Lithium-ion battery technology republic of china

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China is the leading producer of lithium-ion batteries. Chinese companies supply 80 percent of the world"s battery cells and account for nearly 60 percent of the EV battery market. Even some US companies that produce batteries rely on lithium-ion cell components produced by Chinese manufacturers.[2]

Before the 2000s, lithium-ion battery production was dominated by Japan with its superior technologies, by companies like Panasonic. Japan alone made 88% of the world"s battery supply. In the following two decades, China invested heavily in its sourcing and manufacturing processes. Since 2015, China surpassed Japan, Korea, and the rest of the world and became the largest exporter of lithium batteries. Combined with Japan and Korea, the countries account for 95% of lithium battery production in the world.[4]

China has the fourth-largest known lithium reserve with 1 million tons, behind Chile, Australia, and Argentina. Thus making them one of the biggest exports and capable candidates for developing lithium battery technologies. China continues to buy stakes in mining operations around the world. The world"s largest lithium mine in Australia, Greenbushes, is controlled by China"s Tianqi Lithium with its 51% stake.[5]

In the decade since 2010, the market capitalization of China"s lithium battery has had an average annual growth of 14%.[6] Of China"s more than 15 billion units of lithium batteries produced in 2019, China mainly exported to Hong Kong, United States, Germany, Korea, Vietnam, and others, where products and applications of the batteries are manufactured.[7]

The market capitalization for lithium batteries in China is estimated at 190 billion yuan (approximately 30 billion dollars) and is projected to reach 268 billion yuan (42 billion dollars) by 2026.[10]

Upstream also includes processing these materials from the mines into electrolytes, cathodes, anodes, etc. Midstream involves the design of the battery and manufacturing the batteries from electrolytes, cathodes, anodes, and other pre-processed parts. Downstream is the application of lithium batteries, such as cellphones, laptops, and cars.[13]

There are three main categories for products in the downstream - energy storage, consumer, and motor. The motor has the largest share with 53.95%, with consumers in second at 43.16%. The consumer segment is near saturation, while the motor segment is witnessing fast growth in global policies favoring electric vehicles. There are currently 72 Chinese companies in the race to produce lithium car batteries with Contemporary Amperex Technology leading with 50% of the market share.[14]

China is the world"s largest consumer of electric vehicles, with 400,000 electric buses in 2019, it houses 99%

of the world"s electric buses.[15] With Chinese policies favoring electric cars both for manufacturers and consumers, 1.3 million EVs were sold in China in 2020 alone, which represented 41% of global EV sales.[16] China has the goal of pushing electric vehicles to become 40 percent of all car sales by 2030.[17]

In 2020, 46.5% of lithium battery demand comes from electric vehicles,[18] far exceeding the previous lead of smart mobile devices. As the largest consumer of EVs, China itself has a large demand for lithium batteries to produce these EVs. In April 2021, China has reported a total of 8.4 GWh of lithium batteries installed in their electric vehicles, this represents a 134% increase from the year before.[19]

China Aviation Lithium Battery Technology Co. (CALB) was formed in 2015 as part of state-owned aerospace and defense firm Aviation Industry Corp of China Ltd. In 2022, it is going to become public in Hong Kong for $2 billion. As of July 2022, CALB has a market share in China of 11.2 percent. It is the second-largest maker of ternary nickel batteries.[25]

As one of the early leaders in China"s lithium battery industry, BYD Company along with other early players were responsible for the rapid development that transitioned China from a mimicker to a leading developer.[26] It has since transitioned itself into the automaker industry. With a split focus, it was responsible for 14.6% of the lithium batteries installed in electric vehicles countrywide in the first quarter of 2021.[27]

The procedure to produce lithium batteries is long and complex, from mining to refining, cathode production, cell production, to module assembly, before passing on to original equipment manufacturers. Each of those steps encompasses many micro-steps that require precision and time to ensure its quality. For the procedure of formation or aging within module assembly, it could take up to 3 weeks for each batch which contributes to 30% of the manufacturing cost.

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