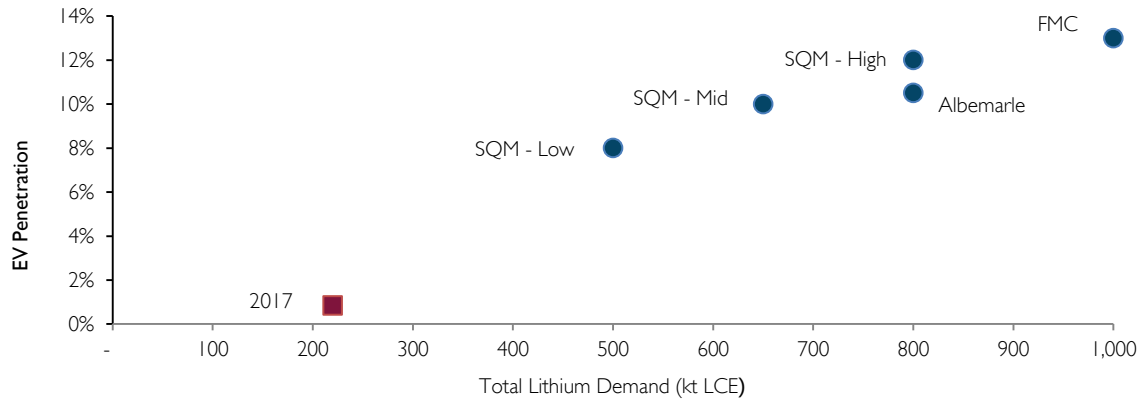


Source: SQM Corporate Filings

Lithium Demand

Annual global lithium demand is currently 220,000 tons of LCE; key sources of demand are consumer electronics, electric vehicles and a range of industrial applications. Figure 4 shows lithium demand forecasts for 2025 published by the three largest global producers (Albemarle, SQM and FMC) and compares this to current levels. Demand is expected to increase by a factor of 3-4 times by 2025 with the vast majority of the growth driven by pure Battery Electric Vehicles (BEV).

Figure 4 – 2025 EV Penetration and Lithium Demand Scenarios



Source Company Investor Presentation

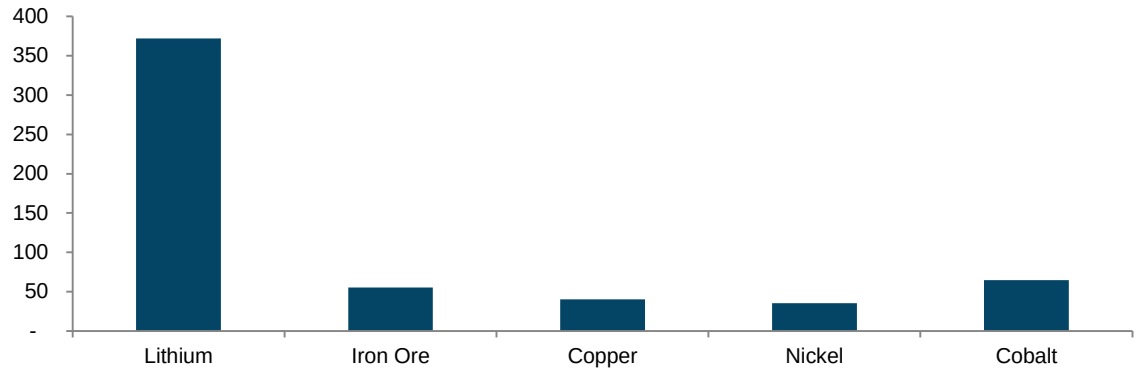
Key variables to consider are: EV penetration, hybrid penetration, lithium content in the battery and the size of the batteries. Differences in the assumptions drive the range of demand forecasts shown in Figure 4. FMC, for example, assume a higher penetration of BEVs and more lithium content per vehicle than to SQM and Albemarle.

Lithium Supply

Lithium is produced from two main sources: extraction from brine and rock mining. Brine-based production is the most efficient method, with cash costs of USD 3,000-4,000/ton; Chile is currently the main source of supply, with Argentina increasing in importance. Rock mining is higher cost; Australia is the largest producer, with cash costs of around USD 6,000-8,000/ton, while Chinese production is at the top of the cost curve (USD 10,000/ton). It is important to note that spot prices of USD 16,000 are currently significantly above even the most expensive part of the cost curve.

The world is not short of lithium; reserves are equivalent to 370 years of current production. Compared to other major traded metals, reserves of lithium are abundant, as shown in Figure 5.

Figure 5 – Reserves of Current Production (Years)



Source: U.S. Geological Survey, Mineral Commodity Summaries, January 2018

High spot prices give miners a significant incentive to increase lithium production at existing sites and to start new projects. Analysis of project economics for brine operations in Chile and Argentina suggests that returns at current prices are very attractive and there are a significant number of new projects expected to enter production over the next 3-5 years. The majority of the capacity expansion will occur in Chile and Australia; both countries have stable mining regulations and want to encourage the development of lithium production.

One example of the supply response is the significant expansions that the major producers, Albemarle and SQM, have recently announced at their brine operations at the Salar de Atacama in Chile. These assets are at the bottom of the global cost curve because the brine has high concentrations of lithium, and high evaporation rates allow the producers to process the brine cheaply. The Chilean government estimates that production at the Salar de Atacama could reach more than 300,000 tons LCE by 2026 –

current production is 90,000 tons LCE. This means that just two projects will supply 30-40% of the demand projected for 2025.

Balancing Demand and Supply

Market participants are generally in agreement that lithium demand will increase significantly over the next 10 years. As always, future prices will be determined by whether supply can match the demand growth.

As discussed previously, availability of lithium reserves is not an issue – the challenge is bringing these reserves into production. Future production will come from a mixture of capacity expansions at existing projects and greenfield projects. The Salar de Atacama example shows that existing projects can significantly increase production at relatively low cash costs; however, the success of greenfield projects is more uncertain, as the high returns available at current prices mean that significant capital will be deployed to the area and this increases the probability that projects will be delivered with consequent increases in supply.

The spot lithium price is currently above the production cost curve and this is driven by short-term shortages. In order to maintain this price level the balance between demand and supply must remain tight. Analysis of future supply growth suggests that the current lithium price level is unlikely to be sustainable.

One of the investment dangers is to become overly thematic on one area: EV's are growing, therefore lithium demand is rising, and therefore lithium company share prices should go up. This clearly ignores the anticipated supply side response. There may be supply constraints in battery production but, over the longer term, lithium is unlikely to be one of them.

Investment Implications

At the current time, shares of lithium producers appear to be discounting a lithium price of about USD16,000 per tonne but, given supply and demand dynamics, we think the longer term top-end price is likely to be closer to USD10,000 per tonne. Should implied pricing drop into range, then lithium producing companies become very interesting with those companies at the bottom of the cost curve, representing the most attractive opportunities.

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Lauran Halpin MSc, BA: Lauran Joined EP in November 2013 from Baillie Gifford with 7 years of investment experience. Lauran Joined Baillie Gifford in September 2007 as a graduate trainee, where she undertook a three year rotational programme spent analysing European and North American Equities as well as Corporate Bonds. In June 2010, she was made Baillie Gifford's global Healthcare analyst. Whilst at Baillie Gifford, she managed the Glenfinlas Global Healthcare fund. The fund was an unconstrained, global best ideas in Healthcare fund.

Lauran is responsible for researching the global Pharmaceutical and Automotive sectors and assisting in the management of client portfolios.

Lauran has an MSc. in Ecological Economics from University of Edinburgh 2005 and BS. in Biology from Davidson College (North Carolina, USA) 2003.

Richard Spalton MA, CFA: Richard joined Edinburgh Partners in October 2016 with eight years of investment experience. He is responsible for researching stocks globally.

Prior to joining Edinburgh Partners, Richard worked at Moneda Asset Management in Chile, where he was a Senior Investment Analyst covering LATAM TMT, Cement, Construction and Utilities.
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Charlotte graduated from the University of Edinburgh with a B.Sc. in Astrophysics in 2014 and went on to complete an M.Sc. in Sustainable Energy Futures at Imperial College London in 2016. Charlotte is currently working towards becoming a CFA charterholder.

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