

Helping guide advances in technology through R&D is just part of CBI's work for the lead battery industry. Maximizing opportunities for lead's future clean energy role is also part of the mission, including a focus on...

Securing a slice of a \$50bn ESS market

The lead battery industry could be in line for a \$10 billion share of the burgeoning energy storage market within the next decade, according to the Consortium for Battery Innovation.

CBI director Alistair Davidson says research into upcoming projects and opportunities indicated that the ESS landscape is forecast to be 550GWh by 2030 with a value of \$30 billion-\$50 billion for all battery technologies.

Davidson, speaking to *Batteries International* alongside CBI senior technical manager Matt Raiford on the side lines of Battery Council International's conference in May, say the lead battery industry has set its sights on securing 100GWh of that potentially lucrative ESS market.

Raiford says: "If lead batteries took

just 20% of that market as it grows — and we think it's feasible — that would be an additional \$10 billion value. That's a key focus for us."

CBI launched its first technical roadmap in 2019 setting specific goals for the end of 2022.

Key targets included increasing cycle life from the then 4,000 (80% DOD) maximum to 5,000 cycles for ESS lead batteries in order to fulfil requirements of the US Department of Energy and the European Commission.

The roadmap said DCA for automotive batteries including start-stop and micro-hybrid also needed to rise from 1Ah in 2019 to 2Ah.

Davidson said short term goals were deliberately set to have an impact on the market.

"It was all really market driven. We

used those targets to select our program. And the result of the projects that we funded have pretty much shown that we delivered on these goals that we set."

There are now batteries on the market, primarily from our members in the US and Asia, that meet that criteria.

This means there are now have advanced lead batteries on the market oriented toward ESS that have an impressive globalized cost of ownership for the system, says Raiford.

"The way we view it as battery scientists is cycle life — most key stakeholders look at it from total cost of ownership.

"So we see stationary batteries now that really perform along the lines of lithium."

CBI member companies are now deploying products that provide that level of performance using lead battery technology.

On research that has gone into achieving those targets, Raiford points to work on the automotive side to optimize the ratio of carbon additives and expanders, which he says has been instrumental in lifting the DCA level for all types of automotive products.

At the same time a lot of carbon research over recent years is now being deployed en masse, so EHF batteries plus carbon is becoming prevalent.

"It's almost the status quo now."

Raiford says when he joined the industry "DCA was abysmal. It was wretched, but now we consistently see even basic level products just through optimizing additives is at 0.5/0.7Ah."

Companies such as ArcActive and Clarios have built on this fundamental research to achieve high DCA values, he says.

But the industry is not resting on its laurels. Davidson says further improvements are being pursued.

CBI is also looking at other applica-



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— Alistair Davidson

tions with companies to improve batteries particularly for energy storage.

The organization still has an eye on key markets for auxiliary batteries and says the huge market opportunity for lead in ESS cannot be overlooked.

Raiford believes some batteries being produced today are more than suitable for ESS, so a big focus for CBI is now on support for productization and front-end engineering.

He says when companies put in a bid for an ESS project they need to have a firm product 'ready to go', plus all the engineering know-how involved to bring all the systems together, correctly configured and with appropriate battery management systems.

"That's 40%-50% of the cost of the bid right there.

"So we are already working with our member companies, mainly in Europe and the US to develop design documentation and methodology, so that when they approach the market that work is done."

This will be vital in helping companies promptly pitch for projects and federal funding opportunities such as those in the US.

Davidson says CBI's success to date working with consortium partners to unlock funding from UK and European institutions — including €10 million (\$9.9 million) under the EU's flagship research and innovation funding instrument, Horizon Europe — shows what can be achieved.

"This is finance generated from outside the CBI core project funding and we are going to push further and harder for more of this for lead-based systems in both Europe and North America."

In the US, Raiford said the industry has gained a lot of traction with the US military.

This includes an 18-month project announced in October 2022 under which the Army is evaluating a range of lead battery energy storage systems as part of a \$3.5 million program to enhance its operational effectiveness in disaster zones and in combat.

The program also seeks to demonstrate how the army can use lead batteries sourced from the US Department of Defense supply system and from locally available sources such as vehicles, while increasing the lifecycle for certain battery types to meet battlefield energy demands.

Davidson says: "CBI's efforts in the US market include capturing not just the hearts of politicians and institutions but also the minds of scientists."



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The CBI and Department of Energy are supporting lead battery tech study programs within the US national laboratories network.

In one project, Pacific Northwest National Laboratory is evaluating batteries from a number of US CBI member companies in a program funded by the federal Office of Electricity.

The program looks at everything from battery fundamentals to testing innovations to specific products.

Similar projects are under way at three other national labs — Argonne, Oak Ridge and the National Renewable Energy Laboratory.

Raiford says such multifaceted growth will be fruitful for lead battery science in general.

Meanwhile, CBI is building on this as a pre-competitive group to help members target new business for lead batteries in a variety of sectors.

Davidson says lithium is a great technology, but it does not have the scale to meet all of the demand. "You need to play to your strengths and so there are great opportunities for lead batteries."

He cites work being done by companies such as Advanced Battery Concepts to corner a share of the

global ESS market with its bipolar technology.

This includes ABC's partnership with India's Exide Industries to "scope-out and define a program" for jointly commercializing ABC's 'BOX-BE' systems, comprising the firm's proprietary EverGreenSeal bipolar battery technology, for the Indian market.

Raiford and Davidson see Asia-Pacific as an exciting backdrop for growth of lead-based ESS systems.

In India, there is almost 100GWh of lead battery production capacity between Exide Industries and Amara Raja alone.

India is just starting the hybridization push, which is expected to see a boost for lead battery sales. Raiford notes the introduction of diesel engine restrictions and the move to micro hybrid vehicles can also drive economic growth.

In addition, CBI has signed a cooperation partnership agreement with the India Energy Storage Alliance.

China holds promise too. CBI will hold its latest annual workshop there in September following the 20ABC conference. Davidson says around 200 attended the China workshop pre-Covid and the expectation is to expand on that number.

Lead battery major Leoch joined CBI earlier this year, becoming the 122nd member firm and there are three other entities belonging to CBI including battery manufacturers Shandong Jinkeli Power Sources Technology, Narada Power and Chinese research institute Zhejiang Qian Li Zhi Xin Science and Technology.

Bipolar tech in particular has great potential and Davidson revealed that CBI is also developing bipolar lead battery project bids in Europe, although declined to disclose more at this stage.

Raiford says the lead battery industry collectively now wants to raise the bar in terms of innovation and growth.

"The ESS market is still immature but it has vast potential and the lead battery industry can and must take a share of it.

"Back in 2016, when I really started looking into this market and saw the numbers being predicted in terms of projects and expansion I personally thought it could not be right."

But Raiford admits he was wrong. "All that I thought then were pie-in-the-sky forecasts for ESS are now being met — and the lead battery industry globally can share in that." ■