

Ba^tteries International

Issue 133

Autumn 2024



ELBC takes Milan by storm

Our pick of the celebrations, presentations

**Time to explore the great
LFP recycling conundrum**


**Gigafactory gloom descends
as demand for EVs falters**

**$Y=aX^b$ — why China is the
next battery superstar**

**View from the top: meet Alan
Greenshields, Scott Fink**

Bringing the industry together
www.batteriesinternational.com

TALES OF DARKNESS REVEALED: THE LAST WORD



**Responsibility doesn't stop with delivery
- our service is second to none**

**Protect your equipment with
unrivalled service post delivery**



Automation • Oxide Production • Material Handling • Service

Eagle Oxide Services Inc.
5605 W 74th Street, Indianapolis, IN 46278
Tel: 317.290.8485 | Email: sales@eagleoxide.com | www.eagleoxide.com

This year’s European Lead Battery Conference held in Milan this September has been hailed as one of the best ever — both from the networking opportunities and the quality of the presentations.

Trend setters of the lead world hit Milan	36
La Dolce Vita (Or a raucous night on the tiles ...)	42
The farewell gala dinner ... and the great lemon tree mystery	43
The big picture for lead, a BI selection of industry presentations	45
The technical papers, a BI selection of presentations	49

EDITORIAL 4

Y=aXb ... why China is the next battery superstar

VIEW FROM THE TOP 6

Alan Greenshields: “I’ve learned it’s not about how much I know, but how little”

Scott Fink: From a globalized world to a regional one

PEOPLE NEWS 10

Steve Gerts: 1952–2024 • Maura: Exceptional honours for an exceptional person • Drasch becomes CEO of Schuler, owner of Sovema Group firms • Microporous promotes Rich to president • Luminous’ Preeti Bajaj recognition by Woman in Energy forum • Doe Run hires new VP of sales and marketing • CEO of Exide Industries’ lithium unit resigns • Khale joins NETZSCH as regional director • Miksad says lead vital to ‘resilient battery supply chain’ • Luminous Power joins CBI

NEWS 24

Howard Myers to buy Mutlu Akü from Metair in \$110 million deal • Battery supply chain breaks labour laws. • \$7m settlement deal for NY battery superfund site • Northvolt to cut 1,600 jobs as EV sales slump • ENTEK gets \$1.2 billion US plant loan • Exide’s pollution saga at Vernon takes a new turn • US unveils \$3 billion in battery funding • US consortium starts battery electrolyte research ‘challenge’

BESS NEWS 32

Exide Technologies provides tech support for ESS4U’s new gel BESS • BESS integrator market becomes less concentrated • Eku Energy closes financing on its first BESS in Japan • Saft latest BESS container line to qualify for IRA requirements • Australia underwrites 1GW new BESS projects • Morrow Batteries signs MoU with Ukraine • Improved BESS testing to prevent \$2.3bn in revenue and O&M losses • DTEK to invest in 200MW BESS units for Ukraine

RECYCLING NEWS 54

Controversial Ecobat plant given potential go-ahead • Teamsters praise safety of Ecobat LA lead recycling site • ‘No cost-effective solution in sight’ for LFP recycling • Troubled Li-Cycle considers Ontario facility closure • BMW and Redwood Materials form recycling partnership for US vehicles



View from the top: Scott Fink 6



View from the top: EES and the Alan Greenshields perspective 8



Steve Gerts: sadly no longer here 10



Drasch new CEO of Schuler 12

RECYCLING NEWS CONTINUED

• Illinois legislates for new battery recycling regime • AE Elemental opens lithium-ion recycling facility in Poland • Gravita posts profit rise, lead demand to increase 'in leaps and bounds' • STC system deal to slash gas usage for Estonian lead recycler • Engitec prepares to install ULAB recycling system in Ivory Coast • UK backs lead and Li recycling plant project for Nigeria

LITHIUM RECYCLING: BLACK MASS TO WHITE GOLD

63

Can the economics ever stack up for lithium iron phosphate recycling?
This is a moot point given that LFP contains relatively little of any value.

63

The European lithium recycling perspective.

70

E-battery fires: Action is being taken in the UK to regulate the disposal
of the batteries used in vapes.

74

E-bike risks: Lithium fires may be rare but the huge popularity of e-Bikes
and e-Scooters means that the number of incidents is on the rise.

77

ONES TO WATCH

78

A new generation of EV battery businesses is moving centre stage. With the teething problems of
their initial start-up phases almost over, they are counting on double-digit growth in the years ahead.

EVENT REVIEW: ICBR

83

The latest recycling event in Basle, Switzerland proved to be the most successful
yet of this well-established conference series

EVENTS

86

Our definitive guide to the global conferences and exhibitions in the month ahead.

THE LAST WORD

96

The mystery journalist and the Pinco car • Anagram excellence from Penox • Where is
Borneo anyway? • BCI'emoji fun • Moo cows and the energy transition



Black mass to white gold

63



Ones to watch

78



Event Review: ICBR

83



The last word: Where is Borneo? 96

Publisher

Karen Hampton
karen@batteriesinternational.com
+44 7792 852 337

Editor

Michael Halls
editor@batteriesinternational.com
+44 7977 016 918

Deputy editor

Shona Sibary
shona@batteriesinternational.com
+44 7585 355 955

Finance administrator

Juanita Anderson
juanita@batteriesinternational.com

Subscriptions, enquiries

subscriptions@batteriesinternational.com
admin@batteriesinternational.com

Production/design

Antony Parselle
aparselledesign@me.com

Content researcher

Matt Halls
Matthew@batteriesinternational.com

International advertising representation

karen@batteriesinternational.com

*The contents of this publication are protected
by copyright. No unauthorized translation or
reproduction is permitted.*

ISSN 1462-6322

© 2024 Mustard Seed Publishing

UK company no: 5976361.

Printed in the UK via Method

Disclaimer: Although we believe in the accuracy and completeness of the information contained in this magazine, Mustard Seed Publishing makes no warranties or representation about this. Nor should anything contained within it be construed as constituting an offer to buy or sell securities, or constitute advice in relation to the buying or selling of investments.

MACCOR

Battery & Cell Test Equipment Worldwide



INNOVATION

in Battery & Energy Storage Testing



Maccor Test Systems perform virtually every type of test on any type of energy storage device (i.e. batteries, capacitors, fuel cells, etc.).

- Materials Research
- Automotive
- Grid Storage
- Medical
- Cells | Modules | Packs
- Military
- Channels over 1200V | nanoAmps to thousands of Amps
- Quality & Standards Testing
- Mobile Devices
- Aerospace
- Cell Balancing
- CAN | SMB | I²C

www.maccor.com

sales@maccor.com +1 918 446 1874

$Y=aX^b$... why China is the next battery superstar

Factors Affecting the Cost of Airplanes should be a must-read for analysts of today's energy storage markets. It was written by Theodore Paul Wright, an aircraft engineering manager in 1936.

Put simply, it stated the blindingly obvious — the more we do something, the better we get at doing it.

But the genius behind this paper was its cost implications.

Wright found that every time total aircraft production doubled, the required labour time for a new aircraft fell by 20%. The result was the formula seen in the headline (above) and now known as Wright's Law.

The great strength of this law is that it introduces an element of predictability about costs (and therefore profits).

It also shows the direction of travel for an entire industry.

A quick glance at the history of the lithium market highlights this point.

Data from Statista shows a battery pack would cost around \$780/kWh in 2013. Two years later it had dropped to \$448/kWh. Two years on from that it was \$258/kWh.

The exponential curve shallows at this point to \$183/kWh in 2019. The price of a lithium battery pack has steadied in recent years to around \$150/kWh. CATL, now the largest producer of lithium cells in the world, says its VDA cells cost around \$57/kWh.

Wright's Law is reflected not just in price. It's also in performance.

A January research paper in the *Journal of Energy Storage* showed that the specific energy of lithium-ion battery cells has been enhanced from approximately 140Wh/kg⁻¹ to over 250Wh/kg⁻¹ in the last decade.

The paper also reckoned there was the potential cost reductions of up to 52.5% possibly by 2030. This was based on potential savings still to be made in cathode materials and minimizing scrap rates.

Since then the manufacturers have gone further. CATL says latest iterations of its products have an energy density of up to 500Wh/kg.

Wright's Law allows investors to forecast how costs will decrease as cumulative production increases. For industries such as semiconductor manufacturing, EV production, and renewable energy, historical data has supported the predictions of Wright's Law.

Costs have fallen predictably as production volumes have increased.

While Wright's Law has proven useful, it's not infallible: other factors — external events, such as regulatory changes, supply chain disruptions, or global economic conditions — can wreck predictability.

There is also a law of diminishing returns, the ability to improve everything is inevitably limiting and some considerations such as the cost of materials will be finite.

The future unbound

All those fine caveats aside, in the end it became a question of those who saw the future and those who chose not to.

This means that in the early 2010s all the lead battery industry's bad-tempered sniping about the costs of EV batteries were simply that. Bad tempered sniping and ill-informed to boot.

"If there are meant to be five stages in the acceptance of imminent death, the lead battery industry only had four phases of denial when faced with the arrival of its nemesis," a rather manic lithium enthusiast once told us. His thoughts are paraphrased below.

Lead battery community, phase one. Lithium? Snorting sound. Worthless nonsense: these batteries are commercially impossible, let's not waste our time even thinking about them.

Second phase. Lithium? Disdainful sniff. They're interesting but in a perverse kind of way. Yes, they work in iPhones and laptops but why even consider them for other jobs?

Third phase. Haughty snuffle. Yes, they're valid but ... not particularly important for the future of transport or anything else.

Fourth phase. Congratulatory-snort-of-I-told-you-so. "I always said they were the Next Big Thing."

But that story wasn't replicated elsewhere on the planet. Chinese battery makers — specifically think CATL or BYD here — roared through those first three phases.

Both firms understood early on what Wright's Law meant for them: volume sales were key to driving costs down and expertise up. Additionally, they saw that R&D was vital for momentum.

The amount of research and development undertaken by these companies is huge. Robin Zeng, founder of CATL — and interviewed 10 years ago by *Batteries International* just as the firm's sales



took off — said this summer that the firm had invested the equivalent of \$2.6 billion in R&D in 2023. BYD, which is also involved in EV manufacturing, invested around \$5.5 billion.

But looking at the current energy storage landscape — for both lead and lithium — there is little to assume that Wright’s Law can now prove meaningful for either the US or European battery industries.

This is particularly odd for the US. Its November 5 election — the result of which theoretically will determine how the world’s most powerful economy will deal with the energy transition and how fossil fuels will be embraced or shunned — is largely irrelevant to its energy future.

Not totally irrelevant but largely so.

The damage is done

It’s simply a question of too little too late. Or in the words of an old English aphorism ... closing the stable door after the horse has bolted.

Wright’s Law has already been proven to work in China, a country that had the forethought and sense to read the signs of the times in advance of the rest of the world.

The Chinese turn-around is all the more surprising because even though they had focused on energy storage and renewables from the start of this century, just a few years previously they were light years away from what they would become.

A lightning tour of recent history shows how China saw the way forward and the West missed a great opportunity.

In the late 1990s China was trying desperately to re-invent itself in a variety of economic areas. There was a huge demand for lead batteries — in those days mostly plain automotive ones — but there was little real capability in making decent ones.

The price was cheap even though most car batteries were, effectively, hand-made. It is not hard to find similarities with the early years of East Penn’s founder DeLight Breidegam after the second world war and his later embrace of mechanization that created the firm’s success.

The landmark event of the late 1990s was the arrival of a remarkable salesperson called Ian Pinson who set up a firm from the legacy of the old Chloride battery giant, called Chloride Technical and Trading. Pinson looked at the China battery scene and saw huge opportunities.

Pinson, an astonishing person in many ways and last interviewed by this magazine some 10 years ago, pulled together a group of many of the best battery machine manufacturers — think Mac Engineering or Wirtz — and arranged for them to sell the mechanization that Chinese battery firms were seeking.

The Chinese battery boom was about to begin, though of course it was not just Pinson’s sales efforts that effected the change. Firms such as BYD, created in 1995, have grown from 20 employees to well over a quarter of a million. Leoch, 1999, now has 14 manufacturing facilities and is expanding into the Americas.

At some time in the mid-2010s it was clear that Wright’s Law had started to kick in. From a lead battery perspective — although the arrival in China of some of the US majors such as Johnson Controls — in terms of battery manufacturers and equipment supplier firms such as Bitrode or Digatron, the home-grown environment had changed.

One veteran of the period told *Batteries International*: “from the early-2000s there was a wild-West atmosphere about doing business with China. Now no more. Then, there may have been IP infringements and some reverse-engineering approaches to copying Western machinery but they had the vision to pursue improving what they had.

“What they had was an incredible understanding of mechanization, a skill vital to doing what they did so well, and generating wealth in enormous numbers,

“For us at the time the country seemed a bottomless well of demand for batteries and energy storage.”

That was then. And now?

Looking around with the West trying to come to terms with the huge energy transition that is needed — and just around the corner too — the boot is on the other foot. ■

Scott Fink, close to the mainstream lead battery industry for two decades, talks to Shona Sibary, about the threats, challenges and opportunities the lead battery industry faces.

China: the Western world could do itself a favour ...

The Covid pandemic disruptions are showing little sign of improvement, according to Scott Fink, president of Sorfin Yoshimura, which supplies and delivers equipment and expertise across the world.

“Supply chain difficulties aren’t really alleviating,” he says. “There are shipping lines that are taking advan-

tage of the abnormalities and using them to really jack up pricing.

“The inefficiencies of global trade that we’ve seen since Covid are going to continue in some form because the pandemic was a catalyst that unfortunately moved the world from a globalized place and reverted it back to being regional.

And the result of that is more and more people are trying to have relationships that are closer in proximity from a geographic perspective to alleviate the supply chain risks.”

He says this has also affected firms hiring staff. “It’s hard to explain what the real drivers are, but in many of the geographies around the world, availability of labor is an extreme hardship and we’re not seeing that alleviated here in the US.

“In Europe and several other economies around the world, Japan as well, having enough labor to do what it is that we need to grow and thrive has been an obstacle and I think it will continue to be.

“And the answer is, we’re seeing many more folks move towards automation because they just they don’t have reliable ways to staff and that’s a big challenge.”

When asked if the major battery leaders are working at full volume at the moment and if there is a sense of panic or, perhaps, complacency, Scott believes that firms are taking a strategic view.

“The main lead battery companies are trying to become more agnostic to chemistry and view themselves as energy storage device makers,” he says.

“They’re starting to utilize some of their resources to develop skills to manufacture other chemistries. So then they can, depending on their customer base — if their customer wants a lithium, lead, zinc solution or something else — they’re able to pull that out of their toolbox and just give it to the customer as needed.

And that is a very appropriate strategic approach and what a lot of the large lead acid battery factories and manufacturers have been doing strategically relative to their lead capacity. Most firms are operating close to capacity depending on geography. You have certain macroeconomic factors and certain geographies that



“My father started the business in the 1970s with another gentleman called Tom Yoshimura, and now the second generation, myself and Taro, Tom’s son, are running it as co-headquarters in New York and Japan. Taro and I are like brothers from other mothers!

“The inefficiencies of global trade that we’ve seen since Covid are going to continue in some form because the pandemic was a catalyst that unfortunately moved the world from a globalized place and reverted it back to being regional.”

might keep things a little bit less robust, but that’s not really demand driven.”

Scott happily admits to not being ‘a battery guy’. He isn’t an engineer and his background — in business development — saw him working in different industries before joining his father at the family firm. But he’s always known he wanted to be in international business. “I love the idea of understanding cultures, people and the different perspectives of what’s going on around the world,” he says.

This view might go some way in explaining his opinions on the challenge that China presents to the lead battery industry — which some could see as controversial. But Scott insists that trying to isolate China is not beneficial to anyone.

“We’re seeing a lot of folks move away from reliance on Chinese manufacturing, but the world would do itself a big favor by trying to work out how to have them as a partner of goods and services. They are a very big player today and will be in the future.

“On the lithium side of things, they’re obviously well ahead of the rest of the world. But with regards to lead, they also have some really nice, lower cost solutions to certain parts of the process that are desirable.

“And if you’re trying to utilize all these things for everybody’s goals and targets and getting an optimized solution, you have to try and look into your toolbox and pull out whatever it is you need to be successful. And China has a lot of available tools. It would be a shame not to use them.”

Closer to his US home he sees legislation as being a potential show-stopper for the industry but feels there is still ‘a lot of runway left,’ for lead batteries.

“It’s really about trying to ensure that the legislation continues to hold space and accommodate lead battery solutions for the long term,” he says. “We are obviously big proponents for the viability of the of the chemistry, and we believe it’s by far the most sustainable option for storing energy as it exists today. But, you know, the

legislators themselves have to agree.”

On a more positive note, Scott sees it as an exciting time for the industry.

“I think a decade ago folks were looking at lithium as a really big potential threat and challenge to the lead battery space. I don’t think that exists today in the same way. People understand the world is electrifying. Our reliance on fossil fuels will be less and less over the course of the next decades. The timing of it isn’t clear, but the thought is clear.

“As we move to using renewables storing energy becomes absolutely crucial. Demand is definitely going to outpace supply for decades which means that lithium won’t be a threat to lead. I see all energy stor-

“We’re seeing a lot of folks move away from reliance on Chinese manufacturing, but the world would do itself a big favor by trying to work out how to have them as a partner of goods and services. They are a very big player today and will be in the future.”

age chemistries winning in the long-term.

“We’re not going to be able to catch up with the global demand — whether it be in automotive power, or stationary backup for data centers that are now going to be enhanced by AI. All of these things are going to continue to drive the critical need for storage devices of all sorts.

“So, I don’t see lithium as a threat. I see it as something that maybe decades down the road we could start to really optimize and say: ‘Oh, well, this chemistry is really perfect for this application’. But for the moment, it’s going to just be whoever has capacity to fill the need is going to receive some business.” ■

The magnetic pull of a family business

Scott is married with twin 16-year-old girls who, he admits, keep him busy outside work. But despite having worked in different industries before joining his father’s company he says he would rather be together with the family, for the family, than anything else and he describes his journey to becoming president of the firm as a “magnetic pull”.

He says: “We run this very much as a family business with less than 100 people globally. We just really tried to keep things as a little tight-knit global family.

“My father started the business in the 1970s with another gentleman called Tom Yoshimura, and now the second generation, myself and Taro, Tom’s son, are running it as co-headquarters in New York and Japan. Taro and I are like brothers from other mothers!

“Our fathers are not involved in the business anymore, they’re retired. But they’re alive and obviously available for insights and consulting works.” He pauses. “That’s its own blessing and curse, right?” ■



Alan Greenshields is the director of EMEA at ESS, the iron flow battery firm. A serial and successful entrepreneur, he has successfully founded and run several technology ventures in the UK, Germany and Switzerland. With over 15 years of experience in the rechargeable battery space, he brings a unique perspective to the energy storage sector.

“I’ve learned it’s not about how much I know, but how little”

ESS director Alan Greenshields is a man on a mission. His goal? To implement the latest and best-suited technology to solve some of the world’s energy problems. Here, in the first of a series of expert profiles delving deeper into issues affecting the battery industry, he talks to Shona Sibary about how achieving decarbonization will come down to safer, bulk storage of long duration energy.

Alan Greenshields is crystal clear on how energy sustainability for Europe can be achieved. “We need huge amounts of stationary storage now. When we started generating wind and solar energy, we could just feed it into the grid,” he says.

“Then we went through a phase where stability of voltage and frequency could be trickier, and that’s where lithium-ion batteries were first deployed in the grid for relatively short duration periods — initially for 15-minute, half-hour grid services — their primary function was to keep the grid stable.

“But the issues surrounding battery

safety are one of the things that are potentially going to come back and bite us. The thing with lithium-ion batteries is that, from a physics and chemical point of view, they want to explode, and you’ve got to do lots of things to stop them doing that. I’ve believed for years now that non-flammability is the missing piece of the jigsaw when it comes to the role of storage.”

Being an entrepreneur means feeling excited and worried about the future in equal measure

Bulk shifting energy

On the issue of decarbonization, Alan is unequivocal. “We need storage systems that allow you to move energy around within a 24-hour cycle,” he says. “You have to bulk shift energy. So, you have over-generation during lunchtime, because all the solar is on, but you’re going to need the energy at night when the sun’s down.

“We’re at a point now where the aim is not to control the stability of the grid from a regulation point of view, like before. But to have storage systems that allow energy to be moved around as and when it’s needed.”

It is this tipping point in terms of energy provision where Alan believes batteries need to step up.

“If we fast forward to 2040 and what a decarbonized grid might look like, what comes out of that is you need short duration batteries for these stability functions.

“You then need storage systems that allow you to move energy around within a 24-hour cycle. And that’s the bulk of what needs to be done. It’s logical because you have a daily cycle of energy production, and you have a daily cycle of human activity.

“So, the fact that you have to move energy around within 24 hours, that’s a very big part of, probably THE biggest single part of decarbonization.

“You also need to store energy for a few days. Then finally, there’s a cate-



“Objectively, for most people in Europe, life has never been better but the population perceives this isn’t the case. Perhaps it will take a real crisis for everyone to realise that, actually, life wasn’t as bad as we thought it was. And maybe then we’ll really pull ourselves together to fix the problem.”

gory where, in most geographies, you typically have two-week periods of low sun and low wind, and you need some kind of backup solution for that. And if you're storing these massive amounts of electricity, then it's got to be cheap and it's got to be safe."

Harvard Business School

Alan has dedicated much of his career to working on non-flammable electrolytes for lithium batteries and has specialized in the energy storage transition since 2005 but he attributes two years spent at Harvard Business School in the early 1990s for teaching him something he's never forgotten.

"People often ask me, what's the most important thing you learnt there? Because it's obviously quite a well-known establishment. And my normal answer, which I heartily believe, is that I learned not how much I know, but how little!

"It's crucial at an institution like that when you're surrounded by all these fantastic professors and other smart people to realize you know very little about most things. I left there feeling very humble."

He cites, in particular, the 'inspiring' experience of being involved in a think-tank day in 2010, where the HBS got a group of people together — former students, industry professionals and regulators — for a multi discussion on what needed to happen to decarbonize.

"I was already involved in energy storage and developing new energy storage technology," he recalls. "And we're all there to talk about how realistic was it, that wind and solar could become cheaper than coal fired generation?"

"There were obviously the optimists in the room and the pessimists. Most people were gulping a bit and saying 'that's a really tough goal.'

"Everyone started with, 'if only wind power were very cheap,' followed by, 'if only solar power were really cheap.' Looking back, the interesting thing is, that the rate at which the cost of wind generation and then the cost of solar generation went down has been way faster and way deeper than the most optimistic optimists ever dared to dream!" Of course, the same thing happened with EV batteries.

"Back then lithium-ion batteries cost 1000s of dollars a kilowatt hour. Now they're heading for 100 dollars and below. Oddly that number isn't a new one," Alan says.

"It was calculated in the US decades

"The thing with lithium-ion batteries is that, from a physics and chemical point of view, they want to explode, and you've got to do lots of things to stop them doing that."

ago as being the breakpoint number at which electric vehicles become cost competitive without subsidy with conventional vehicles. It's just that, back then, people used to say, 'well, you know, we'll need new technology, and we'll think of something.' But, in fact, the price went down so much faster than anyone really dared to believe.

"And, to be fair, we have to thank the Chinese for a lot of that. It's a pity that the geopolitical situation has become tense, because 10 years ago it was a different situation. There was a much greater spirit of common goal and they have really shown us that scale with scale, you can drive the cost down to very low values. So that's what led to low-cost grid batteries — they were a byproduct of the push to make electric cars competitive."

Alan believes that being an entrepreneur means feeling excited and worried about the future in equal measure.

Obstacles

"There's still all kinds of obstacles to be overcome and all kinds of horrible things going on in the world that could derail everything," he says. "You've either got to assume that we'll figure out collectively how to get past those, like we always have in the past — or nearly always have in the past — or it's over. And I have faith that we will figure out how to get past these things. Because, you know, crises tend to focus the grey matter."

"There's also this really worrying, but interesting phenomena that life is actually too good for most people and they don't have to worry about stuff anymore. Objectively, for most people in Europe, life has never been better but the population perceives this isn't the case.

"Perhaps it will take a real crisis for everyone to realise that, actually, life wasn't as bad as we thought it was. And maybe then we'll really pull ourselves together to fix the problem." ■



Alan is the director of EMEA at ESS Inc, the iron flow battery firm. He brings over 15 years of experience in the rechargeable battery space. He is a serial entrepreneur, focusing on new technology and has successfully founded and run several technology ventures in the UK, Germany and Switzerland. Alan has also held senior board-level positions at battery companies.

He has been deeply involved in several initiatives relating to renewable energy, including the Think Tank on Energy Environment and Business initiated by Harvard Business School in 2010.

He started his career in high-volume manufacture of computer electronics with IBM, Scotland and later worked as a senior manager in the Instrumentation Division of VDO Adolf Schindling, Germany, a leader in automotive instrumentation and now part of Continental.

It is with sadness *Batteries International* announces that battery veteran and popular industry figure Steve Gerts died suddenly on September 20, aged just 71.

Steve Gerts: 1952–2024



Steve, a cosmopolitan American who spent most of his working life abroad, had been sales and marketing manager, Eastern Europe and North Africa, for separator firm ENTEK, for 24 years and almost 35 in the battery separator industry. He had retired from the business in July 2020.

Steve moved to France in his early 20s determined to become fully proficient in French. In 1973 he gained official recognition of this while studying at the Alliance Française. He then studied business management, government and intensive accounting in Paris with his French contem-

poraries.

From 1978 through to 1989 he worked in France and later across Europe for Johns-Manville de France finally ending up as European sales manager for its microfibre glass business.

Steve started in the battery industry in 1989, when he joined Lydall, a US manufacturer that makes, among many other things, separators. He rapidly became director of sales and marketing for the company's Axohm Industries subsidiary, increasing the company's market share of battery separators to 55%.

In 1996, he headed to ENTEK and with ever increasing volumes of sales under his belt rapidly became a mainstay of its overseas marketing and management. He stayed with the US firm in France for a while until transferring to its UK office in Newcastle-upon-Tyne in 2008.

Steve later recalled: "I've been close to the industry for a long, long time. I was there at the very beginning of AGM separators, when they were starting to take off," he says. "That experience gave me exposure to the battery world, as from there I moved on to other types of separators."

On his retirement Steve said: "I don't miss the responsibility of my job and my function, but I miss the friends and the marketplace."

Steve was a well-known and popular figure both in his commercial life and also his private one. In Newcastle-upon-Tyne he had a reputation in the clubs and bars of the city as a singer and guitarist.

Batteries International has received many tributes to Steve's kindness and decency. "I was fortunate enough to know Steve during his time at ENTEK and on occasions I would travel with him to conferences and customer visits. He had an infectious positivity on life and was always great company during our trips," says Steve Barnes, managing director of Hammond UK.

"Customers and friends from the industry were always genuinely happy to see him, they recognised his sincerity and honesty. What you saw is what you got — a kind, warm and generous man always who was always smiling.

"He will be greatly missed by those who were lucky enough to have known him." ■

"Customers and friends from the industry were always genuinely happy to see him, they recognised his sincerity and honesty. What you saw is what you got — a kind, warm and generous man always who was always smiling. "He will be greatly missed by those who were lucky enough to have known him."

— Steve Barnes, managing director of Hammond UK

Exceptional honours for an exceptional person



Maura McDermott, the guiding force and spiritual mentor of ELBC (and the ILA for that matter) was honoured by Andy Bush at the ELBC opening day in Milan in September for her contributions to the lead battery industry.

Maura has been one of the key figures in making the events activities of the ILA — starting in 1990 with 2ELBC in Brussels, right up to this year's 19ELBC in Milan — an integral part of the lead battery industry calendar.

Maura had already been honoured with the International Lead Medal and her retirement last year but, said ILA's managing direc-

tor Andy Bush, needed to be recognised at the full audience of the ELBC.

"I'm glad she's receiving the recognition that she's due," one ELBC delegate said to *Batteries International*. "She's always been a well-liked and popular figure in the conferences — she's been scrupulously fair with everyone even with some of the more difficult exhibitors who can be very pushy.

"She's been very much a landmark at our events and a welcome face too!"

Maura joined the Zinc and Lead Development Association in November 1988, as executive assistant to the chief executive,

David Ward. She started work at the association's offices in Berkeley Square, London.

Following a series of reorganizations, the Zinc Development Association moved to Birmingham, and Maura stayed at the International Lead Association, and worked as executive assistant to David Wilson who was then managing director of ILA until his retirement in 2012.

Behind the scenes however Maura became the driving and organizing force behind the ELBC becoming integral to managing the whole conference. In the last 12 years attendance figures have soared from

around 600 in Istanbul to around 1200 at the latest events.

It was during this period that she helped induct a shy new ILA recruit, Andy Bush, who joined the association on completing his doctorate. He was eventually to become managing director.

Commenting on her career she earlier said: "It's a real honour to be recognized by the industry to which I've devoted almost my entire career. It's such a social and friendly industry, I will take with me many happy memories and just as many friends.

"I've enjoyed many aspects of the job, but I'll particularly miss the events and the colleagues and delegates who helped make them such a success.

Andy Bush said: "In three and a half decades Maura has made a huge contribution to the work of the lead association helping to make two of the major conferences supporting our industry — Pb and ELBC — the leading events they are today. She has been a much loved and respected point-of-contact for so many members and partners, as well as our employees. She'll be greatly missed.

"On behalf of the whole industry I would like to thank her for her unstinting loyalty and service over so many years and wish her a long and well-earned retirement. Since her first ELBC in 1990. She's been central to the success and growth of ELBC into what it is today," said Andy.

We couldn't agree more, and we hope retirement will suit her as much as our pleasure in seeing her at industry events. ■

"I'm glad she's receiving the recognition that she's due. She's always been a well-liked and popular figure in the conferences — she's been scrupulously fair with everyone even with some of the more difficult exhibitors who can be very pushy."

Drasch becomes CEO of Schuler, owner of Sovema Group entities



Martin Drasch has been appointed the new CEO of Schuler, the German metal-forming group, which is part of international technology firm, Andritz.

The 49-year-old Drasch had been CEO of Manz, the German multinational engineering firm, since October 2018. Drasch built up the mobility and battery solutions division there and initiated a cooperation with firms Dürr and Grob on the development of turnkey battery factories. He has also held various management positions at Eisenmann.

In September 2022 Schuler completed the take over of the entire Sovema

Group which covered all Sovema entities including Solith, which provides equipment for lithium ion cell and module production, Sovel — formation systems for lead and lithium storage technologies — and US-based battery testing equipment company Bitrode.

Sovema general manager Massimiliano Ianniello said at the time that the acquisition would ensure the group could “play a major role in the gigafactory challenge.

“So far, our size allowed us to serve our customers with high quality product and customization. Now, as part of Schuler, we will

finally be able to reach the volumes required by the massive demand for battery manufacturing equipment in Europe and beyond.”

Andritz Group president and CEO, Joachim Schönbeck said: “The market situation in the automotive and supplier industry is challenging, so we are fortunate to have found Martin Drasch who has extensive knowledge and experience as well as in-depth industry expertise in the future topics of electromobility and battery production.

Founded in 1839, Schuler has production sites in Europe, China, and the US, as well as service companies in more than 40 countries. Its client base includes automotive manufacturers and suppliers and electrical industries.

- Separately, international technology group, Andritz, confirmed in July that Xin Wang, COO of Chinese battery manufacturer, SVOLT Energy, was joining its metals forming division as head of its battery division.

Wang has more than 25

years’ experience in the automotive and lithium-ion battery industries and has held management positions at the Sunwoda Power Battery Group and Shanshan Holding Group. He has also worked in the area of e-mobility at Groupe PSA, which included the Citroën, Peugeot and Opel brands. As part of this he spent some 15 years living in France. ■

Former Ecobat

CCO Soule to

advise Li recycler

Momentum

Former Ecobat chief commercial officer Thea Soule has joined the advisory board of directors of Dallas-based lithium battery recycler Momentum Technologies.

Momentum announced the appointment on September 24, saying Soule would draw on her industry knowledge to help guide and shape the future of the company.

Soule, who joined Ecobat in 2020, led the group’s lithium ion recycling division and expanded its operations across the US, UK and Germany, before announcing in August 2023 that she had left the group.

Momentum has developed what it described as modular, scalable battery recycling technology in conjunction with the US Department of Energy, the Oak Ridge National Laboratory and Halliburton Labs.

The company claims its membrane solvent extraction tech has the ability to extract high-purity metals from battery waste at significantly lower operating and capital costs than existing recycling technologies. ■

Microporous promotes Rich to president

Microporous has appointed Doug Rich as president of the company, the separator firm announced this summer. He will report to John Reeves, CEO, who will



Doug Rich

direct more of his time leading their entry into the lithium-ion battery separator market.

Rich, who has an extensive international background in manufacturing and business management in the plastics and specialty chemicals sectors, will remain based at the company’s Piney Flats site in the US state of Tennessee.

His new position will entail him providing strategic and operational leadership to the organization with a particular focus on the core lead-acid battery

separator business.

Most recently Rich was vice president of operations for the company joining Microporous in 2022. He has previously held several senior jobs including VP/MD Europe, VP/GM Americas and VP Global Manufacturing.

Private equity firm Trent Capital Partners said this February 12 it had acquired full control of Microporous.

Trent has been a minority owner of Microporous for the past 10 years. ■

THE WORLD'S BEST BATTERIES...

ARE MADE BETTER WITH ENTEK

EFB+

ESS+



 **ENTEK**
BATTERY SEPARATORS

The global leader
for Lead Acid, Absorbent
Glass Mat, and Lithium
separators.

-  **TRADITIONAL ICE**
-  **ADVANCED EFB**
-  **ENERGY STORAGE SYSTEMS**
-  **INDUSTRIAL**
-  **LITHIUM-ION**
-  **ABSORPTIVE GLASS MAT**
-  **GOLF CART**
-  **GLASSMAT LAMINATED**

For more than 40 years, ENTEK has been the world's most dependable supplier of battery separators. With a product portfolio that can handle any energy storage demand and help our customers build the world's best batteries.

US +1 541 259 3901 | UK +44 191 268 5054
Singapore +65 6959 6119 | India +91 738 883 3999
Japan / China +81 584 24 3733

Frank Fleming inducted into Alpha-Beta Society

The Alpha-Beta Society, an informal society of members who have made outstanding contributions to the development of lead-acid batteries, announced this summer that Frank Fleming had been elected as its 31st member.

The society, launched by David Rand and Ernst Voss, elects only one member per year. “This is a totally unexpected and wonderful surprise! To be proposed and accepted as a member of such august and esteemed company is very humbling indeed. I would be absolutely delighted to accept,” said Frank.

“For the past 40 years Frank has been at the sharp end of research, manufacture and commercial development of the lead battery business,” said Jürgen Garche, grand-master of the society.

Fleming’s career has indeed been spectacular. While studying for his degree in applied chemistry he took a year’s work experience with Chloride, which was then one of the three top battery manufacturers in the world. Folklore had it that the sun never set in the Chloride empire — it had operations all around the globe.

It was also the stuff of legend. It was there that Frank came under the influence of Barry Culpin and Ken Peters — nowadays the man recognized as having been the pioneer of VRLA batteries and who turned the technology into a commercial phenomenon.

After graduating in 1978, he knew what he wanted to do and he went on to take a PhD in solid state proton conduction at Leeds University.

So, with doctorate in hand, he returned to work for Chloride, which later was to become Hawker Batteries, and for the next 19 years the firm was an integral part of his life.

His initial work was as an applied scientist for Chloride Technical, the R&D arm of the group.

Oddly, for a man whose career has been almost exclusively spent in the lead industry, for a time he was involved with Salford University and the Danish Energy Research Laboratory, studying secondary lithium batteries. This work resulted in the development of a lithium/PEO/V6O13 secondary button cell.

As his experience grew he became a member of a team of onsite trouble-shooters, whose role was to resolve local processing problems and to understand the unique electrochemical phenomena that disrupted the Chloride VRLA product.

During this time, he spent extended periods working in the South Africa and US manufacturing facilities on the Torque Starter, one of the first AGM batteries.

The early AGM batteries were plagued with problems — it was not just a Chloride difficulty but a worldwide one — which became labelled PCL, premature capacity loss. The cycle life of AGM batteries was found to decrease spectacularly in the early months of the batteries’ use. This was a huge problem, in particular, for Chloride, which was involved in huge potential sales for telecom companies.

Frank, with what became a later fabled group of people including Kathryn Bullock, Ken Peters, David Rand, Michael Myers, Pat Moseley and Russ Newnham, was one of the team recruited by the then newly formed ALABC to solve the problem.

During this time, Hawker acquired the Gates Company and Frank became involved in the development and manufacture of TPPL batteries. Thin plate pure lead batteries offer greater cycle life and deeper power.

The next phase of his career was with his relocation to Warrensburg, Missouri in 1995. Hawker had acquired Gate’s Energy Products Inc. Here he became an integral member

of the acquisition team. By 1998 he had been promoted once more, this time to be global director for standby power. Here he was responsible for the strategic and technical direction of Hawker Batteries’ standby products for manufacturing facilities in Europe and the US.

This came to an end in 2000, when Frank became the co-founder and chief technical officer for NorthStar Batteries.

Frank looks back at that period of his life with a kind of amazement. “The first year of NorthStar was like starting from a completely white sheet of paper,” he told Batteries International in an earlier interview. In the event they designed and built a battery factory from scratch, focusing on telecoms batteries for the rapidly expanding cell phone market. NorthStar went on to become a highly successful manufacturer of advanced lead acid batteries for telecommunication, UPS and transportation applications.

In 2017 he took up the position of technical manager for Electric Applications Inc based in Phoenix Arizona. Frank further took on the role of technical manager for the Lead Battery Science Research Program (LBSRP) a US DoE sponsored project between Argonne

National Laboratory (ANL) and a consortium of US-based lead acid battery manufacturers.

The project — arguably the most exciting for a generation — uses the advanced techniques of ANL including the Synchrotron high energy X-ray source to study, in real time, the charging and discharging of lead cells.

The LBSRP is now heading into its seventh year and has been crucial in further understanding the fundamentals of the lead battery electrochemistry, and how to extend the cycle life of the lead battery to compete with other battery technologies.

In 2019 he received the 2019 International Lead Award, recognizing his outstanding lifetime contribution to the lead battery industry.

Frank continues to work with both the LBSRP and as a consultant with EAI, working on grid energy storage projects in the US and overseas. He says he sees this as a tremendous new market sector where lead batteries can dominate given their intrinsic safety, low cost and, as a result of the LBSRP research, potential high cycle life. ■

“For the past 40 years Frank has been at the sharp end of research, manufacture and commercial development of the lead battery business,”

— Jürgen Garche, grand-master of the society

The right fit For every cell



Our genuine system - your first choice

- Highest quality
- Constant improvement
- Excellent performance
- Reliable service

Over 40 years of developing and perfecting battery filling products allow us to provide you with the most reliable system focusing on innovation and usability – a valuable contribution to an extended battery lifetime.

bfs batterie füllungs systeme GmbH
info@bfs GmbH.de

Mitterweg 9/11 | 85232 Bergkirchen | Germany
bfs GmbH.de | +49 8131 36400



Luminous' Preeti Bajaj wins acclaim by Woman in Energy forum



There were numerous plaudits mid-July following the announcement that Preeti Bajaj, CEO of Luminous Power Technologies, had been recognised at the Women in Energy forum 2024 as part of India Storage Week.

Held on July 2 in Delhi, India, the forum provided a platform for over 70

women leaders, speakers, and delegates to come together and celebrate the theme 'Women at the Forefront of Energy Transition & Clean Mobility.'

Writing on a post on her page Bajaj said: 'I am humbled to have been recognized at the Women in Energy Forum 2024 as part of the India Energy Storage Week. The day was filled with insightful discussions, powerful connections, and a shared vision for a sustainable and clean energy future.'

Luminous Power Technologies, India's third largest battery firm, is already known in the industry for its commitment to calling

out societal stereotypes with gutsy campaigns, aimed at empowering women.

On International Women's Day this year, the company launched, for the second time, their #WomenInEnergy drive with a film highlighting the gender gap in the energy sector and challenging existing biases.

Under its CSR project 'Solar PV Installation Training', Luminous also supports women across small towns in India to become solar installation technicians.

Neelima Burra, chief strategy, transformation and marketing officer, said,

"We as a society have come a long way and moved the needle for women in certain professions, but there is still a lot to be addressed. The energy sector and technician jobs are often seen as male-dominated, even though women possess all the necessary qualifications to enter the industry." ■

CEO of Exide Industries' lithium unit resigns

The CEO and joint MD of Exide Industries' lithium-based subsidiary in India, Arun Mittal, is to resign, the company announced on September 4.

Mittal is stepping down from Exide Energy Solutions (EESL) for personal reasons effective October 31. He will also cease to be director of the company.

He will be succeeded as CEO and MD by current joint MD Mandar V Deo, whose appointment takes effect on November 1.

EESL manufactures lithium ion cells, modules and battery packs and the subsidiary's activities include a collaboration deal with China's SVOLT Energy. ■

Doe Run hires new VP of sales and marketing



Mining and metals company, Doe Run, announced at the end of July that copper industry expert Rene Bustamante has joined the firm to take over from veteran, Louis Magdits, who is retiring.

A Chilean native, Bustamante will succeed Magdits as vice president of sales and marketing as part of the company's succession planning and will head up metal and concentrate sales, customer service, transportation, raw materials, and production planning. He will work alongside Magdits until he retires later this year after spending 45 years in the metals industry.

Throughout his career, Bustamante has held posi-

tions of increasing responsibility with high-profile mining companies, including Phelps Dodge Corporation, Freeport-McMoRan Copper & Gold, and ASARCO.

Most recently, he was deputy commercial director of Americas Mining Corporation, Grupo Mexico, where he led the global copper corporate commercial team with operations in North America, South America and Europe.

Magdits joined Doe Run's

predecessor in 1991 while the company was converting a primary smelter in Boss, Missouri, into a secondary smelter to recycle lead batteries and other lead scrap into lead metal.

During his time at the company he established Doe Run's supply base for all lead-bearing materials from a wide variety of sources and maintained customer relationships with the battery industry and other customers. ■

Khale joins NETZSCH as regional director

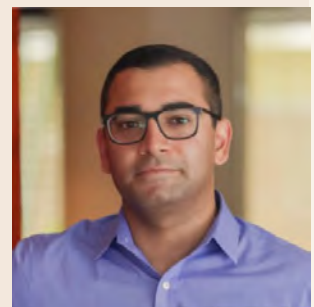
Rahul Khale, a business solutions manager at German firm, IKA, joined global manufacturer NETZSCH in July as a regional business field sales director.

NETZSCH supplies mixing equipment that plays a crucial role in battery manufacturing and Khale said he was "eager" to continue providing innova-

tive solutions to meet the evolving needs of customers in the EV industry.

"With over a decade of expertise in the battery industry spanning North America, Europe, and South Asia, I bring a wealth of experience in sales, marketing, and account management, with a focus on driving growth and fostering

client relationships," he said. ■





THE SMARTEST (AND EASIEST) DECISION IN HEATING

Watt-Flex® heaters have a patented split-sheath design that eliminates costly BORE SEIZURE. Continuous coil technology offers the longest lasting, most even heat used in:

- GRID CASTING and FORMATION
- COS DIE and LEAD PUMP
- COVER SEALING PLATEN

It's time you switched to Watt-Flex® cartridge heaters.

DaltonElectric.com
978-356-9844



Applications open for BCI Foundation scholarships

Battery Council International said on September 3 it has formally opened the application process for its first BCI Foundation scholarships — with awards of up to \$5,000 available for families of BCI member firms studying in the 2025-2026 academic year.

The foundation is a charitable entity set up to mark BCI's 100th anniversary this March and initially funded by donations totalling more than \$115,000 from centennial sponsors including Banner, CD Trojan, Clarios, Crown Battery, Duncan, East Penn Manufacturing, EnerSys, GS Yuasa, Leoch Battery, Moura, Rolls Battery Engineering, Stryten Energy, Superior,

and US Battery Manufacturing Company.

Additional contributions to the BCI Foundation include a \$10,000 'challenge grant' from ENTEK. Daramic supported the foundation with a separate \$5,000 award.

Scholarships will be administered by the University of the Aftermarket Foundation, a group dedicated to providing funding for aftermarket education programs and research. BCI Foundation scholars will be screened and selected by an independent panel of reviewers.

Applications will be accepted through March 31, 2025, with scholarship recipients notified of their selection by June 30, 2025. Funds provided by the BCI

Foundation will be directed to separate scholarship awards including:

The BCI Battery Chemistry and STEM Scholarship, which will award \$5,000 to individuals studying electrochemistry, science, technology, engineering, mathematics or a related technical discipline that will support energy storage applications. In partnership with Women in the Global Battery Industry, BCI will select at least one woman recipient to foster diversity in the industry.

The BCI Community Scholarship will award \$5,000 to an individual who is an employee or direct family member of an employee currently working in a BCI-member company.

To apply for these opportunities, applicants should gather the relevant supporting materials listed on the application form. Most importantly, applicants must list 'Battery Council International' in the program section and identify the relative who is employed by a BCI member firm under sponsor/contact name to ensure eligibility.

BCI president and executive director Roger Miksad said the trade body's members have a proud history of supporting their respective local communities. "The charitable efforts of the BCI Foundation will build on that legacy to ensure a vibrant pipeline of talent so our industry will thrive for many years to come."

Email info@batteryCouncil.org for more information on the scholarships or the application process. ■

Sunlight Group wins gold for sustainable business practice

Sunlight Group, the Greece-based international battery manufacturer, has been awarded the prestigious EcoVadis gold medal for exceptional sustainability performance, ranking it among the top 5% of organizations in the world.

Sunlight has made remarkable strides in its sustainability journey, the company said, as demonstrated by this latest EcoVadis rating — a globally recognized assessment system which evaluates performance in sustainability and corporate social responsibility (CSR).

The accolade highlights the company's significant investments and commitment to the highest environmental, social, and ethical standards. Notably, the firm has advanced from a bronze rating (top 35%) a year ago and no rating two years prior, to achieving a gold medal today.

By investing in the circular economy and operating

recycling facilities across Germany, Greece, and Italy, Sunlight is closing the loop on resource use, reducing waste, recovering valuable materials, and developing more sustainable products.

Lambros Bisalas, CEO of Sunlight Group said: "This achievement represents a significant milestone for our organization, highlighting our unwavering dedication

to sustainable and ethical practices that benefit our entire ecosystem—customers, employees, suppliers, investors, and board members alike.

"A few years ago we lacked any formal rating, then starting with a 14% rating in 2021, we have, in just three years, made the necessary improvements and investments to earn this prestig-

ious gold medal.

"Yet, our journey doesn't stop here. The sustainability mindset has become ingrained in our daily operations and we will continue to advance our efforts—not just for the rating, which validates our work, but more importantly, for the positive impact we strive to create in the world around us." ■

EnerSys recognised by Forbes

International battery company, EnerSys, announced in September that they 'were thrilled to share' the firm had been recognized by Forbes as one of the best employers for new graduates.

"This prestigious honor highlights our unwavering dedication to fostering a supportive, inclusive, and dynamic environment where new graduates can thrive and

grow," they said.

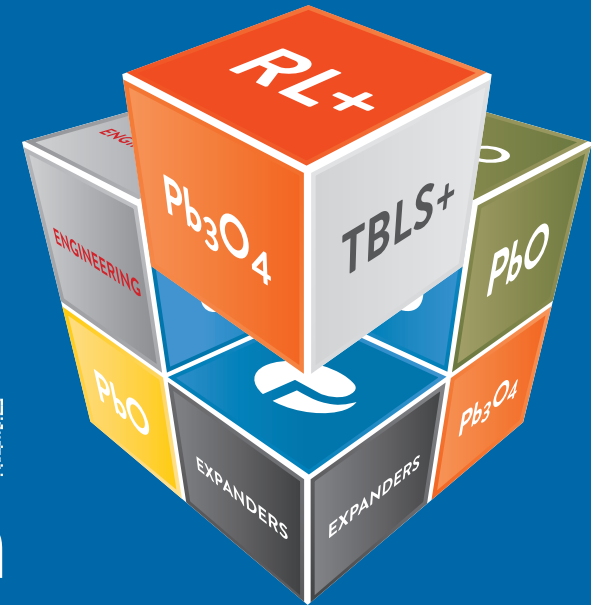
The announcement follows the news last month that the company had closed the acquisition of a \$208 million acquisition of Bren-Tronics, a manufacturer of portable power products for defense customers, including small and large format lithium batteries.

It's been a busy year for the industrial battery

giant. In April they were awarded the Better Project Award from the US Department of Energy Better Plants Program for advancing lead battery technology, specifically for the implementation of the Sovema Cold Cube cutting system. It was the second award that EnerSys has received in two years from the government. ■

Red Lead Plus

- Developed for Industrial (dry and wet filling) & Automotive batteries
- Combines benefits of Red Lead with 4BS seeds TBLs+®
- Customized Red Lead grade & 4BS concentration
- Reduces formation energy
- Enhances cycle life
- Available in big bags



INNOVATIVE PRODUCT

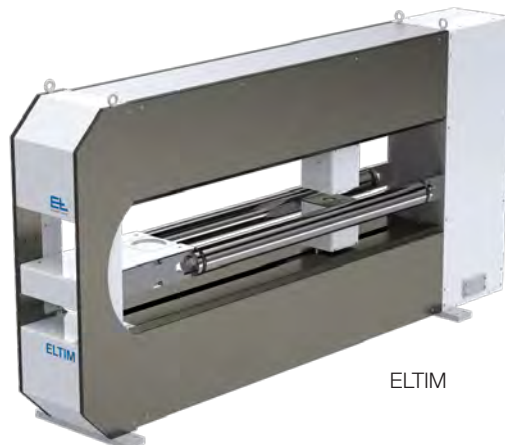
HOW TO INCREASE PRODUCTION QUALITY



Basis weight measuring system for single and double sided coating lines



NO DANGER from radiation due to ultrasonic measuring principle



ELTIM

MORE ABOUT OUR PRODUCT



Discover our solutions – WE KNOW BATTERY PRODUCTION.

Lithium Ion Battery
12.8 Volt 100Ah

Richard Ross passes away 1937 – 2024



Charles Ross & Son Co has announced the death of Richard Ross, former president of the company, on September 14. Ross was described as a visionary leader who played an instrumental role in shap-

ing the company's future and global success.

Taking the helm as president in 1961, Ross' leadership, foresight, and dedication drove Charles Ross & Son Co., also known as ROSS Mixers, to new heights establishing manufacturing facilities in New York, Georgia, and Florida.

The company said that his commitment to innovation and excellence expanded their footprint far beyond its US roots, leading to the establishment of major operations worldwide, including China and India.

In 1999, Rich established the company's Employee

Stock Ownership Plan (ESOP), a decision that not only empowered employees as stakeholders but laid the foundation for the company's continued growth and success as a leader in industrial mixing technology.

He will be deeply missed by his family, colleagues, and the many people whose lives he touched through his work and example.

Posting on LinkedIn, Thomas Digiannurio, vice president of engineering at the firm said: "Rich gave me my start in the mixing business and I have been going strong now for 47 years. He is a good leader and always took care of

his employees. I enjoyed our fishing trips with him and all the fun we had. God bless you Rich, we all know you are at peace in heaven."

Ricky Evans, owner of EPE, also posted saying: "Rich was one of the best businessmen I've ever known. I learned a lot, even at a distance."

Through a mixed marriage, Rich had 14 grandchildren and six great-grandchildren. He is survived by his two daughters, Melanie "Heather" Ross and Carol "Laurie" Ross, and his faithful Labrador, "BB". ■

Luminous Power joins CBI

Luminous Power Technologies has become the latest member of the Consortium for Battery Innovation, the firm announced in early September.

The CBI welcomed the firm's membership in a LinkedIn post and praised Luminous for its expertise on cutting-edge solar systems, inverters and batteries.

Luminous became part of the Schneider Electric group in 2011. As of 2022, Luminous had seven manufacturing plants and more than 28 sales offices in India, with a presence in nearly 40 countries. ■

Miksad says lead is vital to 'resilient battery supply chain'

BCI president and executive director Roger Miksad has called on US legislators to ensure domestic lead battery technology remains a cornerstone of the country's energy and economic security.

Miksad, writing in *The Washington Times* on September 21, said batteries built with lead, a domestically abundant material, "must have a key role in our strategies to protect sources of US energy and economic resiliency.

"The bipartisan investments of the past four years are showing profound impact, with more than \$177 billion in private industry investments in battery and EV infrastructure projects announced in just the last two years."

He argued that these investments are essential: the need for batteries will continue to grow rapidly, as cumulative energy stor-

age capacity will increase more than 10-fold by the end of 2030.

He said the battery industry as a whole should establish a resilient supply chain that is not overly reliant on a single product, company, or foreign adversary nation.

He urged Congress to support a vibrant and

diverse domestic battery industry — which must include the innovation of lead battery technology to be successful.

"Advocacy for a strong domestic battery industry has never been more essential to ensuring the nation's power needs are met." Miksad's article is available in full online. ■

France's AFDIB launches in Paris

Exide Technologies announced that the French Battery Industry Association (AFDIB) launched in Paris in July would be chaired by Serge Arbes, Exide's senior business director, global energy solutions.

"Representing producers and distributors of industrial and starter batteries, AFDIB has set itself the mission

of being the voice of the battery ecosystem in France," Exide said describing the association.

"In particular, to steer dialogue with public authorities at a time when new regulatory obligations on batteries and battery waste, will impose major compliance efforts on all players in the value chain."

AFDIB members will, according to the battery manufacturing giant, be able to actively contribute to the structuring of the French battery industry and take part in defining its positions.

Exide said: "We are proud to be among the founding members of the new AFDIB. Here's to a successful future for a growing organization." ■

Skeleton Technologies hires Järveläinen as CPO

Skeleton Technologies, the supercapacitor manufacturer and developer, announced in July the appointment of Tero Järveläinen as its new chief product officer.

Järveläinen was a co-founder and the CTO of Visedo Oy. Founded in 2009, Visedo manufactured hybrid and electrical drivetrains for electric vehicles across the marine industry, commercial vehicle, and heavy-duty machinery sectors.

Danfoss' acquisition of Visedo in 2017 was one of the largest cleantech exits in Europe at the time.

Taavi Madiberk, CEO of Skeleton Technologies said: "Tero will play a pivotal role in steering the development of Skeleton's product portfolio. He combines engineering and industrial expertise with an entrepreneurial mindset and experience.

Järveläinen, as CPO, will be responsible for leading the development of modules, packs, systems, software and hardware.

Järveläinen said: "Having been active in the supercapacitor field for a long time, Taavi and I have known each other for 15 years, and I have followed Skeleton's success story. I am pleased to join Skeleton, and, with my energy storage system expertise, help bring supercapacitors to the mainstream."

The appointment of Järveläinen is the third senior appointment by Skeleton in recent months.

The firm announced the appointment of former Shell VP, Grischa Sauerberg, as its chief commercial officer. At the end of May it appointed David Arsenault as senior

vice-president of business development. He was one of three co-founders of Effenco Development, a company pioneering heavy-duty vehicle electrification using supercapacitors.

Sabine Bendiek new board member at Sunlight

The Sunlight Group has appointed new board member, Sabine Bendiek as an independent non-executive director. The lead and lithium battery manufacturer said on July 19 that Bendiek would bring over 20 years of expertise in technology and general management to the board of directors and that she had 'proven ability' to lead and transform large organizations, along with an extensive background in go-to-market strategy, sales, people, and operations.

Bendiek most recently worked as a member of the executive board and chief people and operations officer at SAP SE in Walldorf, Germany. Since 2018 she has also been a nonexecutive director on the board of Schaeffler, a German automotive parts firm.

In her career, she has contributed significantly to leading organizations in driving strategic initiatives and business transformations and has been responsible for teams up to 7,000 employees globally.

Li-Cycle names Cunningham CFO

For the record, Toronto-based lithium-ion battery recycler Li-Cycle has appointed Craig Cunningham as its new CEO, effective June 20. Cunningham had been interim CFO since March.

As CFO, he will continue to lead Li-Cycle's finance function, supporting its operations

and strategic priorities, the firm said. His succeeds from Debbie Simpson in the position.

Cunningham brings nearly two decades of experience in accounting, finance, operations and capital markets, along with a strong background in executive-level leadership. He also has experience spearheading financial activities for publicly traded companies in the battery materials and mining sectors.

Before joining Li-Cycle, Cunningham was CFO at Electra, a refiner and recycler focused on producing materials for EV batteries. Before that he was vice president and regional financial officer at Kinross Gold, one of the largest gold producers in the world. Here he oversaw finance, IT, supply chain and logistics and administration functions in Russia.

His appointment follows announcement of a leadership shake-up in April and job cuts representing 17% of the firm's workforce to generate about \$10 million in cost savings on an annualized basis.

Doe Run in critical minerals training grant boost

US mining and metals firm Doe Run Company said on July 29 it had secured a multi-year \$1.2 million training grant to support critical mineral production.

Doe Run, a lead miner and recycler, said its employees are gaining critical new skills as a result of the grant awarded by the Missouri One Start Job Retention Training Program (JRTP).

This initiative, approved by the Missouri Department of Economic Development, is designed to help businesses remain competitive by retaining

a skilled workforce and expanding career opportunities for employees.

Much of the training will be provided by Mineral Area College in Missouri. "For our employees, that means providing new skills and technologies necessary to support the minerals and metals industries, which have driven Missouri's economy for more than 160 years," Doe Run said.

Trojan makes Bossman new GM, sales

For the record, Tim Bossman has joined the C&D Trojan Organization as general manager of sales, the company announced in early July.

Bossman joins from Wesco Anixter, a distribution, logistics and supply chain firm, where he has spent seven years, most recently as district manager growing its business throughout the central Florida market.

Trojan, which is headquartered in California, is one of the world's top deep-cycle battery manufacturers.

Stryten Energy receives WITTDTJR award from AutoZone

US battery manufacturer, Stryten Energy has received AutoZone's WITTDTJR Award ("What It Takes to Do the Job Right") for demonstrating a strong commitment to customer satisfaction.

The award was given at the car retailer's annual two-day vendor summit held in July in Memphis, US.

Along with Stryten, six other vendors received the award: Hitt BRANDS, Motorcar Parts of America, Moveras, Robert Bosch, Technical Chemical Company and The NOCO Company. They were all praised for putting customers first. ■

Three US-based additive suppliers, each with their own manufacturing, commercial, and technical expertise are forming an alliance to create a synergy for their customers – a partnership offering that adds up to more than the sum of their parts.

Addenda, Atomized Products Group, Black Diamond Structures to forge an advanced additive alliance

In a concerted effort to better serve the global lead-acid battery industry, Atomized Products Group, Addenda, and Black Diamond Structures, are proud to announce a strategic alliance. Their aim is to enhance customers' access to bespoke products and solutions-based technical experience while combining the global manufacturing and testing capabilities of the three members.

The alliance combines dozens of unique negative and positive plate products into one portfolio which permits the merged sales team to offer a more expansive array of customized solutions to the end user than any of the three companies could accomplish alone.

This expedites a battery manufacturer's product development by providing multi-faceted, third-party validated, curated solutions quicker, and from a single, dependable source.

With its newfound ability to access products both familiar and unique, the alliance is positioned to become the comprehensive additive supplier to the global battery industry.

Contained within the alliance are decades of technical experience which is leveraged to provide a solu-

tions-based approach to product placement.

Each team is cross-trained to provide technical service regarding their own products, other member's products, and intercompany combinations of products. Before the alliance, each member sought to market component products based on fundamental needs assessments and this principle remains a backbone of the partnership.

By accessing in-house testing facilities, the alliance intends to provide



Inside Addenda's facility in China

materials analysis learnings and deep understanding of structure/function relationships to their customer's technical teams, deepening the value of working with our members.

Testing facilities for 2V and 12V can also be accessed by customers for high-throughput screening or final prototype testing in laboratories capable of running the world's battery specifications (ex. EN, IEC, SAE, JIS, GB, AMNT, OEM).

The alliance knows the power of experience and, together with their global testing facilities, is positioned to become the industry's go-to development partner.

Between the alliance members, a global network of manufacturing, supply, testing, and warehousing is realized. Customers are therefore serviced on a more regional basis, which better serves the needs of the international market.

Despite strong and growing ties

The merged sales team offers a more expansive array of customized solutions to the end user than any of the three companies could accomplish alone

ADDENDA



Addenda will lend the alliance its extensive experience with the application of TBLS (Tetra Basic Lead Sulfate seed crystal) and its associated derivatives for the positive plate. Addenda will also bring its most recent advances in expander formulations, developed in China, which utilize novel organic and inorganic additives.

Addenda will also utilize its newly inaugurated battery testing facilities in China to assist the alliance in developing

new product solutions for various battery types.

Addenda is a material science company specializing in the development and manufacturing of inorganic metal-based products utilizing its proprietary technology for controlling crystal morphology and composition.

Addenda maintains an extensive analytical laboratory and product development center in Brazil, Indiana.

"This alliance allows us to exchange technical expertise across a wide spectrum of battery additives to better create tailor-made solutions for any and all battery applications" – Mark McCaughey, president of Addenda.

between the members of the alliance, each company retains its commercial and financial independence.

Five manufacturing facilities, three research laboratories, and strong ties to logistics and distribution leaders ensure the alliance secures a globalized footprint.

The alliance plans to share sales and marketing resources to maximize the efficiency of the partnership and generate enhanced coverage of all geographies. The first examples of the combined approach will be: the 2024 European Lead-acid Battery Conference (ELBC), in Milan, Italy; the 2025 FENIBAT Conference, in Londrina, Brazil; and the 2025 PowerOn Conference in India.

Addenda, LLC: www.addendallc.com

Atomized Products Group: www.atomizedproductsgroup.com

Black Diamond Structures, LLC: www.blackdiamond-structures.com

The alliance plans to increase the visibility of their services, products, and personnel at international events to ensure maximal interaction with our customers, better supporting them and ease their development challenges.

With strong histories of technical development and innovative product design, members of the alliance will strategize on new product development using the specific strengths of each company and their access to unique materials.

Nanomaterials, distinctive organics, and high-quality carbon sources will be combined with leading manufacturing technologies to produce next generation three or four-part expander formulations which, the alliance hopes, will serve the needs of a variety of battery applications well into the future.

We invite all attendees at the ELBC 2024 in Milan to visit our booth 88 for further information and details on the alliance. ■

ATOMIZED PRODUCTS GROUP



APG has a 25-year track record of providing our TEXEX® negative expander blends to over 20 countries worldwide and supplying a full range of battery expander requirements to the largest battery manufacturers.

Two manufacturing locations provide

maximum coverage and better guarantee reliable deliveries to customers. APG benefits from a customized production system for maximum efficiency and throughput of expander and source only the best raw material components for optimal battery performance in any application.

“We at APG are beyond excited to forge this partnership with Addenda and Black Diamond to better serve the ever-growing demand for higher performance and customized additive packages. Maintaining all existing supply lines while coordinating with two companies with excellent track records of product development makes the alliance a no-brainer”

— Lee Puckett, president and COO, Atomized Products Group

BLACK DIAMOND STRUCTURES

For over a decade, Black Diamond has led the charge in deploying advanced nanotechnology solutions to the lead-acid battery market. Today, their products, based on proprietary MOLECULAR REBAR® technology,



are deployed in dozens of factories, globally, and can be found powering advanced EFB in South Africa, deep cycle OEM batteries in Asia, eMobility powertrains in India and Bangladesh, traction systems in the UK, and powersports batteries available in hardware stores across the US.

Performance formulations exist for multiple application spaces that improve charge recoverability, fast charge reliability, life, crankability, or deep discharge performance. Process formulations offer enhancements to manufacturability that increases plate output while decreasing waste production in a package which pays for itself and

rewards the battery manufacture with more consistent products and higher battery output.

Both performance and process products make use of MOLECULAR REBAR® technology’s ability to physically strengthen the active material and create more optimal active material crystal structures.

Black Diamond’s US-based manufacturing facility is the largest carbon nanotube dispersion plant in the nation and is paired with an advanced materials lab, 129 full-scale Bitrode circuits, and 216 small-scale testing circuits that support the company’s product development, and that of their customers.

“We are pleased to share our MOLECULAR REBAR® product portfolio and Black Diamond’s technical capabilities with our partners at APG and Addenda. It is a critical time for the industry where solutions are demanded in shorter and shorter timeframes. The alliance was conceived to answer that demand, by providing bespoke products and supporting accelerated development. We look forward to a productive relationship as we pool our global resources to better support our customers” — Paul Everill, CTO Black Diamond Structures

Howard Myers to buy Mutlu Akü from Metair in \$110 million deal

Lead mogul Howard Myers' Quexco Incorporated business agreed in September to acquire Turkey's troubled Mutlu Akü lead battery business from South Africa's Metair Investments in a \$110 million deal.

The announcement comes after Batteries International exclusively revealed in February 2022 that Metair was looking to sell its Turkish operation, along with other battery firms that make up its energy storage division including Rombat and First National Battery.

In fact, tentative talks over a possibly sale had started five years ago.

A sale and purchase agreement between Metair subsidiary Metair International Holdings Coöperatief and Quexco Incorporated was signed on September 16, the companies revealed in a Johannesburg Stock Exchange announcement on September 17.

Metair said the disposal consideration in respect of its entire shareholding in Metair Türkiye was around ZAR1.95 billion, based on an exchange rate of ZAR17.76 to \$1 as of the signature date — payable in cash by Quexco, subject to conditions and customary adjustments, on an as yet unspecified closing date.

The value of Metair Türkiye's net assets as of December 31, 2023 was ZAR2.9 billion and the loss attributable for the same date was ZAR70.6 million.

Metair said full details will be published at a later date, but said the sale will allow it to primarily become an automotive component manufacturing business focused on South Africa, with a strategic focus on the sub-Saharan African mobility sector.

Quexco is wholly owned and controlled by Myers as chairman. It was founded in 1984, with its predecessor entity dating back to 1974.

Meyer's purchase of a lead battery firm runs counter to the mainstream trend in the lead battery market which is one of disinvestment in the sector. Private equity and venture capital firms in recent

years have ended up owning huge chunks of battery manufacturers and related equipment suppliers. Their hopes of making a quick and profitable return have been hit by the rapid rise in lithium battery sales which now dominate large parts of the energy storage sector. Some of these investor firms have been waiting for years to sell off these assets.

Meyer's purchase of a lead battery firm runs counter to the mainstream trend in the lead battery market which is one of disinvestment in the sector.

At least three new lead manufacturers are known by Batteries International to be up for sale in the past three years — one German, one part-Italian and one other European firm.

This is not to forget the more than half a dozen lead battery concerns that were already up for grabs before then.

"Existing investors are unsure of what to do with their equity stakes," one senior BCI figure said. "They can't see a decent exit strategy and are rudely aware that they could be comfortably sitting on a 5% return on their money by just parking it in a bank, rather than making their companies more profitable.

"They're in a funny position in that all the major lead battery manufacturers have booming operations — quite literally factories working as close to full capacity (and that's despite the global shortage of workers).

"That said, they feel the storm clouds are gathering — there are massive changes anticipated in the battery and energy storage market. It's encapsulated in one word: lithium. This is their uncertainty and presently looks like the risk without the returns threatening their lead investments."

Just before the sale was announced, Metair Investments reported a 10% increase in battery sales across its lead and lithium energy storage business for the first half of the year, but warned the group is still being buffeted by tough economic conditions and unspecified supply chain and port disruptions.

The battery and automotive group, whose energy storage division includes Turkey's Mutlu Akü lead battery business, Romanian lead and lithium company Rombat and South Africa's First National Battery (FNB), said in an operational update on September 5 that overall battery sales were up by 358,000 units from the year-ago period to nearly 4 million.

The increase was largely driven by stronger aftermarket and export sales, the group said.

Metair said, again before the sale was announced, that it continues to look at de-risking options for Mutlu Akü as interest rates in Turkey rose to 50% in the reporting period and inflation peaked at nearly 72%.

Meanwhile, the Turkish operation continues to recover from the challenges of last year including a shortage of contract workers and a fall in battery exports.

Automotive battery sales increased to just 1.8 million from 1.76 million in the year ago period.

At Rombat, automotive battery sales were up by just over 40% to 1.3 million units compared to the corresponding period last year, supported by what Metair said were strong market gains in exports and aftermarket sales.

First Battery automotive battery sales are expected to be down by around 9% due to reduced demand from local OEMs and a "price sensitive" local retail environment. However, the battery maker has improved manufacturing efficiencies and product mix, Metair said.

The group warned last May of an "extreme likelihood" that demand for its lead batteries would fall significantly within the next decade amid global moves to phase out internal combustion engine vehicles. Potential growth for its business may well be set for Africa. ■

Battery supply chain breaks labour laws

Research conducted by supply chain risk platform, Infyos, claims that three quarters of the world's battery supply chain is at risk of violating laws on forced labour.

The new industry data, compiled from evidence on Infyos' AI supply chain risk platform using thousands of government datasets, NGO reports, news articles and social media sources, has identified that the global battery firms concerned have connections to one or more companies in the supply chain facing allegations of severe human rights abuses.

Most major battery manufacturers are exposed, including many of the world's largest car, energy storage and electronics brands.

Much of this abuse appears to be concentrated in resource-rich countries where raw materials such as lithium and cobalt are mined and refined for lithium-ion batteries.

These abuses, particularly involving forced and child

labour, were found to be most prevalent in the early stages of the supply chain, notably during the extraction and processing of these critical materials.

EV and battery manufacturers have a multifaceted supply chain, sometimes with thousands of suppliers across their network, from mines to chemical refineries and car manufacturers.

Human rights abuses often occur upstream, notably at the raw material mining and refining stages, making it difficult for companies purchasing batteries to identify their supply chain risks.

The widespread human rights abuses identified, range from people being forced to work in lithium refining facilities under the threat of no or minimal pay to five-year-old children mining cobalt materials out of the ground in hazardous conditions.

Severe human rights incidents are occurring globally, especially in resource-rich countries with fragile and

corrupt governments such as the Democratic Republic of Congo and Madagascar.

The demand for lithium-ion batteries has surged in recent years primarily due to the increased production of EVs, the growth of energy storage systems, and the expansion of portable electronic devices like smartphones and laptops. Governments and industries pushing for decarbonisation and net-zero emissions targets have also further driven this demand.

"Our platform is designed to provide users with insights into the complexities of the battery supply chain so they can take proactive measures to identify and mitigate risks" said Tony To, co-founder and CTO.

"By leveraging AI in our technology we've created a system that delivers accurate data despite the complexity of the battery industry and most importantly provides users with simple actionable mitigations to collaborate with their suppliers to

address risks and improve the sustainability of the industry."

Sourcing is coming under growing scrutiny, particularly in Europe and the US, where failure to address the issues means companies could be in breach of current and future regulations, hampering investment in the global battery market forecast to be worth nearly \$500 billion in 2030.

Legislation including the EU Battery Regulation and the US's Uyghur Forced Labour Prevention Act (UFLPA) is being phased in over the next 12 years to address human rights and environmental impacts in the battery supply chain. Rigorous visibility will become a stringent requirement, but many firms are already struggling to comply with the new rules.

It's a pressing issue for the industry and pivotal to the much-talked-about battery passports in 2027.

"Companies manufacturing or purchasing batteries are at risk of having their products blocked at the market, further delaying and increasing the costs of renewable energy projects or tarnishing their reputation because of human rights risks" said Jeff Williamson, head of sustainability, Infyos.

Sarah Montgomery, CEO and co-founder of Infyos, said: "The relative opacity of battery supply chains and the complexity of supply chain legal requirements means current approaches like ESG audits are out of date and don't comply with new regulations.

"Most battery manufacturers and their customers, including automotive companies and grid-scale battery energy storage developers, still don't have complete supply chain oversight." ■

\$7m settlement deal for NY battery superfund site

A \$7 million settlement deal was announced on August 14 for costs linked to the remediation of a former C&D Batteries 'superfund' site in New York State.

The New York State Department of Environmental Conservation (DEC) announced the settlement with Avnet for costs associated with the remediation of the site at Deer Park, Orange County.

As part of an order negotiated by DEC, in partnership with New York State's attorney general, the former owner and operator of the site will pay \$6.3 million towards the cost of remediation activities already

underway and \$700,000 for natural resource damages.

Attorney general Letitia James said: "I applaud the work my team did to ensure Avnet was held accountable and paid its fair share of the C&D Power Systems state superfund site remediation costs."

The state-funded cleanup of the site began in December 2023 and is scheduled for completion in early 2025. DEC will continue to provide oversight of the cleanup work to ensure protection of public health and the environment.

According to DEC, the Empire Tube Company manufactured tubes for

black and white television sets at the site from 1959 to around 1970.

Hydrofluoric acid was used in the manufacturing process to remove carbon and potassium silicate from the inside of the tubes. During this period, industrial wastewater was discharged to a lagoon adjacent to the northeastern corner of the plant building.

C&D Technologies Incorporated operated at the facility manufacturing industrial lead batteries from the mid-1970s to 2006. From the mid-1970s until around 1982, C&D discharged non-contact cooling water into the lagoon, DEC said. ■

Northvolt cuts 1,600 jobs as EV sales slump, competition bites

Swedish battery maker, Northvolt, is to cut 1,600 jobs, or one-fifth of its workforce, as it fights to survive amid production problems, sluggish demand and competition from China.

The announcement to downsize from the contender to become Europe's top lithium battery manufacturer came on September 23, after weeks of uncertainty over reports of financial problems within the group as the EV industry struggles. Cost-cutting measures, including a halt on expenses, were announced two weeks ago and the company is also looking for new investment.

Under what it says is a "revised scope of operations in Sweden," the redundancies will be spread across three of its sites including 1,000 in Skellefteå, in northern Sweden, where it is suspending the expansion of Northvolt Ett, Europe's first homegrown battery gigafactory. The company will also cut 400 jobs at its R&D lab in Västerås, in central Sweden, and 200 in Stockholm, home to its head office.

Many in the industry see Northvolt as Europe's great hope of competing with the dominant Asian players in the battery industry such as China's CATL and BYD and South Korea's LG and Samsung.

But while the group has said it will prioritize ramping up to 16GWh of annual production capacity at its Skellefteå facility, it is shelving a planned expansion that would have added 30GWh. Current production at the site remains under 1GWh — far short of the 60GWh capacity the factory was originally expected to achieve, enough to supply batteries for over one million EVs annually.

Peter Carlsson, the company's chief executive and co-founder, insisted that "overall momentum for electrification remains strong" but that "tough" decisions were needed to ensure the company's future.

"We are determined to overcome the challenges we face, and to emerge stronger and leaner," he said earlier this week in a press release. "We now need to focus all energy and investments into our core business."

The layoffs mark a blow to Europe's industrial strategy as it looks to maintain its position as an automotive leader. The EU has raced to sign

agreements with third-party countries to secure critical raw materials required for EV batteries but consumer demand for greener vehicles is struggling to increase quickly enough.

Earlier this month, industry data showed that EV car sales were at a three-year low in August, plunging 44%.

Northvolt's cuts are the latest in a wave of job losses sweeping the industry, including 14,000 announced by Tesla earlier this year and thousands linked to potential factory closures by Volkswagen in Germany.

Volkswagen, one of Northvolt's key investors, had positioned Northvolt at the forefront of Europe's drive to build its own battery manufacturing base. Yet, the Swedish battery maker has struggled to meet deadlines, a situation exacerbated by production scale-up difficulties. Notably, BMW cancelled a \$2 billion order in June, a significant setback for the firm.

"While overall momentum for electrification remains strong, we need to make sure that we take the right actions at the right time in response to headwinds in the automotive market, and wider industrial climate," Carlsson said. "We now need to focus all energy and investments into our core business."

All redundancies are "subject to ongoing union negotiations", the company said.

A month before this, and widely interpreted as a signal that all was not well for Northvolt, the firm had announced it was shifting development of its next generation lithium-metal battery technology from California to its R&D campus, Northvolt Labs, in Västerås, Sweden.

The move will drastically affect the some 200 Cuberg employees that work in the San Francisco Bay area. Cuberg was acquired by Northvolt in

2021 and has since grown its workforce from 25 at the time of the acquisition to some 10 times greater.

"The transfer reflects a strategic move to consolidate the R&D and industrialization of Northvolt's cell product portfolio — featuring lithium-ion, sodium-ion and lithium-metal — into one location, where future development of the technologies benefits from a platform of expertise and capabilities that is unmatched in the Western world," said Northvolt, which is portraying the consolidation as a positive move.

Richard Wang, the founder and former CEO of Cuberg posted a message of support on LinkedIn: "Today is a sad day for me [with this announcement] ... as I look back on our shared legacy, what I will remember and treasure the most is the close relationships and friendships that we all built as we embarked on this industry-defining effort together.

"For my dear Cuberg colleagues: know that you did everything in your power to make things succeed, and your efforts will never be forgotten. As difficult as things may seem right now, memories and relationships are enduring in our small community of battery enthusiasts.

"For recruiters and the battery industry at large: there are now roughly 200 of the most respected and capable engineers and managers in the battery industry looking for new opportunities. Make the most of it!"

Sami Haikala, Northvolt chief development officer, said the consolidation should prove beneficial for its research efforts: "Bringing lithium-ion, sodium-ion, and lithium-metal technologies together under one roof at Northvolt Labs creates a unique environment for cross-innovation and accelerated development," he said. ■

"While overall momentum for electrification remains strong, we need to make sure that we take the right actions at the right time in response to headwinds in the automotive market, and wider industrial climate"

Peter Carlsson, Northvolt's chief executive and co-founder



90+ Years. 150+ Products. One Focus.



Advanced Battery Chemistry

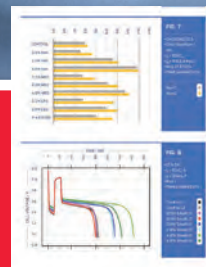
Hammond's innovative signature products, GravityGuard® and Treated SureCure®, are two of more than 150 customized additives that are improving battery performance and lowering manufacturing costs for battery manufacturers around the world.



INDUSTRY NEWS

Independent GravityGuard® Testing Reveals Improved CCA & PSoC Cycling

Hammond has released a comprehensive whitepaper detailing exciting findings of new benefits of the anti-stratification additive GravityGuard®. New research shows that the BCI Innovation Award winning product also offers significant serendipitous improvements that may provide additional value to battery manufacturers and their products. Specifically, the results show GravityGuard® used



in the PAM and NAM can improve CCA performance, 2C Capacity, and extend PSoC Cycle life. The paper presents notes on evaluation methods, specific comparative data, and more than a

dozen charts and graphs with detailed analysis of a wide variety of test results. A PDF is available online. Just snap the QR code above to go to the publication download page.

Read the Whitepaper



SNAP THIS QR CODE TO READ OR DOWNLOAD THE WHITEPAPER

HAMMOND

THE CHANGE CATALYST®



INFO@HAMMONDGLOBAL.COM

HAMMONDGLOBAL.COM

ENTEK gets \$1.2 billion US plant loan

The US Department of Energy announced mid-July that it was prepared to make a conditional loan of up to \$1.2 billion to battery separator firm, ENTEK, to finance a plant for making lithium-ion battery separators.

If finalized, the loan would be offered through the Advanced Technology Vehicles Manufacturing Loan Program that has \$40 billion in direct lending authority and would substantially pay for a new facility in Terre Haute, Indiana to manufacture lithium-ion battery separators.

The separators will be used primarily in EVs — strengthening the US lithium-ion battery industry and enabling the creation of

batteries used in advanced technology vehicles.

Graeme Fraser-Bell, ENTEK's lithium sales and market development VP, told Batteries International that the loan would shore up and create an instant supply chain for EV batteries.

“At the moment, China dominates and both Europe and the US are significantly exposed,” he said. “To have US-sourced components in

these batteries will bridge the gap that currently exists.”

There were, he added, a series of technical and environmental ratios ENTEK had to meet to enable the financing but that the company had factored those in. “We’re ready,” he said. “And the DOE is leaning into the risk. If we were to look outside the government for funding, it would be very hard for

early stage investors to do the same. That’s why these government initiatives are so important.”

The project should create more than 760 construction jobs and 635 operational jobs. Based on current factors chosen by battery cell manufacturers, it will support roughly 1.9 million mid-size EVs or 1.3 million electric sports utility vehicles, ENTEK said.

The DOE estimates that by 2030, the North American lithium-ion EV battery industry will require annual separator production of 7 billion to 10 billion square meters. Once complete, the ENTEK facility should have the capacity to manufacture 1.72 billion square meters of separator material annually for the North American EV market.

“There has never been a more exciting time to be a manufacturer in the battery industry,” ENTEK CEO Larry Keith said.

Separators produced at the plant will accommodate all existing lithium-ion EV battery chemistries, confirmed the DOE’s Loan Programs Office (LPO), adding that the company’s new factory — a sprawling 1.4 million-square-foot complex expected to cost \$1.5 billion to build — will help meet a significant slice of the domestic EV industry’s separator needs.

Car makers face increasingly tough requirements to qualify for \$7,500 EV tax credits. New rules which came into effect at the beginning of the year, restrict Chinese content in batteries eligible for EV tax credits of up to \$7,500, sharply reducing the number of eligible vehicles. Car firms have since made changes to supply chains and won restored eligibility for many vehicles.

It is unclear when the loan will be finalized. ■

The separators will be used primarily in EVs — strengthening the US lithium-ion battery industry and enabling the creation of batteries used in advanced technology vehicles.

Exide’s pollution saga at Vernon takes a new turn

It’s another twist in the long-running scandal of lead battery pollution at Exide’s old battery plant in Vernon, California. This time the culprit causing environmental damage is no longer lead but the trichloroethylene used in making polyethylene separators.

The danger is such that the facility is one step nearer to becoming a superfund site after a US Environmental Protection Agency report concluded this week it could contain enough hazardous TCE to qualify.

The battery recycling facility had ran for 90 years melting down lead-acid car batteries and releasing dangerous lead dust and other chemicals into the environment until 2015. In doing so it contaminated thousands of surrounding residential properties, including homes, schools, parks,

and child care facilities.

Campaigning efforts led to the permanent shutdown of the 15 acre site, five miles southeast of downtown Los Angeles. It has been notoriously labelled as the county’s largest and most expensive environmental cleanup.

Since Exide declared the facility bankrupt in 2015 — and the US Department of Justice allowed the company to abandon the site — California has allocated \$750 million and overseen the cleanup of more than 5,000 lead-contaminated properties surrounding the facility.

But over the last two years, a coalition of federal and state lawmakers have called for a Superfund designation in hopes that it might bring in federal funding that could enable faster results.

Now, it appears that

the facility may well achieve this after an EPS site inspection report revealed that the Exide plant also released TCE — a known human carcinogen — into the soil, affecting the groundwater table and local aquifers tapped for drinking water.

California’s senator, Alex Padilla, has been asking the EPA to rule on Superfund status for the former recycling plant in what he describes as a “long overdue cleanup.”

“The completion of the inspection report is a step in the right direction in achieving justice for the Southeast LA communities that have suffered the devastating consequences of Exide Technologies illegally dumping lead and other hazardous contaminants into the ground and water supply,” he said in a television interview. ■

US unveils \$3 billion in bid to support domestic battery sector

The US Department of Energy has allocated more than \$3 billion in potential funding for 25 projects across 14 states to boost the country's battery manufacturing capabilities and reduce reliance on China.

The investment, announced on September 19, is part of

the Biden-Harris administration's Investing in America agenda and will increase domestic production of advanced batteries and battery materials, complying with the EV tax credit rules.

The portfolio of selected projects, once fully contracted, are projected to support over

8,000 construction jobs and over 4,000 operating jobs.

Subject to successful negotiations and environmental review, the selectees — managed by the Office of Manufacturing and Energy Supply Chains (MESC) — will modernize and establish new facilities for processing critical minerals, manufacturing battery components and recycling, the department said.

“Mineral security is essential for climate security,” said White House climate adviser, Ali Zaidi. “This sets us up to lead on the next generation of battery technologies — from solid state to other new chemistries.”

These are Round 2 selectees, the support for which follows a previous round of programme funding in which DOE awarded a total of \$1.82 billion to 14 projects associated with the construction and expansion of commercial-scale facilities to extract lithium, graphite, and other battery materials, and battery

component manufacturing.

The Biden administration has pushed to bolster the domestic battery industry, with the DOE just last month announcing \$63 million in funding to help state and local governments expand battery recycling as well as make technologies such as advanced sensors and modelling more accessible to small and medium-sized manufacturers.

John Podesta, senior adviser for international climate policy to the US president said: “The Biden-Harris administration is using every available tool to onshore and friend-shore the supply chain for EVs and batteries, working with our allies and partners, for the benefit of our national security, our economy and our planet.”

The two largest awards to be negotiated will each be up to \$225 million in size.

SWA Lithium, a US-based joint venture between Standard Lithium of Canada and Norway's Equinor, plan to use the money for a project to produce battery-quality lithium carbonate in southwest Arkansas, while TerraVolta Resources intends to build a commercial-scale lithium extraction and refining facility to produce battery-grade lithium from domestic brine resources in the Texarkana region.

Cirba Solutions and Group14 Technologies were next with \$200 million for the former's lithium-ion battery recycling centre and the latter's silane manufacturing plant, while EnerSys Advanced Systems could receive \$199 million for its site, where it intends to produce battery cells.

Funding is being made available under the Bipartisan Infrastructure Law. Final award totals are contingent on negotiations between applicants and the DOE, along with environmental reviews of each proposed project. ■

US to invest \$2.2 billion to modernize national grid

The Biden administration announced on August 6 that it is investing \$2.2 billion to bolster the nation's power grid to protect it against growing threats of extreme weather events.

Funded by the Bipartisan Infrastructure Law's Grid Resilience and Innovation Partnerships (GRIP) program and in alignment with Investing in America agenda, the DOE said that the historic investment would support eight major projects

across 18 states allowing for increased manufacturing, more data centers, and improved transmission of renewable power.

The investment should stimulate nearly \$10 billion in public and private investments and will modernize parts of the US grid with nearly 13GW of new capacity, including 4,800MW of offshore wind power. The upgrades could create at least 5,000 jobs and improve over 1,000 miles of transmission lines.

US consortium starts battery electrolyte research 'challenge'

The US Department of Energy is backing studies by the newly-formed Aqueous Battery Consortium, which aims to overcome the limitations of a battery using water as its electrolyte.

The DOE said on September 3 the consortium, led by Stanford University and the Stanford Linear Accelerator Center (SLAC), could receive up to \$62.5 million over five years.

Researchers aim to develop a battery that will be more environmentally safe and have a higher energy density than lead acid batteries and cost one-tenth that of present day lithium ion batteries.

The group plans to keep costs for this future technology low by using “cheaper raw materials, simpler electronics, and new, efficient manufacturing techniques”. The technology to be developed is also expected to be safer, and to create batteries that charge and discharge quickly.

Yi Cui, a Stanford professor of materials science and engineering, of energy science and engineering, and of photon science at SLAC, said a huge amount of stationary energy storage will be needed to reduce net global greenhouse gas emissions to zero — and water is the only realistic solvent available

at the quantity and cost needed for such batteries.

“How do we control charge transfer between solids and water from the molecular to the device scale and achieve reversibility with an efficiency of nearly 100%? We don't know the solutions to those hard problems, but with the DOE's support we intend to find out.”

The consortium will be administered by Stanford's Precourt Institute for Energy. The team consists of 31 leading battery scientists, engineers, and physicists from 12 universities in North America, as well as from SLAC, the US Army Research Lab and the US Naval Research Lab. ■

Octopus buys British solar and battery storage firm Exagen

Exagen Group, a player in the UK solar and energy storage sector, has been acquired by British energy giant Octopus Energy Generation, in a move to expand its renewable pipeline.

The 100% equity buyout, which was carried out on behalf of the Octopus Energy

Development Partnership (OEDP) fund, managed by Octopus, was announced on September 24, and follows an August 2022 investment by Octopus in exchange for a 24% stake in the business.

Exagen, which develops utility-scale renewable energy and storage projects, says it has over 2.4GW of solar and BESS projects across England in the development pipeline which Octopus will now have full ownership of, adding to the nearly \$9.4 billion of renewable energy projects in its existing portfolio worldwide.

“By increasing our investment, we’re going to turbocharge the build-out of new green energy and rapidly grow the UK’s energy storage capacity,” said Alex Brierley, co-head of Octopus’ fund management team.

Britain aims to have 95% of its electricity from low-carbon sources by 2030, which will also require an increase in energy storage to help balance supply and demand on the system.

Financial details of the deal were not disclosed. ■

Tesvolt and Ocean Batteries merge and unveil new power system series

Tesvolt’s Maritime Solutions division announced in September that it merged with Ocean Batteries from Norway at the start of September to create Tesvolt Ocean. Tesvolt holds a 51% stake in the new joint venture.

Tesvolt Ocean will offer the “Kaptein Series” power storage system which it says offers advantages in space, weight and power. In terms of space the battery modules can be installed individually anywhere in the ship — even on the floor.

“Most batteries approved for use in shipping did not even have a

continuous C-rate of 2C. At 4C, the “Kaptein” storage system offers the highest continuous C-rate available in the maritime industry to date. This means significantly shorter charging times for ship owners,” says Tesvolt Ocean.

“The new storage system also scores highly in terms of weight. At just 4.83kg per kWh of storage capacity, it will be the lightest battery system for shipping on the market; batteries currently available on the market weigh at least 7kg per kWh. A unique fire suppression system ensures maximum safety.”

The new batteries were launched at SMM, the huge maritime industry trade fair, last week in Hamburg.

Kent Thoresen, CTO of Tesvolt Ocean said: “The range of ships with electric propulsion is still a problem for many owners. Ship spaces are often cramped, so not enough battery modules can be accommodated to achieve the desired range. At 246Wh per litre, our new Kaptein system has the highest energy density on the market to date, meaning despite its high capacity it takes up very little space.” ■

Goonvean Fibres acquires Core Engineering

Goonvean Fibres announced in September that it has just bought Core Engineering and formed a new company — Goonvean Core Engineering — and becoming the newest member of the Goonvean Group.

“Goonvean Core Engineering will operate as a subsidiary of Goonvean Fibres, the market leader for manufacturing precision cut fibre and flock, operating across the lead acid battery industry,” said a company statement.

“As a privately owned investment company, the Goonvean Group’s strategy is to identify and acquire UK businesses, and through the provision of additional resources, support these businesses to thrive and prosper.”

James Mullins, managing director of Goonvean Fibres said: “Through acquiring Core, the group recognises the engineering potential in the battery market for increasing efficiency to the customers’ supply chain and a scalable solution.”

Will Cross, Core managing

director remarked that: “This is an exciting new chapter for Core and our customers. Goonvean Core Engineering ensures that the lead battery industry continues to benefit from increased choice and quality engineering in the manufacture of COS moulds, tooling and spare parts” ■

Ganfeng Lithium and Yiğit Akü plan \$500m Turkey Li battery project

China’s Ganfeng Lithium has outlined plans to set up a \$500 million joint venture for lithium battery production with Turkish lead acid producer Yiğit Akü.

Ganfeng said in a Shenzhen Stock Exchange announcement on August 17 the companies had signed an intentional framework cooperation agreement to build a 5GWh plant in Turkey and look to jointly develop solid-state batteries and batteries for ships and the aerospace industry.

Ganfeng, one of the world’s leading lithium producers, cautioned investors that making progress on launching the joint venture was subject to market conditions.

However, the company said the partners complemented each other’s strengths and both were determined to jointly expand battery production in Turkey.

Ankara-based Yiğit Akü has four production sites and two battery R&D centres in the country, Ganfeng said. ■

Sustainability certification for more Birla Carbon sites

Carbon additives company Birla Carbon has announced that three more of its manufacturing units have been awarded sustainability certification ISCC PLUS.

The sites at North Bend in the US, Hamilton in Canada and Santander in Spain now have accreditation from the International Sustainability and Carbon Certification (ISCC) — a voluntary scheme that helps identify companies providing sustainable and circular raw materials.

Birla said on July 19 it now expects to complete certifications for its remaining three plants by the end of this year. ■



Single Source Supply

We supply, install and commission, by ourselves, all equipment and automation systems in the assembly lines.

Both for Flooded & AGM

The assembly lines are available for handling batteries in both flooded and AGM technologies.

Flexible and Versatile

We can offer designs for various area requirement and capacities up to 7 batteries a minute.

Complete Assembly Lines

The assembly lines we provide come with an experience accumulated over decades to contribute to the efficiency of our clients.

Batek assembly lines are incorporated with several unique and smart designs to ensure user friendly and reliable processing.



Exide Technologies provides tech support for ESS4U's new gel BESS

Dutch company ESS4U has launched a new residential battery system based on “tried and trusted lead acid technology”, developed with support from Exide Technologies.

Exide confirmed on August 15 it had supported development of the ‘Qurmit’ gel residential BESS by the Dutch startup, in collaboration with the VDL Groep.

Exide said it worked with ESS4U’s parent company — industrial off-grid PV installations designer and

supplier TSS4U — on what it described as a specialized charging regime that markedly enhances the cycling and longevity of Exide’s own Sonnenschein A600 solar batteries.

ESS4U chief technology officer Jan-Willem Linsen acknowledged in an interview with a Dutch publication that the innovative ‘Qurmit’ had its roots in an established technology, saying: “The advantages are numerous.

“It’s a one of a kind because it is based on gel

lead acid battery tech that we have been using for years.”

Linsen said each Qurmit unit, which measures 128x73x48 centimetres, has a charging capacity of 2 kW and a discharge capacity of 2.4 kW. Testing has been conducted over the past year.

“You can use it in combination with any PV inverter. It can easily be linked to other energy management systems and can be installed plug-and-play and used, among other things, for

more self-consumption of electricity from solar panels, energy trading with a dynamic contract and emergency power supply.”

Linsen said the battery “may be a little heavier than a lithium battery”, but it can be placed indoors and outdoors and works from -40°C to +55°C. “No energy is lost due to active cooling or heating, which also makes it quiet.”

Thanks in part to the charging regime, Linsen said Qurmit has up to 9,000 charging cycles guaranteed, depending on usage, which he claimed to be equivalent to a lifespan of up to 20 years.

All components are sourced in Europe and nothing comes from China, he said. “Moreover, with a price, installed and excluding VAT, of less than €10,000 (\$11,000), our home battery is competitive with lithium storage systems with comparable capacity from those regions.

“Everyone knows the disadvantages of lithium ion batteries. Critical raw materials are used, and extraction is associated with great damage to the environment and people. The chance of a thermal runaway is small, but if it does happen, it can lead to a fierce, barely extinguishable fire, an explosion or the release of toxic gases.”

On marketing plans for Qurmit, Linsen said the company would be satisfied with only “a few hundred sales” this year, then run into thousands in 2025. ■

Qurmit has up to 9,000 charging cycles guaranteed, depending on usage, which Linsen claimed to be equivalent to a lifespan of up to 20 years.

BESS integrator market becomes less concentrated

Telsa has overtaken Sungrow as lead producer in the BESS integrator market with a 15% market share in 2023, according to Wood Mackenzie’s ‘Global battery energy storage system integrator ranking 2024’ report.

The market share of the global top five BESS integrators shrank to 47% in 2023 from 62% in 2022, with a 24% y/y decline, stated the report.

The global BESS integrator market is becoming less concentrated, mainly due to multiple China-based companies entering the market, with six of the global top 10 vendors China based. This is partially because the country’s BESS market is exclusively supplied by domestic companies. In addition, China installed the most BESS globally in 2023.

Wood Mackenzie’s Kevin Shang, principal research analyst, energy storage technology and supply chain, said: “The global BESS integrator market is becoming increasingly competitive, especially in China, resulting in declining market concentration. As a sector with a relatively low entry barrier, the BESS integrator industry has attracted a significant number of new players.” ■

Ekü Energy closes financing on its first BESS in Japan

Ekü Energy, an energy storage firm, has completed financing on its first BESS project in Japan, the company confirmed on August 1.

Ekü is jointly owned by Australia’s Macquarie Asset Management fund and Canada’s British Columbia Investment Management Corporation.

In April the company announced its first project in Japan to build a 30MW/120MWh

battery energy storage system in Miyazaki City on the southern island of Kyushu. At the time the firm said they had agreed a 20-year offtake agreement for the project with Tokyo Gas.

Construction is to start in the second half of 2024 and the BESS to begin operating in July 2026. Once live, it will be capable of storing enough electricity to power approximately 63,000 households for

four hours.

“There are certain major milestones to hit until a utility-scale battery energy storage system is ready to support the grid and be a major contributor to the energy transition. Financial close is certainly one of those,” Ekü Energy said. In view of the successful project financing, the company said it is on track to hit all future milestones as planned. ■

Improved BESS testing to prevent \$2.3bn in revenue and O&M losses

Sinovoltatics, in collaboration with Volytica Diagnostics, has released a white paper claiming that enhanced testing and diagnostics can prevent significant financial losses and optimize system performance for BESS projects.

The white paper, “Modernizing Traditional BESS Factory Acceptance Testing with Advanced Battery Diagnostics” details the advantages of their

BESSential 100% battery pack testing service over traditional Factory Acceptance Testing (FAT) and Site Acceptance Testing (SAT) methods.

The white paper presents a case study of a 50MWh energy storage project in Europe, where traditional FAT and SAT methods failed to detect severe thermal imbalances and voltage variations within the BESS.

If left unresolved, the

issues could have resulted in over \$600,000 in financial losses due to accelerated battery degradation and system downtime, the paper claims.

“Since traditional quality assurance methods use sampling instead of testing every BESS container and battery pack, the financial cost could have been multiplied,” it argues.

“The BESSential service, which includes 100% battery

pack analytics, identified critical defects at the factory, ensuring that a defect-free BESS was delivered to the client, avoiding project completion delays and future revenue losses.

“When similar defects are projected across the estimated global deployments through 2030, BESS project developers could collectively incur \$2.3 billion in preventable revenue and O&M losses through 2030. ■

DTEK to invest in 200MW BESS units for Ukraine

DTEK, the largest private investor in Ukraine’s energy sector, plans to invest €140 million (\$156 million) in building “a series” of 200MW energy storage systems despite the war with Russia.

DTEK said on Septem-

ber 12 the systems would be commissioned no later than September 2025 and start providing ancillary services to Ukraine’s transmission system operator, Ukrenergo.

CEO of DTEK Maxim Timchenko did not give technical specifications about

the proposed projects but said battery technology was vital in making possible the decentralization of Ukraine’s energy system and “ending Russia’s energy terror”.

“Despite the war and limited access to foreign capital markets, we continue

to invest in Ukraine — not only to restore destroyed infrastructure, but also to build new facilities in line with our long-term strategy.”

DTEK was the first company to start building ESS units in Ukraine in 2021. ■



NEW DROSS FURNACE

recover the lead contained in the drosses

Low consumption electric furnace
production: 500 kg /hour

Fast return on investment

www.dross-engineering.com



Lower Prices. Better Service.

Using the expertise acquired through more than 25 years, we offer our international customers top quality, excellent service and the lowest prices.

New Equipment
From All Major Manufacturers

Spare Parts
Quality built, reliable replacements
keeping your machines up and running

Material Supplies
Negative Expander, Fiber Flock, Flux,
Cork Powder, Pasting Belts & More

Clean-All Heavy Metals® Soap
The only soap that allows workers to
eliminate lead residue from their skin
without harsh scrubbing. Keep your
workers safe and clean.

Global Shipping
We offer full air, ocean and courier
services at low rates. Or ship with your
own carrier. You are in control.



Sasha's International, Inc.

The World's Price Leader
for the Battery Industry



LOCATIONS:
Miami Beach, FL 33139 U.S.A.
Denver, CO 80234 U.S.A.
www.sashas.net

CONTACT:
TEL: 305-695-8990
FAX: 305-695-8991
Email: sashas@sashas.net

English · Français · Español · Italiano · Deutsch · български · Русский

Saft latest BESS container line to qualify for IRA requirements

Saft, a subsidiary of French oil giant TotalEnergies, has commissioned a new line at its Jacksonville factory in Florida to produce the lithium-ion battery containers that are now the standard building block in BESS. Present supply of the containers comes from Saft's overseas factories.

“Our strategy is to expand Jacksonville's capacity to reach more than 5GWh in 2027. This will also incrementally increase local content by building up our US-based supply chains,” said Hervé Amossé, Saft EVP for Energy Storage Systems.

“Saft will reach the Inflation Reduction Act 2022

requirements with its 5.1MWh containers by 2026,” he said.

“This investment enables Saft to address the booming US demand for ESS projects by offering a solution with domestic content. It will also create new job opportunities, both direct and indirect, as well as strengthening the

national supply chain.”

According to Bloomberg, the US is the second largest ESS market in the world, with 2023 being a record year with 22GWh of capacity deployed.

Bloomberg expects the US market to reach a cumulative 134GW and 484 GWh in 2030. ■

Australia underwrites 1GW new BESS projects

Australia's federal government confirmed on September 4 it would underwrite the construction of six new BESS projects across two of the country's states with a total storage of 1,081MW.

Climate change and energy minister Chris Bowen said the projects in Victoria and South Australia had been selected under the first round of the government's Capacity Investment Scheme (CIS).

Detailed individual project costings were not disclosed, but Bowen said the developers had committed a total investment of A\$12.5 million (\$8.4 million) of shared benefits to local project communities and A\$6.5 million of initiatives for local first nations groups, as well as extensive use of local supply chains.

Under the CIS, if electricity prices are too low for the companies who build projects to generate a profit, the government will pay the difference. However, if a company's earnings exceed a specified ceiling, the government will share in the profits.

The projects are:
Wooreen 350MW BESS operated by EnergyAustralia in Victoria;

Springvale Energy Hub 115MW BESS to be devel-

oped by Progress Power in Victoria;

Limestone Coast West 250MW operated by Pacific Green in South Australia;

Solar River, a hybrid BESS project of 256MW, operated by Zen Energy, South Australia;

Clements Gap, a 60MW BESS operated by Pacific Blue, South Australia; Hallett 50MW BESS owned by Energy Australia, South Australia.

The batteries selected for federal funding support can

run for up to four hours and will operate in conjunction with renewable power sources, the government said.

The projects' selection follows a pilot tender for dispatchable capacity across the two states that received more than 100 bids.

Many of the unsuccessful bids were also of high quality and will be encouraged to rebid in the next tender for the National Electricity Market, scheduled for the end of the year.

In May this year, the federal government opened the national tender to bring an additional 6GW of renewable generation and batteries onto the east-coast grid.

Like the South Australian and Victorian tender, the first national auction for electricity generation was massively oversubscribed, attracting 40GW worth of registrations, which the government said is enough to power more than 21 million homes. ■

Morrow Batteries signs MoU with Ukraine

Morrow Batteries signed a memorandum of understanding at the end of August with two Ukrainian energy bodies with providing LFP battery cells for BESS to strengthen Ukrainian's energy grid.

The system is frequently affected by blackouts and irregular power supply due to the continued Russian attacks since the war started in February 2022. In the latest Russian offensive it has again sought to wreak havoc on Ukrainian electricity supply, while the country aims to build a distributed BESS grid.

Morrow says it will begin production from its first gigafactory in Arendal, Norway,

in the second half of 2024 and start mass production in the fourth quarter.

CEO Lars Christian Bacher of Morrow Batteries, said: “We are honoured to have been chosen as one of the preferred partners to deliver our LFP battery cells for BESS solutions to Ukraine, and we can somewhat reduce the suffering of the Ukrainian people by reducing power blackouts.

“We will do our part in being ready to sign a firm offtake agreement and start deliveries of battery cells from the first quarter of 2025.”

Potential deliveries under the agreement may reach GWh levels, although exact

volumes are yet to be agreed.

“The need is urgent, and the parties will therefore work closely to mature the MoU agreement as soon as possible,” said a government statement. “The final contract will be awarded based on future autonomous negotiations and may involve external financial donors, scientific research institutions and organizations, government and other funds.

Morrow Batteries says it has produced thousands of cells at its Customer Qualification Line and has since November last year shipped LFP samples to potential customers for testing and validation. ■

O.M.I

O.M.IMPIANTI

RAISE YOUR PERFORMANCE
WITH OMI BATTERY
EQUIPMENT!



Our solutions for the battery business:

- ACID RECIRCULATION FORMATION: fast formation for your truck and industrial batteries
- ADVANCED WATER BATH FORMATION: improved quality and shorter cycles for your automotive batteries
- FILLING PROCESS FOR FLOODED & AGM BATTERIES
- FINISHING & DISPATCHING EQUIPMENT
- ACID PREPARATION, STORAGE AND RECOVERY SYSTEMS

+39 0363.901981 

omi-nbe.com 

info@omi-nbe.com 

Romano di Lombardia, ITALY 

This year's European Lead Battery Conference held in Milan this September has been hailed as one of the best ever — both from the networking opportunities and the quality of the presentations. Shona Sibary reports.

Trend setters of the lead world hit Milan

Now in its 38th year and showing no signs of an impending mid-life crisis yet, this year's ELBC proved that things only get better with age.

Held in Milan, the 2024 event organised jointly by the International Lead Association and the Consortium for Battery Innovation was a record holder. Over 1,000 participants came from more than 50 countries across six continents.

It was fantastic to see that a significant number of delegates were joining ELBC for the first time. In fact, our very own Matthew Halls, son of Batteries International editor, Mike, jumped on the family bandwagon (or should that be Vespa?) and joined us in Italy to discover what all the fuss was about:

"It was such an immersive experience," he said. "I felt honored to get a comprehensive look at the current and future state of lead battery technology and how it will better the world. The combination of technical knowledge, industry networking, and hands-on demonstrations really gave me the sense of the global reach of this industry and the sheer scale of it all."

Out of the mouths of babes but we really couldn't have put it better ourselves.

ELBC has always been about bringing together experts from across the industry to share technical knowledge and breakthroughs in lead battery

research.

This year's technical program was packed with cutting-edge insights from nearly 90 industry experts showcasing latest updates on technical improvements and electrochemical research on topical areas from energy storage to automotive lead batteries.

Key highlights included pioneering innovations that are paving the way for future opportunities in automotive auxiliary applications, EV fast charger back up, integration with renewable energy and hydrogen production.

And growing collaborations within the industry resulting in a strategic alliance combining various negative and positive plate products into one portfolio, a groundbreaking discovery on plate design.

The multiple sessions were a further opportunity to shine a light on industry expertise. One was a technical review of recent developments and future performance enhancements by Matt Raiford, CBI's technical director.

Another was an overview of CBI's technical program's key findings by Begüm Bozkaya, CBI's technical manager and a third looked at government-funded projects in Europe and in the US presented by Athanasia-Maria Tompolidi and Alyssa McQuilling, CBI's R&I managers.

As a warm-up to the main conference, CBI also organized a dedicated

workshop focused on energy storage and the new Batteries Regulation being introduced in Europe.

ELBC's co-organiser Alistair Davidson, executive director of the consortium said: "We're going to see a huge increase in opportunities in this sector worldwide and this year's conference was key to understating both the market opportunities and the technical developments that will have the most impact in the coming years."

Back in the exhibition hall there was a palpable buzz with over 120 exhibitors showcasing groundbreaking innovations and setting a new standard for the industry's future.

As THE major lead battery innovation conference in Europe, it was an undeniable hub of experts, researchers, companies and suppliers.

Batteries International's publisher, Karen Hampton said that, in terms of networking, it was an unparalleled event.

"I just couldn't get around everyone I wanted to see!" she said. "I always go to these events with a firm purpose in mind and I'm really strict with myself about time-keeping but this year I was unable to meet with everyone I wanted to. There just seemed to be more than the normal amount of exhibitors."

We think there is also another reason entirely why Karen enjoyed the 'networking' so much, as photographs to follow will prove! ■



Not (quite) nepotism but the next generation



Step forward the rising generation of lead superstars: (from left to right) Andy Bush's daughter Hannah, OMR's Francesco Fulani's son Marco, and our own editor's son, Matthew Halls were all seen at ELBC 2024 learning from the best. And not to forget, MAC Engineering's Jimmy Stewart and grandson David.





Machines for the product

HADI Cast-On Linie 3 – optimal for small ser

The **compact design** of the machines in combination with the **modular structure** offers a stan

Up to **18 positive plates** per stack, output up to **1 cell per minute**.

The **PLATE STACKING MACHINE PLM 3**

Completely housed
Good accessibility
Fast type changeover
creates single stacks
for leaf separators and sleeved plates.

Double stacks are produced in the **STS 3**

The **CAST-ON-STRAP MACHINE COS 3**

Completely housed
Good accessibility
Fast type changeover
For single or double stacks
Insert placement device – PEV 3
Automatic lead bar feeder BBZ-N4
1,5t lead kettle with 2 pumps type MKP
Oil or water cooling possible
Designed for standard COS32 and COS40 molds

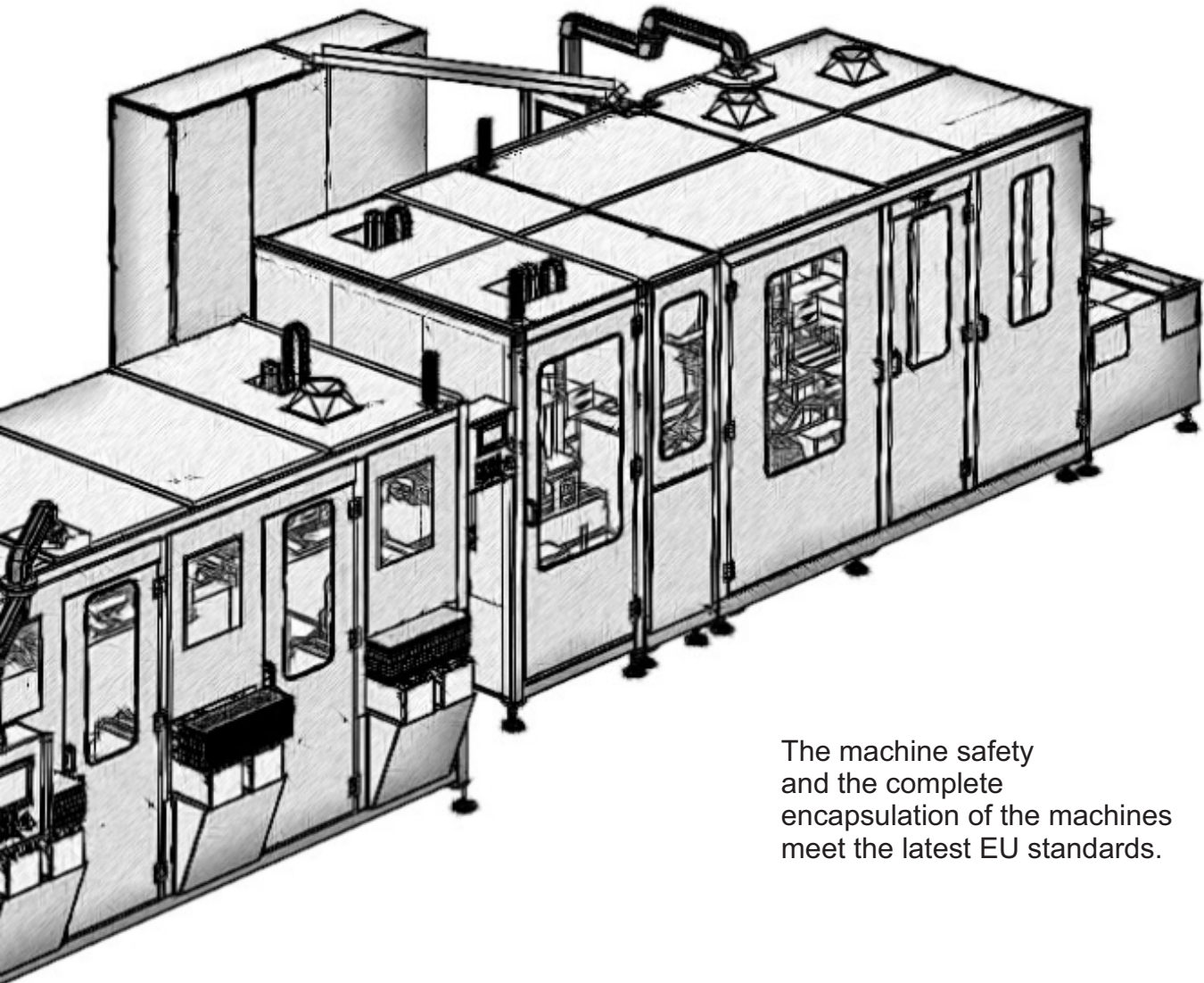


ion of lead accumulators



ies

standardized, small and efficient production line for traction battery plate stacks.



The machine safety and the complete encapsulation of the machines meet the latest EU standards.

HADI Maschinenbau Ges.m.b.H.
Amstetten, Austria
office@hadi.at

IMPRESSIONS OF THE FIRST SESSION

There's always a strange moment of anticipation at the start of any conference, where delegates wonder how things will be kicked off. A little light entertainment? Or, perhaps, if in Asia, a warming-up interlude complete with drums and local dancers.

In the case of this year's ELBC a super-slick presentation extolling the strengths of the CBI, one of the conference organizers, and its activities, gave that frisson of anticipation of a packed agenda to come.

One of the strengths of this year's ELBC was the way that the overall lead battery industry perspective came out strongly in the first morning's sessions. These were then reinforced more specifically with excellent presentations from Nick Starita and Ray Kubis on the second morning.

Although there was no plenary speaker as such, the wealth of information provided by Avicenne's Christophe Pillot proved something for everyone to digest. Not that it would — or did — please all ears. For ELBC delegates only interested in lead batteries it started with a glum outlook as it was clear, perhaps unsurprisingly, that Christophe anticipated a huge boom in lithium batteries.

But later on a more nuanced approach looking at a positive view for lead batteries emerged. The apparent contradiction between the official ILA/CBI message to expect a huge boom in energy storage demand (and with it advanced lead batteries) in the coming years and Christophe's forecasts of a mere CAGR 1.2% between 2020 and 2030 seem hard to reconcile. All the more so in that Christophe's estimates have been reduced since last year.

Interestingly, since most of the lead battery manufacturers are reporting sales at close to full capacity — and a sometimes desperate search for more workers in their plants — the anecdotal story for immediate demand also seems contradictory.

Christophe has a general reputation as being a conservative forecaster unwilling to exchange his core data, much of which is derived from mining and recycling dates for speculation.

What would seem to be clear

from Christophe's presentation is that until a clear next generation of advanced lead batteries emerges then he will not bet on the assumption of a technology that may exist and be commercialized in quick time.

The next presentation drilled down into what we should assume will emerge from Asia.

Much of the western lead battery industry should be grateful to Dong Li, the presenter of the session. For the last decade Dong Li has been the go-to explainer at international lead conferences of how the Asian battery market has been developing while other players in the sector have been unwilling to discuss the larger trends.

One ELBC delegate several years ago told *Batteries International* that Dong Li had changed his whole understanding of China's approach to issues such as lead battery recycling when the government cleaned up the sector a decade or so ago.

“Dong-Li had the data to show what was happening — how the informal and polluting recyclers were being shut down. It was especially interesting in that both China and India had announced new sets of rules, but it was the Chinese that enforced them.”

One of the most immediate statistics from Dong-Li's presentation was the size of the lead acid battery market by region. While Europe and North America had a market size of around \$7 billion each the whole Asia Pacific region accounted for some \$32 billion.

Global growth according to Dong-Li would climb at around a 2% CAGR until around 2029 and would then plateau from around 2033 with total annual sales hovering under \$60 billion.

The story is more nuanced than this. If the CBI is going to make inroads with new technology lifting regular lead batteries into that of the 'advanced' category, it will be APAC where the greatest impact will need to be felt.

Perhaps in anticipation of this, Dong Li's Leoch is co-hosting a conference with the CBI focused on lead battery innovation.

The importance of a regional focus was picked at the start of the next presentation when Neil Hawkes

who, this summer, celebrated 35 years as a specialist on lead pricing and markets, working for CRU, the specialist metals forecasting house, gave a different take on the outlook of lead's importance in the future. Neil was honoured at the end of his talk by the ILA/CBI for his contribution to the lead battery industry.

Neil's immediate attention was given to the price of lead — “still stuck in a longer-term sideways path” — but it would be silly to disparage this with the old argument about market analysis. Yes, the price of lead goes up, then it goes down and then it may go sideways (or even upside down) but there is no reason to dismiss this.

One major lead battery equipment manufacturer once told this magazine that he reckoned the most important presentation of a conference was this market analysis. He said that he used Neil's medium-term predictions on the price of lead as a basis of estimated machinery demand in the near term.

That said, Neil's message took an unusual tack concentrating on the energy transition and predicting that there were surprises ahead in terms of the price performance of lead. This was the first time this magazine has come upon a presentation that specifically linked the failure to reach energy transition targets and their impact on battery storage needs.

In particular, Neil's scenarios for the energy transition and the effect of global warming made a chilling tale. He posited three different scenarios with the CO₂ levels increasing giving a 2°C rise, the hot house assessment of the effect of the world of a 3°C and their seemingly catastrophic result.

The most likely outcome, he said was CRU's central case on emissions and a rise above pre-industrial levels of around 2.5°C and a chilling prediction for real GDP of a fall in global GDP of around -12.5% by 2050.

These are, however, simply the humble musings of this magazine's editor. For further cogitations, *Batteries International* have selected the following extracts from a much larger conference report and the personal view of battery veteran, George Brilmeyer. ■

HFSAB — over 60 years of experience

H. Folke Sandelin AB (HFSAB), is the world leading supplier of continuous lead extruders with over 60 years of experience in design and manufacture of high-quality machines, well-reputed for their reliability, robustness and durability. More than 350 machines have been successfully delivered worldwide since our company has been founded in 1958.

With our roots in the cable industry, and highest demands on product quality and process and production reliability within closest tolerances continuously over weeks, we offer a well proven technology for lead acid battery strip manufacturing with very unique material properties with zero porosity, no inclusions and a controlled homogeneous grain structure below 20 µm. The first extrusion line to be used in commercial production in the lead-acid battery industry is successfully in operation at the new HOPPECKE state-of-the-art plant in Poland since end of 2022.

Our portfolio comprises floor standing, flexibly configurable, fully

automatic, easy-to-operate and energy and cost-efficient lead extrusion equipment with the patented “Pipe-to-Plate process” for continuous strip manufacturing - from single machines to complete lines including automatic double spoolers and turn-key solutions. Expertise in processing lead and lead alloys enables us to offer one-source solutions from lead ingot to spool and full support to our customers over the entire product life cycle from planning to installation, thus mastering the specific challenges in their industry.

Consistent development over decades, staff expertise, service as a core competence and close partnership with our customers have contributed to our success. These core competences have been our fundamental claim in the past and will be in future.

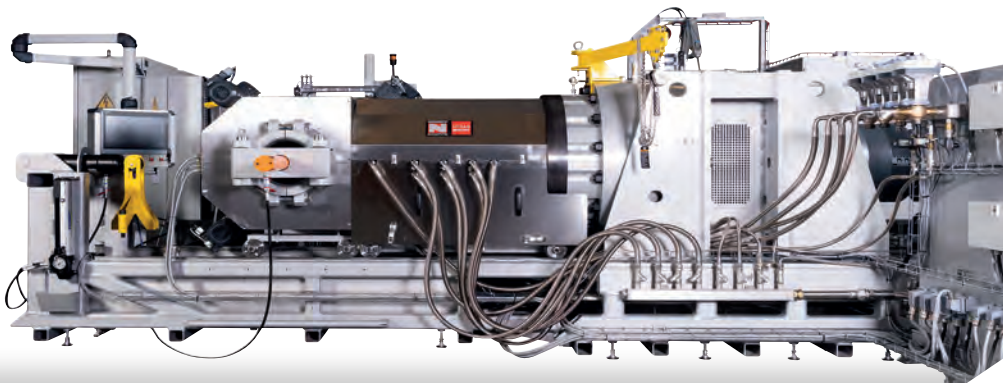
With headquarters in Motala, Sweden, HFSAB is your strong and reliable partner in meeting the global demands of tomorrow already today. ■



H. Folke Sandelin AB

Dynamovägen 7, Box 4086
SE-591 04 Motala, Sweden
Phone: +46 (0) 141 20 36 30
Email: hfsab@hfsab.com
www.hfsab.com

Continuous Lead Extrusion



For production of pure lead and lead alloy strips for **Thin Plate Pure Lead** and other **Advanced Lead Acid Battery Technologies**

What we offer: patented lead extrusion process for flat and profiled strip.

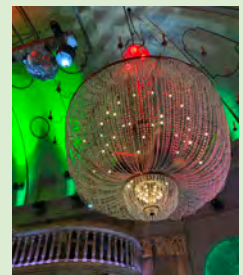
How you benefit: continuous, extremely reliable and cost efficient production of a high-quality strip within very close tolerances and perfect control of homogeneous grain structure in repeatable quality.

H. Folke Sandelin AB
Motala, Sweden,
+46 (0) 141 20 36 30,
hfsab@hfsab.com,
www.hfsab.com



La Dolce Vita!

(Or a raucous night on the tiles ...)



As all seasoned battery delegates know, the real action at ELBC events takes place once the sun has set and Milan was no exception.

First prize for the most coveted networking party of this year's conference has to go to the nine Italian lead battery firms who bussed a select group of 300 invitees to what initially seemed an incongruous destination for drinking and dancing — a former church turned nightclub.

But once inside it was entirely obvious why this architecturally stunning Milanese building had been chosen for the event.

A long, raised bar at one end on what must have been the original altar and a balcony level circling the cavernous ground floor from which delegates had an excellent vantage point to spot the bald patches of their colleagues below.

And, oh, the food.

You obviously can't socialise in Italy without also eating, and the canapés kept coming, and coming again. Tiny bite-sized offerings of Milanese fare

There was a splendid balcony level circling the cavernous ground floor from which delegates had an excellent vantage point to spot the bald patches of their colleagues below.

— goats cheese, salmon, prosciutto and sun-dried tomatoes.

Once these were finished an expansive buffet was laid out. The *Batteries International* team were a bit worried at this point about our waistlines but then our publisher, Karen, took to the dance floor for the next three hours in what can only be described as a master class in fat burning.

The DJ was positioned, Messiah-like, on an even higher raised platform above the bar area, skilfully

spinning tunes, as his flock of disciples happily bopped below.

It was quite the spectacle but when he started on the Abba playlist we noticed a group of alarmed delegates making a hasty exit.

We'll put it down to jetlag. (Or Karen's dancing).

But plenty of others carried on partying and drinking into the night proving, yet again, that no-one has more fun than a lead battery crowd in a place of worship. ■

And, a thank you for making us welcome

Special thanks go to the organizing firms Accuma, Biasin, Degani Aldo, Ditec Engineering, Engitec Technologies, Ferrazza, OMI, Pneumatica, and Sovema Group.

The farewell gala dinner ... and the great lemon tree mystery



The social events were, as always, a resounding success. Monday evening saw the opening reception with around 1000 delegates easing themselves into networking and looking ahead to the coming days of the conference.

Wine was served and some weird savoury donuts which had many delegates wondering if this was Italy's answer to Krispy Kreme.

But nobody seemed too bothered as there was a bigger elephant in the room and we're not talking about the giant ELBC letters that proved a great photo opportunity. The question on everybody's lips was something else entirely.

Rumblings had started before planes had even landed in Italy that the customary, much-anticipated gala dinner had been scrapped. But in favour of what?

Rumours abounded around the reception. What on earth could the

ILA and CBI have up their sleeves? A champagne shindig? A chocolate fountain? Or, god forbid, a finger buffet?

Then, a delegate whispered that he'd seen a lemon tree — or to be accurate a look-alike lemon tree with lemons tied on them with string — being snuck in through the highly vigilant security on the door and up the escalators to the top floor.

Another said he'd seen the same thing happen, but it was definitely low hanging olives — not citrus fruit. Turns out not much gets past you battery lot.

Meanwhile veteran lead expert, Mark Stevenson, who is in the

throes of organizing next year's Asian Battery Conference in Borneo was on the prowl.

"We have a problem," he told *Batteries International*. "Nobody knows where Borneo is!" He then revealed the breaking news that there WOULD be a gala dinner at his Malaysia event stretched along the Shangri-la's tropical, waterfront gardens. But no lemon trees.

Back on the top floor of Milan's MiCo convention centre all was finally revealed on the last night as delegates put on their glad rags for the wrap party. And it was definitely worth the wait.

Somehow, ELBC's intrepid organisers had managed to transform a vast, soul-sapping conference space into something magically Milanese. There was wine tasting, a Campari/Aperol Spritz bar, pasta cooking stations and then — just in case we hadn't got the memo that this was all about Italy — opera singing soloists belting out *Nessun Dorma* and the *Cornetto* song.

Nobody moaned about sit-down dinners but a lot of delegates were heard admitting they liked this new format.

"It's actually quite nice not having to sit next to the same person all evening," one was overheard whispering. Another pointed out that it was a lot more convivial to be able to move freely around the room.

As the big announcement for ELBC's destination 2026 was declared and bets were hastily settled from delegates who, in time honored tradition, have enjoyed a bit of a wager, *Batteries International* wearily packed up our stand at the close of yet another stomping ELBC convinced that the lead battery industry has still got its passion, still got its pride. And yes, (you know what's coming next...) Vienna, does indeed, wait for you. ■

What on earth could the ILA and CBI have up their sleeves? A champagne shindig? A chocolate fountain? Or, god forbid, a finger buffet?

Molded Battery Connector - FRicon - Key Solution for High Power Connections



- Power connectors for 80A, 160A, 320A and current stage II in various cross section
- Proven FRÖTEK End Take-Off's used
- Available in all technical lengths
- High Voltage up to 150V
- EN1175-1:2020



This year’s presentations at ELBC were widely regarded as being of a uniformly high standard. Here is a précis of selected extracts from a larger conference report and personal view, written by battery veteran George Brilmyer. The selection and the pages that follow, are his thoughts, but chosen (and redacted) by *Batteries International*.

The big picture for lead

The amount of data — both actual and forecast — would likely fill an entire issue of this magazine if reproduced in full. ELBC attendees can download the entire presentations by contacting the conference organizers, the ILA/CBI.

The chosen reports are arranged in chronological order starting with the opening sessions on Tuesday September 17.

TUESDAY SEPTEMBER 17

CHRISTOPHE PILLOT (AVICENNE)

– *The Global Rechargeable Battery Market, 2020 to 2030*

Christophe gave a break-down of the 2023 world battery markets (all chemistries). At a value of \$250 billion in 2023 (the market has doubled since 2020), Li-ion will gain ~4% of the SLI market by 2030 and will have 54% of the new and growing auxiliary battery market. Industrial battery applications will be converting to Li-ion and that Li-ion will acquire as much as 30% of UPS, 27% of Telecom, 49% of Motive Power and a staggering 99% of ESS (energy storage systems).

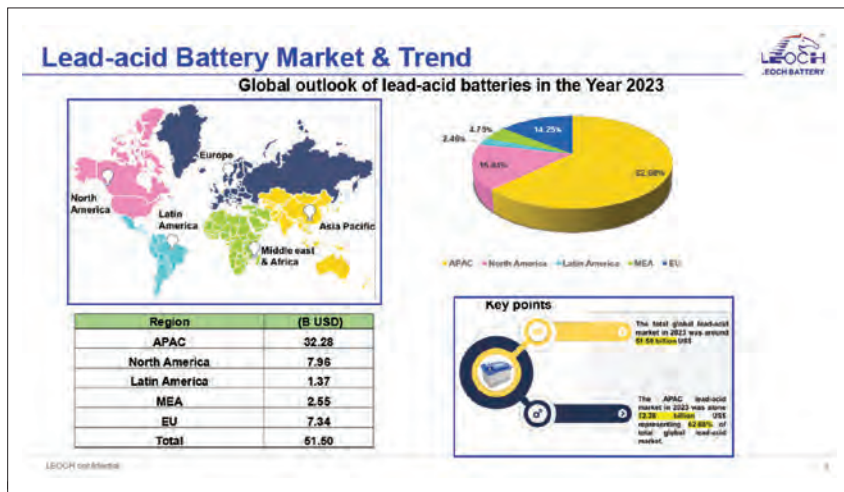
In 2021 total MWh production of Pb and Li-ion was approximately equal at 500 MWh, but in 2030 will increase to 4,200GWh Li-ion and 600GWh Pb.

DONG LI (LEOCH)

– *The Asian Battery Market Forecast*

The world Pb battery market, which was \$51 billion in 2023 with CAGR at 1%-2% through 2035. In 2023 the Asia Pacific market was \$32 billion, North America \$8 billion, EU \$7 billion, Middle East & Africa \$2.5 billion and Latin America \$1.4 billion

CAGR through 2040, will be 3.4% SLI, 2.6% Network Power and -12% for Motive Power. Maintaining research programs is important

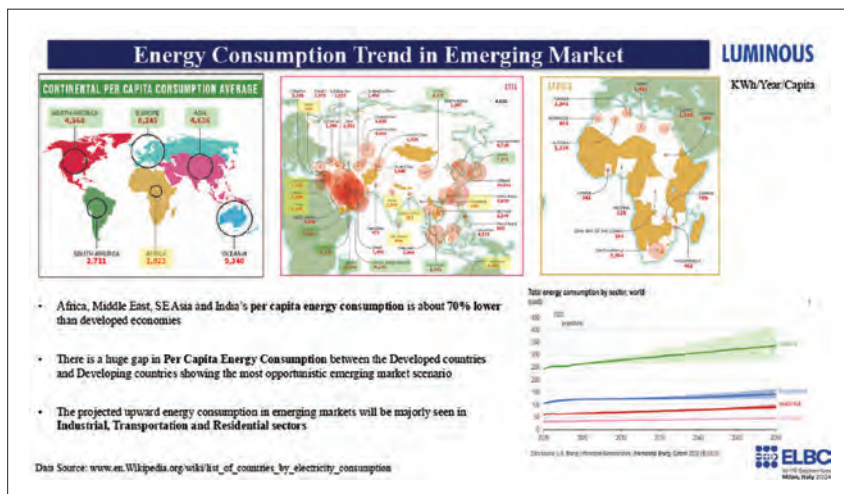


CAGR through 2040, will be 3.4% SLI, 2.6% Network Power and -12% for Motive Power.

for the continued success of Pb. Li-ion will continue to grow as prices continue to decrease. He sees ESS to be ~90% utility side of the meter.

AMLAN KANTI DAS (LUMINOUS POWER)

– *Energy Storage Opportunities for Lead Batteries in Emerging Markets*
Energy consumption per capita



Power demands will increase 2x-3x. Major opportunities for growth. ESS and batteries will be the key because much of their new grid power is solar.

around the world was shown in Kg of oil per year per person. This shows Oceania (Australia et al) at 9,300 Kg, EU at 8,200 Kg and North America at 4,500 Kg, while Africa is only 1,020 Kg. Power demands will increase 2x-3x. Major opportunities for growth. ESS and batteries will be the key because much of their new grid power is solar.

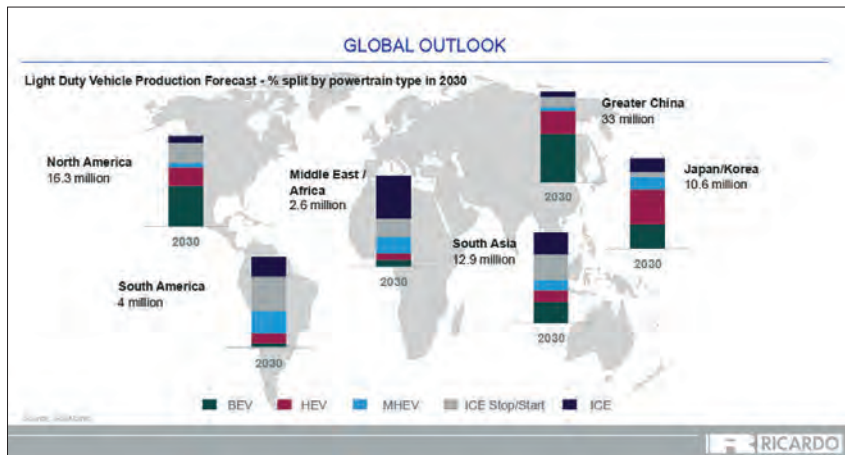
MATT RAIFORD (CBI)

– *The Future of Lead Batteries. A Technical Review of Recent Developments and Future Performance Enhancements*

CBI created its technical roadmap to establish customer-focused “key performance indicators”. Dynamic charge acceptance must be improved CBI research has made major advances, thus increasing DCA from 0.2A/Ah to 0.7A/Ah (and with state-of-the-art prototypes, even higher at 2A/Ah). The development and optimization of the 12V auxiliary “AUX” battery is another a new growth market that is being targeted through the KPIs.

Matt sees a huge opportunity in ESS. Cycle life (a clear KPI target) has been increased through battery designs (bipolar) and battery management systems (BMS). Deep cycle lives reported at 500-750 without a BMS, and with a BMS they believe we can reach 4,000.

Research into EV fast-charging, is now a reality with the CBI Blueprint Project. CBI is promoting that Pb batteries be used for ESS to back up EV fast charging.



WEDNESDAY SEPTEMBER 18

ANGELA JOHNSON (RICARDO)

– *Automotive Technology Outlook: The Future for Lead Batteries*

The EU ruled that emissions must be 100% lower in 2035 than they were in 2021. The EU wants 100% ZEV vehicles.

By 2035 less than 50% of all new Light-Duty vehicles in EU will be ICE and AUX batteries will become extremely important. The market for 12V Pb batteries will remain strong in the EU.

In 2035, there will be 18.4 million Pb batteries required for new vehicles and 54 million for the replacement market. Non-power-train electrical demands in the vehicle keep increasing. If we move to a 48V electrical bus in vehicles, there will still be a 12V bus for things like headlights.

NICK STARITA (H&V)

– *Industrial LED Battery Global Market Trends and Forecast*

Nick began with the drivers influencing our markets. They are: decarbonization; electrification; low price of Li-ion (LFP cell production is currently overcapacity); industrial policies; and Artificial Intelligence.

Motive-Power industry is growing at 3%-5% per year and is trending towards increased electrification (now 73% and increasing). Automation in distribution centers is also growing and Li is taking more of this market (currently 10%-15%) because distribution centers want less downtime for charging. Less time for charging requires higher capacity batteries, fast charging, longer life, maintenance-free. Li has it.

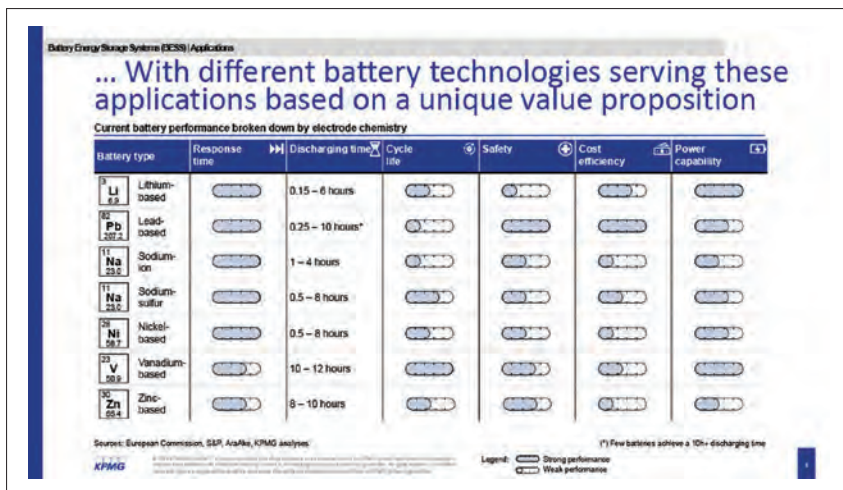
Stationary, Telecom and UPS markets have small Li-ion penetration. Li share is low now in UPS due to the danger of continuous float charging.

UPS for data centers is a growth market due to AI and ‘big data’ trends. The challenge is that data centers are getting TOO big. Data centers are running hotter and hotter, so hot, that microprocessors, especially Nvidia’s microprocessor chips, require so much cooling that the cooling systems themselves may also now require battery backup. He echoed that the ESS market is and will be a HUGE opportunity for Pb, the biggest of a lifetime! Electricity demand is going through the roof in the US (the world’s oldest grid).

MARTIN SEBAN (KPMG CONSULTING)

– *Battery Energy Storage Systems-BESS Market Outlook for all Battery Technologies until 2035*

Deep cycle lives reported at 500-750 without a BMS, and with a BMS they believe we can reach 4,000.



Lithium and Pb rose to the top in terms of cost, and flow batteries look great in terms of “perceived” cycle life (I personally do not believe the flow battery’s cycle-life predictions).

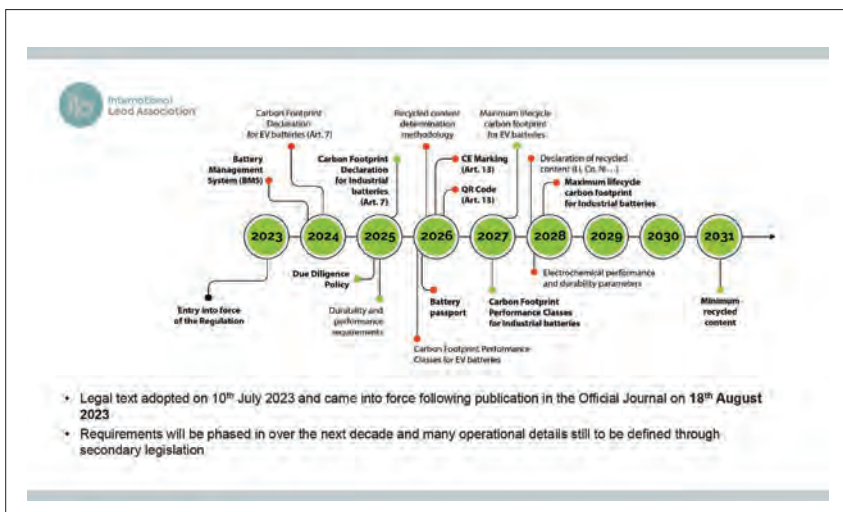
CBI/ILA commissioned KPMG to write this report on the BESS market. Both front and back of the meter. KPMG identified core KPIs such as cycle life, safety, efficiency etc. and then rated seven different battery systems against these KPIs. Lithium and Pb rose to the top in terms of cost, and flow batteries look great in terms of “perceived” cycle life (I personally do not believe the flow battery’s cycle-life predictions).

Their report contains a huge amount of data and analysis, but to summarize, KPMG believes the Pb industry has a massive opportunity,

but Pb must 1) Improve the long-term cost of storage (aka higher cycle life), 2) offer standardized “turnkey” systems (the battery is typically ~40% of the cost) and 3) Include a BMS for not only system integration but also to maximize cycle life.

STEVE BINKS (ILA)
 – *Charging the Future: How the New EU Battery Regulation will Shape the Next Decade*

Steve began with the EU directive, where batteries are the key to “decarbonization” and their demand is expected to grow 10X by 2030.



He thinks no one is “on board” any longer with the European green deal

He thinks no one is “on board” any longer with the European green deal and timelines may eventually be fudged.

New regulations are not just directed at Pb, but will eventually apply to all batteries, even those sold in other consumer products. This new directive replaces the old one from 2006 and is ‘smarter’ than before. It also discusses “second life”. There are lots of new requirements for battery producers, even QR codes on each battery and all batteries must have a “Battery Passport”.

RAY KUBIS (GRIDTENTIAL)
 – *The Battery Technology Race*

Who are the winners and losers in three different races? 1) The EV Race (all candidates are Li variants). 2) The ESS Race. This is diverse because of markets like Residential, Industrial, Micro-grids and Utility-side of the meter. LFP is the winner with maybe Na-ion entering the race. 3) The ICE Vehicle Race where hybrids, stop-start and SLI will compete. Toyota and Honda are happy about hybrid growth, because they have focused on this technology.

By 2030 he sees the propulsion mix at ~33% each EV, hybrid and ICE. Small devices are already using solid state batteries and that in ESS, LFP still gaining and improving. ■



George Brilmyer is a Ph.D. electrochemist with over 45 years experience in the battery industry. He is also well-versed in most of the technology involved in primary & secondary batteries, fuel-cells, electroplating and electrochemistry. A much fuller and unedited version of his analysis can be obtained through his website <https://batt-tekconsulting.com>

DROSS ENGINEERING

Celebrating 50 Years of Engineering Excellence

50

**battery recycling equipment respects nature
benefits the economy.**



Competitively priced.

**Advanced ULAB breaking &
separation system
with desulfurization**



**We also fabricate machine
to cast and stack the ingots**

**We are looking for a sales agent for South America and Sub-Saharan Africa
Please send your applications to: info@dross-engineering.com**



www.dross-engineering.com



The technical and supplier presentations

TIM FISTER

(ARGONNE NATIONAL LAB)

— *X-ray Synchrotron Radiation. Novel Results from Studies at the Advanced Photon Source*

Using the powerful Advanced Photon Source at ANL his team can look inside an operating Pb cell (3 plate cells) and monitor the changes in the chemical and structural composition of the PAM and NAM during formation and charge-discharge cycling.

He showed how the composition of Pb, β -PbO₂, α -PbO₂, PbSO₄ and PbO form and change in time. During cycling, the plate composition behaves

mostly as expected, with PbO₂ levels decreasing and PbSO₄ increasing. The relative ratio of β -PbO₂ / α -PbO₂ is seen to increase, and the effect of acid stratification is clear. His goal in this ground-breaking research is to develop a more detailed understanding of the factors that are influencing PAM structure and cycle life. I believe this goal is well within his reach.

ENGIN GAO (HAMMOND GROUP)

— *Methods of Modifying Structures of Lead-Acid Battery Active Materials*

Hammond understands how to

improve battery performance by changing the pore size and structure of the active mass. There is a Thermodynamic Way and a Kinetic Way to accomplish this. Hammond pH (increasing) agents are used together with a very small amount of 4BS seed crystals (aka “Sure Cure”), beta-PbO₂ and graphite to accelerate 4BS crystal growth. The larger pores created by 4BS crystals improve high-rate performance and qDCA.

MAUREEN SHERRICK (GRIDTENTIAL)

— *Advanced Depositions Methods*

THE SUPPLIERS FORUM: TUESDAY AFTERNOON

MICHAEL MAUL (POLYPORE)

— *Stratosphere: Empowering the Next Generation, Flooded and AGM, Batteries to Transcend Stratification*
Daramic introduced ‘Stratosphere’, its new battery separator that is designed to hold the H₂SO₄ in place, addressing acid stratification, which is a key for improving BMS communication. It is an alternative to AGM in a non-glass fiber separator. Stratosphere reduces acid stratification and therefore improves PSOC cycle life.

FRANCESCO CAPUZZO (SOVEMA)

— *Enhancing Energy Efficiency and Sustainability in Battery Manufacturing: A Review of Sovema Equipment*

The Sovema cold lead cubing machine is the newest addition to their product range.

MARCO ROBOTTI (HAMMOND)

— *GravityGuard: The Advanced Paste Additive to Enter the New Era of Lead-Acid Batteries*

Gravity Guard is a porosity-enhancing acid-absorbing material that is designed to improve battery performance and cycle life. It is an amorphous glassy material that is ~15% silica (SiO₂) and the

remainder ~85% is PbO. Charts demonstrated how the BET surface and the total porosity of the PAM and NAM were increased and subsequently increased the CCA and high-rate discharge performance.

TAMAS MESZAROS (CAM)

— *Innovative Grid Technology and its Impact on Technical and Economic Parameters of Lead Batteries*

This grid technology is unique with branched wire patterns like that of the veins of a tree leaf. The grid wire cross-sections are angular and CAM claims they have a larger surface area for improved paste adhesion and retention, lower weight, lower internal resistance and optimal current paths with higher productivity.

SHEP GERRISH (TBS)

— *Next Generation Plate Making Equipment*

TBS introduced its new ACTIVMAT line of electrode (plate) making equipment. This new system couples grid punching, continuous paste mixing, flash drying and curing into a complete system.

RICARDO FERRARI (GME RECYCLING)

— *Polypropylene Recovery from*

Lead-Acid Battery Scrap

— *Innovative Approach by GME team*
GME’s recycling method puts polypropylene battery case recycling at the same level as lead, and produces high purity and sustainable materials.

FRANCESCO MARFISI (CAM)

— *CAM Innovation: Lead Oxide Production by Mechanical Milling and Induction Melting for Lead for Grids and Lead Pellet Production*
CAM has developed the “Lead Shaver” (a mechanical milling operation) and the “FASMELT” induction melting system that saves 60% energy.

JOHN WIRTZ (WIRTZ MFG)

— *Advancements and Innovation Making Technology to Support Current and Future Trends*

The firm’s equipment produces a continuous full frame grid at high speeds with zero scrap production. Wirtz ConCast can produce TPPL negative and positive grids (up to 3.5mm thick) with increased automation and low-cost full frame industrial grids. The very new, Gravity Flow Caster is designed for continuously casting antimony grids — a first in the industry.

for Bipolar Battery Active Materials-Improving High-Rate Performance and Cycle Life

Paste to grid adhesion is a key to bipolar battery life and performance, so tests were done with three different amounts of vibratory force applied during the pasting process. The amount of applied force did alter the BET surface area of the paste but did little to affect the electrical resistance, which is a measure of battery high-rate performance.

HIGHLIGHTS FROM WEDNESDAY SEPTEMBER 18

REINER BUSSAR (PENOX)

– *Review of the Limits of Structural Optimization of the Positive Active Mass: A Technical Perspective, Costs and Environmental Aspects*

Penox markets red lead products “RL” (standard red lead) and “RL+” (RL doped with 4BS). Penox recommends using RL in the PAM to reduce the energy required during formation, which is referred to the Formation Factor (FF= Ah used in formation / Ah capacity of the cell). Without RL, the FF is typically 3.7-4.3 and, in this study, while using only 25% RL in the PAM paste, they found the FF to be ~2.2. This 50% increase in efficiency, permits the use of higher formation currents and shorter formation times. By combing RL and 4BS to create RL+, they found that the porosity of the paste is improved.

The resulting 4BS PAM structure allows for a higher mass utilization

AMLAN KANTI DAS (LUMINOUS POWER)
 – *Examination of the Influence of NAM Expander Material on the Performance of Lead Batteries*
 Luminous is working with the Hammond Group on expander development. Using a Taguchi DOE L4 designed experiment, the team built and tested 3P-4N cells to optimize the components of their expander blend with the goals to improve PSOC cycle, reduce water loss and improve charge efficiency. Results comparing “Additive-X” expander to a standard expander, resulted in a 20-30% improvement in PSOC cycle life. The Luminous battery product market launch is scheduled for 2025.



than a 3BS structure, but he did not mention the details when he stated that 4BS would result in better cycle life. Total CO2 per kWh is lowest when 50% RL is used. RL helps better match the formation of the positive and negative so the neg doesn't get over formed. Test formations were done at 45C to reduce grid corrosion.

ALYSSA MCQUILLING (CBI)

– *Storage Liftoff: Program Overview and Proposed Research*

The Storage Liftoff Program relates to Energy Storage innovations by 2030. An LCOS goal of 7¢-9¢ per kWh has been targeted by DOE and DOE wants to look at batteries other than Li. Partners in this project are East Penn, Enersys, C&D, Claris, ABC, Gridtential, Crown and Stryten. The DOE has identified 12 areas for R&D for Pb batteries

Improved current collectors (grids) is listed as the #1 priority, followed by Advanced Pb Battery Manufacturing at #2.

SCARLETH VASCONCELOS (VILLANOVA UNIVERSITY)

– *Proof of Concept: Magnetic Field, Monitoring and Cycled Lead Acid Cells*

Scarleth is studying the use of a magnetic field technique to measure acid stratification in real time. Primary and secondary emitter and detector coils are positioned outside the cell and measurement are taken. Work continues as the results are compared between fresh and “aged” (60 cycles) cells.

Scarleth is studying the use of a magnetic field technique to measure acid stratification in real time.

PRITPAL SINGH (VILLANOVA UNIVERSITY)

– *Measurement of DC Internal Resistance and its Variations with State of Charge and Cycle Age of a Sealed Lead Acid Battery*

There is a need for a new and improved battery management system. A novel VOCV-based DC load method was successfully used to establish State of Charge and State of Health. This Virtual Open Circuit Voltage technique was proven out and correlated using new and old cells. More data is required.

HIGHLIGHTS FROM THE THURSDAY SEPTEMBER 19 SESSION

ECKARD KARDEN (BATTERY CONSULTANT)

– *Market and Technology Trends for 12 Volt Batteries in Electrified Vehicles*

Eckhard began by describing the importance of the automotive market to Pb (49% of all Pb is SLI) and the corresponding importance of Pb to the automotive industry. Most OEMs expect Pb will stay, but half are exploring other battery technologies. AUX battery use is growing and is still mainly Pb.

OEMs are losing their SLI battery expertise and must depend more on close cooperation with battery manufacturers.

MACTM

ENGINEERING & EQUIPMENT

Visit us
at the BCI
Booth 308

Steel Belt Paster



Accurately
pastes double
sided and gives
continuous
coverage

Our high quality MAC steel belt pasters use a high tensile strength steel belt and patented FCC double sided pasting technology to give you accurate results.

The paste hopper width is available in 305 mm (12 inch) and 381mm (15 inch).

www.mac-eng.com/mac-steel-belt-pasters/

Learn more >

OptaMAC 610 XM Cotton Belt Paster



Pastes and
applies paper
to the top and
bottom of
continuous strip.

Fast and dependable cotton belt pasting solution. The MAC 610 XM Paster pastes and applies paper to the top and bottom of any continuous metal strip.

Upgraded model over the 170, 250 and 540 series MAC cotton belt pasters are available. The two independent belt and hopper motors optimise and balance production needs with ease and accuracy.

www.mac-eng.com/optamac-xm610-cotton-belt-paster/

Learn more >

Industrial Equipment for Larger Grid Sizes



Large-size lead-acid batteries require machinery built specifically built to handle their manufacture. MAC offers the most comprehensive line of equipment the industry has to offer for your industrial sized grids. Our industrial catalog includes Feeders, Pastes, Flash Dry Ovens, Stackers, COS, Heat Sealers, and more, all specially designed to handle industrial-sized grids.

www.mac-eng.com/industrial/

Learn more >

Stackers that Maximize Manpower



When it's time to load your finished batteries onto pallets, MACoffers multiple high-speed stacking solutions that maximize your workforce, efficiency, and safety. In addition, we've included several desirable options such as brushing, automatic offload, and automatic pallet removal.

www.mac-eng.com/stackers/

Learn more >



Women in the
Global Battery Industry
SUSTAINING SPONSOR

Visit www.mac-eng.com
to see how we can bring
the MAC Advantage to you!



ONE TO WATCH

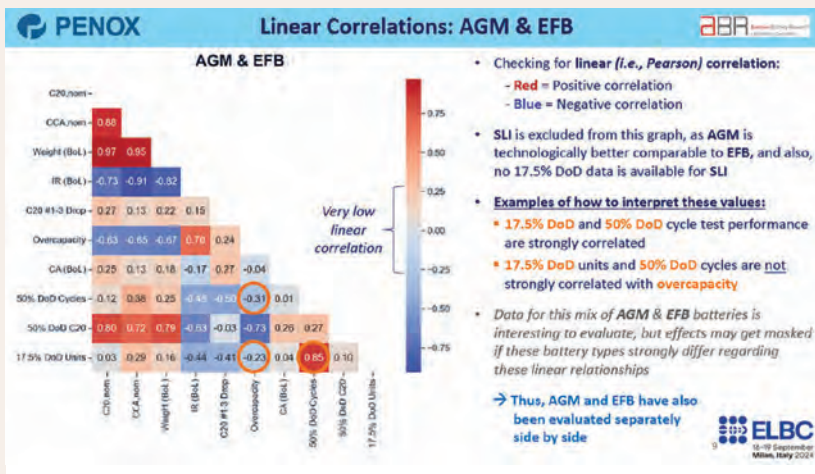
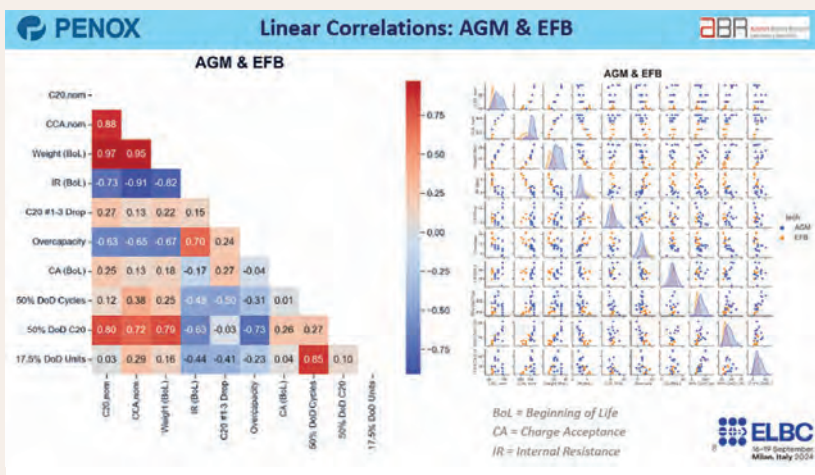
MICHA KIRCHGESSNER (PENOX)

– *Automotive Lead-Acid batteries: A review and “Outside View” on the Perspective for the European Automotive Batteries*

Penox analyzed the current state of SLI battery performance regarding nine different factors from CCA, C/20 and IR to 17.5% DoD (EN 50342) and 50% DoD cycles (EN 50342). Their plan is to identify potential solutions for performance improvements.

With a huge amount of data, they used “Python” software to compare the performance of standard SLI to AGM and to EFB. In the end, AGM > EFB > SLI with opportunities for improvements based on tightening process and control and some design issues.

I suggest taking a detailed look at the data in their presentation, which could be very useful to interested readers.



RICHARD PEKELA (ENTEK INTERNATIONAL)

– *Structure and Property Relationships in the Absorptive Glass Mat AGM*

Rick began by describing the new ENTEK AGM incline-wire pilot line in Japan (300 mm wide) and the work they are doing to improve the performance and strength of AGM, by using blends of different glass and polymer fibers. Compression damages the glass fiber sheet and more damage is done when the sheet is dry than wet.

Glasses fibers are broken during compression, resulting in a hysteresis in their compression vs relaxation data. Tests done to simulate the bending of the AGM at the bottom of a battery plate show similar behavior (and we do not want the folded AGM separator cracked at the bottom of the plate because this can lead to shorts!). Single fibers or multi fibers blends do not change this. Substituting some polyethylene fibers makes it stronger but does not improve compression recovery.

ENTEK finds that AGM does not

follow the classic power law relationship between material properties and relative density. AGM manufactured with multi-diameter glass fiber formulations does have higher tensile strength compared with single diameter formulations.

Wicking behavior does seem to be dominated by larger pores at short wicking times (~2 min) and smaller pores (after 24 hrs). There is certainly a need for more improvements in the compression recovery behavior if separator life is to be extended.

SHU-HUEI HSIEH (NATIONAL FORMOSA UNIVERSITY)

– *New Understanding of Novel Components in Advanced Lead Batteries*

NFU is evaluating Lead-Carbon-Fiber (LCF) cloth composite electrodes for the NAM. This LCF composite is a highly efficient lead-carbon electrode and exhibits notable charge acceptance and long cycle life for lead-acid batteries during HRPSOC cycling. Advantages of the LCF include, triple the high-rate cycle life, consistent discharge times, higher charge acceptance, increased pulse charging rate, less sulfation and less cell bulging.

ONE TO WATCH

NICHOLAS CLEMONT AND STUART MCKENZIE (H&V/ARCACTIVE)

– *Novel Glass Fabric Electrode Material for Grid Replacement in Lead Batteries*

This team has developed a totally new way to produce a negative battery plate that may be a breakthrough for the Pb battery in terms of manufacturing, weight and performance. In their new process, a negative Pb grid is no longer required. A lead tab/lug strip is continuously cast (ConCast) on to the edge of a 3mm thick glass matte (not AGM and not a carbon matte). The moving glass matte is continuously impregnated with a low density paste and flash dried.

The matte is cut into plates having one Pb edge with cut tabs/lugs. “GEM” is their trademarked name for this technology. They run at lower paste densities for impregnation, so there is a significant increase in NAM pore size. Formation of the NAM begins from the top of the plate downwards and once fully formed, there is no difference in discharge capacity between GEM and conven-

tional. CCA is slightly reduced, but improvements are planned.

One amazing feature is that water consumption is less than 50% of conventional and DCA is very high, at 2A/Ah (compared to conventional 0.3A/Ah). They propose that this is a breakthrough for the Pb battery in terms of manufacturing, weight and performance.

Stay Tuned!

PASQUAL GARCIA PEREZ (IMERYS GRAPHITE & CARBON)

– *New Carbon Additives for Advanced Lead Batteries*

Development of new carbon blacks with new properties for the Pb battery is a focus activity for IMERYS. Factors that can be used to alter performance are primary particle shape, aggregate size, BET, porosity distribution and surface properties. Imerys has developed several medium-range BET carbon black grades that greatly increase charge acceptance but may also increase water-loss.

CAILIN BUCHANAN (ARGONNE NATIONAL LABS)

– *Accelerating the Investigation of Organic Expander Molecules to Understand Structure-Function Relationships and Lead-Acid Batteries*

Argonne has developed a screening tool for evaluating performance of expander molecules in the NAM. The goal is to find an expander blend that will increase discharge AND increase charge performance. Their project to identify new expanders is proprietary, but their methodology is not, so Cailin described the overall technique by describing the behavior of their expander benchmark, “Vanisperse A.”

Cyclic voltammetry with a Pb disk electrode and done over hundreds of cycles (500+) demonstrates the gradual loss of discharge and charge performance. They rate each MEM (Model Expander Molecule) in terms of its DEF (Discharge Enhancement Factor) and CEF (Charge Enhancement Factor) and graph each data point on an Ansoff Matrix chart with DEF performance on the Y-axis and CEF on the X-axis. A fantastic MEM (when discovered) will be found in the upper right quadrant of the Ansoff Matrix and a poor MEM will be in the lower left quadrant. Over the last three years more than 100 MEMs have been evaluated and through their newly automated E-SMART system, they plan to evaluate many more.

ONE TO WATCH

EBERHARD MEISSNER (BATTERY CONSULTANT)

– *A Fresh Look at Negative Active Material – “Three Types of Electrochemical Reactions Occurring Simultaneously in the Same Location”*

Eberhard points out that there are many things going on in the NAM, and not just the main reversible Pb < > PbSO4 reaction and the side reactions such as H2 evolution and O2 reduction. There are capillary forces at work that keep the finest pores in the NAM with electrolyte no matter how much gas pressure is there.

The O2 reduction reaction is very fast and therefore, O2 gas cannot penetrate the liquid filled pores of the NAM. He states that many of the current thinking on the NAM and O2 recombination are based on historic views and interpretations that are outdated and related to old cell designs. There is more in this paper than I can relate to you in this short summary, which makes it require more study. His final table of NAM properties with such things as m2 NAM /Ah is worthy of a closer look.

NAM derived characteristics (calculated techn. values – typ. order of magnitude)

Tab.4: derived Material Properties	calculation	calculated Value
NAM pore volume / Ah _{nom}	V _{por} / m.u.(Pb)	~1.2 ml/Ah _{nom}
NAM pore surface area / Ah _{nom}	A _{por} / m.u.(Pb)	~2.4 m ² /Ah _{nom}
NAM apparent volume utilization V.U.(NAM)	m.u.(Pb) / ρ (NAM)	~2.5 ml/Ah _{nom}
NAM Pb volume utilization V.U.(Pb)	m.u.(Pb) / ρ (Pb)	~0.88 ml Pb/Ah _{nom}
H ₂ gas evolution: vol. per charge equivalent	V _{evol} / 2F	~462 mL H ₂ /Ah
Charge of H ₂ gas [Ah] possibly stored in NAM pores /Ah _{nom} (p=1bar)	~0.26% DoD	~9.5 As/Ah _{nom} ~2.6 mAh/Ah _{nom}
Charge of diss. H ₂ [Ah] in e'lyte (p=1bar)	i ² (H ₂) * 2F	~43 As/L = 12 mAh/L
Charge of diss. H ₂ [Ah] possibly stored in NAM pore e'lyte (p=1bar)	~0.0015% DoD	~0.052 As/Ah _{nom} ~0.015 mAh/Ah _{nom}
O ₂ gas evolution vol. per charge equivalent	V _{evol} / 4F	~231 mL O ₂ /Ah
Charge of diss. O ₂ [Ah] in e'lyte (p=1bar)	i ² (O ₂) * 4F	~62 As/L = 17 mAh/L
O ₂ gas evolution vol. per charge equivalent	V _{evol} / 4F	~231 mL O ₂ /Ah
Charge of diss. O ₂ [Ah] possibly stored in total cell e'lyte [10]	~0.07 - 0.1% DoD	~0.7 - 1 mAh/Ah _{nom}

Data at T = 25°C; e'lyte = sulfuric acid, z=4 Mol/L

ALBERTO ROMERO (EXIDE GROUP)

– *An Electrochemical Tool for Characterizing a Soft Lead Sample*

Cyclic voltammetry is being used to predict and detect the potential water consumption in the NAM. The initial phase of the test is to fabricate a Plante' type Pb electrode from a “soft lead” sample taken from a Pb ingot (that is on its way to the oxide mill).

While the soft lead electrode is being characterized by cyclic voltammetry, the soft lead ingot is further converted into leady oxide (ball mill?) and made into NAM paste, then used to produce a negative plate, which is characterized as a 2V cell (22Ah). Traceability between the soft lead sample is maintained.

The 2V cell is then evaluated for water consumption. As the cyclic voltammetry continues, hydrogen evolution reaction (HER) is studied and a Tafel graph is plotted. The two results (water consumption in the cell and Tafel graph from the electrode) were able to be correlated with a high degree of accuracy. A very useful screening tool if water consumption is a high priority.

FREDERICK AGYAPONG FORDJOUR (ARGONNE NATIONAL LABS)

– *Fundamental Studies: Understanding the Discharge Mechanism and Capacity Limits for Lead-Acid Battery Electrodes*

An interesting technique here combined the use of cyclic voltammetry with a rotating disk electrode and ICP-MS. The work began by electrodepositing a layer of PbO2 on to a highly polished glassy carbon disk electrode. Glassy carbon is used as a base, so he can study only the discrete layer of PbO2 that has been carefully electrodeposited from a solution of Pb+2 in perchloric acid, which creates a layer of β-PbO2.

After electrodeposition, the charge-discharge behavior of this layer can be studied in a solution of 1.300 SG H2SO4. Using a tiny capillary connected to the input of the ICP-MS and in very close proximity to the rotating disk electrode, he concluded that the discharge mechanism and capacity limits, depends on the nucleation and growth dynamics of the PbSO4 layer. ■

Controversial Ecobat plant given potential go-ahead

Ecobat, the lead-acid battery recycling giant, at the of July received a draft permit to continue operating its beleaguered Los Angeles plant for the first time in 19 years.

The 13-acre facility, in the City of Industry roughly 15 miles east of downtown LA, has been demolishing 600 tonnes of lead-acid automotive batteries per day on a 2005 permit that technically expired in 2015.

The new draft Hazardous Waste Facility Operation Permit, issued on July 16, is a victory of sorts for the embattled hazardous waste facility, which has survived mounting pressure to be shut down from

surrounding communities due to numerous air toxics emissions and possible soil contamination.

The release of the draft permit marked the beginning of a 120-day public comment period with opportunities for the public to review and provide feedback on the conditions.

The permit, issued by the state Department of Toxic Substances Control (DTSC), is not yet a done deal, but if it goes ahead will impose stricter standards and increase financial insurance funding to protect health and the environment in the county.

The DTSC has previously sued Ecobat, formerly

known as Quemetco, in October 2018, for 29 violations of state hazardous waste laws.

In December 2022 the company agreed to a \$2.3 million settlement in a Los Angeles court. The settlement included several mandatory requirements for improvement at the plant, leading to the new permit being issued.

Although the company asked for 10 years, the permit is valid for only five. Ecobat also requested to increase the number of car batteries they can crush and melt down, and for an increase in its hours of operation.

They were denied this by the DTSC.

“Ecobat has a history of repeatedly violating state laws in handling toxic substances such as lead, which has endangered the health and safety of workers and residents in San Gabriel Valley communities for decades,” said a statement from First District Los Angeles County Supervisor, Hilda Solis, released on July 16.

Ecobat says it has invested over \$50 million in health and safety measures at the plant to protect both the community and the workforce. In a statement released following the decision it said: “Our facility is the only one of its kind in the western US that safely recycles over 10 million car batteries each year with a 98% recycling rate, the highest of any industrial recycling process.

“The state-of-the-art equipment and highly skilled workforce at our facility transform old batteries into ingots and alloys, essential for

lead-based products and components critical to the clean energy transition.”

Rhys Jordan, the plant manager also said, “Our facility stands as a testament to environmental innovation, with industry-leading emission-control equipment ensuring operations do not adversely impact the environment.”

The permit conditions applied by the state agency add numerous operating restrictions which they say will prevent further releases of cancer-causing chemicals. ■

Second annual sustainability report

For the record, Ecobat, the lead and lithium battery recycling giant, released its second annual sustainability report at the end of June.

The firm pointed to various areas of business that had improved. These included a new process for increasing capacity in its smelters and the reduction of blood lead levels for its staff.

Ecobat said its plant in Bazoches-les-Gallerandes, France, had discovered that by isolating gypsum waste from lead paste during the process of electrolyte neutralization with lime, it could increase the capacity of smelters by 5%.

“This resulted in an additional 3,000 tonnes of lead production and an approximate 25% reduction in energy consumption and CO2 in its operation,” the firm said.

Ecobat also reported that it had outperformed its 12-month rolling average blood lead improvement goals which were already set at ambitious levels. ■

Teamsters praise safety of Ecobat LA lead recycling site

US trade body union the Teamsters has praised the safe and environmentally friendly operations at a beleaguered Ecobat lead battery recycling plant in California.

The union’s backing for the plant came after Ecobat received a draft permit from the California Department of Toxic Substance Controls (DTSC) to continue operating its beleaguered Los Angeles plant for the first time in 19 years.

The 13-acre facility, in the City of Industry roughly 15 miles east of downtown LA, has been demolishing 600 tonnes of lead-acid automotive batteries per day on a 2005 permit that technically expired in 2015.

A second, DTSC ‘post-closure’ draft permit, would require

Ecobat to continue monitoring groundwater around two closed areas onsite and conduct annual soil sampling around the facility perimeter for at least 13 more years.

In a statement issued on July 17, Chris Griswold, Teamsters local 986 principal officer and Teamsters joint council 42 president, said most of Ecobat’s employees are proud members of Teamsters Local 986.

“We take pride in our role in ensuring safe and environmentally friendly battery recycling... Teamster Local 986 members operate the world’s cleanest lead acid battery recycling facility.”

Both permits are open for public comment until November 18, 2024. ■

THIN PLATE PURE LEAD

YOUR ONE SOURCE SOLUTION

WIRTZ™

www.wirtzusa.com

**OVER A DECADE OF TECHNOLOGIES
AND PROCESSES SPECIFICALLY
DESIGNED FOR TPPL PRODUCTION:**

CONTINUOUS GRID CASTING

PRECISION PASTING

SORTING - STACKING

OFF LOADING - PALLETIZING



Discover the benefits and market advantage your company can experience from our TPPL processes by calling +1.810.987.7600 or emailing sales@wirtzusa.com.

The Wirtz Group of Companies

WIRTZ™



oxmaster

LEKO

CONBRO

**BATTERYRECYCLING
SYSTEMS**

INNOVATIVE | RELIABLE | PERFORMANCE

‘No cost-effective solution in sight’ for LFP recycling

Recycling of lithium iron phosphate batteries will continue to remain unprofitable — at least in the near term, according to Emma Nehrenheim, president of Northvolt Materials, speaking to the ICBR conference held in mid-September in Basle, Switzerland.

“The LFP recycle market is relatively immature, there is no realistic business model yet for low grade chemistries,” she said. However, she anticipated that ‘significant price drops will happen

in the short term’ but hoped that eventually a solution will be found.

“[In terms of circularity] We can’t pick the gold [nickel, manganese, cobalt] in the black mass and throw away the rest,” she said.

Mark Stevenson, an international lead recycling expert said: “The problem with disposing LFP batteries as opposed to lead ones is that they contain little of any real value. By comparison, automotive starter batteries, for example,

have enough lead metal in them to pay for the cost of putting them in a smelter and make a profit. With LFP the recycling costs far outweigh any value of the metals extracted.”

In the after-presentation discussions, the general impression was that the introduction of the Battery Directive and the related Battery Passport might throw the onus of the cost of the recycling on to the battery manufacturer.

This would inevitably,

some delegates said, raise the cost of EV batteries at a time when the price differential between EVs and conventional ICE vehicles was a sticking point with consumers.

Elsewhere in the conference Mina Ha, an analyst with RHO Motion, said that the bulk of LFP recycling around the world was now happening in China. “They’re ahead of the world in experience and cutting the costs of recycling,” she said. ■

Troubled Li-Cycle considers Ontario facility closure

Troubled Canadian recycler Li-Cycle has confirmed that its first battery recycling ‘spoke’ facility could be shut down, as the firm “explores financing and strategic options” to increase near-term liquidity. The share price has fallen from a peak of \$110 a share in 2021 to just under \$2 in early October

The August 8 announcement came just days after the Toronto-based lithium ion recycler said it had promoted interim CFO Craig Cunningham to the post of CEO. Cunningham had been appointed interim CFO since March.

Operations at the Kingston, Ontario spoke facility started in 2019 but were “paused” last November.

Now the firm has warned Kingston’s closure may loom as part of an ongoing review, which followed a leadership shake-up last spring and job cuts representing 17% of the firm’s workforce to generate about \$10 million in cost savings on an annualized basis.

The restructuring announcement came a week after the company said “significant additional funding” would be needed before it could restart construction of its planned Rochester, New York lithium battery recycling hub — as it revealed the cost estimate of the project had increased to \$960 million.

Analysts say Li-Cycle has not attracted the business required to sustain its pricey operations. The expensive operating costs resulted in a net loss of \$138 million in Q4 despite a 34% increase in revenue from product sales.

Li-Cycle received a \$75 million investment from Glencore this year and has a conditional \$375 million contract with the US Department of Energy. In June 2022, it launched a global recycling partnership and secured a \$200 million investment from Glencore.

Usually, the large influx of cash would mean an exciting growth oppor-

tunity for Li-Cycle, but the company’s spending remains at an all-time high, reaching \$334.9 million in capital expenditures for 2023.

The volatility and uncertainty of the lithium battery market also create uncertainty in Li-Cycle’s supply line. The drop in lithium prices earlier this year took its toll on Li-Cycle’s stock price. The stock saw a slight jump following the recent cash influx but has tumbled again due to the company’s shaky financial sustainability concerns.

In a recent interview with Ajay Kochhar, the CEO and cofounder, he said future prospects were good. In 2024, Li-Cycle expects that approximately 210,000 tonnes of battery material were available for recycling in North America and Europe. By 2030, Li-Cycle expects that there will be approximately 1.2 million tonnes of material available for recycling per year, which is an expected 6x increase.”

Spoke facilities are where all types of lithium ion batteries are transformed from a charged state to what Li-Cycle describes as an inert product.

The resulting black mass is then transferred to a hub, where cathode and anode materials are processed into battery grade end-products for reuse in battery production or other applications.

Li-Cycle reported second quarter revenue for 2024 on August 8 of \$8.4 million. During the first half of the year, Li-Cycle said its largest customer source of revenue was a US headquartered vertically integrated EV and battery manufacturer with a substantial global EV market share.

The company also recently announced a recycling partnership with Daimler Truck North America.

As of June 30, Li-Cycle said it had cash and cash equivalents of \$57 million, compared to just over \$109 million at the end of March. The decrease was primarily driven by changes in working capital and investing activities partially offset by lower selling, general and administrative expenses. ■

IMPROVE BATTERY PERFORMANCE WITH **THE MOP MILL**

ONLY tet-PbO

thanks to the MOP: The Real Oxide Mill

LEAD OXIDE IS THE CORE

Start producing lead oxide with only a tetrabasic structure and you will have a homogeneous plate, with a very strong bond.

With a MOP mill you will have:

- *consistent oxidation*
- *controlled production*
- *ease of production*
- *energy saving*



**SCAN ME
TO RECEIVE THE CAM BOX**

Find out more!
Write Us: info@cam-srl.com

Via Pedemontana 13, 66022, Fossacesia (CH) - ITALY
Web: www.cam-srl.com
Phone: +39 087257724

BMW and Redwood Materials form recycling partnership for US vehicles

BMW of North America and Redwood Materials announced a partnership at the end of September to recycle lithium-ion batteries from all electric, plug-in hybrid electric, and mild hybrid BMW vehicles in the US.

Redwood Materials will work with BMW Group's network of some 700 locations across the US, including dealerships, distribution centers, and other facilities to recover end-of-life lithium-ion batteries.

BMW says the Redwood process has a smaller environmental impact than other recycling technologies or conventional mining.

"Together with Redwood Materials, BMW is laying the groundwork for the creation of a fully circular battery supply chain in the US," said Denise Melville, head of sustainability, BMW of North America. "We have said before that the future of BMW was electric, digital, and circular, and this agreement

brings us a step closer to meeting that goal.

"The materials inside a battery are nearly infinitely recyclable and are not consumed or lost in their lifetime of usage in the vehicle."

Redwood Materials operates a campus in Reno, Nevada where battery components are recycled, refined, and manufactured. A second Redwood Materials campus is under construction in Charleston, South Carolina.

This is close to the BMW's existing plants in the state: Spartanburg, which employs 11,000 staff and the new eco-plant at Woodruff, where BMW will assemble at least six fully electric models, and the high-voltage battery packs for those vehicles, before the end of the decade.

Woodruff will be operated without fossil fuels and will use 100% green electricity.

The company's battery cell manufacturing partner, AESC is also nearby in Florence, South Carolina. ■

Illinois legislates for new battery recycling regime

Battery sellers and distributors operating in the US state of Illinois will be required to develop a recycling stewardship program for their products by 2026 under new legislation.

Governor JB Pritzker signed the Portable and Medium-Format Battery Stewardship Act on August 9.

The new law stipulates, in

part, the need to manage recycling of all battery types to improve safety and prevent mishandling and fire risks.

Action to stop batteries used in a range of products, including e-scooters, being incorrectly sent to solid waste processing plants, is called for under the new law.

The law comes into effect on January 1, 2026, and will

require battery producers to fund and manage the collection, transportation, and recycling of portable primary and rechargeable batteries as well as medium format batteries that the act defines as weighing between 4.4 and 25 pounds.

From January 2027, labels containing details of the battery producer must be affixed to batteries, unless the

battery is less than one-half inch in diameter or does not contain a surface whose length exceeds one-half inch.

From January 2029, batteries must be labelled with detailed collection and recycling information, including identifying the battery chemistry and indicating correct disposal methods.

The Illinois Environmental Protection Agency will oversee and ensure compliance with the program.

According to the Environmental Council of the States (ECOS), the national non-profit association of state and territorial environmental agency leaders, this is the sixth extended producer responsibility law introduced in Illinois and raises the total number of battery EPR (Extended Producer Responsibility) laws in the US to 16.

State senator Dave Koehler, who sponsored the draft legislation with fellow Democrat and state representative Sharon Chung, said the new law will also ensure residents have access to recycling centers and force battery distributors to take measures to deal with potential harm from their products. ■

AE Elemental opens lithium-ion recycling facility in Poland

AE Elemental, a joint venture of US-based Ascend Elements and Poland-based Elemental Strategic Metals, held an opening ceremony of its first commercial-scale EV battery recycling facility at the end of September.

"Located in Zawiercie, Poland, the newly constructed facility can process 12,000 tonnes of used Li-ion batteries each year — or approximately 28,000 EV battery packs annually — making it one of the largest battery recycling facilities in Europe," said a spokesperson for the firm.

"Dozens of business and community leaders from

Europe and North America attended the opening ceremony and toured the state-of-the-art facility."

The wave of new recycling facilities being built across Europe has in part been prompted by new European legislation.

From 2031, new EV batteries sold into the EU must include a minimum of 6% recycled lithium, 6% recycled nickel and 16% recycled cobalt. These targets increase to 12%, 15% and 26%, respectively, by 2036. ■





Golden Profit from Scrap Lead Acid Batteries through the unique Engitec CX[®] Technology and Equipment...

Scrap Lead Acid Batteries Recovery Plant - over 230,000 tpy
by courtesy of Clarios LLC (USA)



The widest range of productivity from 10.000 tpy up to 300.000 tpy and beyond



Batteries Recycling and the broadest Portfolio of Technologies for a Greener Environment, already present in the five Continents



engitec.com

...Master in Separation and Lead Production...

- CX[®] Battery Breaking and Separation
- Grids and Paste Desulphurization with NaOH or Na₂CO₃
- Sodium Sulphate Crystals Production
- Foundry and Refinery
- Process and Hygiene Fumes Filtration
- Fully Automatic Ingots and Hogs Casting, Stacking and Strapping

...Master in Innovation...

- Li-Ion Battery Recycling Process
- FAST[®]
Electrochemical Lead Production from Concentrates or Scrap

...and the story continues...

Gravita posts profit rise, lead demand to increase ‘in leaps and bounds’

Lead recycling conglomerate Gravita India has posted increased net profit for the past year of Rs239 crore (\$28.5 million) and has revealed work is underway on innovative new emissions reduction processes.

Reporting annual figures in a regulatory filing on August 24, Gravita chairman Mahavir Prasad Agarwal also forecast that demand for lead in the battery sector will increase “by leaps and bounds” in the next few years.

According to the annual report, net profit was up from Rs201 crore in the previous year. EBITDA for 2023-24 was Rs331 crore (up from Rs286 crore in the past year).

Increases in profit and earnings were in part driven by net sales of Rs3,161 crore for the year, compared to Rs2,801 crore in the previous financial year, said Agarwal, who was reappointed as chairman and a director for the next three years last April.

“The growth underscored

the effectiveness of our market strategies and the strong demand for our recycled products.”

More than 60% of total sales were made in the domestic market, while overseas markets accounted for much of the remainder.

“We have also embarked on a groundbreaking pilot project to integrate an electric refining furnace into our metal recycling operations. This initiative aims to revolutionize the refining process by significantly enhancing efficiency and reducing environmental impact.”

Agarwal said the furnace is designed to optimize energy consumption, reduce greenhouse gas emissions and minimize other pollutants associated with traditional refining methods.

“We are also conducting oxygen trials during smelting processes to enhance energy efficiency through the introduction of higher oxygen concentrations into the combustion system.”

Agarwal did not elaborate,

but said the trials aim to demonstrate that the process can raise the combustion temperature and promote faster and more thorough fuel burning.

This in turn will lead to lower fuel consumption and a reduction of emissions while enhancing the overall efficiency of smelting.

He cited data from US-based analyst TechSci Research indicating that India’s lead acid battery market was worth nearly \$4.5 billion in 2023 and has an expected CAGR of nearly 7% up to 2028.

Demand will be driven by the automotive, telecoms, EVs and electronic two-wheeler sectors, according to TechSci.

Agarwal said datacentres in India, where lead batteries are “widely used”, will also need more batteries to support critical systems as that sector too is expected to expand over the next four years.

“The trend is a clear indication that the country needs to start preparing to

meet the increasing demand for lead in the coming years.”

However, Agarwal said the lead recycling industry in India continues to face significant challenges as a result of informal operations that do not adhere to environmental and related regulations.

Informal recyclers can offer higher prices for used lead acid batteries because they have lower operating costs.

Agarwal urged the government to further strengthen a national crackdown on the informal sector and called for the introduction of lower taxes for formal recyclers processing end-of-life batteries.

According to Agarwal, there are some 800 authorized recyclers of lead wastes in India, with a combined processing capacity of more than 2 million tonnes per year.

This equates to a maximum production of about 1.25 million tonnes (60%-65% of the recycling capacity) of secondary lead annually at full capacity, he said.

India’s total lead consumption is an estimated 1 million tonnes annually, including primary and secondary production and imports.

Globally, the metal scrap recycling industry is valued at \$500 billion with India’s share around 2.2% of that figure, Agarwal said. Recycled lead accounts for 50% of the world’s total lead production and India’s production capacity is in excess of 2 million tonnes annually.

Lead demand to feed the lead battery production will increase by leaps and bounds because of increased vehicle production, e-bikes and infrastructure, Agarwal said ■

STC system deal to slash gas usage for Estonian lead recycler

Italian lead recycler and engineering firm STC has been selected to supply its mechanical vapour recompression (MVR) energy recovery technology to Estonian used lead battery recycler Ecometal.

STC confirmed to Batteries International on August 16 that it has been contracted to transform Ecometal’s existing system used for the crystallization of sodium sulfate solution obtained from the desulfurization of lead paste.

Upgrading the system to utilize MVR technology will result in a combined annual saving

on natural gas consumption of about 5 million cubic metres and a reduction in CO₂ emissions of about 3,000 tonnes annually, STC said.

Ecometal said the estimated cost of the project, set to be completed by August 2026, is €1 million (\$1.1 million), for which it has received

a grant of more than €394,000 from the European Regional Development Fund.

STC has installed MVR systems in separate projects in recent years including at all Monbat Recycling sodium sulphate crystallization plants in Bulgaria, Romania and Serbia. ■

“Upgrading the system to utilize MVR technology will result in a combined annual saving on natural gas consumption of about 5 million cubic metres”

Engitec prepares to install ULAB recycling system in Ivory Coast

Italian engineering company Engitec Technologies is to deploy its innovative lead battery recycling technology to Ivory Coast.

Installation of the modular CX Smart system is scheduled to take place in the West African nation in 2025, the International Lead Association reported on August 19.

The ILA member company's system includes a break-

ing and separation station, foundry and refinery, ingot caster and pollution control system that can process up to 12,000 tonnes annually of waste lead batteries.

An as yet undisclosed coastal site will host the system and support exports of batterygrade lead to other countries, the ILA said.

Engitec will provide hands-on support during the

commissioning and continued operation of the facility to ensure that it maximizes recovery of lead and minimizes emissions of hazardous substances.

Local policymakers are supporting the development and enforcement of binding minimum standards for recyclers operating in the region, meaning the new plan will bring social and economic

benefits to the Ivory Coast, the ILA said.

The circular economy for lead batteries provided by highly regulated recyclers in many regions delivers the ultimate sustainability goal of creating much needed energy storage solutions from waste, the ILA said.

Sub-Saharan Africa is one such region where economic growth has resulted in growing vehicle fleets, high demand for backup power systems and decentralized solar installations that are increasing the volumes of used lead batteries.

These batteries are often collected by hundreds of small collectors and sold on to the informal sector or regulated recyclers operating without taking the kind of precautions necessary to avoid pollution. There are very few environmentally sound lead battery recyclers operating in sub-Saharan Africa.

Typically lead battery recyclers in lower and middle income countries (LMICs) are often small and investment costs required to make them environmentally sound can be substantial and make operating facilities uneconomic.

Steve Binks, ILA senior director for regulatory affairs, said: "Finding solutions to the problem of poor lead battery recycling practices is often challenging but the new offering, developed specifically for adoption in LMICs by Engitec, offers some hope the UN Environment Assembly resolution on improving lead-acid battery recycling can be achieved."

Batteries International reported last year that Engitec was preparing to ship its CX system to Moura Batteries in Brazil — in its first equipment supply contract to the country. ■

UK backs lead and Li recycling plant project for Nigeria

The British government is supporting investment to develop a lead and lithium ion battery recycling plant in Nigeria, led by UK-based Hinckley Recycling.

British high commissioner to Nigeria, Richard Montgomery, confirmed on September 18 that the equivalent of \$5 million was being made available to support initial investment in the project for Ogun

state.

He said the UK's investment would be made through its Manufacturing Africa program.

Montgomery discussed the project during talks with state officials and business and investment leaders.

Technical details, including the construction schedule and processing capacities of the plant, were

not disclosed.

The UK is committed to supporting economic growth and promoting trade in Nigeria, he said.

Last February, Hinckley signed an agreement with UK-based Mobile Power (MOPO), the pay-per-use battery technology company, to recycle batteries used at MOPO's solar powered battery rental hubs in Nigeria. ■

Glencore silent on smelter outages as lead output falls

Glencore has revealed that overall lead metal production by the group in the first half of this year was down 21% — due in part to European smelter outages.

The mining group said on August 7 that the drop of 26,500 tonnes, compared to the same period a year ago, reflected a temporary furnace shutdown at its Nordenham Metall lead facility in Germany and the continued "care and maintenance" of its Portovesme lead line in Sardinia.

However, Glencore has yet to respond to questions from *Batteries International* about the reasons for the Nordenham temporary shutdown

or say when the facility is expected to return to operation.

Lead has been produced at Nordenham since 1912 and the facility produces more than 10,000 tonnes of primary and secondary lead on average annually.

Glencore has said previously that Nordenham will be transformed into a "modern polymetallic smelter" in future years to handle lower-lead zinc production residues and more complex composite materials.

On Portovesme, the group has also yet to comment on what the future holds for the site since it emerged in late 2022 that Glencore was reviewing operations

against the backdrop of escalating energy costs.

Batteries International reported last November that Glencore was considering building a pilot EV battery recycling plant at Portovesme in a joint venture with Canada's Li-Cycle, while continuing to dodge questions about the future of the site's lead and zinc processing facility.

Meanwhile — see separate story in this news section — troubled Canadian recycler Li-Cycle has confirmed that its first battery recycling 'spoke' facility could be shut down, as the firm "explores financing and strategic options" to increase near-term liquidity. ■

RED

POWER[®]

by COLOROBRIA

OXIDES FOR THE HEART OF BATTERIES

Strengthened by its fifty years' experience in Red Lead production both for crystal and ceramics, Colorobbia is able to support the market of Lead Batteries manufacturing with centennial transversal knowledge and worldwide recognized competence.

Colorobbia can offer different product grades with constant quality and high purity, proving a trustful partner for your future of success.

www.colorobbia.com

COLOROBRIA

excellence to improve your ceramics
since 1921

Black mass to 'white gold'



Can the economics ever stack up for lithium iron phosphate recycling? This is a moot point given that LFP contains relatively little of any value. Sara Verbruggen reports.

BLACK MASS

There is no standard black mass. It is essentially a raw material that contains all cathode and anode materials from shredding lithium ion batteries. This material can contain different ratios of metals as well as inorganic solvents, depending on whether the black mass is mainly made from end-of-life or production scrap.

As a basic commodity it can be sold to the battery as well as other industries, for further processing. Manufacturing lithium ion battery cells requires high purity metals. Black mass contains water and contaminants and has a high impurity profile of more than 1000ppm, more like ore grade metal.

Most of the processing into new battery-grade, valuable cathode materials takes place in China.

In 1995 Bill Clinton was US president, a new sitcom about six friends living in New York City had recently begun airing, prototype electric cars were appearing and America was the world's largest producer of lithium.

How times have changed!

Australia, Chile and China now account for 90% of the global production of what the World Economic Forum has dubbed the "white gold of the energy transition".

China's demand for lithium — a critical metal for the electrification of just about everything — has been insatiable. In addition to developing mines

at home, Chinese companies control sites in Chile, Canada and Australia while 60% of the world's lithium refining capacity for batteries occurs in China.

Recycling batteries and reusing the metals within will need to be scaled up massively to ensure supplies of lithium and other key materials can meet demand. Chinese companies already account for most lithium ion battery recycling.

Sources of scrap, black mass

According to Benchmark Mineral Intelligence, in the 2024 global lith-

In NMC lithium ion battery recycling business models the value of the cobalt and nickel cover the cost of recovering the lithium. This raises the question about what is going to happen as more LFP battery gigafactories come online

ium ion battery scrap pool, the majority of this material comes from process scrap. “When we look at the significant amount of production scrap in the global scrap pool we can see this is influenced heavily by China’s significance in the recycling market,” says Beatrice Browning, senior analyst recycling, at Benchmark.

In the European scrap pool, however (shown first of two slides below) comparisons of the end of life (EoL) and process scrap show these volume shares to be very similar, due to the fact there is little manufacturing capacity for batteries within Europe. “By 2040, in Europe, the majority is from the EoL scrap pool,” she says.

In the second slide the cathode chemistry splits for scrap for recycling lithium ion batteries in Europe mainly comprises NCM (low, mid and high nickel chemistries) in 2024, while by 2040 LFP will account for the largest share, reflecting the bigger market share of LFP batteries over other cathode chemistries.

Legislation

Legislation, such as the EU’s new Batteries Regulation (EU 2023/1542), are enabling a more

Almost everyone involved in recycling says the targets set by the European Commission are fanciful. “The consultants who advised the civil servants drafting the legislation set it much lower than these official targets,” says one lead analyst. “They did it for political reasons rather than economic ones. They believe that they can drive a market forward by legislating it into existence.

“Unfortunately this approach doesn’t stand a chance of success. They will have to back down. I hope it will be a humiliating experience.”

EU 2023/1542 also provides for mandatory minimum levels of recycled content for industrial, SLI batteries and EV batteries, set as 85% for lead, 16% for cobalt, 6% for lithium and 6% for nickel and over time set to roughly double for each of these metals, with the exception of lead of which a high proportion is already recycled.

The recycling value chain for end-of-life lithium ion batteries is established upon:

- collection, logistics, sorting
- discharge and dismantling
- shredding — aka black mass production

resulting black mass often ends up exported overseas to Asia to be made into new battery cathodes or cells.

For nascent battery industries establishing themselves in the West, having access to critical metals, like lithium, depends on closed loop recycling approaches, which takes the spent batteries sold in local markets, recycles them and then re-supplies the materials back into the local battery supply chain, attaining energy security and supply chain sustainability.

Metals with exceptionally high purity are needed to make lithium ion batteries. In current recycling markets, valuable metals are being lost to other industries because it is expensive to create battery grade — high purity — metals from black mass.

Today for example, nickel, which is a critical metal in nickel, manganese and cobalt (NMC) lithium ion batteries, often ends up supplying the steel-making industry from recycling.

Refining approaches used in mining, including pyrometallurgy (smelting) and hydrometallurgy (leaching with solvents), are often deployed. These energy and resource-intensive plants, costing between \$500 million and \$1 billion to build, need a steady supply of black mass to recoup investment.

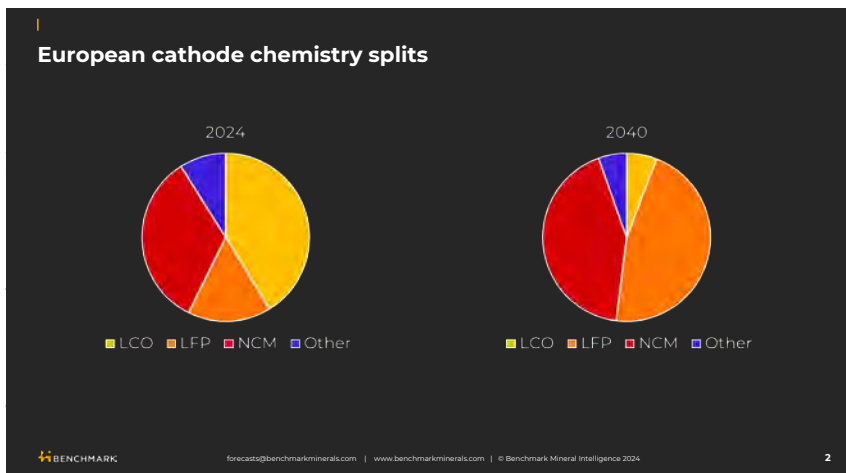
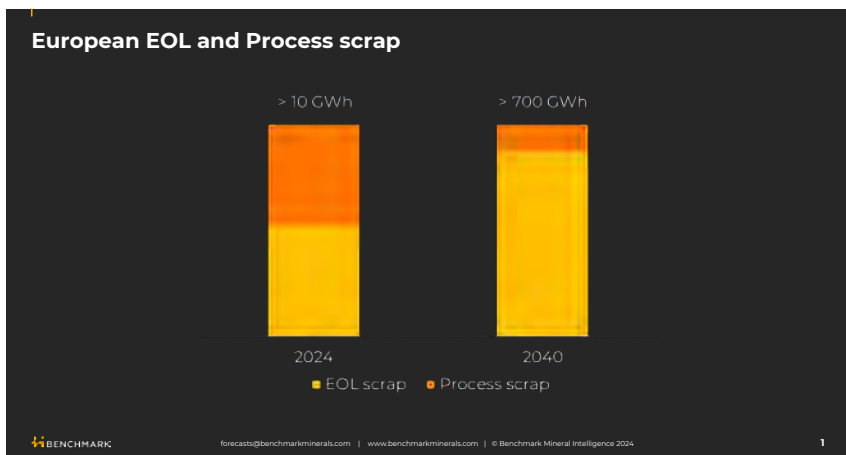
Many being built or in development are for NMC batteries, with the higher value of the cobalt and nickel covering the cost of recovering lithium.

Closing the loop

New, alternative recycling businesses are not simply commercializing a different technology to pyro- and hydrometallurgical plants. They are refiguring the lithium ion battery industry, positioning themselves as the key partner in a closed loop, circular supply chain.

Ascend Elements shreds EoL batteries and production scrap into black mass at its recycling plant in Covington, Georgia. From the black mass a product of much higher value is produced that is sold to battery makers and other customers, such as EV original equipment manufacturers (OEMs).

To eliminate variability in black mass Ascend Elements collects batteries and scrap and separates components down to cell level to start with cleaner, purer black mass. This is done by separating out the cathode metals — the black mass — from plas-



tics, used for casing, as well as copper and aluminium, used for current collectors. These enter other recycling streams.

Hydrometallurgical processes are used to separate out all the individual metals in the black mass, much in the way the mining industry separates the valuable metal from ore, to achieve high purity metals. This requires vast amounts of solvents.

CAM from black mass

Ascend's Hydro-to-Cathode direct precursor synthesis process skips the metals separation step, bridging black mass and production of cathode active material (CAM) precursor, known as pCAM. This reduces CapEx and OpEx, as well as emissions, required to recycle black mass into pCAM and CAM materials suitable for battery manufacturing.

The cathode precursor, which is the first step in making a cathode active material, is an engineered material. The NMC hydroxide has a single digit purity, equivalent to pharmaceutical industry grades, with a value of up to five times that of black mass.

Ascend Elements is also processing the pCAM by mixing it with lithium — carbonate or hydroxide — and sintering these materials. The resulting CAM has up to nine times the value of black mass. It is coated on to electrodes by battery manufacturers.

Ascend Elements' CAM materials from this process are being evaluated and tested by over a dozen companies. They include XALT/Freudenberg e-Power Systems in Germany and an unnamed US company which has contracted a sale worth \$1 billion of pCAM.

Different customers have different needs. Ascend Elements spokesperson Thomas Frey says: "Some customers want finished, battery-ready CAM, others want to integrate our decarbonized pCAM into their cathode manufacturing process. Others simply need recycled lithium carbonate. There are many different entry points for recycled battery materials."

Outside of China, most of the lithium ion battery recycling capacity coming onstream in the next several years, will be concerned with processing production scrap and EoL NMC batteries.

In NMC lithium ion battery recycling business models the value of the cobalt and nickel cover the cost of recovering lithium.

This raises the question about what

is going to happen as more lithium iron phosphate battery gigafactories come online, producing scrap as part of production, while the volume of batteries based on this chemistry reach end of life.

Ascend Elements has lithium carbonate agreements with companies, including Koura Global, a producer of fluoroproducts, which will use recycled lithium carbonate from Ascend Elements as the source for lithium ion battery materials in the US and European markets, including lithium hexafluorophosphate (LiPF₆), an electrolyte salt.

The supply agreement supports the production of more than one million EVs annually.

Ascend Elements has also deepened its ties with Honda. It has been recycling used lithium ion batteries for American Honda Motor Company since 2021 and now the two companies are setting up a closed-loop supply chain for recycled battery materials, including lithium, as well as nickel and cobalt.

One advantage of creating a business model around LFP recycling is the lack of demand for source material. "There is little or no competition for demand for LFP black mass but there is oversupply because no one is buying it, except China. Our USP is simple. We want LFP and can refine it economically even at \$10/LiCO₃ (lithium carbonate) prices," says ReElement Technologies' chief commercial officer Chris Moorman.

The company's process uses chromatographic separation, which is commercialized in several other industries including pharmaceuticals, which is low volume, high margin and corn syrup refining, which is high volume, low margin. "LFP lies between these two," says Moorman.

The company's commercial validation (pilot) facility is processing a tonne per week of LFP scrap. Seven companies are carrying out validation and testing of the resulting lithium carbonate for the manufacture of CAM for LFP batteries. Four are in Asia Pacific (all outside of China), two are in the US and one is in Europe.

Battery grade lithium carbonate is a specialty chemical with a commodity index pricing so different producers have slightly different impurity profiles they can work with in their CAM manufacturing, according to Moorman.

Even in the case of 99.5% or 99.9% purity, it is what is in the residual that



"The focus has been on LFP because one day the technology will be a big proportion of the battery market. If we can recycle the lowest value batteries, it ensures that, ultimately, all batteries have a recycling solution"

— Bryan Oh, NEU Materials

matters. This parts per million of zinc, or copper or aluminium influences the purity profile.

"The qualification process can be arduous. It starts with 1kg-5kg samples moving up to 1 tonne samples and then for OEM qualification requirements it then moves up to tens of tonnes of repeatable product. We're getting the commercial validation processes started and working through the levels so we can secure long-term offtakes."

Of the seven companies validating its product, ReElement aims to finalize qualification with a US company by the end of 2024 and will complete the process with two or three more partners in the first half of 2025.

ReElement has acquired a site in the US state of Indiana, which was once the US's largest cathode ray tube factory, to build its first commercial facility. The facility, which is entering the final stages of construction, will produce 5000 tonnes of lithium carbonate in its first full year of production, which is targeting 2025-2026.

The Indiana site is big enough to attract companies that will benefit from co-locating, ranging from battery shredders to potential customers and partners, which include

producers of CAM and even EV OEMs, which are starting to acquire lithium carbonate. The company is also working with trading subsidiaries of Asian (non-Chinese) conglomerates.

“Commodity markets are cyclical so we think it is good to have a proposition for the industry that shares the risk as much as possible because prices at which black mass is acquired go up and down depending on demand and supply,” says Moorman.

ReElement classes almost every party in the supply chain, excluding mines and battery shredders, as both customer and supplier. “This is because OEMs, CAM manufacturers and so on all have some waste in their process that we could refine back to battery grade. We structure recycling/recovery contracts as a circular agreement where there is never a moment where the black mass gets sold to ReElement. Otherwise we’ve got to factor in potential price fluctuations,” he says.

He says the best approach is to offer someone either a lower cost on the repurchase, or for shredders, a split of the gross margin on the purified product. Ideally ReElement would negotiate a split of margin with the shredder with better prices paid for the black mass, but no commodity risk associated for ReElement by buying material and then seeing prices fall.

Decentralizing battery recycling is a critical step on the path to closed loop recycling of LFP with costly and more sustainable technologies, says.

The company’s main business is producing last mile delivery electric

vehicles for the postal industry. These are powered by LFP batteries, also manufactured by Kyburz.

This vertically integrated approach extends to reusing the company’s LFP batteries. At the end of 2022 Kyburz began operations at its pilot recycling line, Liberty, installed at the company’s headquarters in Freienstein, to recycle its spent batteries. There is wider potential in the LFP battery industry.

“Since the majority of lithium ion battery recycling is for NMC batteries, there has been a lack of necessity to look at any alternative, as the metals are high value and there are already pyrometallurgical processes installed. Why change?” says Flaschenträger.

Separation

Instead of shredding batteries and scrap into black mass, Kyburz’ process separates batteries into component parts, including the outer casing, the copper and aluminium foils that act as current collectors, plastic packaging and the cathode and the anode.

The last two ingredients are separated from the current collectors by a process involving an immersion in distilled water. The entire process is semi-automated.

This January Kyburz signed an agreement with commercialization partner Vitesco Technologies, concerning a recycling plant in Limbach-Oberfrohna, near Chemnitz in Germany, to jointly industrialize Kyburz’s recycling process for LFP batteries.

“Vitesco produces millions of diesel injectors per month, a market that will reduce as EV demand grows, so apply-

ing its industrial know-how to our battery recycling process would be an advantage for both companies.”

As well as working together to make LFP lithium ion battery recycling economical, efficient and sustainable the partnership could lead to future prospects for the Limbach-Oberfrohna site, where series production of diesel injectors will be phased out by 2028, therefore helping to secure jobs in the future in battery recycling.

The location of the Liberty 2 line is close to its first customer which has operations nearby. The unnamed customer supplies into the off-highway market, such as forklift trucks and will account for 50% of capacity.

“It is a nice market to begin with as it is a mature market and there is certainty over demand for the next five years because the customer knows what it has sold in the last five years,” says Flaschenträger.

Kyburz has fielded enquiries from potential customers and partners from around the world, including a Chinese company seeking to invest in the European lithium ion battery industry.

Kyburz’ process has shown potential for use with most kinds of LFP prismatic cells and also for some NMC batteries, demonstrating versatility. “An advantage of developing a recycling process for LFP is that there is much less competition for these batteries from a recycling demand perspective, unlike NMC,” says Flaschenträger.

Bryan Oh, chief executive of NEU Materials, which operates a pilot LFP battery black mass recycling plant in Singapore using a redox technology,

PYROMETALLURGY AND HYDROMETALLURGY

Pyrometallurgical processes can treat different lithium ion batteries without pre-sorting and shredding into black mass, but lithium is not recovered unless the slag is refined.

Hydrometallurgical processes are able to recover different metals, including lithium, from black mass. Hydrometallurgical processes require spent batteries to undergo dismantling, discharge, electrolyte separation, followed by mechanical separation, to extract copper and aluminium leaving black mass, which is essentially shredded cathodes or a mix of shredded cathode and anode (graphite).

CATL subsidiary Brunp has

pyrometallurgical facilities in China, elsewhere in Asia and Latin America, with a total recycling capacity of 120,000 tonnes per year, most of which is for NMC though LFP capacity is expanding in line with demand. Other Chinese companies, such as Green Eco-Manufacture (GEM) are investing in capacity to recycle LFP as well as NMC cathodes.

Belgium-based Umicore uses pyrometallurgy and hydrometallurgy to recover nickel, copper, and cobalt from used batteries and can extract lithium from flue dust and ash as well as from slag. Meanwhile, companies

in the US, such as Redwood are commercializing variations on the pyrometallurgical and hydrometallurgical approaches.

The problem with much of the investment pouring into lithium ion battery recycling facilities is that as well as depending on economies of scale to run profitably, these tend to be centralized operations reliant on importing battery production scrap, old batteries, or black mass from sources over big distances that entail logistics costs and transport emissions. Smelting and leaching are energy-intensive and produce a lot of chemical waste.

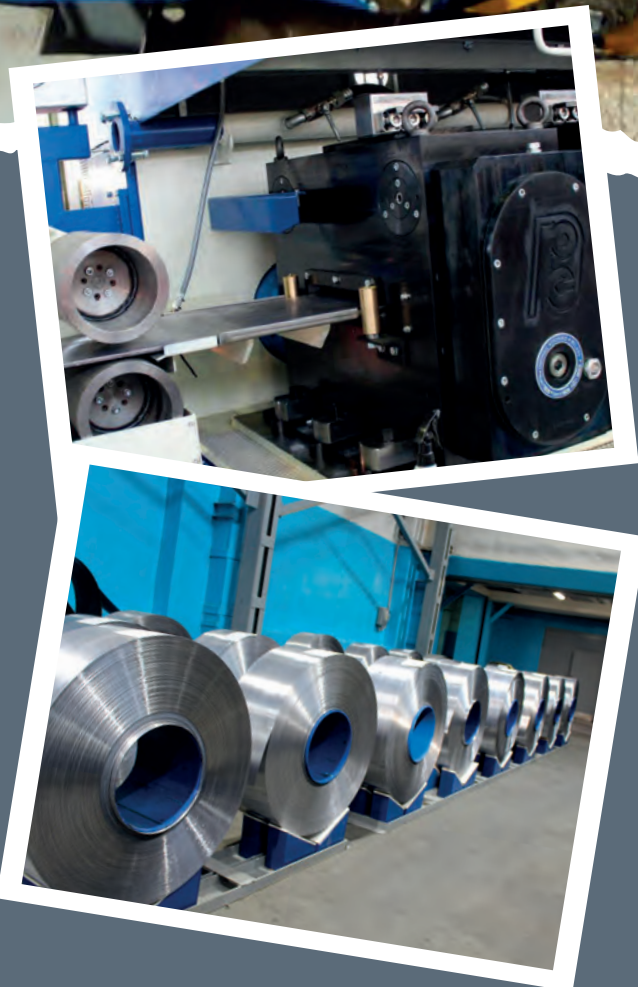


CONTINUUS-PROPERZI LEAD DIVISION



Improved
technology on
wide lead strip
for **punched grids**,
for **batteries production**.

A large percentage of worldwide
batteries has been produced with
Properzi lead lines.



Contact us: sales@properzi.it or visit our website www.properzi.com



“Since the majority of lithium ion battery recycling is for NMC batteries, there has been a lack of necessity to look at any alternative — David Flaschenträger, Kyburz

requiring water and electricity, says the focus has been on LFP because one day the technology will be a big proportion of the battery market. “If we can recycle the lowest value batteries, it ensures that, ultimately, all batteries have a recycling solution,” he says.

NEU Materials’ closed loop process — redox targeting electrochemical extraction — uses a regenerative chemical solution, allowing for continuous recycling of these batteries without the need to replace the chemicals, only producing hydrogen as a by-product. The resulting products are lithium hydroxide and iron phosphate.

The model or approach by other companies with closed loop recycling technologies is to have everything under one roof.

Decentralizing. Closing the loop. The model or approach by these companies and others relies on having “everything under one tent”, says Sam Adham, head of battery materials economics and sustainability at metals commodities analyst CRU group. “Ascend has emphasised with Honda that it would like to be in the same state, if not the same industrial park as the carmaker.

Not only does no-one know what prices are going to do in future but also who is going to be paying whom. Manufacturing scrap is a cost to the automaker/battery maker. The recycling company, as long as they are integrated or co-located with the battery manufacturer, and there is a dedicated supply agreement, should know what is in the batteries. “Then those costs should be minimal or much less than



“If this scramble for recycled material is combined with a constraint of feedstock negotiating power moves into the hands of the recycler” — Sam Adham, CRU

the overall cost of a black mass refiner sourcing material in from everywhere on the open market,” Adham says.

“Industry players worry about the impact of the EU Battery Regulation mandating a minimum recycled content in batteries,” he says. CRU Group’s modelling suggests that even with the impact of recycled content targets and recycled premium on LFP cell production cost, the cost will be negligible.

“If this scramble for recycled material is combined with a general constraint of feedstock availability, it’s possible that negotiating power moves into the hands of the recycler who could command a premium,” says Adham.

CRU has used a bottom-up battery cost model to examine the impact of recycled content on the overall cost of the battery cell. “Although every dollar per kWh counts the impact is minimal,” he says and it is less for LFP than that of NMC. This would depend on the baseline raw material price.

But prices would have to rise to “record levels” to have any profound impact on the cost. It also should be noted that the model also does not include a tolling fee, whereby the seller, such as an automaker, pays the recycler to process manufacturing scrap or produce black mass.

Challenges ahead

Few countries or markets can onshore the entire end-to-end battery supply chain. However, many governments, including the EU, the US and the UK, recognise that investing



“There is little or no demand for LFP black mass but there is oversupply and no one is buying it at all, except China” — Chris Moorman, ReElement Technologies

in midstream processes, such as the refining of raw minerals — including recycling — and the manufacture of cathodes and anodes, will confer strategic advantages.

In a profit-driven industry focused on driving down cost against the backdrop of cyclical commodity prices, companies like Kyburz, ReElement Technologies, NEU Materials and Ascend Elements have taken on the hardest challenge. How to take a low value commodity there is little demand for and transform it into a battery grade product the industry needs without costing the earth to do it? If such businesses succeed, it will be a kind of alchemy in more ways than one. ■

THE SUMS AT STAKE

Making a \$500 million to \$800 million bet on a hydrometallurgical plant is tough in a market that has seen price swings from \$12-\$75/kg for LiCO₃ in 18 months. “With a hydromet facility, you build it and pray that you can keep it full of input material and prices remain high enough,” says ReElement Technologies’ Chris Moorman.

Furthermore, the hydromet plants in the US now being built or developed to process NMC black mass could in future integrate ReElement’s processes to recycle lithium carbonate from LFP black mass, potentially improving their profitably.

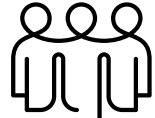
The expander may be negative, but your experience will be entirely positive.



The job of negative expander is to reduce strain, maintain capacity and improve performance. In a way, that's our job, too.

TEXEX[®]
NEGATIVE
EXPANDER

At APG, we deliver the best products and customer satisfaction in the industry through unwavering focus and personal relationships.



We offer the best pre-blend negative expander on the market, brought to you by a certified Women's Business Enterprise and family-owned company you know and trust.



apg

ATOMIZED PRODUCTS GROUP, INC.



Find out more at atomizedproductsgroup.com
info@atomizedproductsgroup.com

Battery recycling in Europe continues to pick up speed: moreover, the recycling of lithium-ion batteries will play a central role for Europe in the future, writes Fraunhofer researcher Maximilian Stephan.

Mapping the new European recyclers as end-of-life batteries start feeding in

In addition to waste management, the reduction of import dependencies for raw materials and the reduction of the environmental impact of battery production are crucial for LIB recycling capacities in Europe.

Statutory collection and recycling quotas, the expansion of the European battery industry and the production scrap in cell manufacturing are further stimulating the development of the recycling industry.

End-of-life (EoL) traction batter-

ies, which currently still often come from pilot and test vehicles, are also contributing to this. In particular, the EoL return volumes of traction batteries after eight to 15 years show that the development of recycling capacities is taking place with a time delay to the market ramp-up of the battery industry and electromobility.

Figure 1 below shows the recycling plants in Europe with corresponding capacities for lithium-ion batteries that are expected to be installed by

the end of 2024 and those announced for the coming years, as well as their operators.

In particular, the announcements relate to maximum capacities that are named. The particularly high number of recycling sites in Central Europe is striking. However, more capacities are also being announced in Eastern Europe.

Proximity to battery material producers, battery cell producers or car manufacturers is a recognizable driver for the selection of recycling infrastructure locations, for example, in central and eastern Germany, Hungary, northern France or on the Scandinavian coast.

Many plants are being planned from pilot projects or smaller plants with expansion stages. The former, such as Cylib or Tozero, are mostly university-based start-ups. For the latter, there are already established companies such as Northvolt, SungEel HighTech and EcoBat, some of which are planning to expand the recycling capacity of their sites by more than 100 kilotonnes of processing capacity per year by 2030.

Car manufacturers such as Mercedes-Benz with Licular, whose recycling site is licenced in Kuppenheim (Southwest Germany), is expanding its own spoke and hub recycling capacities close to their production networks.

Spokes and hubs

Recycling facilities can be divided into 'spokes' and 'hubs' according to the depth of recycling, i.e. the input and output materials of the recycling process.

Spokes: The first steps of battery recycling, known as pre-treatment,

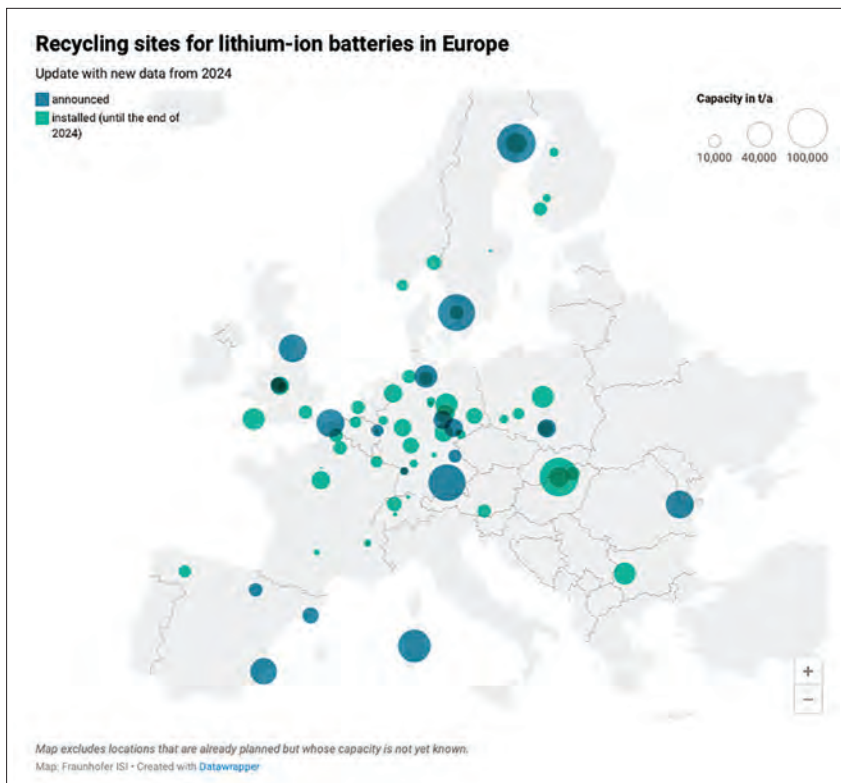


Figure 1: Existing and announced recycling sites for lithium-ion batteries in Europe (as of June 2024)

Note: Map excludes locations that are already planned but whose capacity is not yet known. Source: Fraunhofer ISI, Created with Datawrapper

With the projected return volume, the actual recycling capacity and real treatment in Europe is expected to approach the input streams.

take place mainly in the spokes. Here the used batteries are collected, discharged, dismantled and mechanically or by pyrolysis processed into the so-called black mass (a mixture of cathode and anode active materials) which also contains the valuable metals such as lithium, nickel and cobalt.

Hubs: The actual recycling and refinement of the raw materials occurs in the hubs. Here, the black mass is refined using pyro- or hydrometallurgical processes or electrochemical processes, whereby valuable metals such as Li, Ni and Co are recovered. However, other less valuable but critical raw materials such as graphite or manganese are now also being included in the focus of the recovery process.

Individual recycling projects include both pretreatment (spoke activity) and refinement (hub activity) at one location. These are labelled ‘spoke+hub’ in figure 3, whereby the processing capacity corresponds to the maximum total quantity on the site per year.

Overall, battery recycling is very diverse and can be carried out using different process combinations — there is no ‘one’ recycling route. In Europe, hydrometallurgy is clearly emerging as the core process in the hubs. Pyrolysis is only occasionally used in pre-treatment or pyrometallurgy as a sub-process in refinement, for example, at Umicore or Nickelhütte Aue.

Spokes are typically decentralized arranged to facilitate optimal collection logistics, whereas hubs for processing the black mass are often situated centrally and well connected in terms of infrastructure.

This approach is partly also driven by the fact that the transportation of lithium-ion batteries is classified as dangerous goods, which is a costly endeavour. Yet conversely, the onward transportation of the black mass to the hubs is not a significant concern.

In Europe, the cumulative capacities of the hubs (status 2024: approx. 350 kt/a) currently exceed the capacities of the spokes (status 2024: approx. 300 kt/a). The current capacities of integrated recyclers (spoke and hub activities at one location at the same time) only amount to a few tens of kilotonnes per year. At first glance, the absolute

The development of recycling capacities is taking place with a time delay to the market ramp-up of the battery industry and electromobility.

number of hubs exceeds the number of spokes.

Nevertheless, numerous hub activities represent either the installation or proclamation of capacity expansions of pre-existing facilities. Almost every player in European battery recycling is planning to set up several sites for its recycling activities.

Recycling capacities for lithium-ion batteries in Europe will increase to

330,000 tonnes per year by 2026.

Information on the capacity of most recycling plants is publicly available. However, as not all plants have the same recycling depth, it is not possible to simply add these capacities together. The capacities for spokes and hubs can be added up separately, which provides an estimate of the total recycling capacities in Europe.

EUROPE: PUTTING THE NUMBERS TOGETHER

In Europe, the total capacity of spokes for LIB recycling is expected to increase to 300,000 tonnes per year by the end of 2024. This already includes capacities that have been announced for this year, but have not yet been officially commissioned.

Compared to 2023, this is almost a doubling of capacities (160,000 tonnes by the end of 2023), not least due to the announcements of Li-Cycle in Magdeburg, Eramet in Dunkirk and Re.Lion.Bat in Meppen with a cumulative capacity of 100,000 tonnes in 2024.

With announced additional plants and expansions, capacities in Europe are expected to reach 330,000 t/a in 2026. By 2030, almost 370,000 t/a in pretreatment capacity has

been announced.

After 2024, the announced capacities for recycling the black mass in hubs will also increase significantly. By 2030, the total capacity for material recovery would be 900kt/a, almost double the pretreatment capacity. Whether and to what extent the import of black mass as feedstock for material recovery will play a role is still unclear.

A comparison of the planned recycling capacities with the forecast return volumes of recycled batteries and production scrap (the projected return volume in 2026 is approximately 270,000 tonnes per year) indicates that the cumulative planned capacities will exceed supply in the coming years (Figure 2).

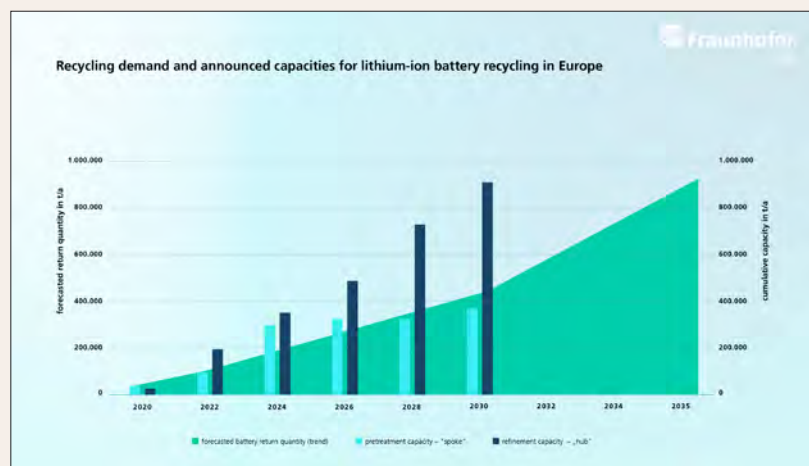


Figure 2: Installed and planned LIB recycling capacity in Europe compared with projected return volumes and production waste

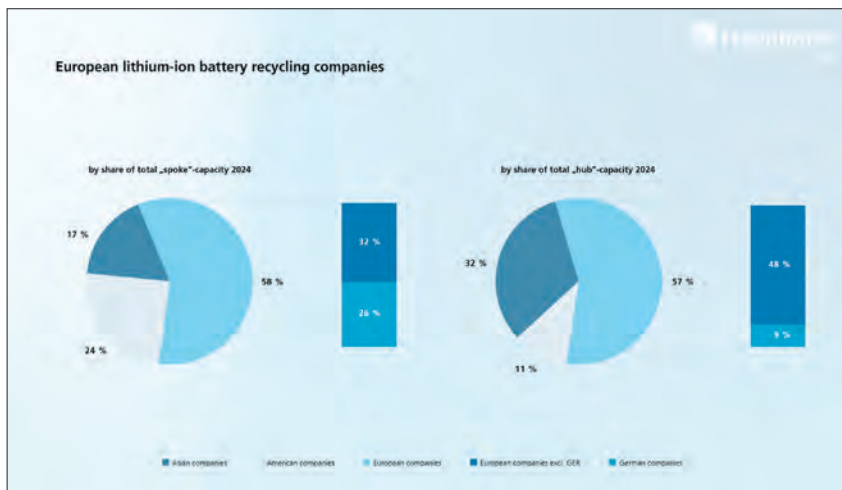


Figure 3: Companies in European LIB recycling by share of total spoke and hub capacity 2024

Plants that cover all process steps are included in both the spoke and hub capacity accumulation. The capacities do not reflect the actual reserved capacities, but the publicly reported maximum capacity of a location.

Production waste too

The high market momentum in Europe is driven by the establishment of battery cell production sites, among other things: This is because, particularly during the ramp-up phase, but also during ongoing operations, relevant quantities of production waste are accrued that need to be recycled.

For example, SungEel HighTech is installing its new recycling plant for the utilisation of production waste not far from the LG Chem cell production facility in Wrocław, Poland. A slowdown in the expansion of cell production capacities could therefore also delay the establishment and expansion of recycling capacities.

European companies dominate battery recycling competition in the EU — but Asian players are catching up.

In recent years, European companies have been able to compete with foreign players with new facilities and plant expansions. Currently, around

40% of spoke capacities in Europe are provided by Asian and American companies (Figure 3).

In 2023, the share was still around 30%. SungEel from South Korea and the American company Ecobat operate the largest facilities here. It is interesting to note that around a quarter of European spoke capacities come from German companies. In terms of hub capacity, Asian and American companies account for around 45% of total capacity. Here again, SungEel and Ecobat operate the largest plants, followed by Altium Metals and BASF as European players in the market.

European companies such as Northvolt (Hydrovolt), Altium Metals and Librec have expanded their capacity announcements. Northvolt itself plans to increase its capacity by several 100,000 tonnes per year until 2030. However, current news such as that regarding Northvolt could delay or reduce this and other capacity expansions for several years.

Overall, it is likely that the current proportions will remain the same, as new sites occur (for example the entry of EcoNiLi in Spain) or Asian companies (for example, SungEel in Germany, Poland and Hungary) as well as European companies such as Glencore in Italy, BASF in Spain

Currently, around 40% of spoke capacities in Europe are provided by Asian and American companies

and Tozero in Germany intend to increase their capacities in the coming years through expansions.

The construction and expansion of recycling plants for LIB recycling is currently developing very dynamically and strong growth in both the required capacities and the number of plants can also be expected in the coming years. With the projected return volume, the actual recycling capacity and real treatment in Europe is expected to approach the input streams. ■

The data used in this article comes from the BEMA2020 (grant number 03XP0272B) and BETSY (grant number 03XP0540B) research projects, which are funded by the German Federal Ministry of Education and Research.



Maximilian Stephan studied economics at the University of Heidelberg as well as business administration and engineering at Pforzheim University and business administration and engineering at Karlsruhe University of Applied Sciences. Since March 2020, he has been working at the Competence Center Emerging Technologies at Fraunhofer ISI — initially as a student assistant, since December 2021 as a research associate and since December 2022 as a PhD candidate

In Europe, the cumulative capacities of the hubs (status 2024: approximately 350kt/a) currently exceed the capacities of the spokes (status 2024: approximately 300 kt/a).



COST SAVINGS

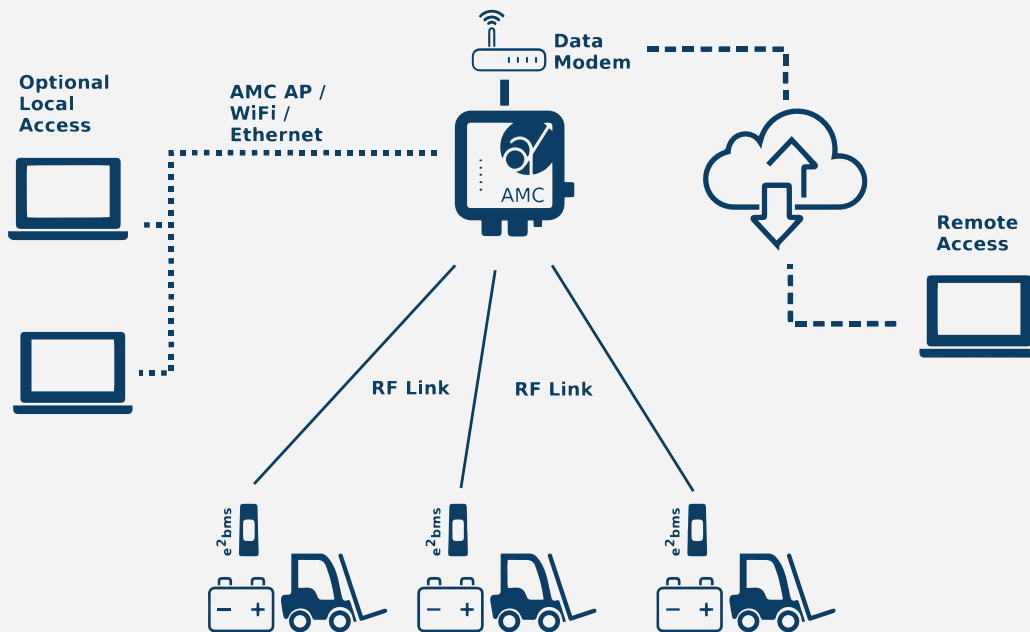


RELIABILITY



QUALITY

AMC - e²BMS site monitoring system



*Your battery data:
in your hands,
anytime,
anywhere!*



www.abertax.com



info@abertax.com



+356 23678100



@Abertax



Abertax Technologies

Lithium fires may be rare but the huge popularity of e-Bikes and e-Scooters means that the number of incidents is on the rise. Sara Verbruggen reports.

The whizzy peril that is stalking our streets, setting our homes on fire

Battery friend or battery foe? That's at the heart of a lively, if occasionally hysterical, debate about the role of e-Bikes in the modern world.

Some say they are critical to decarbonizing transport and improving air quality in towns and cities. They're also convenient and easy to use, bridging the gap for those journeys that are too short for a car but too long on foot, especially in congested urban areas.

Then others say that they pose a real and present danger to life and limb.

Not in the number of pedestrians knocked off pavements by these whizzy e-Scooters and e-Bikes, but by the hidden and insidious threat they pose in the home when they may suddenly catch fire. Sometimes when being charged. Other fires for no apparent reason.

One of the first major cities to gain first-hand experience of the correlation between e-Bike uptake and battery fires is New York.

In January 2024 the topic made the agenda of the 92nd Winter Meeting of The United States Conference of Mayors, in Washington DC, which was attended by elected officials from more than 1400 US cities.

A panel, that included the Commissioner of the Fire Department of New York City, Laura Kavanagh, along with experts from Underwriters Laboratories (UL), discussed how cities can manage the fire risks of lithium ion batteries in e-mobility devices.

When used improperly, and particularly without regulation, all these seemingly benign technologies can quickly become major fire safety threats, Kavanagh told the audience.

The mayors of other cities were urged to adopt legislation similar to New York's own law passed in 2023 that requires e-Bikes and other battery micromobility devices sold, leased or distributed in the city to conform to UL standards.

George Borlase, vice president of

standards development at UL Standards & Engagement said such standards would engender trust that that battery is safe "compared to either the low-quality, counterfeit, tampered batteries that we are seeing cause a lot of the fires".

ULSE studies show that more than half the people buying an e-Bike are doing it for work purposes, such as commuting or giga-economy workers doing deliveries. "This is a growing market and we want to protect people's access to these products by

making sure they are safer," says a ULSE spokesperson Katie Denis.

ULSE says consumers often lack understanding about the power source. Denis says: "For e-Scooters 61% of people do not know that a lithium ion battery powers these, while for EVs that proportion is 57% and for e-Bikes that proportion is 51%.

"There is an awareness gap that needs to be closed otherwise people will make the same mistakes because they don't know there is a risk in the first place." ■

A fact unknown to the public: e-Bike batteries contain the same energy as the TNT in six hand grenades



BANG, BANG, HOW QUICKLY IT HAPPENS

Lithium ion battery fires are damaging and potentially lethal because they are fast and intense. The Fire Safety Research Institute carried out an e-Bike fire test in partnership with the Fire Department of New York.

It took less than 20 seconds from when the first smoke appeared from the e-Bike's battery to completely engulf the room in flames. Such fires present a magnified risk in cities and densely packed urban areas,

where, if a fire starts, it can spread quickly, apartment to apartment or building to building.

ULSE has begun analysing the impact of such fires in economic and other terms. Denis says: "There is a risk to people's lives and property even if they don't have an e-Bike. It is also important to add that e-Bikes are often kept within apartment hallways and entrance areas which are also exit routes."

The early regulations about lithium battery safety are no longer fit for purpose (and probably some never were). A new raft of guidance and rules is needed before the accidents climb yet higher.

The three rules of e-batteries: safety, safety and ... safety

UL Standards & Engagement is working with legislators in several US cities that are considering introducing e-Bikes/e-Scooter incentives to encourage their adoption as a cleaner form of transport.

“Denver and Washington DC have incentive programmes where if people want to qualify for the incentive, then the e-Bike, or e-Scooter, they buy has to conform to safety standards. This is a good approach and other cities are looking at doing similar,” Denis says.

New York City led the way because the number of people living in close proximity has made these fires that much more devastating. Between 2021 and 2022 fires roughly doubled, leading to legislation in 2023.

Engagement with local policymakers is important because it helps identify the levers that will affect the most change while ULSE also has partnerships and relationships with organizations like the National Bike Dealers Association.

The ULSE spokesperson says: “We don’t want to take away the market but we want to work with the industry to establish a safer market.”

Efforts are underway to regulate the safety of e-Bike batteries federally. New York politician representative Ritchie Torres (Democrat) is sponsoring a bipartisan bill, HR1797 – Setting Consumer Standards for Lithium-Ion Batteries Act— requiring the Consumer Product Safety Commission to issue a consumer product safety standard for rechargeable lithium-ion batteries used in micromobility devices to protect against the risk of fires.

UK e-Bike fires

Fires involving lithium batteries are the fastest growing fire risk in the UK capital, according to the London Fire

Brigade, with its firefighters called to, on average, an e-Bike or e-Scooter fire once every two days in 2023.

A similar figure is emerging in New York which reports a similar proportional figure, as well as also rising.

Electrical Safety First, a UK charity working to reduce deaths and injuries caused by electricity in homes, has written a bill to reduce what it says are largely avoidable e-Bike fires.

According to ESF fires from lithium ion batteries in e-Scooters and e-Bikes “have skyrocketed” since 2020, with over 190 reported injuries and more than a dozen fatalities. Such fires have been recorded in 150 UK parliamentary constituencies in the last 18 months, from Scotland to Cornwall and the south-east to the north-west of England.

Not ‘inherently unsafe’

ESF’s product safety engineer Giuseppe Capanna, one of the authors of its Battery Breakdown report published in 2023, says lithium ion batteries are not inherently unsafe, as long as proper standards are followed and they are manufactured properly.

Last year ESF asked British Retail

Establishment’s laboratories in London to carry out a series of tests on lithium ion batteries used in e-Scooters and e-Bikes, to understand what causes them to fail and observe what happens when they do.

“With e-Bikes and e-Scooters we’ve found that lots of these products are entering the UK and are not being tested. Manufacturers of e-Bikes and other types of appliances only have to declare they have been tested,” Capanna says.

One of the problems is online marketplaces, which do not have responsibility for items that are sold. Through them, overseas e-Bikes and e-Scooters are ending up in the UK and Europe.

When the ESF does receive enquiries, such as when consumers buying an e-Bike that has come with a foreign plug and adaptor, it reports these issues to the Office of Product Safety and Standards, which is the regulator for electrical appliances on the market.

Lack of standards for types of connectors or communication between the battery and the charging system along with the prevalence of DIY bike to e-Bike kits which are sold online have

NEW YORK’S PROGRESSIVE STANDARDS-BASED APPROACH

New York is introducing legislation focused on improving e-mobility safety. Local Law 39, signed on March 30, 2023, prohibits the sale, lease, or rental of e-mobility devices and their batteries that do not meet ULSE safety standards UL 2849, UL 2272 and UL 2271.

To remove e-mobility devices that

do not conform to safety standards, the city council approved a trade-in scheme for residents, where they can purchase certified products at a lower cost. New York also approved a separate e-Bike trade-in scheme just for delivery workers enabling them to do their job safely without worrying about an extra cost burden.

no standards, are cause for concern. These effectively leave the consumer to work out compatibility between charger and battery, while the BMS is vulnerable to being modified to be overridden.

Using e-Bikes and other micro-mobility devices with incompatible chargers presents a major and critical fire risk, according to SafeBatt, which also suggests more regulation of micro-mobility devices, to reduce opportunities to purchase from non-reputable suppliers and public awareness campaigns to advise people on the purchase and use of micro-mobility devices, and how to stay safe.

The SafeBatt project has a large industry engagement to disseminate and educate various government, fire safety and other bodies in the UK about lithium ion battery fire risks and how to minimize these.

It has worked with over 40 different groups within the UK. These include the National Fire Chiefs Council, UK Maritime & Coastguard Agency, UK Chamber of Shipping EV Working Group, the Department for Transport, the Department for Energy Security and Net Zero, the National Headquarters of the State Fire Service of Poland and Australasian Fire And Emergency Services Council.

The EU way

E-biking is growing in popularity across the continent, so it is perfectly normal to expect more press coverage of incidents, according to Daniela Leveratto, technical director of the Confederation of the European Bicycle Industry (CONEBI), whose members include bike brands selling conventional bicycles and e-Bikes.

A fast growing market such as e-Bikes will attract more companies, which may not always apply the same focus on safety as well-known brands. “Despite this we have not seen any significant increase of e-Bike battery fires on the EU market,” she says,

“Nonetheless, improper handling, import of low quality products and manipulation will increase the risk of thermal incidents. We are advocating for high battery safety standards and raise awareness on the proper handling of batteries.”

The main requirements for product and battery safety for EPAC stem from the EU Machinery Directive (soon Regulation) and UN tests, which are necessary to transport lithium ion batteries as they are classified as a Class 9 dangerous good.

This means that batteries have to undergo extensive mandatory tests. “Some of our members even go beyond the requirements and test for more. Most of our members also have the batteries evaluated and certified by accredited laboratories with regard to complying with the standards,” says Leveratto.

CONEBI’s members are, she says,



reputable manufacturers who focus on high quality of their components and follow all legal requirements and standards ensure that e-Bike batteries undergo extensive tests.

The bicycle industry has established its own specific battery standard EN 50604 to address safety requirements specifically. These include Bosch, which provides additional guidance for end-users, now referenced by insurance and fire protection services.

Members pay particular attention to battery safety by only using batteries from all reputable manufacturers. These will have a BMS which continuously monitors the condition of the battery, which protects against excessive operating temperatures, overload and deep discharge.

Members also pay attention to specific design considerations to protect against water ingress, by encasing individual cells in flame-retardant plastic, by separating cells electrically and mechanically to reduce the risk of overheating in the battery and a possible thermal chain reaction between the individual cells. ■

“We’ve not seen any significant increase of e-Bike battery fires on the EU market ... that said, improper handling, import of low quality products will increase the risk of thermal incidents” – Daniela Leveratto, CONEBI

E-BIKE BATTERY SAFETY BILL IN THE UK

ESF’s Safety of Electric-Powered Micromobility Vehicles and Lithium Batteries Bill, which is being taken forward in the UK parliament calls for three things.

The first is mandatory certification of all e-Bikes and e-Scooters and their batteries before they enter the UK. “They have to go through testing and being approved by a third party before going on the market. This is required of fireworks and high-risk tools. Although e-Bikes etc are not inherently dangerous they are high risk so this does justify mandatory third party certification,” Capanna says.

The second addresses disposal of batteries that would require regulations ensuring the safe disposal of lithium batteries once their lifecycle ends. Capanna says

one of the reasons why fires are so dangerous is that thermal runaway can’t be put out by conventional means because the chemical reaction creates its own oxygen, hence fires can restart hours or days later.

The third clause of the bill calls for a system of communication between battery and charging system.

“We’re talking similar to a phone charger, which communicate and work out the correct power to be transferred,” says Capanna. “We don’t have issues with mobile phones catching fire.”

This clause is also concerned with setting standards for conversion kits and charging systems and wants a temporary ban on the sale of universal chargers as these can increase fire risks. ■

Action is being taken in the UK to regulate the disposal of the batteries used in vapes.

Tobacco debate moves into new health area

“Single-use vapes are a strong contender for being the most environmentally wasteful, damaging and dangerous consumer product ever made.”

Add the word “Discuss” at the end of it and it could be almost the start of a university essay.

Unfortunately there’s little to discuss about this. It’s almost certainly correct as it stands,” says Material Focus’ executive director Scott Butler. He estimates from a recent study that the number of disposable single-use vapes thrown away in the UK has risen to nearly 5 million every week, a fourfold increase on 2022.

Material Focus is a not-for-profit whose goal is to stop the UK throwing away or hoarding old small electricals.

The potential yearly cost of collecting and recycling these vapes stands at £200 million (\$260 million) which isn’t being paid for by vape producers, importers and retailers.

Since that study was published in September 2023, the UK government announced its intention to ban sales of one-time use vapes. The Environmental Protection (Single-use Vapes) (England) Regulations 2024 is expected to come into force in April 2025. In outlawing these types of vapes it could potentially reduce the volumes ending up carelessly discarded and ending up in the environment and in general waste and recycling streams.

This March the UK government concluded a consultation on reforms

to the Waste Electrical and Electronic Equipment Regulations 2013. These are yet to be published but the consultation was launched to support the drive towards a more circular economy by ensuring products are designed to have a lower environmental impact than those consumed today. It aims to ensure producers and distributors of electrical and electronic products finance the full net cost of collection and proper treatment of products that end up as waste.

However, it remains to be seen whether the regulatory changes will go far enough in terms of measures that decrease the use of lithium ion cells.

On vapes and other small electrical devices, Electrical Safety First’s product safety engineer Giuseppe Capanna says: “people need to be educated that these are appliances and recycled appropriately. There are streams to recycle small electronics, but the issue is that people don’t know, or are not aware they contain a lithium ion battery which can be a fire hazard if not dealt with correctly”.

According to SafeBatt regulation is also required for vapes, including single-use vapes because they represent not only a safety hazard, but also a significant waste of valuable resources.

SafeBatt has been instrumental in raising awareness of the vapour cloud explosion hazard and of highlighting the additional hazard of confined vapour cloud explosion. A crucial part has been engaging with first responders, so that they are aware of hazards they may face that differ from those they are used to from extinguishing fires in vehicles with internal combustion engines.

Other work that SafeBatt has been involved with is around sidewall rupture, which can occur in some cylindrical cells. The research shows that potential cell failure signals could be detectable in advance of thermal runaway, knowledge that battery manufacturers and OEMs could possibly build into safety systems. ■

RIISING TREND IN WASTE INDUSTRY FIRES

Zurich Municipal, which insures local authorities, produced research in late 2023 that estimates the number of refuse collection vehicles damaged by fires has increased by 62% over the last two years. Insurance costs have skyrocketed as a result.

Material Focus found that among local authorities across the UK in 2022 over 700 fires in waste trucks and sites were caused by batteries that hadn’t been removed from electricals. The research was commissioned to raise awareness of how householders can recycle their batteries and electricals.

When a lithium ion battery, or any battery, is binned, either in mixed recycling or general rubbish, rather than being recycled separately through dedicated battery or waste electrical services, the likelihood of it becoming damaged is high.

During kerbside rubbish and recycling collection devices can be pressed or crushed in the back of a bin lorry or refuse collection vehicle.

The next risk is the waste reception area, where shovel loaders grab material to be passed through a mechanised sorting process, typically comprising big

circular rotating drums, known as trommel screens, magnets, conveyor belts and ballistic separators, all of which reduced chances of batteries avoiding damage.

One of the challenges facing any effort to address this growing trend, according to the ESA, is the lack of widely available local authority kerbside collection services for waste batteries and waste electricals, while alternative drop-off containers tend to be found only at household waste recycling centres (HWRCs) – the local dump – or at large retail stores.

This requires consumers to put in the effort to dispose of them, compared with other forms of. Another is lack of consumer awareness. According to polling and focus group research conducted for the Chartered Institution of Waste Management by Env23 in 2023 most consumers (as much as 80%) lack confidence about how to safely dispose of items containing batteries.

It found that goods like power banks, electric toothbrushes and children’s toys among those with the lowest confidence levels, while vapes and electric toothbrushes are most frequently thrown in the bin.

A new generation of EV battery businesses is moving centre stage. With the teething problems of their initial start-up phases almost over, they are counting on double-digit growth in the years ahead. By Sara Verbruggen.

Moving up the league table to play with the big boys

With the US and Europe seeding localized lithium ion battery value chains and ecosystems, everything is up for grabs when it comes to what goes into making the cell.



In less than four decades the lithium ion battery industry has gone from enabling a revolution in portable and mobile electronics, to powering energy transition ambitions.

The global demand for batteries across electric vehicles and stationary storage applications today is a fraction of the calculations for future need. Cost, safety, resource scarcity, supply chain security are major concerns that cannot simply be resolved with new gigafactories pumping out cells based on tried and tested chemistries.

With the US and Europe seeding localized lithium ion battery value chains and ecosystems, everything is up for grabs when it comes to what goes into making the cell.

The single ingredient that is common across all variants EV batteries — ie lithium! — has become a whipping boy for concerns about the unsustainability of the industry, long term.

It's a perverse thought. But mining lithium for EV batteries upsets environment focused-politicians in a way

that mining oil for producing petroleum does not. (And irrespective of the huge difference in terms of emissions and ecological impact.)

Silicon switch

US-based Group14 Technologies' SCC55 is a silicon-carbon composite anode material that affords up to 50% more energy density than conventional graphite for lithium battery anodes, resulting in batteries that recharge more quickly.

Its hard carbon-based scaffold-

VULCAN ENERGY: GREEN LITHIUM AND THE JOYS OF GEOTHERMAL BRINE

Germany — one of the biggest car markets in the EU — could also meet much of the bloc’s lithium needs, according to Cris Moreno, CEO of Vulcan Energy.

“Europe has set clear targets for an emissions-free transition by 2035. Securing a domestic source and production capability for lithium now is critical to ensure that targets can be met and the European automotive industry remains globally competitive,” says Moreno.

“Vulcan is working towards producing enough green lithium for 500,000 EVs by 2026 and scaling up from there, enabling a secure domestic supply chain in Europe, well into the future”.

Vulcan has secured 16 exploration licences in the Upper Rhine Valley Brine Field where it intends to extract lithium contained within hot geothermal brine using a technique called adsorption-type direct lithium extraction (A-DLE).

The hot brine containing lithium is channelled through a proprietary sorbent, where the lithium ions remain suspended. This process is heat-driven, so the natural waste heat in the brine can power the lithium extraction process. The brine is then returned to the natural reservoir in a closed cycle.

The first phase of Vulcan’s commercial production aims to produce 24,000 tonnes of lithium

hydroxide — enough for half a million EVs a year. The second phase aims for the same amount.

The individual steps in the Vulcan extraction process are not new in themselves.

Geothermal renewable energy has been used to produce energy for many years and A-DLE has been used commercially since the 1990s and accounts for 10% of global lithium supply.

What is new is Vulcan Energy is putting the different steps together. Where lithium and heat are present in sufficient quantities in the brine, A-DLE can work commercially, but also with net zero carbon emissions, by harnessing the geothermal energy.

In April Vulcan began production of the first tonne of lithium chloride at its Lithium Extraction Optimisation Plant (LEOP) in Landau, Germany, which will then be converted into lithium hydroxide monohydrate at Frankfurt-Hoechst.

The metal will be tested by Vulcan’s lithium offtake partners, Stellantis, Volkswagen, Renault, Umicore and LG. Both optimization plants will serve to train the production team, contributing to shorter ramp-up times.

Vulcan is planning to build an integrated geothermal and lithium extraction plant in Landau, and has



“Vulcan is working towards producing enough green lithium for 500,000 EVs by 2026 and scaling up from there, enabling a secure domestic supply chain in Europe, well into the future”

— Cris Moreno, Vulcan Energy

an agreement with the city for it to construct the first phase G-LEP. Vulcan submitted the building permit for the lithium extraction plant last November.

In the lithium extraction plant, Vulcan will produce the precursor lithium chloride, which will be converted into 24,000 tonnes of lithium hydroxide monohydrate at a central lithium plant in Frankfurt-Hoechst. This is enough to produce batteries for around 500,000 EVs. Vulcan is planning on starting operations of its lithium extraction plant in H2 2026.

There are only a few locations where the process can be realised at all; one of the others is the Salton Sea in California, US, which has hot geothermal brine.

The Upper Rhine Valley is home to one of the largest lithium resources in the world and the largest in Europe. It has also been explored for oil and gas for many years, so there are already many wells with data showing that the lithium concentration increases at depth.



Vulcan’s Upper Rhine Valley Brine Field consisting of 16 licenses for a total area of 1,790 km², represents Europe’s largest lithium resource, with 27.7Mt contained LCE from 10 of its 16 German licenses.



“Over the next 12 months we’ll continue to progress preparations for our German factory to enter production sometime in 2026, to supply the European EV battery market. There is huge scope for growth in future”

— Christ Timmons, Group14

ing keeps silicon in the most ideal form — amorphous, nano-sized, and carbon-encased. German battery company CustomCells has signed a multi-year supply agreement with Group14 to procure SCC55, which is expected to exceed \$300 million of contract value to secure a supply of the material beyond 2030.

Group14 vice president of engineering Chris Timmons estimates 80 lithium ion battery manufacturers, collectively supplying 90% of global lithium ion battery demand, have been supplied with Group14’s material. In June the company signed five multi-year binding offtake agreements amounting to a minimum commitment of \$300 million with three EV and two consumer electronic cell manufacturers across Europe, Asia and North America.

By 2030 demand for graphite, driven by growth in lithium-ion batteries for EVs, is expected to outstrip supplies.

Timmons says: “There’s a significant advantage in terms of a carbon footprint given the lower energy density. The overall carbon foot-

print per amp hour of the battery is significantly improved over graphite, which is generally where the industry is going. This is an enabling technology for that.”

Because SCC55 delivers higher energy density, less of the material is required than graphite for the same performance.

Porsche is the first EV maker in the public domain to be using SCC55, which will enter the car maker’s battery production this year. Porsche will initially be supplied with the material produced at Group14’s factory, with SK Materials in South Korea, which will go online in H1 2024 and will supply enough material for 100,000 EV batteries annually.

By the end of 2024, Group14 expects to be producing SCC55 from its new US factory. Combined, the US and South Korean factories will have enough capacity to supply 300,000 EV batteries annually.

Timmons says: “Over the next 12 months we’ll continue to progress preparations for our German factory to enter production sometime in 2026, to supply the European EV battery market. There is huge scope for growth in future. For now, Group14 will supply its materials to customers and is focused on supplying the EV lithium ion battery market.”

One of the main advantages of the material that appeals to customers is that it can be almost readily blended or dropped into anode production with very little adjustment to processes. Customers can adjust quantity or ratio to their anode as required. Or, in some cases, automakers may displace graphite entirely in the anode.

As well as being compatible with all kinds of lithium-ion batteries based on different cathode chemistries, including NMC and LFP, SCC55 is also applicable for solid-state cells.

Nano One

LFP cell research originated at the University of Texas, before being developed, piloted and first commercialized in Québec in the early 2000s and Canada’s Nano One has ambitions to establish a supply chain for these batteries on its home turf.

The company’s One-Pot process involves mixing lithium, other metal feedstocks and coatings in a single reaction to produce metals-rich cathode active materials. It is less emissions-intensive, energy



Timmons: “There’s a significant advantage in terms of a carbon footprint given the lower energy density. The overall carbon footprint per amp hour of the battery is significantly improved over graphite, which is generally where the industry is going. This is an enabling technology for that.”

and water-intensive than current processes and eliminates waste byproducts in the form of sodium-sulphate.

In 2023 Nano One completed its first full year of ownership of its Candiac LFP pilot plant, in Québec, during which time trial production of LFP cathode materials production using the One-Pot process has got underway.

The Candiac facility is the “bridge between bench and industrial production, taking the risk out of the equation while leaving the reward to play for,” says Alex Holmes, chief operating officer. Over one tonne of the LFP powders made at the Candiac plant are being shipped to a global automotive manufacturer and other collaborators.

With policies in the US and Europe encouraging the reshoring of battery supply chains, new cell gigafactories will decouple supplies of critical materials from sources in Asia, and Nano One aims to influence emerging ecosystems.

In addition to the automotive/ electric vehicle market Nano One is also working with players within stationary storage that will create the pull within supply chains to source its cathode materials. Defence applications are also in Nano One’s sights.

The company has a strong pedigree in terms of partnerships across



“The Candiac LFP pilot plant, in Québec is the bridge between bench and industrial production, taking the risk out of the equation while leaving the reward to play for”

— Alex Holmes, Nano One

the value chain, including Rio Tinto, Sumitomo and Umicore.

It has also signed a joint development agreement with Our Next Energy (ONE), a Michigan-based energy storage technology company to collaborate on the validation, qualification and production of a North American supply of LFP cathode active materials.

The cathode active materials will be produced at Nano One’s Candiac pilot and future commercial facilities for potential use in ONE’s production of LFP cells used in its Aries and Gemini batteries.

Partnerships are key, says Holmes and he says Nano One is focused on working with those companies willing to provide collaborative feedback and facilitate information exchange. This year, pending offtake agreements within the energy storage sector, Nano One will secure financing to build an industrial scale facility planned to come online in 2027.

Québec has the right mix of raw materials, strategic location, and secure green power, plus a skilled and experienced workforce, says Holmes. There is a provincial strategy for developing a battery industry and for Critical minerals, along with a federal strategy to support the battery supply chain.

Solid Power: a \$60bn electrolyte opportunity

Solid Power, based in the US state of Colorado, aims to commercialize liquid and gel-free battery technology (100% solid state) for improved performance, safety and cost advantages over lithium ion cells used today.

The company is differentiating itself by investing in sulphide-based solid state electrolyte manufacturing. This requires a fraction of the Capex required to invest in a cell gigafactory, while also allowing it to partner with, as opposed to compete with, cell makers.

“We can do business with virtually any battery chemistry that is out there with the proper work,” said CEO John Van Scoter in an investor-focused presentation this January. The company’s estimates point to a \$60 billion addressable market assuming the electrolyte is 10% of future total battery cost.

The fact that most major EV brands have announced sulphide-based solid state cell technology in their roadmaps is reason to feel bull-

“We can do business with virtually any battery chemistry that is out there with the proper work”

— John Van Scoter, Solid Power

ish, Van Scoter believes.

The company is targeting three major EV markets through three publicized partnerships: in the US with Ford, Europe with BMW and South Korea with SK On. SK On has overtaken Samsung to become the fifth largest supplier of EV batteries, with ambitions to become the number one by 2030. Its portfolio includes different lithium ion cell technologies, spanning nickel-rich to LFP.

This January Solid Power and SK On announced an expanded partnership, comprising three agreements.

The first concerns R&D, where SK On will license Solid Power’s solid-state cell designs and manufacturing processes for R&D purposes only, in exchange for payments totalling \$20 million from 2024 to 2027.

The second concerns line installation, where Solid Power will design, procure, and install a cell manufacturing line at one of SK On’s South Korean facilities in exchange for \$22 million. The line will be based on Solid Power’s Colorado-based line and will produce cells using Solid Power’s electrolyte technology. Construction is to be completed in 2025.

The third, which is the first of such an agreement Solid Power has negotiated, concerns electrolyte supply, where SK On will purchase Solid Power’s electrolyte for use on the South Korean line, initially for validation purposes, after which it will be required to purchase at least eight tonnes of electrolyte from through to 2030, for use in collaboration with Solid Power to advance its cell technologies, which will net Solid Power at least \$10 million in sales.

Van Scoter said the partnership will create opportunities to work with South Korean supplies of equipment, raw materials, existing lithium ion flow as well as collaborations with national laboratories there.

Different automotive OEMs all have different approaches. BMW is duplicating Solid Power's pilot production lines at its own facility in Germany, which includes staff exchange between the companies. The carmaker plans to put Solid State's cells into modules to power a demonstration EV before the end of this year.

Other brands are sampling the electrolyte as they have cell capability in-house but are looking for an electrolyte supplier.

Solid state EV batteries offer a large scope for improvement, especially in terms of safety by removing the liquid electrolyte. "We think we'll match lithium ion to begin with but range, lifetime, safety and cost of solid state will all be improved. Raw material input will be lower cost as well due to less required on the battery management side," according to Van Scoter.

Ascend Elements: maximizing battery metals recycling

Reusing metals from spent batteries is critical to new value chains for cell manufacturing. But there is cost involved, in sorting different battery

"We can recycle a 10-year-old battery from a first-generation EV, break it down to an aqueous solution containing lithium, nickel, and cobalt atoms, and then rearrange those atoms into the newest type of cathode active materials such as a NMC 811 or a high nickel NMCA"

— Thomas Frey, Ascend Elements

product or application waste streams, in the multiple steps to produce black mass or metal salts, not to mention the further steps to make production-ready cathode materials.

Ascend Elements' process extracts the impurities and leaves cathode minerals intact in an aqueous solution, rather than extracting individual metals in series — first lithium, then nickel, then cobalt, for instance. Microstructure engineering techniques adjust the elemental crystal structure needed to produce cathode precursor (pCAM).

Marketing director Thomas Frey says: "In other words, we can recycle a 10-year-old battery from a

first-generation EV, break it down to an aqueous solution containing lithium, nickel, and cobalt atoms, and then rearrange those atoms into the newest type of cathode active materials such as a NMC 811 or a high nickel NMCA."

The incoming feedstock can be a mixture of different lithium ion battery types and elemental compositions, such as used batteries from old EVs, laptops, cell phones, scooters, and power tools. Even gigafactory scrap and waste can be mixed in. Because there is no need to sort batteries into different categories before recycling, this should facilitate increased recycling rates. ■

OTHER PLAYERS IN CELL MANUFACTURING

The impetus of the IRA has made the US the main draw for cell gigafactory investments this decade, much of these focused on capturing demand from the EV market.

Several also have their eye on stationary storage and the opportunity to invest in significant capacity for making LFP cells, suggesting the industry may coalesce around this technology, for stationary storage initially, then EVs.

LG Energy Solutions (LGES), Our Next Energy (ONE) and Freyr are some of the companies backing LFP. Their different approaches span proven chemistry but also riskier technology that could pay off by driving down cost.

ONE's first gigafactory (29GWh) is a \$1.6 billion investment, supported by a \$215 million state grant, located in Michigan which is slated to be operational in late 2024 but reaching full capacity by the end of 2027.

ONE will begin delivering cells from pilot production to customers in commercial truck, automotive

and utility grid markets, to validate performance and durability in the first half of 2024.

ONE's roadmap includes dual-chemistry architecture, Gemini, which combines LFP and anode-free chemistries into one battery pack, eliminating the need for graphite and anode manufacturing equipment, reducing production costs to \$50/kWh cell cost at scale.

In 2023 LG Energy Solution (LGES) announced one of its biggest LFP investments outside of Asia, a \$2.3 billion LFP pouch facility with a capacity of 16GWh. It is part of a \$5.5 billion battery manufacturing complex in Queen Creek, Arizona, which will also include a facility for making cylindrical batteries for EVs.

In 2023 investors voted in favour of redomiciling Norwegian LFP cell start-up Freyr to Delaware from Luxembourg in part to benefit from US incentives.

The company has been banking on licensing partner 24M Technology's semi-state technology because it could yield LFP cells

that are 25% cheaper to make, due to simpler production. However, it is not mature. The company has built a customer qualification plant, in Mo i Rana, northern Norway, a critical step in going to fully automated production that will be replicated in a \$2.5 billion 34GWh battery plant in Georgia, US.

Having communicated delays it had run into at the CQP plant around achieving automated a scalable production in late 2023, this year Freyr has completed its first production trial of manufacturing chargeable unit cells with the Casting and Unit Cell Assembly machinery at CQP plant. It marks the first time manufacturing steps were run with automated processes. In June 2024 Co-Founder and current Chairperson of the Board of Directors Tom Jensen replaced Birger Steen as CEO, who has also left the board.

As an insurance policy the company has begun negotiations with other potential partners to license commercial LFP technology.

iarc 2025

International Automotive Recycling Congress
March 19-21, 2025
Antwerp, Belgium

**Benefit from the
early bird for
sponsoring and
exhibition now!
Enjoy special rates
until November 30th**



What to expect at IARC 2025:

Next year's event brings exciting new developments!

The ELV Regulation's scope is expanding to include commercial, heavy-duty vehicles, and motorcycles. The critical role of Original Equipment Manufacturers (OEMs) in recycling will be highlighted at the conference.

Car, motorbike, truck, and bus manufacturers need to take an active role in preparing for the significant responsibilities and financial implications that new European regulations and policies on critical raw materials and decarbonization will bring. The ELV Regulation introduces new rules for vehicle design and end-of-life management, requiring lorries, buses, and motorcycles to be treated at authorized treatment facilities, and restricting the export of non-roadworthy vehicles.

IARC 2025 will be the perfect platform for industry leaders to collaborate, share insights, and stay ahead of these changes. With all key players of the vehicle circular economy in attendance, this is your chance to contribute to the debate on regulations and policies with global impact while there is still time!

www.icm.ch

icm.
— bringing people together

Basle • Switzerland | September 12-14, 2024

Top experts and decision-makers from the entire battery recycling value chain came together on September 12 for the 29th annual International Conference on Battery Recycling. Some 600 delegates attended the event to learn about latest challenges and innovations and to engage in discussions shaping the industry’s future. Michael Halls reports.

Battery recycling will power the

One opening remark at this year’s ICBR hit the nail exactly on the head. “Recycling batteries continues to be a deepoly troublesome issue to execute commercially, given that the flow of, for example, EV batteries is still relatively limited. In full flood, it’ll be very different in a decade or so.

“Most of our issues about profitability are based on our need to receive large enough volumes of the batteries to make the process worthwhile. That’s when scalability turns into profits. But that’s not the case now.”

With the EV world now looking to produce batteries that contain ever less recycling value, the knock-on effect is huge for any ambitions to generate revenue from lithium scrap. This was a key topic at the conference with presentations effortlessly walking the line between technology and commerciality.

Other battery conferences don’t have such a challenge as the ICBR. It is easy for some sectors of the business — think of the relative simplicity of dealing with used lead acid batteries — to present to delegates on fairly



The conference presentations effortlessly walked the line between technology and commerciality

uncomplicated issues.

But discussions around this particular hot potato were, as expected, intense and nuanced.

For the last decade speakers have debated ways and means to dispose of the next generation of (mostly) lithium batteries, and the ICBR has become the go-to conference to make any sense of the issue.

Perhaps because of this, as one delegate told this magazine: “The conference atmosphere might appear to be relaxed and casual — there is a general sense of optimism in the air — but there is nevertheless an underlying uncertainty over the future of recycling in Europe.

“The lack of demand for EVs creates a problem for lithium battery recyclers that comes from three directions. The first is that demand for their recycled product such as the lithium, nickel, manganese, cobalt and graphite is not there in the scale needed to ramp up demand and help prices.

“The second is that the ability to ramp up their facilities to meet a surge in supply of used EV batteries means that the benefits of scale are simply not there.”

Ecobat, for example, one of the leading lights in both lead and lithium recycling across Europe, has put back its plans for installing new plant until the early 2030s. The overall impression from delegates was that it





future ... the debate rumbles on

would be a foolhardy firm that would invest in tens of millions of euros for a recycling facility that might be unused (and not be generating revenue), for many years.

There was also a third uncertainty hanging over this recycling sector. The shift is from high-power NMC batteries containing nickel, manganese and cobalt to lithium iron phosphate cells. NMC cells have value in their metals. LFP are relatively valueless.

This was picked up in an excellent presentation from Emma Nehrenheim, president of Northvolt Materials who said LFP recycling will continue to remain unprofitable — at least in the near term.

“The LFP recycle market is relatively immature, there is no realistic business model yet for low grade chemistries,” she said. However, she anticipated that ‘significant price drops will happen in the short term’ but hoped that eventually a solution will be found.

This might, however, be a statement of faith that a suitable technology will emerge but, as she said about the future, “we can’t pick the gold [nickel, manganese, cobalt in the black mass and throw away the rest.]”

Mark Stevenson, an international lead recycling expert said: “The problem with disposing of LFP batteries as opposed to lead ones is that they contain little of any real value. By comparison, automotive starter batteries, for example, have enough lead metal in them to pay for the cost of putting them in a smelter and making a profit. With LFP the recycling costs far outweigh any value of the metals extracted.”

In the after-presentation discussions, conversations were lively around these issues. Market participants are hesitant to pay a premium

for lithium salts of recycled origin, said Claas Hoffend, AMG Lithium project manager for lithium salts.

“The key question is whether the customers – the carmakers – are willing to pay a premium on recycled material and if the recycling capacity is not here by 2031, then what do we do?” Hoffend said.

“It’s possible that the regulation will be postponed by some years and regarding my understanding [as to] whether carmakers are willing to pay a premium — I don’t think so.”

The 2023 EU Battery Regulation will require at least 6% of recycled lithium and nickel, 16% cobalt and 85% for lead in the new battery rules become effective in August 2031.

“Lithium recycling competes with the primary lithium production costs and if the [recycled origin] price is similar [to primary origin] then everyone is in a good shape, but I don’t think someone is willing to pay dollars and dollars more,” Hoffend said.

“Maybe some political direction will be relaxed or postponed depending on the [current] recycled content in Europe [...] but I don’t see that a premium will be paid,” a participant from a large EU carmaker said. “We need to ask ourselves if we would pay the extra money.”

“No one in cell manufacturing will accept inferior quality materials so it’s important that at a certain point in production — from the refining or pCAM [pre-cathode active material] — you have to mix recycled lithium with primary material to have a homogenous quality so that there is no difference in primary or secondary material,” another conference participant said.

All excellent food for thought ahead of next year’s meeting. ■



Battery Safety Summit

November 4-5, 2024
Alexandra, Virginia, USA

With constantly increasing market demands for higher energy density cells globally, it is critical that advances in chemistry and engineering for next generation batteries have a significant focus on safety. Accurate testing, modelling and battery management systems are critical for predicting and controlling the complex electrochemical, thermal, and mechanical behavior of LIBs

Contact

www.cambridgeenergetech.com/battery-safety
 Phone: +781 972 5400
 E-mail: ce@cambridgeenergetech.com

Future Battery Forum

November 5-6, 2024
Berlin, Germany

The Future Battery Forum 2023 exceeded all expectations. Over 1,000 top level decision makers from the entire battery value system gathered in Berlin with the common goal to build up an innovative, resilient and sustainable European battery industry together and foster the European battery community. In 2024 the event will once again unite the most important decision makers and offer a unique opportunity for premium networking that you should not miss.

Contact

www.futurebattery.eu/
 Phone: +49 511 473147 96
 E-mail: t.m@ipm.ag



Berlin, Germany

Battery Experts Forum

November 5-7, 2024
Darmstadtium, Germany

The BATTERY EXPERTS' FORUM in Darmstadt is the leading platform for discussing the latest developments in battery technology, presenting innovative products and making valuable business contacts. With a comprehensive conference program and top-class trade visitors in the renowned Darmstadtium, the event attracts experts from all over the world. Benefit from first-class conferences, trade exhibitions and the opportunity to present your company. Meet experts, present your research and stay at the forefront of battery innovation.

Contact

www.battery-experts-forum.com/en
 Phone: +49 (6188) 99 410 24
 E-mail: info@battery-experts-forum.com

11th workshop Lithium-Sulfur Batteries Workshop

November 11-12, 2024
Fraunhofer, Germany

Lithium-sulphur batteries are envisaged to enable energy storage devices with high specific energy at low material cost. The recent research provides significant progress in terms of materials for active and passive cell components as well as on understanding of mechanisms finally leading to improved Li-S cell performance. Variations in cathode materials from elemental sulphur to sulfurized polymers and electrolyte formulations from sparingly solvating to fully solid-state concepts lead to further differ-

entiation of several Li-S concepts. Various current investigations focus on transferring innovations into application relevant prototype cells while several companies

Contact

www.iws.fraunhofer.de/en/events/lithium-sulfur-batteries.html
 Phone: +49 351 83391 0
 E-mail: [info\(at\)iws.fraunhofer.de](mailto:info(at)iws.fraunhofer.de)

Benchmark

November 12-14, 2024
Los Angeles, USA

Since 2016, Benchmark Week has been the leading gathering for the world's lithium-ion battery supply chain and the wider energy transition. This year, multiple content streams held simultaneously over three days will provide broader context of the opportunities and challenges facing clean energy supply chains, with in depth expert presentations & discussions alongside unrivalled networking, all hosted by Benchmark Mineral Intelligence.

Contact

www.benchmarkevents.com
benchmarkminerals.com
 Phone: +020 3598 1752

Electronica 2024

November 12-15, 2024
Munich, Germany

Since 2016, Benchmark Week has been Electronica covers the entire world of electronics, from high-performance systems to the micro- and nano-worlds of semiconductor and micro systems technology, as well as measurement and sensor technology, display technology and vehicle electronics. The range of exhibitors is enormous — an impressive A-Z from the UK's Alexander Battery Technologies to China's Zhejiang Guchi Electronics.

Contact

exhibitors.electronica.de/exhibitor-portal/2024/start/

Shanghai International Lithium Battery Industry Fair CBS

November 19-21, 2024
Shanghai, China

The 13th Shanghai International New Energy Lithium Battery Technology Fair. Exhibitors' Comments. Previous Exhibitors Supporting programs Shanghai International, Energy Stor-



2024
—
2025

ENERGY STORAGE EVENTS

The Leading Exhibition Series for Batteries and Energy Storage Systems

- **FEBRUARY 12–14, 2025, GANDHINAGAR, INDIA**
www.ees-india.in
- **APRIL 7–9, 2025, DUBAI, UAE**
www.intersolar.ae
- **MAY 7–9, 2025, MUNICH, GERMANY**
www.ees-europe.com
- **AUGUST 26–28, 2025, SÃO PAULO, BRAZIL**
www.ees-southamerica.com
- **SEPTEMBER 2–4, 2025, MEXICO CITY, MEXICO**
www.intersolar.mx

Follow us





London, United Kingdom

age Commercialization Application Technology Conference. International New Energy Vehicle Battery Technology Innovation and Application Development Forum. Shanghai International Power Battery Application International Summit for Sharing and Going Overseas.

BTF, with its continuous accumulation, has been recognized as an international exchange platform for the lithium industry, integrating trade, seminar, and a largescale, complete exhibition, and a lot of audience, since more than 10 years.

Contact

www.cantonfair.net/event/1898-shanghai-international-lithium-batteryindustry-fair
Phone: +020 8395 3211
E-mail: cnibf@zhenweiexpo.com

The energy management exhibition

November 20-21, 2024
London, United Kingdom

Hosting a multitude of focused professionals committed to advancing a low carbon, energy-efficient, and sustainable future, EMEX offers your brand a prime position in this rapidly expanding market. EMEX brings together leading brands with the energy sector in the UK, creating an environment where innovative technologies, products, and equipment engage with significant purchasing power.

Contact

www.emexlondon.com/
E-mail: jack.jones@markallengroup.com

Automotive batteries – cells, systems and beyond

November 20-21, 2024
Berlin, Germany

The VDI conference “Automotive Batteries - Cells, System and beyond” brings together stakeholders from the automotive sector who are involved in the development, production and integration of battery and fuel cell systems. Topics that will be discussed include new battery materials and cell formats, more efficient battery production processes and the recycling and reuse of materials.

Contact

www.vdiconference.com/
Phone: +49 2116214 201
E-mail: wissensforum@vdi.de

Battery Innovation Days

November 26-27, 2024
Barcelona, Spain or Online

The Battery Innovation Days is a unique 2-day hybrid experience designed to spark conversations on the latest developments in the European R&I Battery domain. Network and connect with Industry peers from different backgrounds can provide a refreshingly different insight. Stay on top of trends and emerging new technologies: discover more about the market and bring awareness to your business by fully immersing in our two-day conference that will cover the hottest topics in the battery industry

Attend the delivery of the Battery Young Research Award: honouring academic excellence in battery research, the award recognises the commitment of those students supporting scientific advancements in the field. Visit the exhibitor booths and extend your network in a prime place for business.

Contact

bepassociation.eu/battery-innovation-days/
Phone: +32 2 743 29 80
E-mail: info@bepassociation.eu

London EV show

November 26-28, 2024
London, UK

The exhibition at the London EV Show gathers the world’s leading companies and startups to showcase a broad range of products, services, and ideas, from the entire EV ecosystem including electric cars and light vehicles to electric trucks and vans, as well as electric charging infrastructure and battery systems. In addition, the show features the latest advancements in eVTOLs and electric boats, making it a comprehensive showcase of the electric vehicle industry.

Contact

www.excel.london/whats-on
Phone: +44 20 7069 5000
E-mail: nfo@excel.london



Barcelona, Spain

Save The Date

Join Peers at the Leading Meeting Place for
the Advanced Battery and H/EV Technology Community

THE **BA+TTERY** SHOW



electric & hybrid
vehicle technology expo



Mobility Tech | ASIA



**Energy
Storage**

The Battery Show Middle East
April 7-9, 2025 | Dubai World Trade Centre, UAE

The Battery Show South
Electric & Hybrid Vehicle Technology Expo
Energy Storage South
April 16-17, 2025 | Georgia World Congress Center, Atlanta, GA

The Battery Show Europe
Electric & Hybrid Vehicle Technology Expo Europe
Energy Storage Germany
June 3-5, 2025 | Messe Stuttgart, Germany, DE

The Battery Show Asia
Mobility Tech Asia
July 15-17, 2025 | Asia World Expo, Hong Kong

The Battery Show India
September 17-19, 2025 | India Expo Centre, Greater Noida, India

The Battery Show Asia (Indonesia)
September, 2025 | Jakarta, Indonesia



Cairo, Egypt

Egypt Energy 2024

November 26–28, 2024

Cairo, Egypt

Egypt Energy is North Africa’s biggest energy event with a legacy of 32 years in the region. The show brings together energy manufacturers and suppliers from all over the world to showcase new technologies and innovative solutions covering the entire energy value chain from power generators, energy storage and energy management systems, high and low voltage cables, energy transmission and distribution, solar panels, solar power and green energy.

Contact

www.egypt-energy.com/en/home.html

Phone: +201092192224

E-mail: egyptenergycs@informa.com

Global Automotive Components and Suppliers Expo Stuttgart

December 3-5, 2024

Messe Stuttgart, Germany

The “Global Automotive Components & Suppliers Expo” in Stuttgart is a significant international trade fair held annually at the Stuttgart Trade Fair grounds. Organized by UKIP Media & Events Ltd., it is the

largest expo of its kind in Southern Germany and serves as a central meeting point for the original automotive component supply industry. This fair is distinguished by the participation of over 300 suppliers who showcase a wide array of materials, components, modules, and subsystems. It offers a unique platform for both international and local professionals

to discover the latest technologies, designs, and services in the automotive component industry. Special highlights include the national pavilions, where numerous new potential suppliers from around the world present their assortments, making the fair particularly appealing for visitors seeking new supply partners.

Contact

www.tradefairdates.com

Phone: +44 1306 743744

4th Annual AABC Advanced Automotive Battery Conference USA

December 9-12, 2024

Las Vegas, USA

Here are just some of the OEMs and battery developers that will present this year: 24M Technologies, Accelera by Cummins, Amionx, Amprius, Blue Current, BMW Group, Cadenza Innovation, CATL, EC Power Group, ENOVIX, Factorial, Ford Motor Company, Gbatteries, General Motors, Hyundai-Kia, LG Energy Solution, Lyten, Lucid Motors, Mercedes-Benz, Nissan, Nyobolt, ProLogium, Proterra, SAFT, Sebang Lithium Battery, Sepion Technologies, Solid Energies, South 8 Technologies, Stellantis, Toyota, & more.

Contact

www.advancedautobat.com/us

Phone: +781 972 5400

E-mail: ce@cambridgeenergetech.com



Las Vegas, USA

Battery Minerals & Mines Summit

December 10-12, 2024
Las Vegas, NV, 2024

As global demand for critical minerals needed for decarbonization efforts grows, commercialization of newly discovered deposits and processing efficiency moves into the spotlight. With much of the world's supply of these minerals in overseas territory and both supply chains and national security concerns at the forefront, this new event will bring together mine operators, mineral processors, battery manufacturers and other key stakeholders to examine challenges, innovation and opportunities.

Contact

www.cambridgeenergetech.com/minerals-and-mines
 Phone: +1 781 247 1816
 E-mail: sstockwell@cambridgeenergetech.com

Battery Tech Expo

TBD 2025
Prague, Czech Republic

Central Europe is rapidly emerging as a key location in the Battery Technology landscape. With a well-established and rapidly developing automotive industry, and a growing number of giga factories both in operation and planned to come on-stream, the next few years will see a rapid expansion in battery production capacity in the region.

Contact

www.batterytechexpocentraleurope.com/
 E-mail: david.reeks@104-media.com

World Future Energy Summit

January 14-16, 2025
Abu Dhabi

The World Future Energy Summit is a global think tank, powered by global innovation, pioneering minds and groundbreaking insights. Bringing together industry influencers, problem solvers and cutting-edge solutions, we're focused on creating the blueprints for a sustainable future.

Contact

www.worldfutureenergysummit.com/en-gb.html
 Phone: +971 2 409 0333
 E-mail: leen.alsebai@rxglobal.com

Energy Storage Summit

February 17-19, 2025
London, England

2025 is set to be a pivotal year for the global energy transition, as we reach the halfway point in a significant decade for the planet on its path to net zero. Our Summit aims to highlight the fundamental role that energy storage will play in this journey, and will strive to recognise, explore and analyse key challenges that may present themselves on the trajectory ahead. Join us in February for the networking event of the year, bringing together over 2000 delegates from across Europe's energy storage value chain, spanning investors, developers, IPPs, banks, government and policymakers, TSOs and DSOs, EPCs, optimisers, manufacturers, data and analytics providers, consultancies, system integrators and more.

Contact

storagesummit.solarenergyevents.com
 Phone: +44 207 871 0122
 E-mail: lucy@solarmedia.co.uk



NAAtBatt 2025

February 17-20, 2025
Orlando, Florida, USA

NAATBatt International, the trade association for advanced battery technology in North America, is holding its 16th annual meeting & conference at the Omni Orlando Resort at Champions Gate in Champions gate (Orlando), Florida on February. This year's program will focus on the challenges of growing businesses to scale in a world where volatility, uncertainty, complexity and ambiguity have become the norm.

Contact

nac.naatbatt.org/
 Phone: +1 312 588 0477
 E-mail: +info@naatbatt.org

SAVE THE DATE



2025 BCI Convention + Power Mart Exp

May 4-7, 2025
San Antonio, Texas, USA

Get ready to power up for the 2025 BCI Convention + Power Mart Expo in the vibrant city of San Antonio, TX! As we look forward to the next century of innovation, this year's convention promises to be a dynamic gathering of industry experts and leaders. Mark your calendars and join us as we explore the future of battery technology, network with top professionals, and discover innovative solutions that will drive our industry forward.

Contact

<https://convention.batterycouncil.org/>
 E-mail: info@batterycouncil.org



Intersolar North America

February 25-27, 2025
San-Diego, California, USA

Intersolar North America and Energy Storage North America highlights the latest energy technologies, services, companies, and organizations striving to create positive impact on climate change and support our planet's transition into a more sustainable energy future.

Contact

www.intersolar.us/
 Phone: +1 603 547 7057
 E-mail: SolarGames@divcom.com

2ND Annual electric vehicle battery and Recycling forum

February 26-27, 2025
Amsterdam, Netherlands

Electric Vehicle Battery Recycling Forum brings together the key European industry leaders from the Electric Vehicle community to discuss the newest innovations in EV battery recycling. This is the right place to discuss the biggest challenges that the industry is facing and of course, thanks to the expertise of the Speakers, we will get a deep insight into the strategies and best practices that help them overcome the difficulties. Join us to explore more about the innovative technologies and EV battery recycling processes, as well as about the incoming European battery regulations.

Contact

www.leadventgrp.com/events/2nd-annual-electric-vehicle-battery-andrecycling-forum/details
 E-mail: info@leadventgrp.com

The Distributed Energy

March 12-13, 2025
Birmingham, United Kingdom

The future of energy generation is flexible, decentralised and renewable. Energy users, network operators and the entire energy supply-chain come to The Distributed Energy Show to see technology in action. The show features the UK's widest array of tech-



nologies for onsite and localised heat & power generation along with the infrastructure, software and components necessary to connect to the energy network and implement a low-cost, low-carbon energy strategy.

Contact

distributedenergyshow.com/
 Phone: +44 (0) 01273 957116
 E-mail: marina.rodousaki@event-partners.com

Battery Tech Expo

March 26-27, 2025
Silverstone, United Kingdom

Battery Tech Expo UK 2024 runs 25th April 2024 at The Wing, Silverstone, a major hub of the UK's high-tech engineering sector. The event brings together professionals from across the advanced battery technology and energy storage sector to connect, innovate and do business. The event will provide a unique opportunity to showcase the latest products, technologies and services covering the Battery Management Systems, EV Battery, Battery Storage, Battery Development/ Discovery, Commercial and Mobile Power Device sectors.

Contact

batterytechexpo.co.uk/
 Phone: +44 1283 381719
 Email: david.reeks@104-media.com

Intersolar & EES middle east

April 7-9, 2025
Dubai, United Arab Emirates

The 3-day conference guides the region through the energy transition by providing concentrated insights into the transformative dynamics of renewable energies. The conference is a must-visit for those who can sense the sea change in the energy industry and want to get the inside track. It's specifically for visitors who want to explore the latest advancements in renewable energy, energy storage and green hydrogen. Join the energy industry as it gathers to engage in meaningful dialogue, identify indus-

try pain points, and showcase the latest in energy trends. What's more, it's the perfect place to meet the fresh faces, major players and key influencers in this emerging industry. Get a first glimpse at the topics from the conference program 2024.

Contact

www.intersolar.ae/home
 Phone: +49 7231 58598 205
 E-mail: maass@solarpromotion.com

E-TECH 2025

April 15-16, 2025
San Donato, Italy

RE-BATTERY 2025 is Southern Europe's largest international trade fair, within E-TECH EUROPE 2025, for battery producers, recycling companies, raw material suppliers and the entire battery supply chain: on collecting, sorting, processing and reusing batteries, e-mobility systems and e-waste. Main topics discussed will include battery recycling technologies, materials recovery solutions, green electronics, sustainable materials, non-toxic substitutes and end-of-life / reuse strategies, as well as regulatory and business models to help reduce the environmental impact. RE-BATTERY 2025 will focus on lithium-ion batteries from e-mobility transportation, stationary applications, mobile and charging products, but also lead-acid batteries and e-waste from electronics.

Contact

e-tech.show/re-battery/
 Phone: +39 02 6630 6866
 E-mail: events@e-tech.show

All Energy

May 14-15, 2025
Glasgow, Scotland

All-Energy takes pride in being the UK's largest low carbon energy and full supply chain renewables event; while the co-located Dcarbonise is aimed at private and public sector energy end users. All-Energy offers an opportunity to meet, network and make connections with the renewable energy community with two days of uninterrupted business. The next live edition of All-Energy & Dcarbonise is taking place in May 2025 at the SEC, Glasgow.

Contact

www.all-energy.co.uk/en-gb.html
 Phone: +44 20 8271 2179

LOOKING FOR NEW EQUIPMENT?

OXIDE
PRODUCTION

FINISHING LINE

PLATE MAKING
LINE

CONSUMABLES
& SPARE PARTS

ASSEMBLY LINE

WE SPECIALISE IN



MANUFACTURING

We manufacture
Machinery and Parts



TECHNICAL TRADING

Contracts, Logistics
and Customerization



CONSULTING

We love to help with our
expertise



*Supplier of first class equipment and services
to the Lead Acid Battery Industry since 1950*



Fenibat

**May 25-27, 2025
Londrina, Brazil**

Their objective is to disseminate new products, services and technologies from all over the world to the South American market, as well as the exchange of information and knowledge. Besides the networking events, the FENIKART Tournament and the Welcome Cocktail, we'll have two days of the Equipment and Materials and Services Exhibition and the Technical and Commercial Conference. The theme of this edition will be LITHIUM AND THE FUTURE OF THE LEAD BATTERY INDUSTRY, being this, so, the focus of our Conference presentations.

The FENIBAT will bring information of interest to entrepreneurs, administrators and investors; managers, supervisors and technicians of Administration, Purchasing, Production, Maintenance, Projects and Product Development, Quality Control, Laboratories, Metrology, Work Health and Safety, Environment.

Contact

www.fenibat.com/en/home
Phone: +55 43 99937 4911
E-mail: camila@fenibat.com

The Battery show Europe

**June 3-5, 2025
Messe Stuttgart, Germany**

Meet battery manufacturers, suppliers, engineers, thought leaders and decisionmakers for a conference and battery tech expo focused on the latest developments in the advanced battery and automotive industries.

Contact

www.thebatteryshow.eu/en/home.html
Phone: +44 20 8052 0660
E-mail: thebatteryshowcs@informa.com

Battery Recycling Conference & Expo

**June 11-12, 2025
Mess Frankfurt, Germany**

Battery Recycling Conference & Expo 2025 is the must-attend event for battery producers, recycling companies, critical raw material suppliers, and the entire battery supply chain to come together to discover the latest innovations and solutions to create a circular economy for used batteries and help create sustainable supply chains for the future.

Contact

batteryrecycling-expo.com/
Phone: +44 1483 330018
E-mail: peter@trans-worldevents.com

A Battery cells & systems expo

**July 9 –10, 2025
Birmingham, United Kingdom**

Battery Cells & Systems Expo will bring together automotive manufacturers, electric utilities, battery system integrators, cell manufacturers and the

entire manufacturing supply chain. A truly unique showcase, companies from around the world will use the show to launch products and demonstrate their technology to an audience of professionals.

Contact

batterysystemsexpo.com/
Phone: +44 1273 286362
E-mail: iana.fowler@event-partners.com

The Battery Show Asia

**July 15 – 17, 2025
Hong Kong, China**

Don't miss The Battery Show Asia that is happening 15-17 July 2025 in Hong Kong, bringing together the leading innovators & engineers in the battery industry. Positioned as the premier event for energy storage solutions, electric vehicles, and advanced battery technologies, this is your opportunity to connect with Asia's growing market.

Contact

www.thebatteryshow.asia/
E-mail: info@thebatteryshow.asia

SAVE THE DATE

Battcon

**August 3-6, 2025
Orlando, Florida, USA**

The Battcon technical committee is seeking abstracts (to eventually become papers if accepted) for peer-review, by Battcon. The published papers will be available on the Battcon website archive. The papers focus on stationary batteries, geared mostly towards an end-user audience. Feel free to submit a non-commercial (focus on the technology, method, or standardized practice, not the product or company) abstract on whatever subject related to stationary batteries you think might have an interest to an end-user audience consisting primarily of electric utility, data center, telecom, firefighting professionals, and stationary battery service companies.

Contact
<https://www.battcon.com/>
E-mail: events@battcon.com
www.elbcexpo.org

Our advertisers enjoy their elite status with us! Join them!

Company	Page number
Abertax	77
Accurate Products	93
Atomized Products	22-23, 69
Batek Makina	31
BFS	15
CAM Srl	57
Colrobbia	62
Continuus Properzi	67
Dalton Electric	17
Dross Engineering	33, 48
Eagle Oxide Services	Inside Front Cover
Engitec Technologies	59
Entek	13
Erhardt & Leimer	19
Froetek	44
H Folke Sandelin	41
Hadi Offerman	38, 39
Hammond Group, Inc	27
ICM AG - ICBR	83
Informa – Battery Show	89
Maccor	3
MAC Engineering & Equipment	Outside Back Cover, 51
O.M.Impianti	35
Penox Group	19
Sasha's International	33
Sorfin Yoshimura	Inside Back Cover
Solar Promotion - ees Global	87
Wirtz Manufacturing Group	55

Contact Karen Hampton: karen@batteriesinternational.com or call +44 7792 852337

THE LAST WORD

Our new ABC geography primer

There's a major problem with the 21st anniversary of the Asian Battery Conference to be held in Borneo from September 1-5, 2025. According to organizer, Mark Stevenson, certain battery industry folk (we're looking at you, Stateside) seem a tad muddled about Borneo and where, exactly, it is. "It's not enough to go to Australia and up a bit," he grumbles. "Or to turn left at San Francisco,"

To help with any confusion, Borneo is the third largest island on earth and split into three countries: the sultanate of Brunei; the east Malaysian states of Sabah and Sarawak, and Indonesia to the south. The ABC is being held in Sabah with —we have been told — a gala dinner to end all gala dinners in the grounds of the Shangri-La hotel.

Now that's a date for the diaries!



Strange things about the energy transition are constantly passing across our news desk. Think synthetic forests, cow poo... potatoes

One offered news about its 'modern mechanical forest' offering "CO₂ levels back to the 1950s' levels within a generation."

Another offered us conference presentations on the "Great Cow Poo Alert: emissions both stinky and deadly".

Best of all was a new green demonstration project from a London university using two nails, two potatoes (renewable of course), crocodile clips and a voltmeter ... here we go 0.67V. Scaleable too.



A draped mystery over Pinco's mystery car — the *Dallara Stradale* at the recent ELBC — is *Batteries International's* own deputy ed, Shona Sibary, now turned motoring correspondent par excellence. You should see what's under this babe's bonnet. Boasting a 2300cc capacity and four turbocharged cylinders this little beauty can reach 100km/h in just 3.2 seconds (that's the car, not Shona).

Who says battery men are behind the times? Not us, says BCI's Advanced Emoji Tech Team.



Tackling the Gas Emissions from Livestock

Fascinating anagram facts



Did you know that Penox's catchy slogan ORIGINAL on the backs of their team is almost a perfect anagram of "Batteries International is the best"... strange things!



**NEW YORK
USA**



**TOKYO
JAPAN**



**QINGDAO
CHINA**



**PARIS
FRANCE**



**SAO PAULO
BRAZIL**



**SORFIN
YOSHIMURA**

Supply Chain Global Provider



**BANGKOK
THAILAND**



**PUNE
INDIA**



**SY
INNOVATIONS**



**MONTERREY
MEXICO**

www.sorfinyoshimura.com



USA: sorfin@sorfin-yoshimura.us



JAPAN: tokyo@sorfin-yoshimura.jp



CHINA: qingdao@sorfin-yoshimura.cn



FRANCE: paris@sorfin-yoshimura.fr



BRAZIL: vendas@sorfin.com.br



MEXICO: dbortoni@sorfin-yoshimura.us



THAILAND: jiroyoshimura@sorfin-yoshimura.jp



INDIA: sales@sorfin-yoshimura.in



SY Innovations: agurevich@sy-innovations.com

MACTM

ENGINEERING & EQUIPMENT



For over 55 years, MAC Engineering & Equipment Company, Inc. has sold more than 4500 machines, to over 300 customers, in 81 different countries, bringing the MAC Advantage worldwide.

MAC ENGINEERING & EQUIPMENT COMPANY, INC.



Women in the
Global Battery Industry
SUSTAINING SPONSOR

Visit www.mac-eng.com to see how we can bring the MAC Advantage to you!