Lithium: A Circular Economy Perspective for ESG Investment and Stewardship

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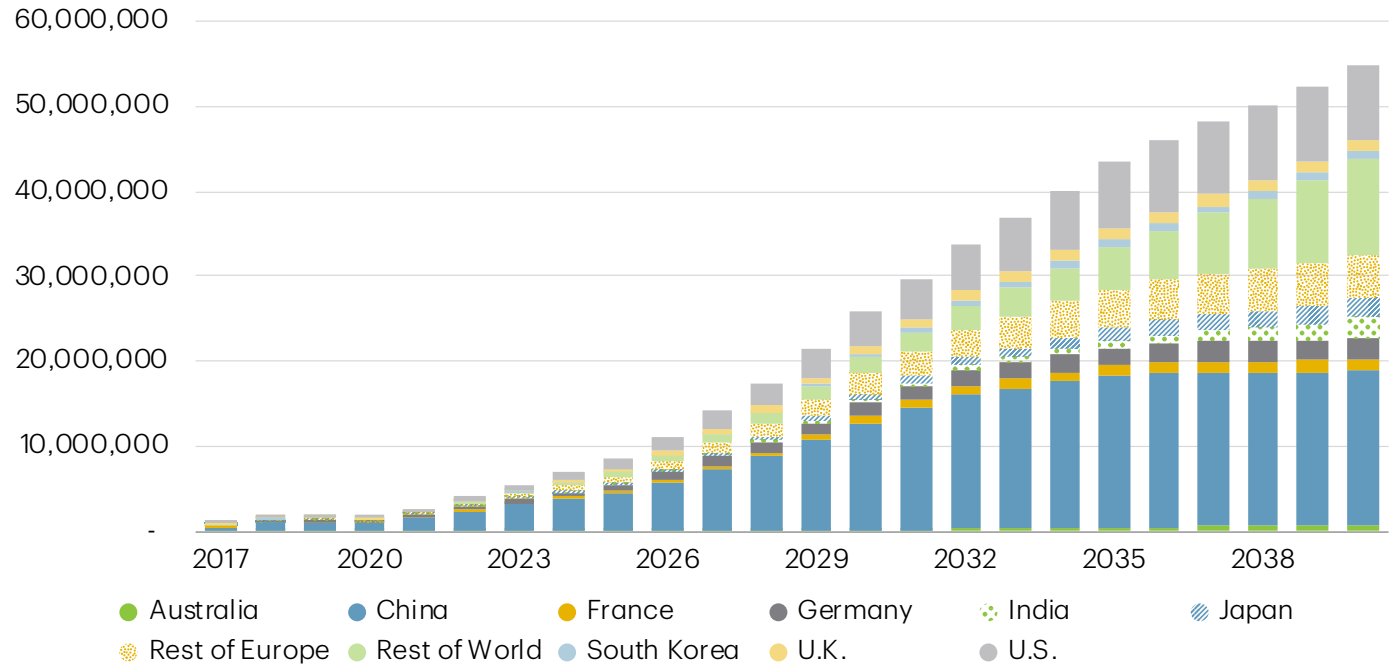
The race to achieve net-zero emissions by 2050 is presenting an interesting challenge and opportunity for circular economy sustainability objectives. A circular economy or systems thinker identifies interconnectivity between different pieces of the economy, society and environment, their relationship, and how looking at one piece is often insufficient compared to the whole picture. The circular economy applies restorative and regenerative design thinking to economics and aims to achieve sustainable outcomes each step of the way.

In order to curb and eventually reach net-zero greenhouse gas (GHG) emissions by 2050 commitments, some big shifts are underway. While the imperative of climate change is paramount, as investors we must acknowledge that a transition to a low- or no-carbon economy relies on activities that have potentially negative impacts. For example, with transportation accounting for 15% in global GHG emissions at the end of 2019[1], a switch from traditional vehicles to battery-powered electric vehicles (EVs) will help achieve climate objectives.

EV sales increased by 54% year-over-year in 2020 despite the COVID-19 pandemic, and demand for lithium-ion batteries is expected to grow 1030% by 2030, as per Bloomberg estimates.

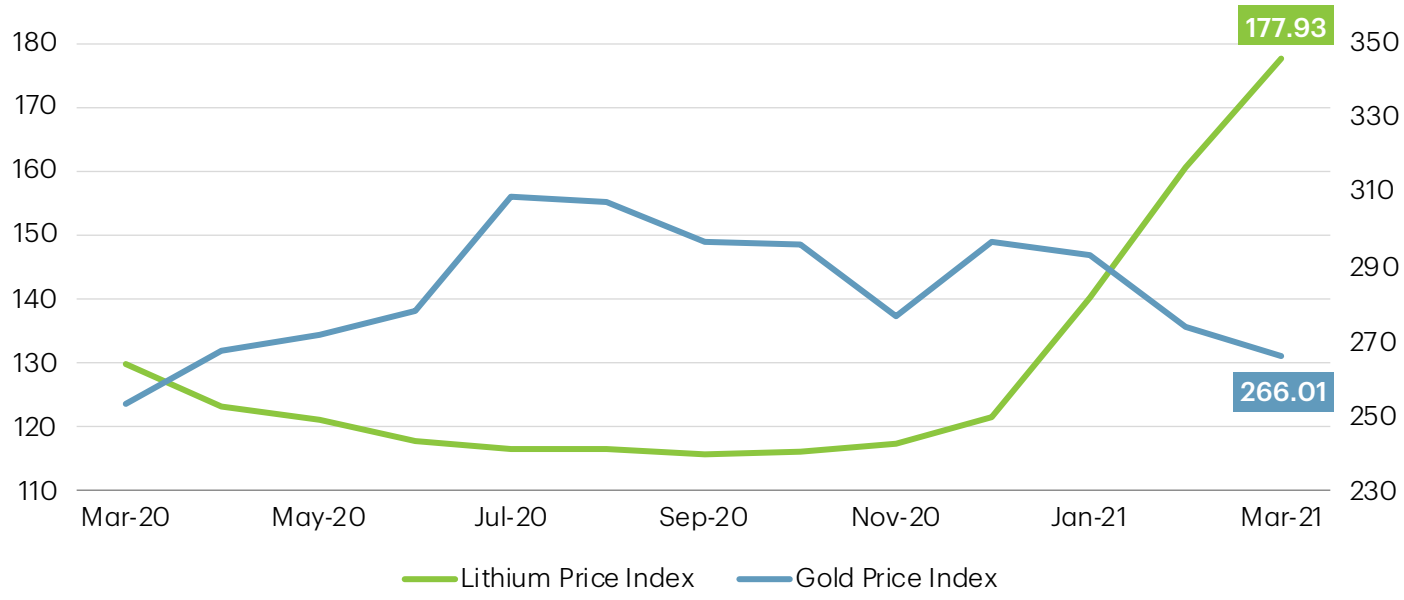
[1] https://www.c2es.org/content/international-emissions/

Exhibit 1: Projections on Electric Vehicles' Impact on Demand for Lithium Batteries



Source: BloombergNEF.

Exhibit 2: Lithium Price Index



Source: Bloomberg LLP, as of March 13, 2021.

This is not surprising given existing and upcoming regulations across different regions (China's 13th Five-Year Plan and the emissions reduction schemes of California and the European Union).

Investors in battery manufacturers and car makers as well as direct investors in renewable projects need to consider the environmental and social externalities associated with lithium in order to ensure that companies in their value chain are sufficiently addressing these challenges, which can potentially affect their supply dynamics.

Lithium production and water consumption

A Tesla Model S car battery uses 12 kilograms of lithium. Extraction of 1,000 kg or 1 tonne of lithium uses 500,000 gallons of water[2]. This means that one car battery requires approximately 6,000 gallons of water.

The majority of lithium is produced in Chile, Australia and the USA. China is the biggest supplier and has the largest lithium mining operations.

The South American triangle which covers parts of Argentina, Bolivia and Chile holds more than half of the world's supply of lithium. South America is also one of the drier places on Earth. In Chile's Salar de Atacama, mining activities consumed 65% of the region's water, which can potentially compromise the water requirements of farmers and other activities[3]. This could heighten the potential risk of community opposition just as in other mining activities, and companies can lose their social license to operate.

Air, water and soil contamination - effects on biodiversity and communities

Apart from water usage, lithium extraction methods use harmful chemicals. These chemicals are hazardous to aquatic life and water quality. They ultimately affect communities and their water supplies as they cause air and soil pollution. The emission intensities of nitrogen oxide (NOx) and sulfur oxide (SOx) of the specialty chemicals company Albemarle, for example, are significantly higher than other specialty chemical companies in the MSCI ACWI index[4].

According to the International Chemical Secretariat, lithium mining produces 17 chemicals, including brominated flame retardants[5]; these are cited on the list of hazardous chemicals, raising the possibility of restriction on their usage. Companies can be subject to significant environmental liabilities if contamination risk is not properly managed or mitigated.

In addition, at the end of life, if not properly recycled, rechargeable batteries create significant environmental damage. Once in the landfill, these substances contaminate groundwater, soil and air.

Opportunities in recycling

With strong tail winds in battery demand and consumption, as well as associated contamination risks in the landfill, recycling is a strong beneficiary of this trend if economical and scalable. Market reports indicate that the market for battery recycling will reach $137 million by 2027 in North America[6]. Most of the current recycling is accounted for by the consumer sector; however, given the electrification trends in transportation and industrial sectors, this growth number can be even higher.

GHG emissions in lithium-ion life cycle

Starting from mining and transportation, to battery manufacturing, shipping and car manufacturing, EVs have their own product carbon footprint. Many companies are now working with their suppliers to reduce Scope 3[7] emissions by switching to renewable sources of energy in their operations. Scope 3 emissions (indirect or value chain emissions) account for over 90% of the GHG inventory of an automotive original equipment manufacturer. However, progress on Scope 3 emissions remains preliminary. Much needs to happen before we can switch entirely to the virtuous cycle of net-zero emissions.

A systems view of sustainability and stewardship

Lithium batteries play a crucial role in decreasing our reliance on fossil fuels. At the same time, being mindful of ESG impacts in the lithium battery life cycle is important for environmentally and socially conscious investors. Shareholders, direct investors and creditors of companies involved in the EV supply chain, and other users of lithium batteries in general, can help move the discussion towards a systems view of sustainability by doing the following things.

[2] https://www.barrons.com/articles/new-risk-tesla-other-electric-vehicle-makers-lithium-supply-batteries-51601498472
[3] Juan Ignacio Guzmán, Patricio Faúndez, José Joaquín Jara, Candelaria Retamal (2021), *Role of Lithium mining on the water stress of the Salar De Atacama Basin.*
[4] MSCI ESG Ratings report for Albemarle Corporation as of March 2021.
[5] MSCI ESG Ratings report for Albemarle Corporation as of March, 2021.
[6] https://www.prnewswire.com/news-releases/north-america-lithium-ion-battery-recycling-market-report-2021-2027
[7] Scope 1: Company direct emissions
Scope 2: Emissions from energy purchased by the company
Scope 3: Emissions throughout supply chain and final use of product/services

Considerations for public market investors (shareholders and creditors):

- Research and establish best practices in lithium supply chains through ESG analysis of operating companies and industry best practices.
- Encourage research and development to spur technological innovations in reuse, recycling and disposal.
- Adopt best practices in product stewardship programs and plans to phase out hazardous chemicals.
- Encourage target setting for reduction of harmful emissions. Key metrics to track can include GHG, NOx, Sox emissions and other effluents.
- Understand political and governance risks of the regions from which battery minerals are sourced.
- Integrate ESG performance of companies into investment analysis and financial models (e.g. through a discount rate for ESG laggards to account for potential higher operational costs, fines or litigation costs that may arise from negative environmental and community impacts).
- Regularly engage with companies to better understand their practices, targets, performance metrics and future plans about minimizing environmental and social impacts. Engagement also helps to better understand companies' research and development plans about identifying more sustainable and viable options and technologies.

Considerations for direct/real asset investors:

- Integrate ESG factors into project planning and development - e.g. initial impact assessments as well as free and prior informed consent.
- Conduct regular environmental and social impact assessments, including ongoing effects on biodiversity and community resources.
- Establish operational best practices and performance reporting on sector/business-relevant ESG issues, such as waste management, air emissions (including carbon emissions from transportation), health and safety practices and performance, ESG accountabilities in executive compensation, and skills diversity at board level.
- Deeply understand ESG risks in their supply chains.

By directly and collaboratively engaging with companies on issues and metrics that ensure a holistic view of ESG performance of a company, investors can help mitigate ESG bubbles created by specific themes. This way, investors can play a significant role in facilitating a socially and environmentally just transition towards a net-zero economy.

ESG

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