



ELON MUSK: OUR LITHIUM ION BATTERIES SHOULD BE CALLED NICKEL-GRAPHITE...

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... Yet Tesla executives fail to allay lithium shortage fears //

Tesla CEO Elon Musk and CTO JB Straubel have attempted to play down the role of lithium in a lithium ion battery, but could have inadvertently given themselves further supply headaches.

In response to a question of whether there is enough lithium supply, Musk diverted it onto two other key battery raw materials of nickel and graphite in an attempt to allay fears that there will not be enough lithium for an operational Gigafactory, which is set to become world's largest lithium ion battery plant.

"Our cells should be called Nickel-Graphite, because primarily the cathode is nickel and the anode side is graphite with silicon oxide... [there's] a little bit of lithium in there, but it's like the salt on the salad," the CEO explained.

Musk said that the amount of lithium in a lithium ion battery is about 2% of its total volume and that “lithium in a salt form is virtually everywhere... there is definitely no supply issues with lithium.”

Tesla also explained that it has been working with a number of lithium producers “from tiny start-ups to large name lithium companies all around the world and working with them to figure out the most economical or efficient ways ... to have the capacity ready when we need it”.

Lithium’s most severe shortage

Despite Musk’s confidence, the lithium market is in its most severe shortage of modern times, a shortage that has seen internal Chinese prices for hydroxide reach \$30/kg while rest of the world contract prices have risen to up to \$14/kg (FCL).

While Tesla has said that it does not expect any shortage for the Gigafactory, it also revealed that the battery megafactory will be producing complete cells, from scratch, ahead of schedule in Q4 2016.

“We need to make sure we have the [lithium] extraction and processing capacity [ready] but it’s not that much different to lining up other supply chain components for the car it just has long lead time,” Straubel explained.

However, with limited new lithium supply set to hit the market within the next 18 months, the shortage of both carbonate and hydroxide is set to continue particularly as China’s electric bus production and electric car output surges.

This timing will also coincide with Tesla’s Gigafactory expansions in 2017 and 2018.

It is, however, important to note that new short term lithium supply will be coming from hard rock lithium sources in Australia destined for China.

As stressed by Tesla, lithium is an immature market that is not exchange traded. Last year, only 15,000 tonnes of lithium hydroxide was used in batteries.

Tesla alone will need at least a third of this quantity in 2017, its first year of Gigafactory operation.

While FMC Lithium were the latest to announce plans to triple its lithium hydroxide production by 2019 to 30,000 tonnes, the question remains whether there will be enough feedstock product available to supply this.

Graphite overlooked

When downplaying the lithium supply issue, Tesla explained that the most important cost factors to a lithium ion battery included the cost of nickel and the graphite anode.

“The main determinants on the cost of the cell are the price of the nickel in the form that we need it... and the cost of the synthetic graphite with silicon oxide coating,” explained Musk.

Graphite has not experienced the price spikes that lithium is going through primarily because the price is driven by the materials' consumption in steel, a globally depressed market.

As a result, graphite's supply situation has fallen under the radar.

At present, Tesla uses Panasonic manufactured cells which use both synthetic graphite and natural spherical graphite for anode material, all of which is sourced from China.

For the Gigafactory, however, Tesla has had to source all raw materials itself and, in a bid to drive costs down and improve battery performance, **Benchmark understands that Tesla favours the natural spherical product due to its lower cost profile and lower carbon footprint for manufacturing.**

Today, 100% of natural spherical graphite is produced in China, and last year alone production expanded by nearly 50%. Increasing demand has seen prices of uncoated spherical graphite increase by 10% in the last two months.

While the country is increasing its spherical graphite capacity, there is a fear that there will not be enough quality product available for internal Chinese needs together with other emerging customers such as Tesla.

In many ways, however, Elon Musk was correct. Graphite's importance to the cost of a lithium ion battery cannot be underestimated.

While the average cost of an anode is 30% of a battery, graphite is 50% of the anode cost equating to 15% of the cost of a cell.

Meanwhile, the average cost of the cathode is 40% with lithium being 50% of the cathode cost, equating to 20% of the cost of a cell (before the Q1 2016 price spike).

If you consider that there is more graphite in a lithium ion battery than lithium, the cost of graphite to a battery could be as, if not more, significant than lithium. It just has not been considered because the price of flake graphite feedstock is low and there is a synthetic substitute.

But considering the preference towards natural spherical graphite, and the fact that demand is outpacing new supply, it is a subject that could soon rise to the surface, and in many ways, that is thanks to Tesla putting it on the radar.

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