BATTERY PRODUCTION TODAY AND TOMORROW

TOO MANY MANUFACTURERS TOO FEW CUSTOMERS

March 2018

Study on the battery market
There will be a gap of up to 30 percent between battery production and demand for many years to come.

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

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

Berylls’s analysis suggests a second-life reuse of batteries as an alternative business model for battery manufacturers.
Demand for traction battery packs for cars is growing worldwide. China is currently responsible for a good third of global demand; a quarter comes from Japan; the USA, with less than 20 percent, accounts for less than a fifth of global demand.

European suppliers, on the other hand, only play a minor 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 cell manufacturers will originate from China, and U.S. industry 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. Already by 2025, China and the USA will have relegated the other countries to the role of bit players on this market.

A majority of Chinese battery pack manufacturers are subsidiaries of OEMs or, as joint ventures, closely tied to their customers in mutual dependency. They thus have a guaranteed market for their products.
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. Sales of electric vehicles are growing too slowly; even in the best-case scenarios discussed today. A battery bubble is emerging. Nothing in this disparity will change in the next few years, as is shown by the Berylls study.

On the contrary, the chasm will initially widen, before capacity and demand move closer together again. The surplus capacity among global battery pack manufacturers will be as much as 30 percent, based on the storage capacity produced, not on the number of battery cells. This will make a strong drop in demand and market consolidation inevitable. Nevertheless, it seems that many of the major car manufacturers want to enter this business. They are planning manufacturing facilities or already producing modules and battery packs – in many cases in close association with partner companies.

**THE GAP BETWEEN SUPPLY AND DEMAND FOR XEV* BATTERY CAPACITY IS PUTTING PRESSURE ON THE ENTIRE INDUSTRY.**

![Graph showing estimated growth of supply and demand according to battery capacities for xEVs (GWh)](image-url)
Experts assume that batteries and battery manufacturing may make up as much as 40 percent of the supply chain. Berylls expects continued growth in the market share of batteries 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 are not subsidiaries or joint ventures of an OEM.

In fact, the number of companies crowding into this oversaturated market is continuing to grow at present. Competition is hotting up, while margins decrease. Already, only a small portion of the business is available to independent third-party suppliers. All that remains for independent suppliers of battery packs is about 15 percent of the overall market.

The study illustrates this with the example of China, a market that is dominated by cell producers and OEMs, and where, already, only a very small part of the total market is open to specialized battery manufacturers.

**THE BATTERY WILL ACCOUNT FOR 40% OF THE AUTOMOTIVE.**

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**CHINESE BATTERY PACK MARKET [€M] AND MARKET SHARES ACC. TO COMPANY TYPE IN 2017 [%]**

<table>
<thead>
<tr>
<th>Year</th>
<th>Market Shares</th>
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<tbody>
<tr>
<td>2016</td>
<td>285</td>
</tr>
<tr>
<td>2017</td>
<td>453</td>
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<tr>
<td>2018</td>
<td>548</td>
</tr>
<tr>
<td>2019</td>
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<tr>
<td>2020</td>
<td>5,011</td>
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<tr>
<td>2021</td>
<td>6,164</td>
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</tbody>
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GROWTH +85% AVERAGE P.A. (CAGR)

A MORE DETAILED STUDY SHOWS THAT THE CHINESE BATTERY PACKAGING MARKET IS DOMINATED BY CELL MANUFACTURERS, OEMS AND COOPERATIONS.
MARKET CONSOLIDATION UNTIL 2020.

Massive overcapacities already mean that battery cell producers and battery pack factories are operating at sub-optimal capacity. However, the greatest 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, by 2020, nearly 50 percent of players will have disappeared from the scene. 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 hampered by national laws there, which are forcing foreign suppliers into cooperating with Chinese manufacturers. It will become increasingly difficult to find suitable Chinese partner companies. Established companies already have close business relationships in many cases. If no local Chinese partners can be found, these incentives will not be available.

Besides this regional challenge, competition will be exacerbated by increasing raw materials prices. Berylls therefore recommends that battery manufacturers seek out alternatives to the automotive OEM business. For example, they should dedicate themselves to the “second life” of the car traction battery pack, or position themselves clearly in automotive niche markets and special applications.
After about eight years, lithium-ion car batteries reach a condition in which it is increasingly unattractive to use them as energy storage for traction. Their storage capacity generally declines to below 80 percent of its original level. Berylls’s study shows that, by 2032, there will likely be 1,522 GWh of capacity in the form of used batteries, which will be available for use as second-life energy storage.
SECOND LIFE 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 as buffer storage for ev-charging stations, though this has not yet been implemented on a large scale.

Battery pack suppliers, such as Bosch, ElringKlinger, Webasto, 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.

After all, as major suppliers, they have the competencies for turning a used car battery into a completely reliably operating stationary storage battery. However, the success of these second-life applications is heavily dependent on the industrialization of the complicated recycling process.
MARKET OPPORTUNITIES FOR COMMERCIAL VEHICLES.

The experts at Berylls recommend continuing to look at truck, bus and off-highway fields, for example agricultural machinery or mining vehicles. Berylls expects that here, too, there will be a shift from combustion engines to electric drive in the coming years. However, so far, the technical experts have found hardly any suppliers who are capable of supplying these segments with traction energy batteries on an industrial scale.

In Berylls's view, second life applications and the production of commercial-vehicle battery packs are precisely those new business models that enable new suppliers to successfully position themselves long term in the highly competitive market for battery packs.

They can still do this by availing themselves of innovations already offered by individual start-ups. This includes technologies to optimize the charging capacity and document and predict the cell condition. Such differentiating factors can give individual battery manufacturers an advantage over the competition.
The accessible global market for independent battery pack manufacturers is relatively small - it is also divided up between OEMs, their cooperation agreements and joint ventures, which makes it difficult for new suppliers to gain entry.

The use of innovative technologies for cell monitoring can be a USP for battery pack manufacturers.

The market for second life applications currently offers considerable potential for battery pack suppliers.

Only low capacities are currently installed for manufacturing bus and truck traction battery packs; this is an emerging business area.

Large-scale industrial production of off-highway traction battery packs that can be used, e.g., in agriculture, is still in its infancy. Long-term commitment would seem worthwhile.
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.