

2024

Insights from the Battery Cells and Systems Conference, Birmingham, 2024

CONFERENCE & EXHIBITION REPORT
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Welcome

The Battery Cells & Systems Exhibition & Conference (BCSEC), held from 15-16 May 2024, brought together industry leaders, innovators, and experts to discuss the latest advancements in battery technology. As an energy storage consultant I was hoping this event would provide a unique opportunity to delve into the development of battery cells and systems, network with professionals, and explore cutting-edge solutions that are shaping the industry.

Actually, it was a “4 for the price of 1” as there were four simultaneous exhibitions and conferences. Besides BCSEC, there was also space for the Vehicle Electrification Expo, Advanced Materials & Advanced Ceramics, and The Graphene Council.

This report is only on the Battery & Systems Expo & Conference. Unfortunately this conference overlapped with the AABC show, but as I was invited as a speaker at BCSEC I gave preference to attend that one.

Reflections and Takeaways

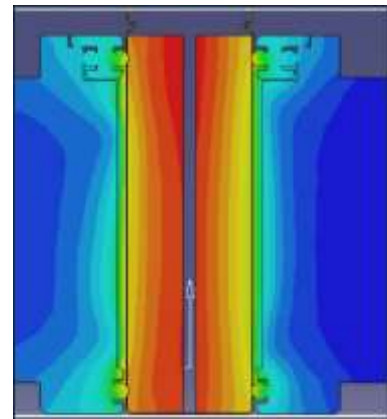
Bob Galyen, former CTO of CATL, inaugurated the conference with a compelling statement: “Societies around the world are embracing electrification as a new industrial revolution with the great hope that a new generation of batteries will fulfil the insatiable hunger for storing more energy. At present, the Lithium-Ion Battery is the device of choice, which requires specific materials to build these complicated energy storage devices. Countries that hold these precious materials are using them for economic gain, and in some cases creating geopolitical tensions by withholding materials or placing tariffs on these materials to restrict importation of these materials. Governments are creating intricate relationships and/or challenges within the global battery market.”

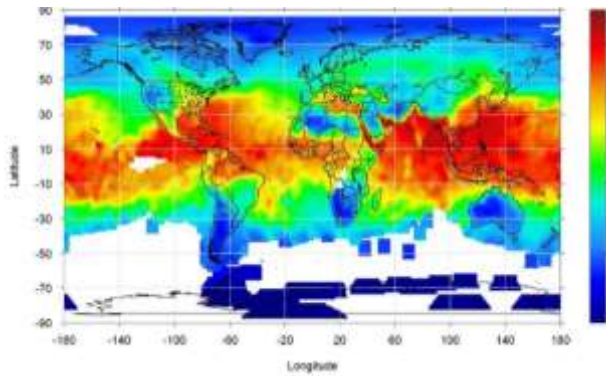
And the tone was set: While China develops the next generation technology and matching supply chain, we are battling politics. This is where one sees the difference between a pyramid-shaped top-led society where vision slowly gets translated into action as it percolates down the hierarchical layers of the chain of command, versus a much flatter decentralized societal organisation, akin to an ant colony, where people know what they need to do and get the job done. Besides being in the doldrums for the past 2 centuries up to 1978, China has been leading the way in technology for 3000+ years with inventions like paper making, printing, the compass, gun powder, ... , leaving others to catch-up.

I will endeavour not to get sucked into history and politics, but attempt to bring you the technological highlights of the show. Here goes.

Gary from Cosworth demonstrated their model optimisation which showed highly accurate and validated models for internal cell temperature. Particularly for high rate applications such as power tools and UPS its important to know (externally) measured temperature and internal temperature can be far apart.

Chris from Arcadis shared his views on the importance of defining process and utility demands early in gigafactory projects to optimize cost, efficiency, and sustainability. Key strategies include integrating early information on process needs, using benchmarks and empirical data, and planning for future technological advancements to ensure effective energy use.

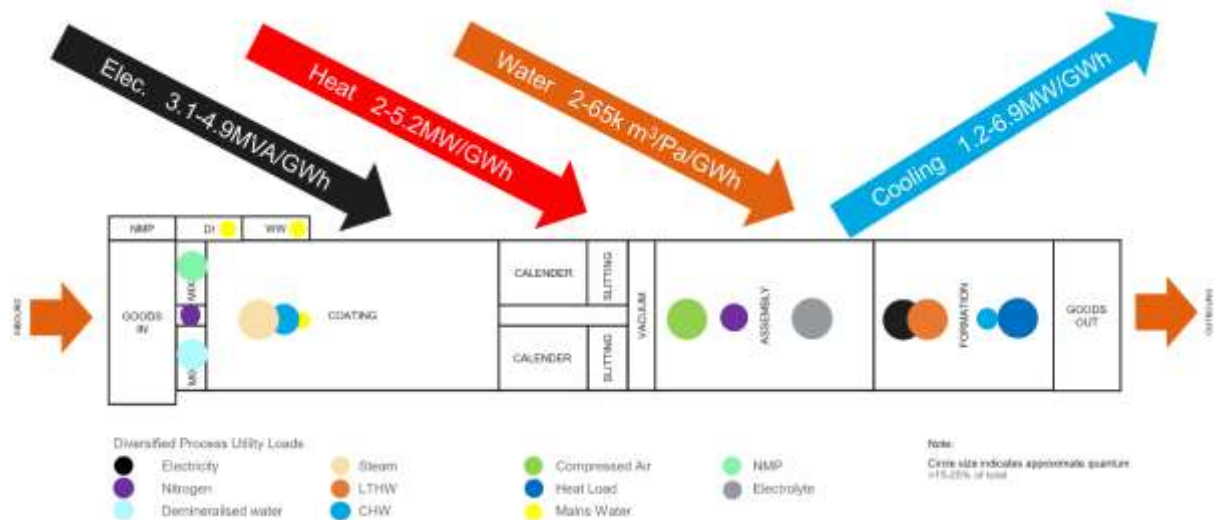




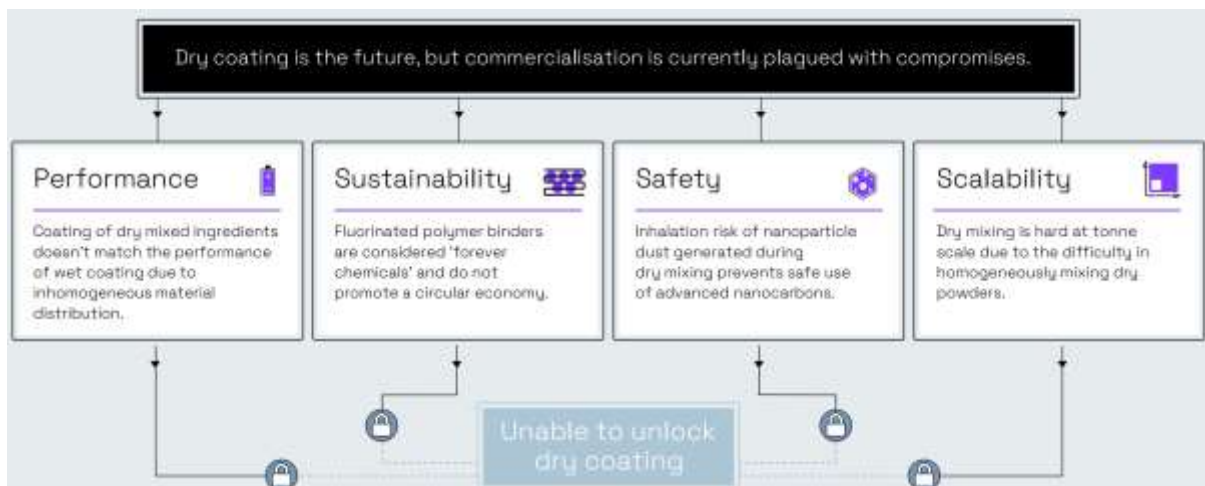
I believe there is a large nascent market segment, which might be led by companies in India, which I would refer to as “energy storage solutions for the tropical world”. Competing with China in the energy storage domain is tough, and therefore focusing on a USP like that is key to differentiate. But it also has an impact on the factory itself. While the map shows specific humidity, it looks similar to a temperature map. Large parts of the world

colour red, but very few gigafactories exist there yet. This higher humidity and temperature increases the demand on the dehumidification and HVAC units.

He also showed interesting slides on the utility requirements and how much of the energy can be reused. The impact of future technologies such as sodium-ion and solid-state cells was also touched upon.



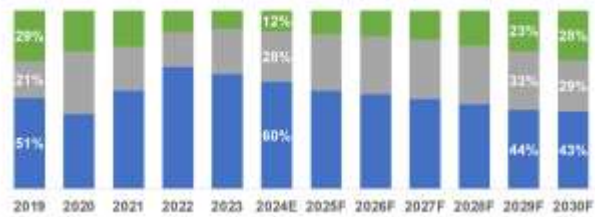
Jennifer from Anaphite talked about the challenges of dry electrode coating, and claimed that their dry coating precursor is the solution for these roadblocks, without compromising performance.



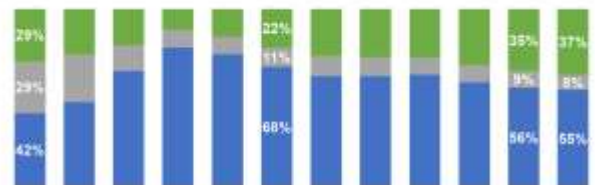
An interesting presentation from Electroder by Luke showed the past, present and future trends in cell format



Global Battery Cells by Each Format - Mobility Application



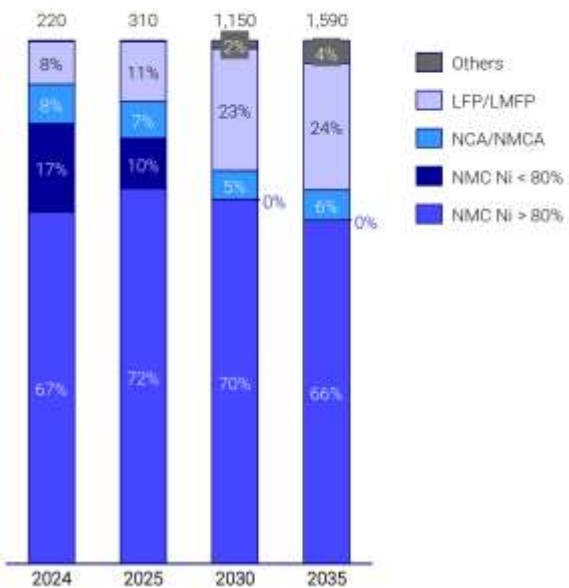
Global Battery Cells by Each Format - Energy Storage



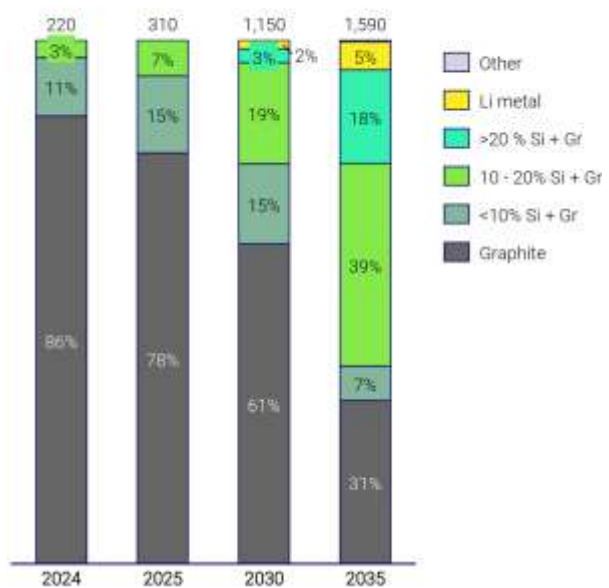
In conclusion however, each cell format has its own advantages & disadvantages, and the best choice is therefore a matter of balancing performance and manufacturing requirements while taking circularity into account.

In terms of what is used on cathode and anode in the European automotive market, a presentation from P3 by Jochen informed us as follows.

Current split in cathode chemistries [GWh/a]



Current split in anode chemistries [GWh/a]



And even when a technology reaches maturity at pilot scale, it still takes 2.5-3.5 years of qualification time until series production at vehicle manufacturers

On the cost competitiveness of SIB vs LIB Jochen informed us that cell cost of LIBs correlate with the LCE (Lithium carbonate equivalents) price, as Lithium is required for both the cathode material and electrolyte. In a simplified cost sensitivity scenario, the SIB price is independent of the LCE price. Under current technology and price assumptions, the break-even cost window for layered SIBs to be cost competitive opens at around 25 USD/kWh vs. LFP. Prussian white-based SIBs, exhibit a clear cost advantage against LFP due to the significantly lower material price for the PBA cathode material. Estimated long-term LCE price forecasts indicate prices above 20 USD/kg LCE rendering SIB technology

feasible alternative to LFP. However, vertically integrated cell producers with direct access to LCE at a significantly lower price compared to LCE spot market, may have a competitive advantage for LFP.

He concludes that stronger market segmentation can be expected leading to a higher share of graphite / silicon anodes for performance and LFP / graphite chemistries for low-cost segments. Only minor adoption expected for solid-state & Na-ion batteries until 2030. Since both silicon-rich anodes and solid-state batteries still belong to the class of Li-ion batteries and the application of Na-ion technology in passenger cars is still unclear as of now, Li-ion battery technology will continue to dominate the market in the long term.

My own presentation was for OEMs and system manufacturers. Beyond cell testing, I recommended to audit the Tier-1 cell manufacturing processes, equipment and quality assurance mechanisms and to verify the cell design. I used the example of the Samsung Galaxy Note 7 as a \$17b mistake.

Markus from Weiss Technik explained the dangers of testing cells and showed us some pictures of bloated climate chambers that became victim of cell thermal runaway during testing & cycling. He illustrated how they make their chambers to provide safety to lab operators and infrastructure.

There were also several presentations on testing, simulation and modelling and it is noticeable how ML & AI is also making its entry in those markets. This is also true for BMS.

Networking Opportunities: Building Connections

The conference was well organised and offered ample opportunities for networking, allowing attendees to build connections with industry peers, potential partners, and customers. Informal networking sessions facilitated meaningful exchanges of ideas and fostered collaborations.

Media Coverage

I did not find any noteworthy media coverage of any news or innovations that were announced at the show/conference.

Conclusion

The Battery Cells & Systems Exhibition & Conference 2024 was an enriching experience that offered deep insights into the current state and future prospects of the battery industry, primarily focussed on the British and European industry. The event showcased some technological innovations but also emphasized the importance of sustainable practices. As an energy storage consultant, the knowledge gained from this conference will undoubtedly inform and enhance my work in helping customers design and manufacture cutting-edge energy storage solutions.