

The Power of 3

ISSUE 19
November
2017

Driving the future further

Watch out, Tesla: there's
a dragon on your tail!

'Luck is what happens when preparation meets opportunity'

~ Seneca the Younger

Overview

According to the *Nikkei Asian Review*, Chinese manufacturers "continue to electrify global markets for lithium-ion [Li-ion] batteries" for use in consumer electronics, with China leading the world in battery-cell manufacturing.

Already in China, more than 40 established companies mass-produce low-cost battery components for the electronics market: high-purity electrolytes (a core component); separators (which isolate cathode and anode) and materials for the cathodes and anodes themselves. Companies from other sectors are also moving into this space.

Now that all major automotive producers are committed to electric vehicle (EV) production and governments worldwide aiming to phase out the internal combustion engine, and with power utilities simultaneously beginning to install huge storage systems to smooth the ebb and flow of renewable sources of energy, the canny Chinese see serious opportunities in the emerging EV market – what *Forbes* describes as a US\$240 billion industry in the making, for which reliable, high-performance batteries are essential (the same being true for stationary energy storage).

Like a raft of others, *Bloomberg* predicts that, in China, EVs and the batteries that power them will become very big business in the next five years:

As Elon Musk races to finish building the world's biggest battery factory in the Nevada desert, China is poised to leave him in the dust.

What's the rush?

Like many other governments, Chinese central planners want to phase out diesel and gasoline cars in favour of EVs sooner rather than later.

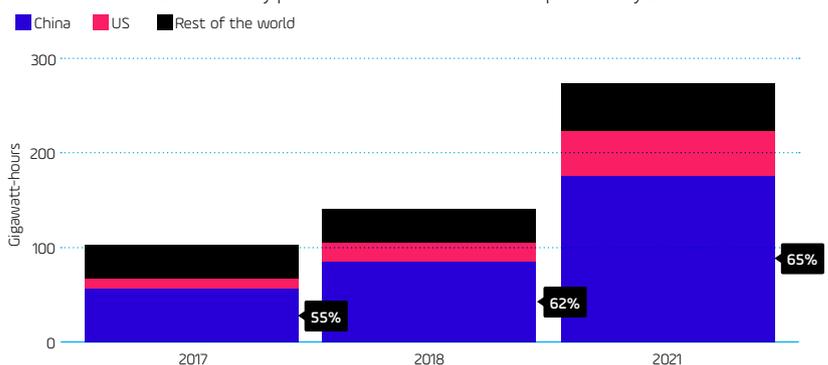
Their motivations, says *Green Car Reports*, are that China:

- desires technological leadership globally;
- imports more oil than it produces or has in reserve;
- suffers from severe urban air pollution, and
- lacks intellectual property in plug-in hybrid vehicle technology (touted by some auto-makers as a practical transitional technology while the world weans itself off oil and internal combustion engines).

For the past decade China has ranked as the largest vehicle market in the world. Chinese auto-assemblers generally choose home-grown products; therefore, more than 90% of locally made EVs are powered by locally produced batteries. Ergo, pretenders to the throne of global leadership in EV battery manufacture face fierce competition from The People's Republic.

Power surge

China's share of Li-ion battery production is forecast to hit 65 per cent by 2021.



[Source: Bloomberg New Energy Finance.]

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The biggest producers you probably never heard of ...



At present in China, so many companies are churning out batteries for EVs that the country's leaders have set minimum capacities, as PushEvs.com notes:

With electric cars the battery technology is the most important part; it's what differentiates the best from the rest. Knowing this, in 2016 the Chinese government passed legislation that requires EV cells to achieve an energy density of at least 200 Wh/kg¹ ...

Chinese companies [with] vast resources to invest in acquiring or developing battery technologies are more likely to dominate the global battery cell market in the coming years.

The Chinese are also considering minimum production standards to further strengthen their position among leaders in the field.

Some industry sources maintain that to become a champion in the battery-making stakes, a Chinese company must first shed any foreign investment, making it eligible for subsidies and other policy support. While China has certainly subsidised its EV makers heavily since 2012, this year Beijing called for Chinese companies to double their EV battery capacity by 2020 and encouraged them to invest in factories overseas.

Build Your Dreams (BYD)

Right now (although opinions differ), Panasonic – which teamed with Elon Musk to open Tesla's vast Gigafactory) – leads the world in EV battery manufacture ... but only just.

Warren Buffet-backed, Hong Kong-listed **Build Your Dreams (BYD)** is China's – and the world's – leading manufacturer of EVs (cars and buses), as well as a major supplier of batteries globally, with a market capitalisation of US\$18.7 billion.



At the APTA Expo in the US recently, the company unveiled "the world's first 45-foot battery-electric commuter coach bus" and showcased a number of other commercial EVs. Today, more than 27,000 of its electric buses are in service around the world.

The *Financial Review* maintains that this year BYD overtook Tesla in the battery and EV business, and that the company's battery factory near Shenzhen is more than *eight times larger* than Musk's behemoth in Nevada (see *The Power of 3*, issue 3).

Contemporary Ampere Technology Ltd (CATL)

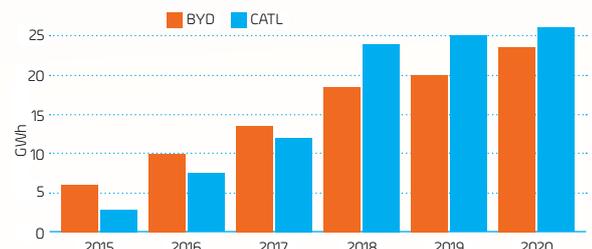
The focus of large – and inexorably expanding – Chinese company CATL is narrower: it's dedicated to Li-ion battery research, development and production for EVs and energy storage systems, and the evolution of battery management systems.

Robin Zeng, founder of leading Li-ion battery-maker Ampere Technology Ltd (ATL), established CATL in 2011 and the latter is now valued at US\$11.5 billion. Initially, ATL held a 15% stake in CATL ... until, that is, EV sales took off. However, the two companies are said to maintain a close relationship.

Describing itself on its website as 'the rising Chinese lithium power' and the 'third-largest lithium battery manufacturer in the world'², CATL's ethos is that of contributing to a sustainable energy future, one that involves innovative EV batteries with longer range and shorter charging speeds.

With respect to China's minimum standards, CATL's second-generation NMC battery cells (see *The Power of 3*, issue 18) have already significantly exceeded the nominated capacity.

Today, CATL collaborates not just with Chinese auto-makers but also international enterprises like BMW, Hyundai, Daimler and NEVS (formerly SAAB), and in so doing is rapidly extending its reach. Further, CATL is currently in the running for a huge contract with Volkswagen and rumoured to be working with Apple on a confidential EV-related project.



[Source: company data, BofA Merrill Lynch Global Research.]
Note: 2015 output figures compiled by BofA.

According to the Bank of America (BoA), CATL could surpass BYD in battery production by 2018³.

Fortune, too, predicts that by 2020 the company could be a dominant force globally:

CATL is China's answer to Japan's Panasonic and South Korea's LG Chem, [having] tripled its production capacity for lithium-ion car batteries in the past year to keep up with the surge in China's sales of EVs.

And finally ...

Fancy aerial ride-sharing? That's Uber's grand plan for the not-too-distant future. Indeed, the company's first partner cities for its Elevate project – Dallas-Fort Worth in Texas and Dubai in the United Arab Emirates – are already aboard.

Potential problems include noise, how to regulate testing and the implementation of technology, and how flying cars could conform to existing certification processes and air-space management systems.

Such issues aside, Uber, as *The Guardian* reports, has progressed its plans by signing a contract with NASA to develop management software for its all-electric flying taxi service. The company has already partnered with five manufacturers to develop vertical-takeoff-and-landing (VTOL) aircraft and initiated plans to build 'skyports' for its VTOLs in Los Angeles. Uber says it will begin testing the service in LA in 2020. The adage 'An eye in the sky' may take on a whole new meaning ...

NOTES

¹ Watt-hours per kilogram (Wh/kg) = a unit of specific energy used to measure the density of energy in batteries and capacitors: 1 kilo of battery material can produce electricity at a level of 400 watts for an hour.

² CATL is probably now the second-largest Li-ion battery manufacturer in the world.

³ CATL maintains that, as of mid-2017, it's already overtaken rival BYD in terms of sales.

Which Perth-based company aims for lithium sustainability in the EV era?

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