BATTERY PRODUCTION TODAY AND TOMORROW

TOO MANY MANUFACTURERS, TOO FEW CUSTOMERS

March 2018

Study of the battery production market
Berylls’ study shows that battery production capacity will continue to exceed the predicted demand by up to 30 percent for many years.

Numerous new battery pack manufacturers are crowding onto the market, mainly in Asia, but also in Europe.

The largest manufacturing capacity is in China; the USA is greatly expanding its share.

Market consolidation is inevitable; well-known manufacturers will disappear.

Berylls’ analysis suggests a second-life reuse of batteries is an important business model for battery manufacturers.
Demand for car traction batteries continues to grow. China currently accounts for a third, Japan for a good quarter, and the USA, with 16 percent, for less than a fifth of global demand for battery cells.

European suppliers, on the other hand, play a subordinate role. The declared aim of the USA is to cut itself an even larger slice of the pie. Tesla’s gigafactory, in collaboration with Panasonic, will make a significant contribution to this. But China, too, is expanding capacities at a breathtaking speed.

The comprehensive international study by Berylls Strategy Advisors shows that even by 2020, two out of three battery cells will originate from China, and U.S. production will deliver more than every fifth cell - to the detriment of other producers. Japan and South Korea, most of all, will lose their significance in percentage terms.

In addition, cell technology continues to advance, forcing cell suppliers and their OEMs to continually modify their products and production systems. This is driven by the scarcity of some raw materials used in conventional lithium ion batteries and the fact that these materials are often found in politically sensitive countries. In the future, new technologies such as lithium-air, lithium-polymer and solid state batteries will be used in the automotive world in order to reduce dependence on raw materials such as cobalt and to increase battery performance pr kg and per $.
However, it is extremely problematic for all battery producers that the manufacturing capacity for electric vehicle traction batteries is growing stronger than the demand by the auto industry. Some battery pack manufacturers have announced they will greatly expand their production capacity; new players show great interest in entering the market. However, sales figures for e-vehicles are not increasing fast enough - even in the most optimistic scenarios currently under discussion. A battery bubble is emerging. As the Berylls study shows, nothing in this disparity will change in the next few years.

On the contrary, the chasm will widen at first, before capacity and demand converge again. In the long term, the surplus global battery manufacturing capacities will be 30 percent - based on the energy storage capacity produced, not the numbers of battery cells. This will make a strong drop in price and market consolidation inevitable. This trend will not even be halted by isolated bottlenecks among suppliers of battery cells - rather, cell demand will continue to rise with the increasing volume of EV sales.

**BATTERY PRODUCTION CAPACITY AND DEMAND WILL STILL DIVERGE WIDELY IN 2025.**

**THE CURRENT GAP BETWEEN SUPPLY AND DEMAND FOR BATTERY CAPACITY FOR XEVs PUTS PRESSURE ON THE ENTIRE INDUSTRY**

**ESTIMATED GROWTH OF SUPPLY AND PRODUCTION OF BATTERY CAPACITIE FOR XEVs [GWH]**
It can be assumed that the production, packaging and ancillary areas of the traction battery will represent up to 40 percent of the value creation of an e-car. It seems that many large auto manufacturers would want to build up their own battery pack production in order to retain a portion of the value creation chain in house.

They are planning manufacturing facilities or are already producing modules and packs – in many cases in close association with partner companies. Berylls therefore expects continuing growth in the market share of battery packs manufactured directly by OEMs or their joint ventures. However, this is not only a problem for already existing battery manufacturers but most especially for new players in the market who will not be subsidiaries or joint ventures of an OEM.

In fact, the number of companies crowding into this oversaturated market is continuing to rise at present. Competition is heating up, while margins are not getting positive. Already, only a small proportion of the business is available to independent third-party suppliers of packs. All that remains for independent suppliers of battery packs is about 20 percent of the total market. The study makes this clear on the example of China.

A battery pack market that is dominated by cell manufacturers and OEMs, and in which only a small part of the overall market is open to battery manufacturers who are not currently directly tied to an OEM. After all, a majority of Chinese battery pack manufacturers are already subsidiaries of OEMS or, as joint ventures, closely tied to their customers.

Nevertheless, independent, specialized battery pack suppliers will be able to gain a place in the overall market. After all, there will continue to be OEMs whose size, and consequent production volumes, do not gain them an economic advantage through the in-house production of battery packs.

In addition, special vehicle models may require special battery packs that cannot be produced cost effectively in-house. Thus, for the aforementioned reasons, independent battery pack manufacturers have every opportunity for their business model, though principally in small niches.
STRONG SUPPLIER CONSOLIDATION BY 2020.

Massive overcapacities already mean that battery factories are operating at sub-optimal capacity. However, the highest possible utilization is the most important key to economic success. It can be assumed that the manufacturing costs of a factory operating at only 30 percent of its capacity are 50 percent higher than those of a production site running at 80 to 90 percent capacity. It is therefore expected that, in China alone, by 2020, nearly 50 percent of players will have disappeared from the scene. But it is also not unrealistic to envisage scenarios in which European battery producers are driven out of the market on a large scale by Chinese producers - experts are already reminded of the situation of international photovoltaics producers, who were forced out of the market at the beginning of the 2010s due to massive pressure by Chinese manufacturers on the production costs of solar cells.

However, new battery manufacturers will find it difficult to gain a toehold in the global market - not only because of the existing overcapacities. In China, the biggest electric vehicle market in the world, their success is already influenced by national laws, which are forcing foreign suppliers into buying from Chinese manufacturers. Hence, it will become increasingly difficult to find suitable Chinese battery customers. Many established companies are already in close business relationships, with their products benefiting from government purchasing incentives. These incentives will not be provided without a white-listed Chinese partner. Besides this regional challenge, competition will be exacerbated by increasing raw materials prices. Berylls therefore advises battery pack manufacturers to seek out alternatives to the automotive OEM business. For example, they should turn to the fast emerging energy storage market and the so-called “second life” of the car traction battery, or position themselves clearly in car niche markets and specialty applications.
A SECOND LIFE FOR THE TRACTION BATTERY SEEMS APPROPRIATE AFTER EIGHT YEARS.

After about eight years, lithium-ion car batteries reach a condition in which it is increasingly unattractive to use them for traction energy storage in the car. Their storage capacity generally declines to about 80 percent of its original value and the charging rate deteriorates.

This decreases the vehicle’s range and charging performance. Berylls study shows that, by 2032, there will likely be at least 1,522 GWh of capacity in the form of used batteries, which will be available for use as second life energy storage.

GLOBAL SECOND-LIFE BATTERY CAPACITY [GWH]
PRODUCTION OF ENERGY STORAGE AS A NEW BUSINESS MODEL.

However, at present, the reuse of batteries hardly figures on the manufacturers’ list of priorities. There are currently only a few sporadic ideas about giving former traction batteries a second life as stationary energy storage, for example as emergency power supplies for hospitals, or else as buffer storage for EV charging stations. Though this has not yet been implemented on a large scale, but will become an interesting business model when relevant quantities of EVs are sold.

Battery pack suppliers, for example Bosch and ElringKlinger, but in the future also BMW, Daimler or Volkswagen, will be able to stake out a position in this sector at an early stage and build up a profitable pillar for themselves. This niche is particularly recommended for relatively small battery pack manufacturers.
INDUSTRIALIZATION AS A KEY TO ENERGY STORAGE SUCCESS.

After all, like the major suppliers, in the future they will have the competencies in-house for turning a used car battery into a reliable general-purpose stationary storage battery. However, the success of these second life applications is heavily dependent on the industrialization of the complicated recycling processes.

CELL MANUFACTURERS, BATTERY PACKAGERS AND OEMS THROUGHOUT THE BATTERY LIFE CYCLE.
OTHER ALTERNATIVE BATTERY SALES OPPORTUNITIES IN THE COMMERCIAL VEHICLE MARKET.

The experts at Berylls recommend continuing to look at truck, bus and off-highway fields, for example agricultural machinery or mining vehicles. For these applications, there are hardly any suppliers at present who are capable of supplying these segments with traction energy storage batteries on an industrial scale.

In Berylls’ view, second life applications and the production of commercial vehicle battery packs are exactly the business models that will allow new suppliers to position themselves sustainably in the competitive market for battery packs.

In addition, German manufacturers of battery packs, in particular, must develop USPs that differentiate them from their Chinese competitors. This includes, among others, technologies for optimizing and documenting the charging capacity of the modules and cells, and forecasting the life cycle.
The global market for battery packs is largely shared between OEMs, their cooperations and joint ventures; only a small addressable market share is open to new players.

The market for energy storage applications based on second-life cells still offers great potential for battery pack suppliers.

One possible business area that is emerging is the industrial-scale manufacture of battery packs for buses, trucks and off-highway applications (e.g., tractors or mining vehicles).

Battery pack manufacturers can create USPs for themselves by employing innovative technologies for cell monitoring.
Berylls Strategy Advisors is a top management consulting firm with offices in Munich, Berlin, Baar / Switzerland, Detroit / USA, Leamington Spa / Great Britain, Seoul / South Korea and Shanghai / China. Together with automotive manufacturers, automotive suppliers, engineering and mobility service providers, equipment suppliers and investors, its strategy advisors and associated network of experts work to deliver answers to the central challenges of the automotive industry.

The focus is on highly innovative and high growth strategies, assisting in mergers & acquisitions, organization development and transformation, and measures to improve performance along the entire value chain.

In addition, the experts at Berylls Digital Ventures work with clients on solutions for digitizing and transforming the business models of OEMS, suppliers and automotive service providers.

Berylls’ consulting teams are known for their extensive and relevant experience, solid knowledge, innovative creativity and entrepreneurial outlook.

CONTACT PERSON

Christian Bangemann
Head of Communication
t +49 89 710 410 40-71
christian.bangemann@berylls.com
March 2018

Study of the battery production market