APS1028 Project

**The era of EVs:** How battery manufacturers can respond to rising EV demand. Battery demand is increasing as the auto industry embraces electric vehicles. Bold moves in gigafactory construction, supply chain strategy, and talent acquisition can help industry participants gain a competitive advantage.

Background Research:

[EV battery shortage: The market gets hotter | McKinsey](https://www.mckinsey.com/capabilities/operations/our-insights/power-spike-how-battery-makers-can-respond-to-surging-demand-from-evs) – Problem Topic Article

[Electric vehicle battery value chain opportunity | McKinsey](https://www.mckinsey.com/industries/electric-power-and-natural-gas/our-insights/capturing-the-battery-value-chain-opportunity) – The Battery Market

[The Top 10 EV Battery Manufacturers in 2022 (visualcapitalist.com)](https://www.visualcapitalist.com/the-top-10-ev-battery-manufacturers-in-2022/) – Battery Manufacturers

[Lithium mining: What you should know about the contentious issue (volkswagenag.com)](https://www.volkswagenag.com/en/news/stories/2020/03/lithium-mining-what-you-should-know-about-the-contentious-issue.html) – Issue of Lithium

[The Big Battery Challenge: 3 potential alternatives to lithium-ion (imeche.org)](https://www.imeche.org/news/news-article/the-big-battery-challenge-3-potential-alternatives-to-lithium-ion) – Potential Alternatives for Lithium

Major metals needed for a lithium-ion battery:

Lithium – 54% Australia, The lithium triangle: nexus between Chile, Argentina, and Bolivia. Many environmental problems are associated with lithium mining and processing, like requiring insurmountable amounts of water!

Cobalt – 70% comes from the Democratic republic of congo: lots of problems with illegal mining, no ethical cobalt out there! Warlords, prices of cobalt have risen 300%

Nickel

Getting cobalt and lithium for EVs in itself is incredibly difficult but getting “green/eco-friendly” lithium and ethical cobalt is next to impossible!

One possible solution:

Requiring fewer raw materials for making batteries, i.e., making batteries better! Eg. The Solid-state batteries!

[**Jiangxi Ganfeng Lithium Co**](https://www.globaldata.com/company-profile/jiangxi-ganfeng-lithium-co-ltd?scalar=true&pid=115294&sid=19)**. Ltd**: Based in China with a [market cap](https://www.dnb.com/business-directory/company-profiles.ganfeng_lithium_co_ltd.4b7ad38f4320356c1d7fc3575eba85c1.html) of $38.6bn. [Jiangxi is primarily involved](https://www.globaldata.com/company-profile/Jiangxi-Ganfeng-Lithium-Co-Ltd/) in the research, development, production, and sales of lithium products. The company sells lithium in both its metal form and compounds, including fluorides, chlorides, and others. Jiangxi Ganfeng is the largest lithium metal producer in the world, while its lithium compound capacity ranks third worldwide and first in China. The firm holds lithium resources across Australia, Argentina, and Mexico and has over 4,844 employees. It reported a revenue of 2020 $839.26 m in 2020, almost double the $432.11 m it reported in 2016.

Project Objectives:

* To introduce the current battery market, EV battery specifications, raw materials required, etc.
* To analyze the diplomatic problem between The West and China and the battle for the control of the next big thing, the EV market!
* To assess the in-land solutions for the raw material crisis (battery crisis).
* To explore how one of the major manufacturers of Electric vehicles is handling this market, Tesla.
* To analyze the possible solutions to this crisis both in-land and on foreign soil.

Project Scope:

Within Scope:

* Key raw materials required in the manufacturing of a battery.
* USA’s/West’s hiccup of being too reliant on China for Battery raw materials (China controls the mining of the majority of the world’s Lithium reserves)
* The West’s solution: Thacker Pass, Nevada (USA’s largest Lithium deposit? Is Silver Peak Lithium Mine not enough?
* Factors required for the successful operation of a lithium mine.
* Why is the USA unable to start operations at Thacker Pass?
* Problems in mining Cobalt from the Democratic Republic of Congo.
* Why are gigafactories (manufacturing their batteries instead of buying them elsewhere) a thing now?
* How is Tesla tackling this world problem of shortage of highly expensive battery materials, manufacturing batteries, environmental concerns, etc.?
* Possible solution to raw materials problem: Designing batteries that require fewer raw materials? For example, Solid-State Batteries.

Outside Scope:

* Technical aspects of designing batteries.
* Plant layouts/design.
* Technicalities of Lithium ore processing.