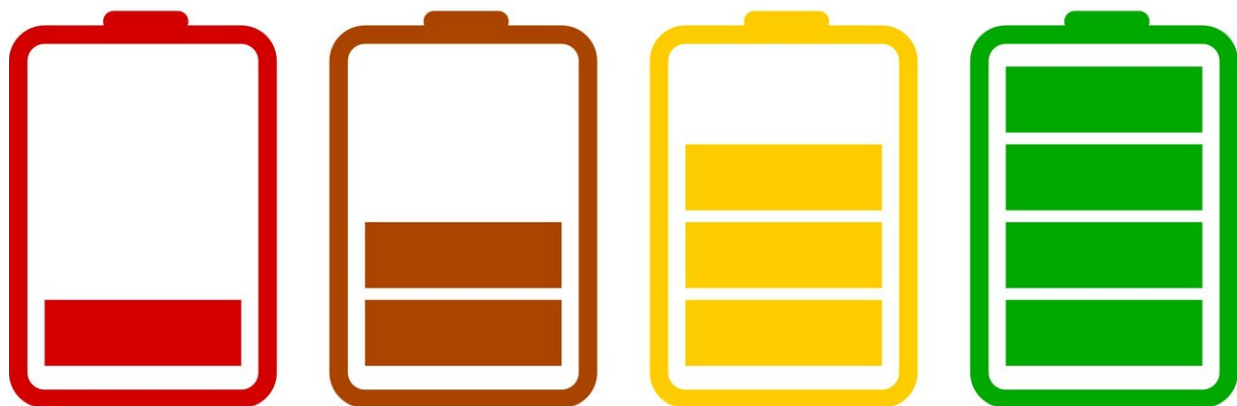


The electric car battery boom has screeched to a halt, for now

June 18 2020, by David Stringer and Akshat Rathi, Bloomberg News



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Three decades of advances took lithium-ion batteries from powering handheld Sony camcorders to propelling Tesla's popular electric vehicles. The rapid rise is facing a major test in the COVID-19 pandemic.

Demand for [rechargeable batteries](#) will decline for the first time this year, as sales of electric cars—the biggest user—slump with novel

coronavirus pummeling the [auto industry](#), according to BloombergNEF forecasts. Battery shipments to carmakers are forecast to fall 14% in 2020, and the effects of the slowdown are seen lingering into next year.

Major producers, including South Korea's LG Chem Ltd., a supplier to Tesla Inc. and General Motors Co., have cut annual sales forecasts. Analysts expect the industry's planned vast expansion of manufacturing capacity to slow down. Startups burning through cash as they work on potential breakthrough technologies are bracing for a tougher sell to secure funds.

And yet, from Silicon Valley laboratories to China's Contemporary Amperex Technology Co. Ltd., the world's top producer, optimism over the [lithium-ion battery](#)'s longer-term outlook is undimmed. Batteries, say automakers and utility companies, are still on track to become more powerful, cheaper and ubiquitous, not just in passenger vehicles, but also in additional forms of transport, consumer electronics and large-scale energy storage.

Despite short-term pressures, Zeng Yuqun, chairman of CATL, said there is "great confidence in the long-run." In less than a decade, his company has grown to lead its industry: CATL's sales rose 90% in 2019, according to BloombergNEF.

Lithium-ion battery demand has more than doubled since 2015 and remains on track for about a ninefold expansion from last year to the end of the decade. The sector is also forecast to keep lowering costs. Battery prices plunged 87% in the past 10 years, pushing plug-in electric cars to near sticker-price parity with gas guzzlers.

The pandemic might even prove to be an opportunity, with at least some governments, including those of Germany and France, using virus recovery funds to help accelerate a transition from internal combustion

engines to battery-powered alternatives. France will offer about 8 billion euros (\$9 billion) to its auto sector to bolster support for electric vehicles; Germany's stimulus package includes about 5.6 billion euros for the sector and will require gas stations to install charging units. "This is a historic plan to confront a historic situation," French President Emmanuel Macron said on May 26.

There are other sources of optimism. Volkswagen AG on June 16 announced an additional investment of \$200 million in QuantumScape Corp., a battery technology startup founded by former Stanford University researchers, after committing \$100 million in 2018. In May, the carmaker became the biggest shareholder of Chinese battery producer Guoxuan High-Tech Co. Ltd.

"The train's left the station on both renewable power generation and electric vehicles, and no one is going to put that train in reverse," said Jeff Chamberlain, chief executive officer of Volta Energy Technologies, a Chicago-based fund focused on energy investments. Chamberlain previously led energy storage initiatives at the Argonne National Laboratory, the U.S. government facility seen as having been pivotal in the transfer of battery technology from academia to the auto sector.

Battery makers also are quickly making progress on three key fronts: battery life, power and cost. CATL recently announced it will soon begin production on a battery that can operate for 2 million kilometers (1.2 million miles), or about 16 years. The capability puts it far ahead of any of the batteries on the market today, which typically are under warranty for about 150,000 miles, Zeng said.

Tesla and GM are each developing batteries that can last a million miles. Neither have yet said exactly when they'll be ready. GM is "almost kind of there on longer life," Doug Parks, an executive vice president, said at a May 19 Citigroup Inc. event. The car maker is "experiencing nearly

that in some of our products today," Parks said.

Combustion engine vehicles are currently scrapped in the U.S. after about 200,000 miles, Tesla said in a June 8 report, meaning a longer-life battery pack could dramatically extend a car's lifespan, particularly useful for taxis or delivery trucks. More important, a million-mile pack could be resold by a consumer to be deployed in a second vehicle, offsetting some of the initial purchase price.

Tesla is planning to provide further details on its battery innovations in the coming weeks at what it's billing as a "battery day" investor seminar. It had tentatively been scheduled for April but was delayed on account of COVID-19 travel concerns and restrictions.

One critical update investors are expecting: the average cost of batteries used in Tesla's various models. The carmaker's numbers typically set the standard for others to catch up to, and the car battery still accounts for about 30% of the total cost of an electric vehicle. Better technology and rapid growth in manufacturing capacity has already sent the price of lithium-ion batteries tumbling, down from more than \$1,000 a kilowatt hour to an average of \$156/kWh at the end of 2019, according to BNEF.

An industry average battery price of \$100/kWh, should be achieved in 2024, BNEF analyst James Frith said at a seminar in May, leading to price parity between electric cars and combustion engine vehicles. Additional savings through 2030 will lower costs further, though they'll prove harder to achieve and will depend on additional advancements and new technology, according to Frith.

Every battery has three key components: two electrodes, cathode and anode, with an electrolyte—usually a liquid—to allow the battery to charge and discharge.

A key, pending breakthrough will be the addition of silicon into battery anodes in place of graphite. California's Sila Nanotechnology Inc., which counts Daimler AG among its investors, says the silicon will help make a single charge last at least 20% longer.

The technology is being applied to consumer devices that are due to hit the market next year, said Sila CEO Gene Berdichevsky. There's also potential for the technology to make its way into some supercars or luxury vehicles as early as 2023—and mainstream vehicles after that, Berdichevsky said. "There's now more engineering resources at the battery makers that we work with," he said. "There's more capacity on the production line to try new things.

"A more significant advance could be achieved before the end of the decade via the commercialization of solid-state lithium-ion batteries for regular cars. Such a development would enable smaller battery packs, reducing safety risks and dramatically improving energy density, allowing cars to travel much further on a single charge.

Solid-state technology does away with the liquid electrolyte, replacing it with a material such as ceramic, glass or polymer. Toyota Motor Corp., the leader in development of the technology, is on track for commercialization in the first half of this decade, the company said.

Colorado-based Solid Power Inc. has started shipping its solid-state batteries to prospective customers in the auto industry for testing. The startup is likely to face challenges in securing funding, while its products go through the years-long process of verification. The batteries won't be available for purchase before 2025, if the company is able to navigate through the current economic downturn.

"I'd be lying if I said raising capital in the near term is not going to be challenging," said Doug Campbell, Solid Power's CEO.

Those able to withstand short-term pressures should benefit from a demand wave that'll make about 31% of the world's passenger cars—about 500 million—battery-powered by 2040, according to BNEF.

There's also rapid growth coming from two-wheelers such as motorbikes and scooters, as well as in large-scale energy storage. Above Moses Lake, Washington, last month, the maiden flight of a converted, all-electric Cessna plane pointed to an additional potential source of demand.

It's a long-term outlook that's offering the [battery](#) industry reassurance. With parts of California under shelter-in-place restrictions, the board of Sila Nanotechnology, which includes General Electric Co.'s financial crisis-era leader Jeff Immelt, met last month via videoconference to consider how best to handle a pandemic-led downturn.

"They said: Keep going, be thoughtful in your investments, but keep investing," Berdichevsky said. "Now is not the time to stop."

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Citation: The electric car battery boom has screeched to a halt, for now (2020, June 18) retrieved 17 April 2024 from

<https://techxplore.com/news/2020-06-electric-car-battery-boom-screeched.html>

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