

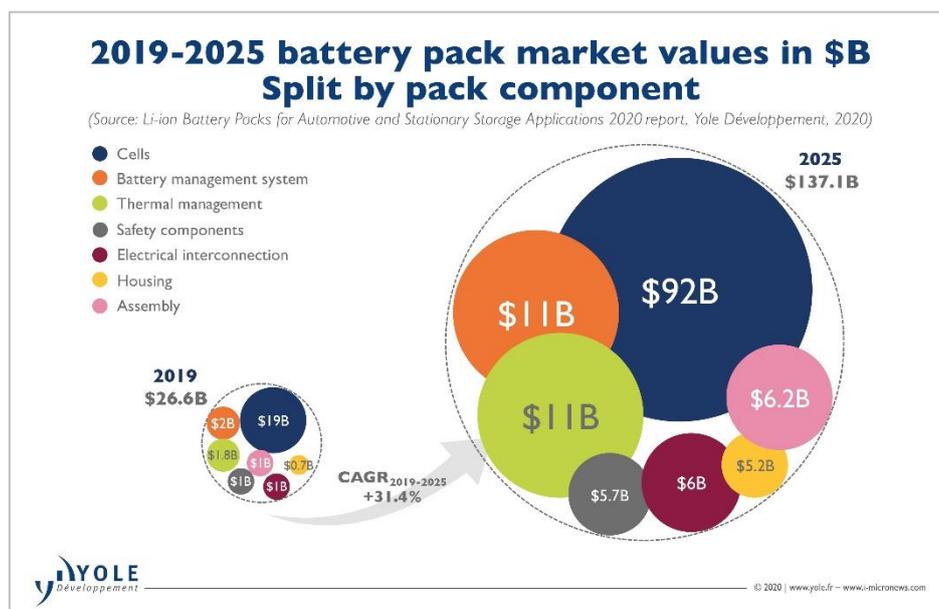
# Are battery packs at the heart of EV market explosion?

## OUTLINES:

- The battery pack market is driven by EV<sup>1</sup> demand.
- The market for each battery pack component is growing.
- Who will be winning companies benefiting from strong battery pack business potential?

“The main driver for battery pack applications is the growing EV market segment,” says **Milan Rosina, PhD, Principal Analyst, Power Electronics and Batteries, at Yole Développement (Yole), within the Power & Wireless division.** “The EV sector is booming mainly due to the need to significantly reduce average vehicle fleet CO<sub>2</sub> emissions to match governments’ strict CO<sub>2</sub> emission reduction targets and thus avoid heavy penalties.”<sup>2</sup>

**For Shalu Agarwal, PhD, Power Electronics and Materials Analyst at Yole, within the Power & Wireless division:** “The total annual demand for battery packs for the aforementioned applications will grow from US\$26.6 billion in 2019 to US\$137.1 billion by 2025. The growth rate for different applications varies, as their market dynamics have different drivers. At Yole, we think that the demand will be mainly driven by full electric vehicles, specifically BEVs, which will represent 75.9% of the total demand in GWh by 2025. PHEVs enable big CO<sub>2</sub> emission reductions



<sup>1</sup> EV : Electric Vehicle

<sup>2</sup> Extracted from : Li-ion battery packs for automotive and stationary storage applications report, Yole Développement, 2020

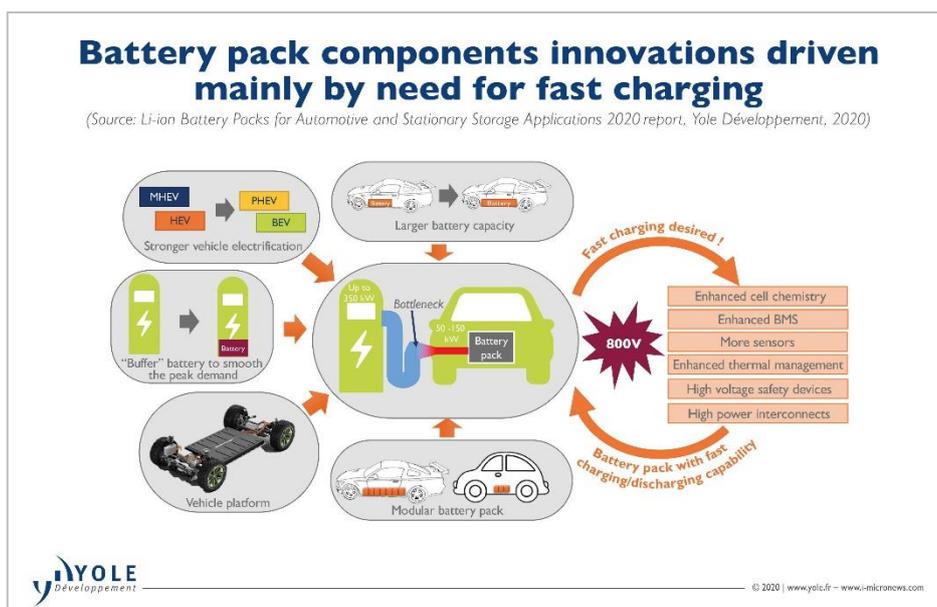
due to their electric engines, while keeping long driving ranges thanks to their ICEs<sup>3</sup>. They will take the second place in our ranking of total demand measured in GWh by 2025.”

The high level of air pollution in some big cities is driving deployment of electric buses. Buses stop frequently and can potentially charge at each stop or terminus station, making them well-suited for battery power. Electric trucks can then benefit from battery and charging station technology development for buses. The use of electric trucks in the urban environment helps further reduce air pollution.

Stationary battery energy business is not the first priority of most battery manufacturers that are focusing today mainly on electric mobility. But the market growth for stationary battery systems is growing and is mainly driven by renewable energy sources, mainly photovoltaics and wind, and electricity grid regulation. EV/ PHEV charging stations have emerged as a new interesting market driver for stationary battery energy storage solutions to “smooth” strong electricity demand peaks while charging many EV/PHEVs at the same time.

The market research and strategy consulting company, Yole, releases a technology and market analysis focused on the Li-ion batteries industry: Li-ion battery packs for automotive and stationary storage applications. This report proposes a comprehensive overview of the Li-ion battery sector covering insights into battery pack components, different technologies currently used in battery packs and related technology trends and supply chain. The end applications of battery packs analyzed include PHEVs<sup>4</sup>, BEVs<sup>5</sup>, electric buses and trucks, as well as stationary battery energy storage applications.

Yole has developed a valuable market knowledge and technical expertise dedicated to the batteries industry. The company, with Milan Rosina and Shalu Agarwal delivers, year after year



<sup>3</sup> ICE : Internal Combustion Engines

<sup>4</sup> PHEV : Plug-in Hybrid Electric Vehicle

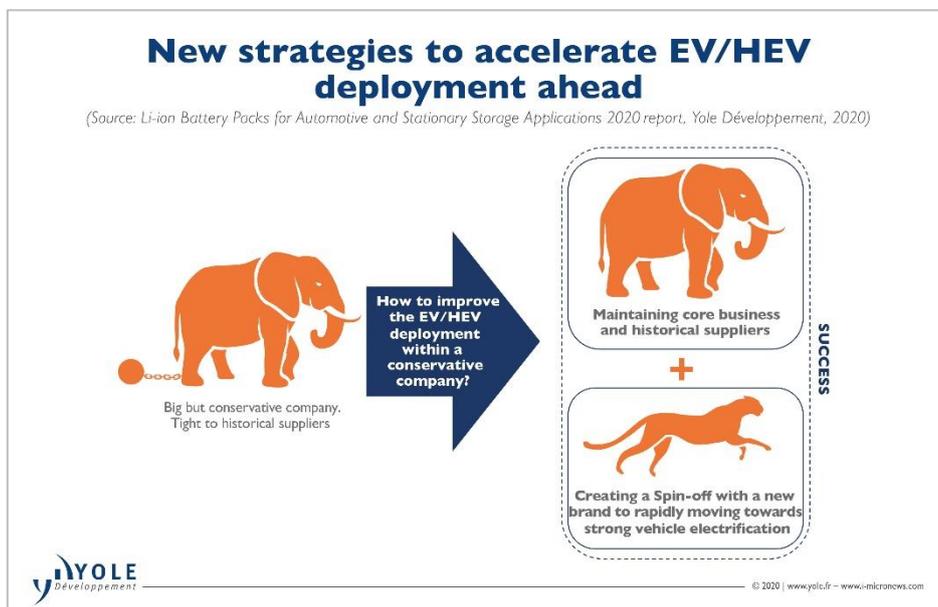
<sup>5</sup> BEV : Battery Electric Vehicle

a significant collection of reports in this domain. Milan and Shalu are closely working together to get a deep understanding of the industry evolution, market needs and identify technical breakthroughs. Based in Asia, Shalu manages a close relationship with leading battery manufacturers to collect their vision of the industry and its evolution.

In this regard, **Milan Rosina** from Yole asserts: *“The importance of BMS<sup>6</sup> is growing with increasing requirements to accurately determine remaining battery capacity, and with increasing cell and pack energy capacities. An enhanced BMS also allows better using of the energy stored in a battery pack, thus reducing needs for battery pack capacity increase.”*

**Shalu Agarwal** adds: *“There is no big technology breakthrough expected in coming years regarding battery cells and other battery pack components. The main trends will involve existing technology solutions, which will be further improved and more widely deployed. Technology and cost improvement will be steady.”*

Yole’s market forecast has been made during the outbreak of coronavirus disease 2019 (COVID-19). According to the analysts, the impact of this virus on automotive and battery industry is significant. It is hard to evaluate how long this crisis will last and how its duration will negatively impact the manufactured volumes of conventional vehicles and EV/PHEV. The numbers presented in this report for 2020 might be thus reduced in the case of prolonged crisis due to coronavirus.



What about the supply chain? Who are the winners?

Battery pack suppliers face significant challenges from newcomers attracted by the fast-growing market, dominant position of some cell suppliers, and strong price pressure on all battery application segments. Most battery pack suppliers are battery integrators, especially

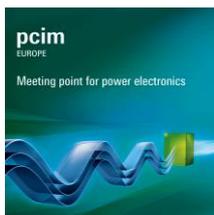
<sup>6</sup> BMS : Battery Management System

carmakers. They purchase battery cells mainly from leading suppliers like CATL, LG Chem, Panasonic and Samsung SDI, and build their battery pack using other components, including BMSs, heating/cooling systems, electrical interconnections, safety components, and housings. Carmakers are intruding ever more into battery cell design and in some cases also into cell manufacturing, as in the cases of Tesla and Daimler. Instead of purchasing cells, some battery integrators purchase battery modules directly and they just integrate modules into battery packs.

Indeed, the modular battery pack approach enables further manufacturing cost reductions and keeps the design flexibility for battery packs. Some carmakers have developed specific internal know-how and established tight supply chain partnerships. They might remain at least partially stuck with their historical technology and integration choices, while their competitors will move rapidly towards latest technologies and full vehicle electrification.

And who's losing it?

*"The companies with tight technology and supplier partnerships may lose some business in the future, but not because their technology is bad. Instead they will not easily be able to adopt the latest innovations, reduce costs by choosing optimal suppliers and follow customer need evolution rapidly enough,"* affirms **Shalu Agarwal**. She also reveals a possible option for companies tight with their suppliers to spin-off a part of their activities into a new company and create a new brand. *"It is also crucial to shorten the development time for new products and reduce the development cost,"* confirms Shalu... A full description of this new battery report is available on [i-Micronews.com](http://i-Micronews.com), [battery & energy management reports section](#).



All year long, Yole Group of Companies, including [System Plus Consulting](#) and [Yole Développement](#), publishes numerous Battery reports. Discover an overview of our activities on [i-Micronews.com](http://i-Micronews.com) including interviews with leading companies, analyses from our experts and dedicated online and onsite events, such as the [PCIM Europe 2020](#) (May 5th – May 7th, Nuremberg, Germany).

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### About the authors

**Milan Rosina, PhD**, is Principal Analyst, Power Electronics and Batteries, at Yole Développement (Yole), within the Power & Wireless division. He is engaged in the development of the market, technology and strategic analyses dedicated to innovative materials, devices and systems. His main areas of interest are EV/HEV, renewable energy, power electronic packaging and batteries. Milan has 20 years of scientific, industrial and managerial experience involving equipment and process development, due diligence, technology, and market surveys in the fields of renewable energies, EV/HEV, energy storage, batteries, power electronics, thermal management, and innovative materials and devices. He received his PhD degree from Grenoble Institute of Technology (Grenoble INP) in France. Milan Rosina previously worked for the Institute of Electrical Engineering in Slovakia, Centrotherm in Germany, Fraunhofer IWS in Germany, CEA LETI in France, and utility company ENGIE in France.

**Shalu Agarwal, PhD**, is Power Electronics and Materials Analyst at Yole Développement (Yole), within the Power & Wireless division. Based on Seoul, Shalu is engaged in the development of technology & market reports as well as the production of custom consulting studies. Shalu has more than 10 years' experience in Electronic Material Chemistry. Before joining Yole, she worked as a project manager and research professor in the field of electronic materials, batteries and inorganic chemistry. Shalu Agarwal received her master's and Ph.D. degree in Chemistry from the Indian institute of Technology (IIT) Roorkee (India).

### About the report

#### **Li-ion battery packs for automotive and stationary storage applications 2020**

*The battery pack component market continues to be driven mainly by electric vehicles. - Performed by Yole Développement*

#### **Companies cited**

ABB, Amada, Ltd, Anhui Jianghuai Sinoev Battery System Co. Ltd Arrival, Ashok Leyland, Audi, AUTOLIV, Bitrode, BMW, BMZ, BYD, CALB, CATL, Calienté, Calsonic Kansei, Carling Technologies, Dana, Daimler, EATON, EC Power, Efen GmbH, Electrovaya, Elithion, Eska, ETI Elektroelement, Ewert Energy Systems, Henkel, Porsche, Preh GmbH, Proterra, Renault Trucks, Samsung SDI, Scania, Schneider Electric, SIBA, Solaris Bus & Coach, Skoda, SOC, STMicroelectronics, Sunstone, TE Connectivity, Tesla, Tesvolt, Texas Instruments, Toshiba, Volkswagen, Volvo, Wanxiang, Workhorse, Xiamen SET Electronics, Yutong, Zhong Tong Bus, and many more...

#### **Related reports:**

- [Power Electronics for Electric & Hybrid Electric Vehicles 2020](#)
- [Status of Rechargeable Li-ion Battery Industry 2019](#)

### About Yole Développement

Founded in 1998, Yole Développement (Yole) has grown to become a group of companies providing marketing, technology and strategy consulting, media and corporate finance services, reverse engineering and reverse costing services and well as IP and patent analysis. With a strong focus on emerging applications using silicon and/or micro manufacturing, the Yole group of companies has expanded to include more than 80 collaborators worldwide covering MEMS & Sensors - Imaging - Medical Technologies - Compound Semiconductors - RF Electronics - Solid State Lighting - Displays - Photonics - Power Electronics - Batteries & Energy Management - Advanced Packaging - Semiconductor Manufacturing - Software & Computing - Memory and more...

The market research, technology and strategy consulting company Yole Développement, along with its partners System Plus Consulting, and PISEO, support industrial companies, investors and R&D organizations worldwide to help them understand markets and follow technology trends to grow their business... [More](#)

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