

**Wednesday 24 June 2020**

**Written Testimony of Simon Moores, Managing Director, Benchmark Mineral Intelligence**

For: US Senate Committee on Energy and Natural Resources Committee

Hearing: Wednesday, June 24, 2020, at 9:30 a.m. EDT in Room 366 of the Dirksen Senate Office Building in Washington, DC and online.

Subject: Full Committee Hearing on the Impact of COVID-19 on Mineral Supply Chains

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When was the last time the USA built a heavy industry from scratch?

This is my third time presenting to the Senate in two and a half years on the criticality of securing supply chains for the electric vehicle and energy storage revolution.

In that time, we have witnessed a global battery arms race and watched the world's number of supersized battery plants – known as battery megafactories or gigafactories – go from 17 to 142.

China has increased its number of battery megafactories from 9 to 107, of which 53 are now active and in production

The USA has gone from 3 to 9 battery megafactories in the pipeline of which still only 3 are active, the same number as back in 2017.

Lithium ion batteries are a core platform technology for the 21<sup>st</sup> century.

They allow our energy to be stored on a widespread basis in electric vehicles and energy storage systems, and they spark the demand for the critical raw materials to be mined, chemically refined and made into engineered, functional materials.

A new global lithium ion economy is being created.

Yet, any US ambitions to be a leader in this lithium ion economy continue to only creep forward and be outstripped by China and Europe.

In more stark terms: China is building the equivalent of one battery megafactory a week, the USA one every four months.

This rise of the battery megafactories will require demand for battery raw materials to increase significantly: by 2029, demand for nickel will double, cobalt to grow by 3 times, flake graphite but four times, and lithium by more than six times.

The tectonic plates of the industry have shifted.

Layered on top of this are new, emerging demands of supply chain security, transparency and accountability.

Not only has the COVID-19 pandemic showed the weakness of truly global supply chains and the need to build domestically, it has continued to shine a spotlight on how these raw materials are extracted around the world.

In the USA, progress is far too slow on building out a domestic lithium ion economy, but the opportunities that remain are vast and pioneers have emerged.

Tesla has continued to lead the industry and build on its Nevada gigafactory by announcing super-sized battery plants in Germany and China and is widely expected to announce a fourth plant in Texas.

Ohio, with bipartisan support and of organizations like JobsOhio, has recognized the scale of this opportunity and successfully attracted the \$2.3B General Motors /LG Chem joint venture.

The state now has the potential to become a second major regional hub for batteries in the USA.

You can also turn to Alabama, Georgia and Tennessee for inspiration and knowhow in their successful attempts to court automotive and battery cell investment.

Yet most of these developments are more stand-alone achievements than a coherent US plan, and all rely on imported raw materials and chemicals for the two main components that make a lithium ion battery: the cathodes and anodes.

America has some of the best cathode knowhow in the business, yet only three cathode plants producing under 1% of global output. While China produces over two third of global supply from over 100 cathode facilities.

It's a pleasure to see Umicore on this panel here today - one of the true leading lights and a company that should be leading major capacity expansions in the US as it has done elsewhere in the world.

For graphite anode, the USA has zero manufacturing plants that can supply automotive-grade anode at scale. China has 48 plants and controls 84% of total global supply.

Developing this mid-stream of the supply chain will create a domestic ecosystem, an engine for more battery plants to be built, more electric vehicles to be made, and will spark the development of domestic mining and chemical processing.

I return to my original question: When was the last time the USA built a heavy industry from scratch?

FDR's New Deal built the core infrastructure that the USA still relies on today.

Nearly 100 years on eerily similar economic and industrial circumstances, your country has to do this all over again for the 21<sup>st</sup> century.

Yet instead of dams, you need to build battery megafactories in their multiples.

Instead of highways, bridges and tunnels, you need to build the supply chains to enable these megafactories: the cathode and anode plants and the lithium, cobalt, graphite, nickel and manganese sources to feed them securely and consistently.

And this has to be done at a speed, at scale and quality that will make most of corporate America uncomfortable.

Even more, these supply chains need to be underpinned by Giga sized battery recycling facilities to match the scale of these new operations and close the loop.

One can also look to the creation of a widespread semiconductor industry in the 1980s.

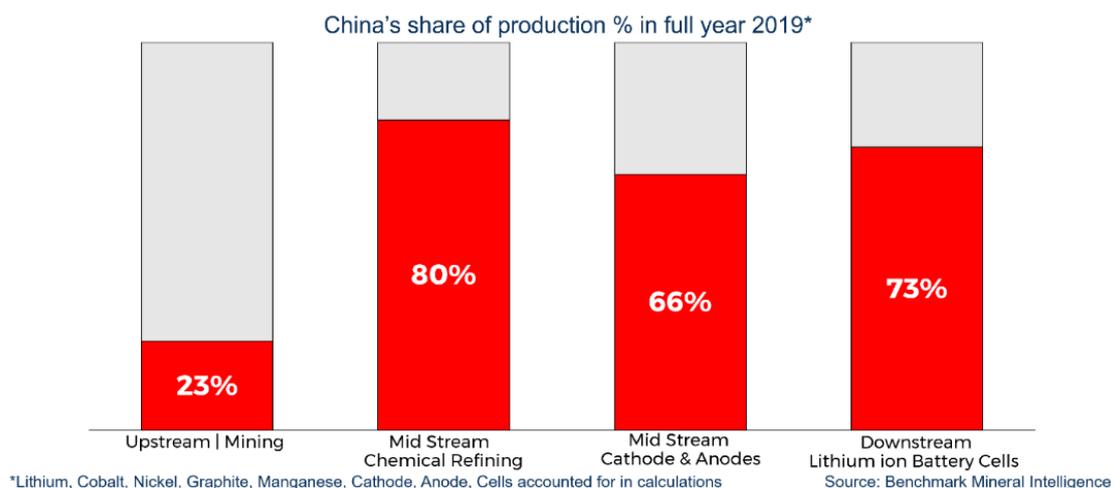
The lead that the USA built in semiconductors and computing power due to companies like Fairchild Semiconductor and Intel Corporation has sustained the USA's dominance in global computing for over 5 decades.

Likewise, those who invest in battery capacity and supply chains today are likely to dominate this industry for generations to come.

It is not too late for the US but action is needed now.

I would like to thank Senator Murkowski who's leadership on this subject over the years has been crucial and relentless. The industry is listening.

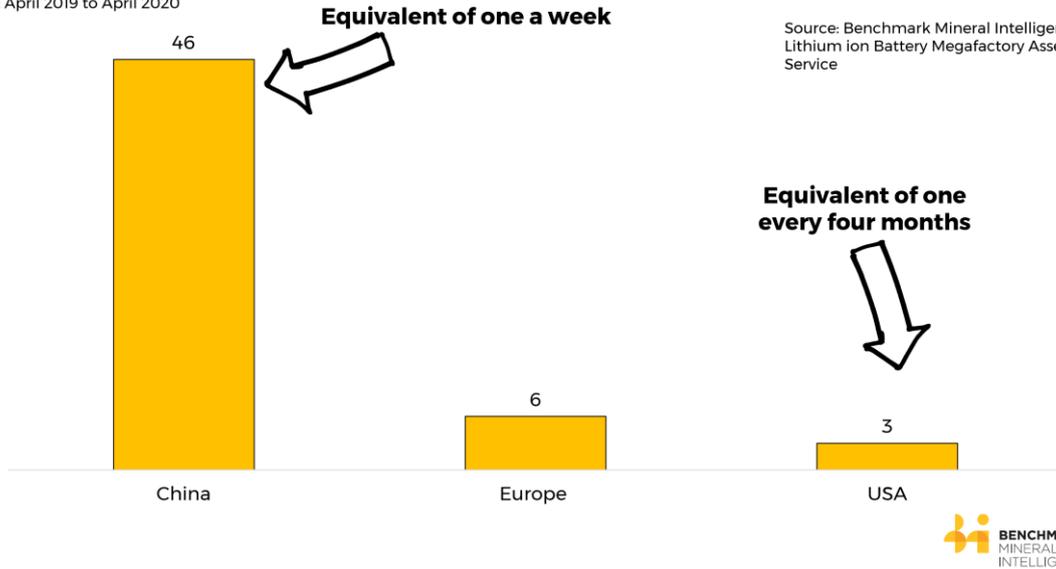
### Where does China's dominance lie in the lithium ion battery to EV supply chain?



China's supply chain dominance lies in the midstream of the lithium ion battery to electric vehicle supply chain. While many long term contracts and asset ownership secure raw materials located in foreign countries, China's domestic chemical conversion, cathode and anode capacity creates an ecosystem for lithium ion battery and electric vehicle production to flourish.

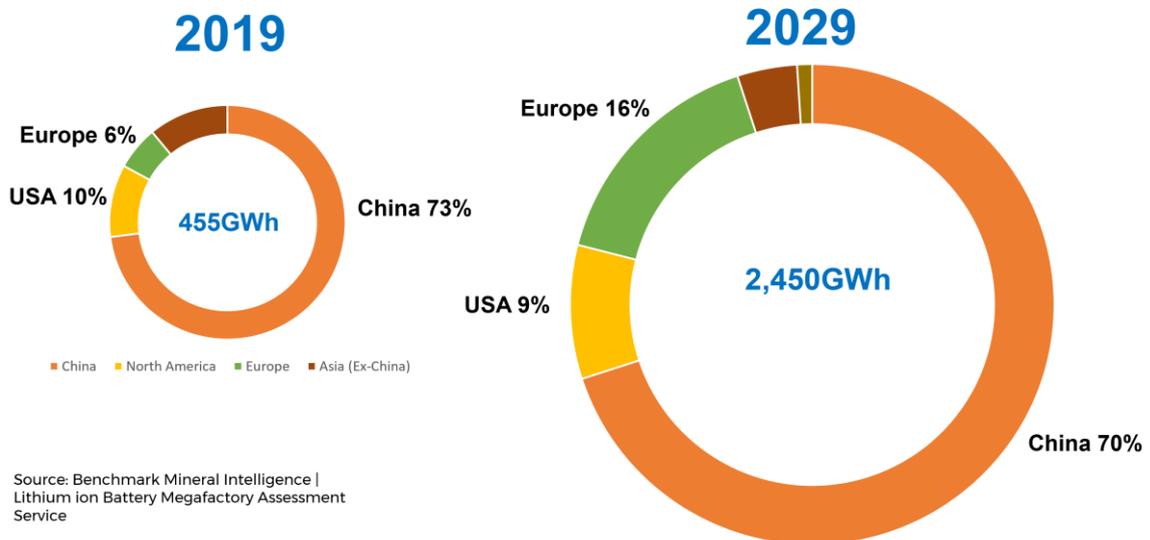
## The number of new battery megafactories in last 12 months

Data: April 2019 to April 2020



Between April 2019 and April 2020, China planned 46 new lithium ion battery megafactories for its electric vehicle and energy storage industries versus 3 plants in the USA.

## China surges ahead in the lithium-ion battery arms race



Benchmark forecasts China to account for 70% of lithium ion battery capacity in 2029 versus 16% within Europe and 9% in the USA. Europe's capacity investments over the last 18 months have allowed it to increase its share of the global capacity pie from 6% to 16%.

A handwritten signature in black ink, appearing to read 'Simon Moores', with a long horizontal stroke extending to the right.

Simon Moores  
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Benchmark Mineral Intelligence