Batteries International
20ELBC Vienna September 15-18, 2026

The Conference Guide

International Lead Association

ELBC 15–18 September Vienna, Austria 2026

Consortium for Battery Innovation

- Behind the scenes: APG share their winning formula
- ELBC then and now — rolling back the industry years
- CEO Bobby Lucas reveals Hammond's next big plans
- Hot topics. Big debates. Industry talking points

NO NEED TO STRAUSS — WE'VE GOT YOU COVERED...

AMARA RAJA | ENERGY & MOBILITY

POWERING THE FUTURE OF MOBILITY

Advanced Lead-Acid & Lithium-Ion Solutions
Automotive & Industrial Applications | Across 70+ Countries.

AMARON®
LASTS LONG, REALLY LONG.

POWERZONE

AMARON® QUANTA
LIFE UNINTERRUPTED

Amara Raja Energy & Mobility Limited
Terminal A, 1-18/1/AMR/NR, Nanakramguda, Gachibowli, Hyderabad - 500032. India.
email: customercare@amararaja.com | www.amararajaeandm.com

ELBC
15–18 September
Vienna, Austria 2026

Organised by
International Lead Association
Consortium for Battery Innovation

CONTENTS

In their own words... 2
Ten years of ELBC opening addresses chart the challenges, ambitions and changing priorities of the lead battery industry.

The conference schedule 4
The ELBC agenda at a glance — workshops, plenaries, supplier forums, receptions and the gala evening.

Ever wondered what 1% of 1% of a car battery looks like? 7
Atomized Products Group takes us behind the scenes of expander manufacture, technical partnerships and supply-chain resilience.

Vienna didn't wait for us! 10
Eight years on, here's a snapshot of how the capital has changed since we were all last here. From beer and strudels to EVs and energy.

Rolling back the years 11
We take a retrospective look at the battery industry's most defining moments since 2018, when ELBC last visited Vienna.

The inside track — Bobby Lucas 19
Hammond Group's president talks about his first couple of years at the company's helm, and exclusively reveals big plans ahead.

Conference debate — time to think about security 24
Why BESS, UPS and other power infrastructure are moving to the front line of the cybersecurity debate.

Conference debate — the new north-west passage 28
A dramatically shorter maritime route between Asia and Europe is emerging for batteries, EVs and other high-value cargo.

Exhibition guide 32–33
Alphabetical exhibitor listing, stand numbers and floorplan — your DEFINITIVE guide to WHO's exhibiting.

Lead shakes off its bad-boy image! 35
Unintended consequences, public perception and how the lead battery industry is reforming itself from villain to hero.

ELBC
15–18 September
Vienna, Austria 2026

A WELCOME FROM THE CHAIR 2016-2026

A decade in their own words

For the past 10 years, ELBC's opening addresses have captured the challenges, ambitions and changing priorities of the lead battery industry. As the conference returns for its 20th edition, *Batteries International* looks back at what the view from the top said then, and is saying now.

2016 MALTA

"Our whole industry is standing at the crossroads of competing battery chemistries."

David Wilson, Chair, 15ELBC

In Malta, David Wilson highlighted the growing competition facing lead batteries.

"And this is something where we need to fight our corner."

David Wilson, Chair, 15ELBC

A call to action for the industry to be proactive in making the case for lead.

2018 VIENNA

"Many policy makers openly say they see us as yesterday's solution."

Andy Bush, Chair, 16ELBC

In Vienna, Andy Bush challenged the industry to change perceptions and make the case for lead while pursuing wider global awareness of the full energy storage mix.

"We need to demonstrate that a range of technologies — including lead and lithium batteries — will be required in the future."

Andy Bush, Chair, 16ELBC

Andy Bush underlined the importance of a multi-chemistry future.

2020 VIRTUAL ELBC

"If you'd told me last December that we would be hosting a three-day conference, live from a studio, bringing together battery experts and companies from across the world — and doing it all online — I'd have laughed."

Andy Bush, Chair, 17ELBC

In an unprecedented year, Andy Bush reflected on the industry's resilience, and the opportunities that remain ahead for the lead and energy storage sectors.

"It's a key event and an important stepping-stone as we look ahead to a decade of considerable uncertainty, change and opportunity."

Andy Bush, Chair, 17ELBC

Andy Bush emphasised the resilience of the industry and its ability to adapt, highlighting the scale of the challenges but also the significant opportunities for lead batteries in the years ahead.

Andy Bush
Executive DIrector, International Lead Association

2026 VIENNA

"A pivotal time with challenge and

ANDY

"Looking ahead to Vienna, Andy Bush emphasised the industry's opportunity to show leadership, to work together, and to seize the momentum behind global energy storage."

"We need to demonstrate that lead batteries are not just part of the past, but a key part of the solution to a cleaner, more resilient energy future."

Andy Bush, Chair, 20ELBC

ELBC
15–18 September
Vienna, Austria 2026

A WELCOME FROM THE CHAIR 2016-2026

Alistair Davidson

Executive DIrector,
Consortium for Battery Innovation

2022 LYON

"I for one am convinced lead batteries will play an important role in the future."

Andy Bush, Chair, 18ELBC

In Lyon, Andy Bush spoke about an industry at a critical juncture, with an unprecedented energy crisis to support the global energy transition.

"We're co-organising ELBC for the first time and as interest in lead battery innovation continues to grow, ELBC is a great opportunity to hear all of the latest developments in research as well as technical updates."

Alistair Davidson, Director, CBI

Alistair Davidson highlighted ELBC's role in showcasing innovation and research

2024 MILAN

"This year's conference, possibly more than any other, marks a significant turning point for our industry."

Andy Bush, Chair, 19ELBC

Andy Bush described 2024 as a moment of real momentum, with growing recognition of the role lead batteries can play in a lower carbon, more secure energy future.

"There is a real sense of optimism and excitement about the global growth in opportunities for lead battery energy storage systems."

Alistair Davidson, Director, CBI

Alistair Davidson highlighted ELBC's role in showcasing innovation and research

"Meanwhile, elections this year in Europe, the United States, India and many other countries all have implications for our industry — whether as a result of shifting trade policies, regulation changes or geopolitics."

Andy Bush, Chair, 19ELBC

Andy Bush highlighted the geopolitical and regulatory forces shaping the industry's future.

2026 VIENNA

so much change, opportunity"

ALISTAIR

Alistair underlines the growing global momentum for energy and the important role lead batteries can play, provided the industry remains united and focused on innovation and sustainability.

"This year, the message for policymakers is clear: Europe needs to embrace all battery technologies and protect what it has – including important foundation industries such as the lead battery value chain."

ELBC
15–18 September
Vienna, Austria 2026

Organised by
International Lead Association
Consortium for Battery Innovation

Conference Programme
Monday, September 14

2:00-5:00 pm	**CBI General Assembly - Members Only Meeting**	K2

Conference Programme
Tuesday, September 15

8:30-9:00 am	**CBI Welcome Coffee**	K2 Foyer
9:00 am-12:30 pm	**CBI Technical Update - Members Only Meeting**	K2
10:15-10:45 am	**Coffee Break**	K2 Foyer
11:00 am-6:00 pm	**Registration Open**	Foyer D
1:30-2:00 pm	**Welcome Coffee**	K2 Foyer
2:00-5:00 pm	**Workshop - Integrating Lead and Other Advanced Battery Technologies**	K1
2:00-5:00 pm	**Workshop - Navigating the EU Batteries Regulation: What It Means for Industry**	K2
6:00-7:30 pm	**Welcome Reception**	K Terrace

Conference Programme
Wednesday, September 16

8:00 am-6:00 pm	**Registration Open**	Foyer D
9:00-10:35 am	**Plenary**	Hall D
10:35 am-5:00 pm	**Expo Hall Open**	Expo Hall
10:35-11:15 am	**Coffee Break**	Expo Hall
11:15 am-12:30 pm	**Plenary Continued**	Hall D
12:30-1:45 pm	**Lunch**	Expo Hall
1:45-2:45 pm	**Latest Innovations in Lead Battery Technology**	Hall D
1:45-3:10 pm	**Supplier Forum**	K2
2:45-3:10 pm	**Coffee Break**	Expo Hall
3:10-4:30 pm	**The Role of Lead Batteries in Energy Storage Systems**	Hall D
3:10-4:30 pm	**Supplier Forum**	K2
4:30-5:15 pm	**Panel - Lead Battery ESS: Crucial to Many Applications**	Hall D
5:30-6:30 pm	**WGBI Reception**	K Terrace

CONNECTIONS,
PROVEN RELIABILITY.

WE ARE LOOKING FORWARD TO CONNECTING, SHARING INSIGHTS, AND EXPLORING OPPORTUNITIES TOGETHER.

PLEASE VISIT US AT BOOTH #75

ELBC

ELBC
15–18 September
Vienna, Austria 2026

Organised by
International Lead Association
Consortium for Battery Innovation

Conference Programme
Thursday, September 17

8:00 am-6:00 pm	**Registration Open**	Foyer D
8:55 am-5:00 pm	**Expo Hall Open**	Expo Hall
9:00-10:30 am	**Plenary**	Hall D
10:30-11:10 am	**Coffee Break**	Expo Hall
11:10 am-12:30 pm	**Plenary Continued**	Hall D
12:30-1:45 pm	**Lunch**	Expo Hall
1:45-2:45 pm	**Next Generation Additives**	K2
1:45-2:45 pm	**Lead Batteries: Enabling Greater Resiliency on the Grid**	Hall D
2:45-3:10 pm	**Coffee Break**	Expo Hall
3:10-4:30 pm	**Innovative Battery Developments**	K2
3:10-4:30 pm	**Enabling Partial State of Charge**	Hall D
4:30-5:15 pm	**Panel - The Importance of Stakeholder Engagement for the Battery Industry**	Hall D
7:00-11:00 pm	**Gala Evening - Volksgarten**	

Conference Programme
Friday, September 18

8:00 am-1:00 pm	**Registration Open**	Foyer D
9:00-10:00 am	**Recent Battery Development and Future Perspectives**	K2
9:00-10:00 am	**Current Developments in Automotive Batteries**	K1
10:00-10:25 am	**Coffee Break**	K2 Foyer
10:25-11:45 am	**Cutting Edge Methods to Improve Battery Performance**	K2
10:25-11:45 am	**Current Developments in Automotive Batteries Continued**	K1
11:45 am-12:30 pm	**Panel - Where Do Lead Batteries Head Next in Automotive Applications?**	K2
12:30-12:45 pm	**Closing Remarks**	K2
12:45-12:50 pm	**Conference Close**	

Ever wondered what 1% of 1% of a car battery looks like?

It's 35 grams of expander. That's all that's needed to transform a lead acid battery into a durable power horse of energy. APG took us behind the scenes.

Years ago, if you walked through a lead battery factory without wearing a mask, you knew it. Blow your nose afterwards and the handkerchief would come away black.

It is a story APG's COO Lee Puckett likes to tell — not out of nostalgia, but to illustrate how much the industry has changed.

Today's plants bear little resemblance to those of previous generations. Automation, environmental controls and rigorous quality systems have transformed both manufacturing and perceptions of what goes into a modern lead battery.

Few components illustrate that evolution better than the humble battery expander.

Measured by weight, an expander accounts for around 35g in a conventional automotive battery—about 1% of 1% of the finished product. Yet those few grams can have a disproportionate influence on charge acceptance, cycle life, consistency and overall performance.

This is the background to APG's approach. Rather than selling another commodity ingredient, the company sees itself as a technical partner, working alongside manufacturers to tailor formulations, improve production consistency and develop additives for an increasingly demanding market.

Lee Puckett, APG's COO

Consistency first

Expander manufacture is driven by process discipline as much as chemistry. Every formulation is produced in controlled batches using large ball-mill mixers, with batch sizes matched to the behaviour of individual raw materials. Lightweight carbons, dense barium sulphate and other ingredients each mix differently, so production recipes have been refined over decades to deliver consistent results.

Operators are judged not by hours on the factory floor but by completing a set number of batches to specification. Every production run follows what employees call the company's 'Bible'—a detailed manufacturing sheet setting out the recipe, process controls and quality checks required before material leaves the plant.

The approach has produced a remarkable record.

Over more than 20 years, APG says it can recall only one batch traced to an internal manufacturing error. Although the batch itself had modest value, the consequences multiplied once the material had entered battery production, reinforcing the importance of traceability and rigorous process control.

APG is unusually willing to discuss its technology, but it draws a clear line between openness and confidentiality.

Customer-specific formulations remain proprietary and are never shared. However, products developed in-house — or formulations based on chemistry that is no longer protected by patent — are treated differently.

Its graphite-based CX expander range is a good example. Customers evaluating the products can receive detailed formulation data under non-disclosure agreements, allowing engineers to understand exactly what they are testing rather than treating the additive as a "black box".

That policy was not universally welcomed when it was introduced. Some questioned whether revealing formulation details, even under NDA, would hand competitors an advantage.

APG reached a different conclusion. Trust, technical support and long-term relationships, Lee says, are harder to copy than a recipe. A competitor may reproduce a formulation, but replicating years of customer support and application knowledge is another matter.

Many speciality chemical suppliers have invested heavily in battery-testing laboratories. APG has chosen a different path.

Its own laboratories concentrate on chemical and physical analysis — verifying raw materials, checking production quality and ensuring every batch meets specification. Comprehensive battery testing is largely left to customers, who must validate any new expander before introducing it into production anyway.

Collaborative model

APG has expanded its research capability through partnerships with Black Diamond Structures and Addenda.

Together they provide advanced chemical analysis, battery testing and independent performance data without the need for major capital investment. This gives customers third-party results while recognising that final validation always takes place inside the battery manufacturer's own factory.

The partnership between APG, Black Diamond Structures and Addenda grew from a simple observation: each company contributes a different technology to the lead battery, and those technologies perform best when developed together.

APG supplies negative plate expanders. Addenda specialises in positive plate additives. Black Diamond brings carbon nanotube technology and advanced battery testing. None replaces the others. Together, they offer customers a broader technical toolkit than any could provide alone.

The collaboration is already producing encouraging results. Researchers have identified combinations where particular expander formulations work especially well alongside

carefully optimised carbon nanotube additions, delivering measurable improvements in battery performance.

Just as important, each partner contributes capabilities the others lack.

Black Diamond offers sophisticated battery-testing facilities and a growing presence in markets such as India. Addenda brings materials science expertise. APG contributes more than three decades of manufacturing experience, established production capacity and long-standing relationships across the global lead battery industry.

The alliance is deliberately non-exclusive. Customers are not expected to buy every product from every partner. A manufacturer may evaluate Black Diamond technology while continuing to use another supplier's expander, or choose APG products independently. The objective is to solve technical problems, not lock customers into a package.

Beyond North America

Although APG remains a relatively compact business, its ambitions are international. The company already exports throughout North and South America, Asia and parts of Europe, but foresees its strongest growth in regions where lead batteries remain central to transport and energy storage.

Brazil has become one of its most successful overseas markets. Rather than attempting to build the business remotely, APG works through an exclusive distributor with detailed knowledge of local regulations, customers and commercial practice. That local expertise has proved as valuable as the products themselves, helping establish long-term customer relationships.

India represents another strategic priority. While electric vehicles dominate headlines in Europe and North America, APG expects lead battery demand to remain strong in countries where vehicle ownership is still expanding and infrastructure continues to develop. The rapid growth of electric rickshaws is one example, creating sustained demand for deep-cycle batteries and the additives that improve their performance.

The company also supplies neighbouring markets, including Pakistan, through its long-established Korean distribution partner.

Europe presents a different challenge. Unlike Brazil or India, it already has established expander manufacturers with local production.

Winning business therefore depends less on geography than on technology, technical support and the willingness of manufacturers to qualify alternative suppliers. APG believes its growing relationship with Black Diamond will help open those conversations.

If one phrase captures APG's thinking today, it is the shift from "just in time" to "just in case." For decades, manufacturers focused on efficiency. Inventories were minimised, supply chains stretched across continents and companies often relied on a single trusted supplier.

Recent years have exposed the risks in that model. Trade disputes, tariffs, shipping disruption and geopolitical tensions have shown how quickly global supply chains can unravel. For APG, resilience has become as important as cost.

Like many suppliers, APG imports much of its raw material and has experienced first-hand the uncertainty created by changing trade policies and international instability. It is now looking for alternative sources closer to home, even if they come at a higher price.

The company believes battery manufacturers should adopt the same philosophy. Diversification, it argues, should be viewed as insurance rather than inefficiency.

Moreover, supply chains should work the same way. This means that a second supplier cannot exist only on paper. It must receive enough business to maintain production, preserve expertise and remain commercially healthy.

At APG, quality assurance extends beyond testing the finished product.

Production is supported by ISO and IATF management systems, regular customer audits and detailed internal procedures designed to ensure every process is documented, repeatable and traceable.

In a business where a few grams of additive can influence an entire battery, consistency depends as much on disciplined manufacturing as on chemistry.

That discipline sometimes produces frustrations. A supplier may receive a non-conformance letter even when the product itself is faultless because a document has not been updated or an approved vendor has yet to be added to a register.

Regular audits from customers including East Penn and Clarios provide another level of scrutiny, ensuring improvements become

part of everyday practice rather than one-off corrective actions.

Few industries demonstrate the balance between competition and cooperation quite like lead batteries.

Manufacturers compete fiercely for business, yet suppliers frequently work together when unexpected disruptions threaten customer supply. Maintaining confidence in lead battery technology benefits everyone involved.

APG believes the same principle applies throughout the supply chain. Technical advances made by one company ultimately strengthen the position of lead batteries against competing energy-storage technologies.

Longer life, higher efficiency and better performance are victories for the industry as a whole.

The company sees that philosophy reflected in its long-standing relationship with customers such as East Penn, where family ownership and long-term thinking have helped build partnerships based on trust rather than short-term commercial gain.

Next gen

As APG has grown, the role of its leadership has evolved. Where senior management once focused largely on day-to-day production, responsibility has increasingly been delegated to experienced managers. That has allowed the leadership team to concentrate on developing partnerships, strengthening supply chains and identifying opportunities for future growth. It is a subtle shift, but an important one. Whether discussing manufacturing, research, customer relationships or sourcing, APG returns repeatedly to the same idea: long-term resilience is more valuable than short-term optimisation. ■

Born to stick

Like our pasting tissue paper

Novaplate®

Made in Barcelona

Our premium pasting tissue paper, NOVAPLATE, suits the requirements of continuous grid pasting technologies.

TERRANOVAPAPERS

Miquel y Costas Group

Meet us at ELBC stand 129

Terranova Papers has a team with a long experience in papermaking; our Technical Department continuously develops new products and it allows us to find specific solutions for our clients. We have the most qualified people and the most advanced technology.

ELBC
15–18 September
Vienna, Austria 2026

Vienna:

HOW THE CITY HAS CHANGED SINCE ELBC LAST VISITED

Eight years ago, battery delegates filled Vienna's conference halls, coffee houses and bars. Now we're back, and while the city's imperial charm is exactly as you remember it, quite a lot has changed. Here's a snapshot of Vienna in 2018 and 2026.

Welcome back!

POPULATION

A bigger Vienna

2018	2026
1.9 million	>2.0 million

Vienna passed the two-million mark again in 2023 for the first time since 1910, and remains one of Europe's fastest-growing major cities.

A PINT IN VIENNA

Same great taste. A higher price.

2018	2026
EUR3.50 (0.5L)	EUR4.90 (0.5L)

Expect to pay around 40% more for a pint of local lager than you did in 2018.

APFELSTRUDEL

Still a classic. A bit more expensive.

2018	2026
EUR3.90	EUR5.50

A slice of traditional Viennese apfelstrudel with cream will set you back a little more these days - but it's still worth every bite.

GETTING AROUND

New lines, new connections

2018	2026
5 U-Bahn lines	U2xU5 expansion in progress

Vienna's major U2xU5 project is adding 12 new stations and 11km of track, with the first 4.2km of U2 tunnels completed in 2025.

HOTELS

More choice at the top end.

2018	2026
~400 hotels	~450 hotels

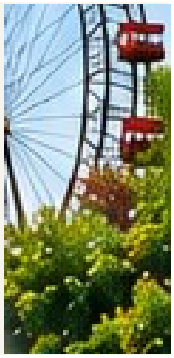
Around 50 more hotels than in 2018, including the new Mandarin Oriental Vienna (opened 2025) in a former courthouse.

VISITORS

More guests than ever.

2018	2026
15.8 million overnight stays	20.1 million overnight stays (2025)

Vienna recorded a landmark 20.1 million overnight stays in 2025, with around 83% international visitors.



CYCLING

More bikes on the streets.

2018	2026
~1,300 km of cycle routes	~1,600 km of cycle routes

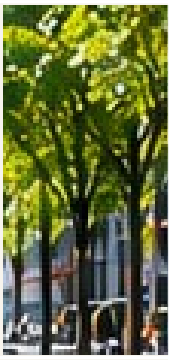
The city has added more than 300 km of cycle routes since 2018, making it even easier (and greener) to explore on two wheels.

A GREENER, COOLER CITY

More trees, more shade, more climate action.

2018	2026
Hot summers, but fewer extremes	53 tropical nights in 2024

Since 2021 Vienna has invested EUR 100 million in around 320 projects adding trees, parks, shade and water features to tackle rising temperatures.

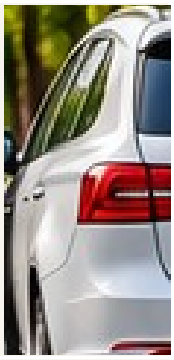


ELECTRIC CARS

From niche to normal.

2018	2026
~3,800 BEVs in Vienna	~48,000 BEVs in Vienna

The number of fully electric cars in Vienna has grown more than tenfold since 2018, supported by a major expansion of public charging infrastructure.



ELECTRIC TRAMS

Still a Viennese icon - and even cleaner.

2018	2026
~170 trams	~190 trams

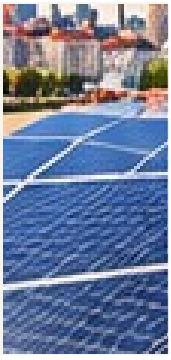
Vienna's tram network remains one of the largest in the world and continues to be fully electric, with newer, longer and more energy-efficient trams joining the fleet.

RENEWABLE ENERGY

A brighter, cleaner future.

2018	2026
~18% renewables in district heating	~28% renewables in district heating

Vienna has increased the share of renewable energy in its district heating network, with more solar, waste-to-energy and geothermal sources feeding the grid.

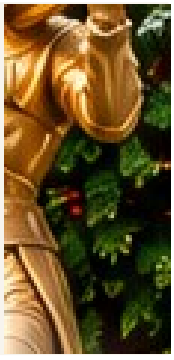


CULTURE

The classics, and some new arrivals.

2018	2026
Same great museums, operas and palaces	New exhibitions, new venues, new energy

Vienna's cultural scene remains as vibrant as ever, with new exhibitions and events alongside the timeless favourites.



The last ELBC in Vienna took place in a golden September. There was, as ever, a busy schedule of talks, but the business environment was changing. The shadow of lithium was casting a pall over the industry. *Batteries International* looks back on the intervening years.

What a difference eight years make...

2018

- **Batek Makina** opens 43,000 sq ft plant in Dilovasi in Turkey.
- **Furukuwa Battery** partners Vietnam's **Pinaco** in **UltraBattery** manufacturing deal. Furukuwa already had operations in China, India, Indonesia and Thailand.
- **C&D Technologies**, a portfolio company of KPS Capital Partners, acquires Trojan Battery Company.
- Proposal for new body to replace **ALABC** mooted at Vienna ELBC. The Consortium for Battery Innovation emerged the following year.
- **SY Innovations** formed, designed to support SY Group and explore new markets, products and sales/marketing techniques.
- **Gridtential** wins BCI award for its bipolar battery solution but automation problems on the production line dog adoption despite backing from well-known battery manufacturers.
- Chinese battery firm **Leoch** makes undisclosed investment in UK firm DBS Energy.
- **Hollingsworth & Vose** invested in capacity expansion in raw material and global separator production to support the AGM market.
- **Duracell** unveils new lead battery, citing cost benefits against lithium.
- Solar power company **Mobisol** partners African lead battery firms for storage component to its offering.
- Canada's **Discover Energy** buys Korean lead manufacturing business **iQ Power Asia**.
- India's **Exide Industries** moves into lithium with **Leclanché** in joint venture.
- Innovative New Zealand lead battery pioneer **ArcActive** partners **East Penn**.
- **Amara Raja, Gravita** sign recycling deal. JCI, which has worked with Amara Raja for 20 years, formalized an agreement between the two this year.
- **Narada** inaugurates first of five grid-scale lead carbon ESS in Germany.
- **EnerSys** buys Canada's **Alpha Technologies** for $750 million in push into energy storage markets.
- Korean lead battery maker **AtlasBX** gets go-ahead to build lead battery plant in US.
- **Trojan Battery** sold to **C&D Technologies** as last remaining link with Godber family cut.

2019

- **RSR Technologies** wins BCI award. Working with East Penn Manufacturing and the US Argonne National Laboratory, used Argonne's Advanced Photon Source synchrotron to look at, in real time, the crystallization of lead plates at the atomic level during the charging and discharging process. The results enable the firm to develop Supersoft-Hycycle alloy, which enhances lead battery performance.
- **Microporous** forms joint partnership with Chinese firm **Zisun**, the largest fully integrated producer of glass micro-fibres and media in Asia, allowing Microporous to add AGM separators to its product range.
- Specialist battery machine maker **Wirtz Manufacturing** invests in nickel-zinc battery maker **ZAF Energy Systems.**
- **Johnson Controls Power Solutions** — the former battery division of JCI bought by Brookfield Business Partners for $13 billion — launched itself with the name **Clarios**.
- Lead batteries in India lose subsidies under new **FAME-II** regulations.
- **East Penn** takes stake in lithium battery maker **Navitas**.
- **Exide Industries** moves into e-rickshaw battery manufacturing.
- **Water Gremlin** moves back to full production after agency shut-down.
- **Upside Group** switches on 25MWh lead carbon system in Germany.

• **John Devitt**, VRLA pioneer and developer dies aged 96.

2020

• **Hammond Group** completes the first step to employee ownership.

• Covid-19 claims first lead battery insolvency victim, **Moll**, but outlook for the firm brightens later.

• **Exide Technologies** (and four subsidiaries) file for Chapter 11 bankruptcy protection to facilitate the sale of its North American assets. In July Exide sells its North American assets to Atlas Holdings.

• German formation firm **Inbatec** and **Kustan** become equal and independent subsidiary of new firm **RedDotPlastics**.

• **ArcActive** wins BCI innovation award with technology to replace negative battery electrode with non-woven carbon fabric that achieves high DCA with minimal loss.

• **Exide Technologies** officially separates from its North American business and in October becomes a new European, Asia-Pacific firm. European business, free from the US parent, can focus on its automotive and industrial energy storage technologies. It has two R&D facilities as well as 11 production plants across Europe.

• **Don Gribble**, inspirational founder of ***Batteries International***, passes away in November.

• California DTSC issues writ to former Exide Technologies — now called Stryten Energy — to recover Vernon clean-up costs. Saga continues.

2021

• Batek Makina, the Turkish battery equipment manufacturer, takes over Italian formation firm Bertola and its subsidiary Moran.

• India's second largest lead battery maker **Amara Raja** announces plans in February to begin working on lithium battery cells.

• **Hammond, East Penn, CBI** launch joint research program in March. CBI meanwhile announced it had launched a new European research project using neutron diffraction.

• China moves to **ban lead batteries** in low-speed electric vehicles.

• **Chris Pruitt, East Penn** CEO takes over as new BCI president.

• **Kathryn Bullock**, one of the greats in the electrochemical history of the lead battery, passes away in May.

• **Hammond Group** wins BCI innovation award for development of using lead silicate as a way to counter acid stratification in lead batteries. This is subsequently called GravityGuard.

• **Oxis**, the lithium sulfur battery developer, is acquired by Johnson Matthey.

• **BCI victory** as lead batteries removed from California's DTSC danger list. A huge vindication of the value of BCI's tireless campaigning on the subject.

• Lead/lithium hybrid trial starts in Poland in July. **GS Yuasa**, later, wins another installation of lead/lithium hybrid.

• **Clarios** pulls $1.7 billion capital raising via an IPO at last minute citing market volatility.

• **Ecobat** buys German lithium battery recycler Promesa in July in clear sign of future plans. It follows this up in October with acquisition of Emrol.

• **ENTEK** closes acquisition of **NSG** separator division in September can offer AGM, P/E and lithium separators.

• **Women in The Global Battery Industry** group launched at BCI meeting held in San Diego, California.

• **Sunlight Systems** says it will spend €50 million ($59.2 million) to create the world's largest motive lead battery unit.

• **Long Duration Energy Storage Council** formed in November by 24 tech companies.

• **Monbat** plans to open a bipolar lead battery facility by 2024. In following June agreement reached with ABC when Monbat managers secure near 21% stake in the group.

• **Stryten** buys vehicle power division of **Galvion** a military equipment maker. In December it buys **Tulip Richardson Manufacturing** which makes injection moulding products and in January acquires **Storion Energy**, a vanadium flow battery technology firm.

2022

• Disturbing signs of **imminent lithium battery shortages**, well before the Russian invasion of Ukraine and the ensuing chaos.

• Shake up of maritime transportation rules becomes likely after cargo vessel ***Felicity Ace*** sinks off Azores with talk of lithium fire in EVs being transported.

• Shareholder reveals in February ahead of **Metair**'s results announcement that the South Africa holding group is to sell off its batteries business.

• Surprises at **Ecobat** as Marcus Randolph is appointed in March as its president and CEO taking over from incumbent Jimmy Herring.

• **Clarios** acquires Spanish recycler **Metalúrgica de Medina**.

• India's **Exide Industries** announces plan in March to invest $800 million in lithium manufacturing.

• **Gridtential** signs development agreement with **Camel Energy**.

• **Ahlstrom-Munksjö** launches AGM line in June in Italy. European battery production is still a mainstream market.

• **EU** warns in June 'hazard' classification could endanger battery investments/

• **Campine** acquires **Recyclex** in €3.5 million agreement in July after court process in May.

- **Mark Stevenson** wins International Lead Medal at ELBC Lyon iand becomes 29th member of Alpha/Beta club. Eckhard Karden also wins ILM.
- Senior management buy-out of **Monbat**, now one of the five largest battery manufacturers in Europe
- **Advanced Battery Concepts** wins BCI innovation award
- **Gridtential** announces plans to develop bipolar pilot line with Hammond and Wirtz.
- **Ace Green Recycling** plans to produce US lead in 2023.
- Clean-up envisaged for **Exide's** former plant at Vernon, California which enters 'next phase'.
- Industry first as **batteries insurance warranty scheme** launched.

2023

- UK and US legislators consider further laws to tighten up **lithium safety**.
- **ABC** agrees bipolar lead BESS projects deal
- Prices and **supply chain disruptions** hit all battery supplier firms.
- **International Energy Agency** warns further substantial hikes in all battery packs.
- New direction for lead with '**battolyser**; project launched.
- **Clarios** challenges Mexico claims on soil contamination
- **Lithiun fire** on container ship blamed on battery from hold EV cargo. Second such fire recorded.
- **Gopher Resource** wins BCI innovation award with better slag processing.
- Battery 'rogue genius' **William Brecht** dies at his home in Rio Rancho, New Mexico.
- **Leoch's** battery assembly plant in Monterrey, Mexico to be operational by end of year says chairman Dong Li.
- Battery and auto components group **Metair Investments**, 100% owner of Mutlu Aku, First National Battery and Rombat, appoints Johan Mouton as COO.
- **KORE Power** will use lithium separators manufactured at ENTEK's new plant under construction in Indiana,
- **Amara Raja Batteries** changes its name to Amara Raja Energy & Mobility showing new avenues of business

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

Visit us at the ELBC on booth 50.
15–18 September
Vienna, Austria 2026

NIEHOFF GRUPPE HFSAB

• The US Occupational Safety and Health Administration (OSHA) cites **US Battery Manufacturing** for four unsafe lead violations.

• The **Alpha-Beta Society** appoints battery veteran **Manfred Gelbke** as its 30th member.

• **Clarios** wins the circular economy category of the World Sustainability Awards.

• **Ecobat** sells its **Zimco Group** businesses in South Africa including lead manufacturing, recycling and chemicals firms to AutoX.

• **Sunlight Group** to spin off lead recycling into a new subsidiary to guarantee raw material supplies.

• Decision on controversial proposals for lead metal to be added to an expanded **European chemicals authorization register** is shelved until late 2024. Later until 2025.

• Lead battery developers are urged to apply for **US federal funding** worth up to $3.5 billion after energy chiefs clarify their eligibility for the cash.

• EU competition chiefs accuse **Clarios, Exide Technologies, Banner, Rombat, Fiamm Energy Technology** and its predecessor Elettra of possible collusion to fix starter battery prices, aided by trade association **EUROBAT**.

2024

• **Lee Koenig**, the driving force in creating the modern **Crown Battery**, dies aged 94.

• Lead recycler **Ecobat** commissions its first lithium recycling plant in the US.

• **Monbat** says it is mulling plans to sell off three subsidiaries including EAS Batteries — for which a planned deal fell through last year.

• **Ecobat** appoints Thomas Slabe as the company's third CEO and president in five years.

• The **Consortium for Battery Innovation** joins three-year US program for deployment of advanced lead batteries.

• The **Sunlight Group** signs agreement to acquire the remaining 50% stake in its German lead battery recycling subsidiary Ubatt.

• Industry leaders say new **lower workplace limits for lead** set to become EU law will create unnecessary compliance costs for battery manufacturers.

• European lead acid battery manufacturer **Exide Technologies** acquires German lithium battery tech firm **BE-Power**.

• **Sergio Pezzotti**, founder of battery components group **Accumalux**, dies in Monza, Italy on March 19 aged 91.

• **Largo and Stryten Energy** plan a 50-50 joint venture to be a key player in the vanadium supply chain for North American flow battery market.

• **US treasury secretary** Janet Yellen warns cheap exports from China of products including batteries are damaging national economies.

• Private equity firm **Trent Capital** Partners acquires full control of separator company Microporous.

• **EnerSys** chooses South Carolina as site to build its planned $500 million lithium ion gigafactory.

• South Korean car firm, **Hyundai Motor** and subsidiary **Kia** agree strategic cooperation with India's **Exide Energy.**

• **Leoch International** reveals plans to build two additional lead battery manufacturing plants (Malaysia, Mexico, as well as expanding lithium capacity in China and Vietnam.

• US Department of Energy awards $5 million each to **Battery Council International**, New Lab and Clean Tech Strategies to investigate long duration energy storage. Roger Miksad, president of BCI says: "This will bring together BCI, CBI and three national laboratories to conduct pre-competitive research aimed at improving lead battery performance."

• US Department of Energy Better Plants Program awards **EnerSys**, for the implementation of the Sovema Cold Cube cutting system.

• The most eagerly awaited party of the decade — the special centenary **BCI conference celebration** — kicks off in Fort Lauderdale, Florida. **ENTEK** wins BCI battery innovation award for its solvent-free separator technology. **Trojan Battery Company** wins Amplify marketing award with its "Say Yes to Trojan AES!" campaign.

• **Clarios** partners in JDA Swedish sodium ion cathode material and cell technology developer **Altris** to develop batteries for the automotive industry.

• US president, Biden, accelerates **trade dispute** with China on May 14 calls for hike of tariffs.

• Europe cannot keep up with the money being thrown at the electric vehicle and energy storage industries through **US Inflation Reduction Act**.

• The European Commission re-enters China **EU tariff war** and penalizes 'battery electric vehicles that benefit from unfair subsidization.'

• **Stanley Whittingham**, joint Nobel Prize winner for inventor of the lithium battery, awarded a knightbood

• **Paul Rüetschi**, legendary battery exponent from the 1960s to 1990s, dies a year short of his 100th birthday.

• **US Department of Energy** issues conditional loan of up to $1.2 billion to **ENTEK**, to finance making lithium-ion battery separators.

• The **Alpha-Beta Society** names **Frank Fleming** as its 31st member.

• **EnerSys** acquires **Bren-Tronics**, a manufacturer of portable power products including small and large format lithium batteries.

2025

• **Clarios** secures a major automotive contract for supercapacitors designed to work alongside AGM batteries in 12V and 48V vehicle architectures.

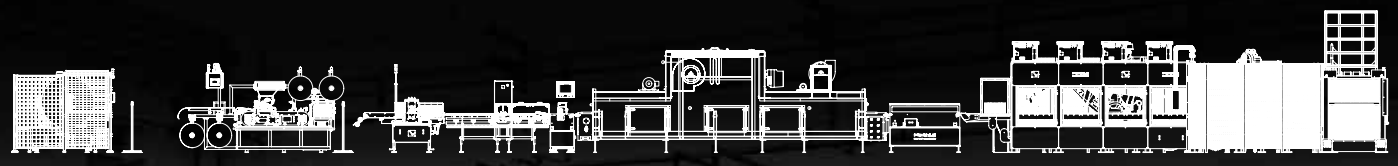
• **Hoppecke** launches its 'Clean Lead R3' branding — robust, resilient and recyclable — to underline the continuing development of advanced lead technology.

FRIMAX

BATTERY EQUIPMENT

THIN PLATE PURE LEAD

EQUIPTMEN FOR PASTING LINES



FRIMAX SMART FACTORY®

The pasting production line is integrated with Frimax Smart Equipment®

LABAYEN LABORDE GROUP

Informática, 22
19200 - Azuqueca de Henares
Guadalajara (Spain)

Phone: +34 949 260 653
E-mail: info@frimax.es
Web: www.frimax.es

- **LeadBattery360°** unveils an independent assurance and certification framework for responsible lead production and raw material sourcing worldwide.

- **Clarios** unveils a 10-year, $6 billion US investment programme centred on AGM batteries, critical minerals recovery, domestic manufacturing and next-generation storage technologies.

- **Battery Council International** says the US lead battery industry contributes more than $35 billion a year to the national economy and supports more than 106,000 jobs.

- **Northvolt** files for bankruptcy in Sweden after failing to secure a viable financial and operational future — a landmark setback for Europe's home-grown lithium battery ambitions.

- **Leoch International** wins a Rmb150 million contract to supply lead batteries for a major Fortune 500 data-centre project.

- **EnerSys** installs Shawn O'Connell as president and CEO as David Shaffer retires after a period of major expansion and restructuring.

- **DN Automotive** announces a major new lead battery factory project in Busan, South Korea, as it pushes towards annual production capacity of 10 million batteries.

- **Clarios** produces its one millionth 12V lithium-ion battery, marking a milestone in its drive to become a chemistry-agnostic low-voltage energy systems supplier.

- **EnerSys** opens an expanded manufacturing operation in South Carolina as the group continues to strengthen US production.

- **LeadBattery360°** names its first eight certified sites, including operations run by Clarios, East Penn Manufacturing, Ecobat and Boliden.

- **Endless LLP** acquires Ecobat Battery, taking over a 23-hub European distribution network supplying automotive and industrial batteries.

- **Campine** agrees to acquire Ecobat's French lead recycling and speciality lead operations as Ecobat accelerates the break-up of its European portfolio.

- **Clarios** reveals plans for a US technology campus built around supercapacitor production paired with advanced AGM batteries.

- **Ecobat** sells its Italian lead battery and polypropylene recycling operations to Haiki+, continuing a rapid series of European divestments.

- **East Penn Manufacturing** announces a leadership shake-up: Chris Pruitt moves to executive chairman, Pete Stanislawczyk becomes CEO and Christy Weeber president.

- **Clarios** agrees to acquire Ecobat's lead recycling operations in Germany and Austria, including plants at Freiberg, Braubach and Arnoldstein.

- **US government** proposes adding lead to the nation's critical minerals list, a move strongly backed by Battery Council International.

- **Amara Raja** says lead batteries still account for more than 95% of group revenue even as investment in its lithium business rises.

- **Battery Council International** warns that North America's lead sector remains reliant on imports despite the strength of its closed-loop recycling model.

- **GS Yuasa** says lead-acid batteries will remain the mainstay of its global business beyond the next decade, with strong demand expected through at least 2040.

- **Ecobat** agrees to sell its UK lead recycling business to Splitstone Capital, a deal that will leave the company close to a full exit from Europe's lead market.

- **Clarios** acquires supercapacitor specialist Maxwell Technologies, strengthening its position in high-power storage for vehicles, data centres and grid applications.

- **Nyrstar** casts its first antimony metal at Port Pirie, putting lead-smelting technology at the centre of a new US-Australia critical minerals supply chain.

- **Asahi Kasei** sells lead battery separator specialist Daramic to Kingswood Capital Management while redirecting investment towards lithium-ion separator technology.

- **European Commission** fines Exide, FET, Rombat and EUROBAT around €72 million over a long-running automotive starter-battery price-fixing cartel; Clarios receives immunity for revealing it.

- **International Lead and Zinc Study Group** forecasts continued growth in refined lead demand into 2026, with the battery sector remaining the dominant end use.

2026

- **Hollingsworth & Vose** wins BCI's 2026 Innovation Award for its Glass Electrode Material, developed with ArcActive to improve charge acceptance and cycle life in lead batteries.

- **Clarios** and **Altris** deepen their sodium-ion partnership and target serial production of low-voltage sodium batteries in Europe or the US before the end of the decade.

- **EnerSys** launches new thin plate pure lead DataSafe batteries for high-rate UPS duty as AI and data-centre power density rises.

- **Gravita India** confirms a major expansion of lead recycling capacity at Mundra, with the site moving towards 100,000 tonnes a year.

- **Acumuladores Moura and Nyrstar Stolberg** join LeadBattery360° certification, taking the number of independently assured sites to 10.

- **Clarios** selects its Meadowbrook plant in Michigan as an assembly site for supercapacitor systems designed to complement AGM batteries.

- **EnerSys** closes its Tijuana lead battery plant and shifts most production to Missouri as it consolidates manufacturing in the US.

- **EnerSys** passes four million global sales of its Hawker Armsafe Plus AGM thin plate pure lead battery for military and industrial applications.

- **Donna Snyder** receives Battery Council International's Distinguished Service Award after 42 years with East Penn Manufacturing.

- **Clarios** completes the acquisition of Ecobat's recycling plants in Germany and Austria — a transaction that marks Ecobat's exit from the European lead market.

- **Battery Council International** and **CRU** say the North American refined lead market will remain tight through 2028 while UPS lead battery demand surged 21% in 2025.

- **Ford Energy** launches a $2 billion US stationary storage business based on LFP technology, signalling the growing pull of data-centre and grid demand on the lithium sector.

- **Clarios** celebrates production of the 100 millionth AGM battery at its Zwickau plant in Germany.

- **ENEROC USA** becomes BCI's first lithium-only battery manufacturer member, a symbolic broadening of an association historically centred on lead.

- **Stryten Energy** agrees to acquire C&D Technologies and Trojan Battery in one of the largest consolidations of the North American lead battery industry in years.

- **Peak Energy** chooses Sacramento for a planned 4GWh sodium-ion BESS factory, underlining the accelerating challenge to lithium-ion in stationary storage.

- **Battery Council International** reports a 98% US lead recycling rate, confirming lead batteries as the country's most recycled consumer product.

- **US administration** moves to restrict exports of recoverable critical minerals including lead, tin and antimony in a bid to reinforce domestic battery supply chains.

- **European lead battery industry** wins a major regulatory reprieve as the next EU review of the exemption allowing lead batteries in vehicles is pushed beyond 2030.

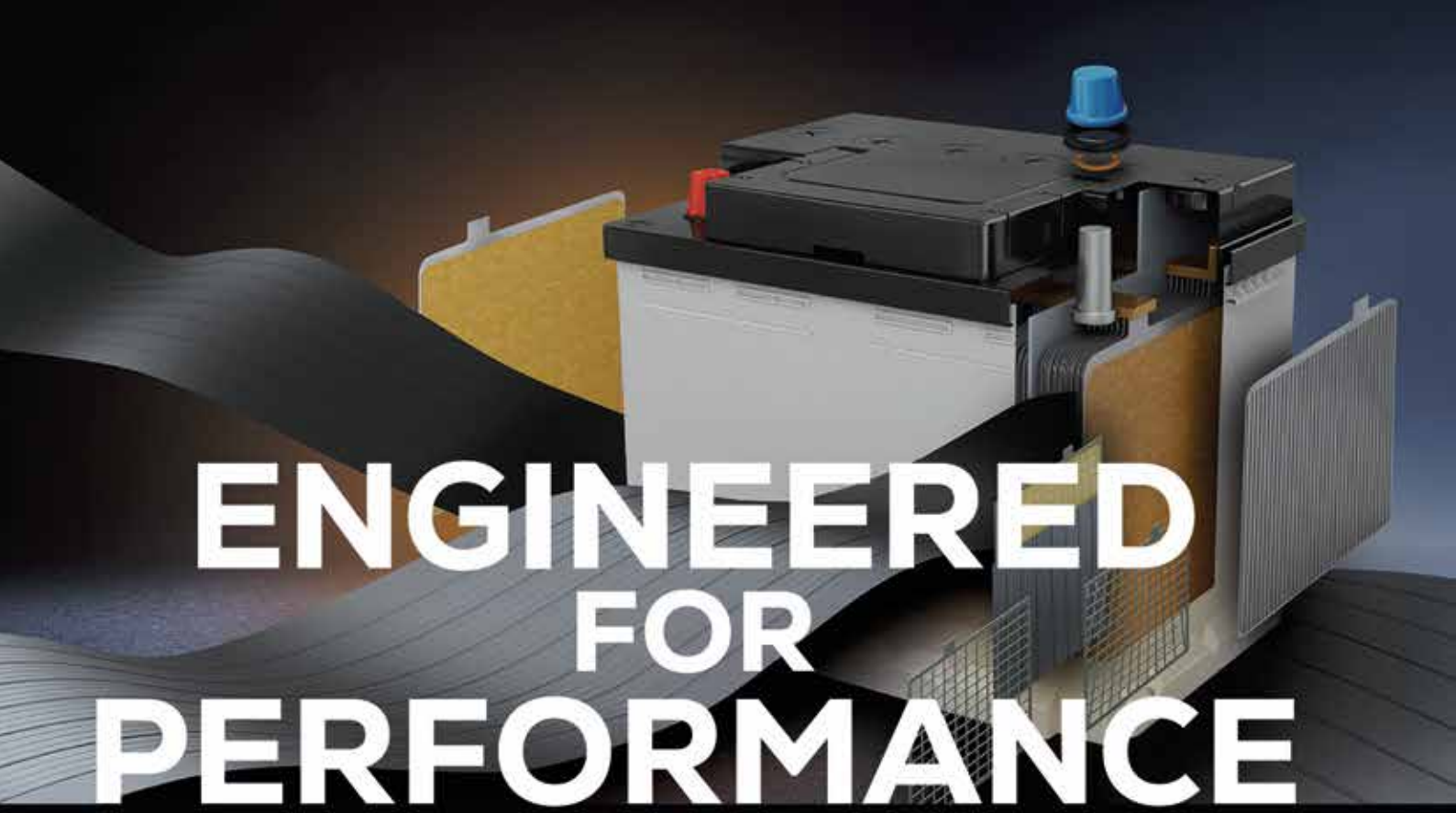
- **China's Tianneng** warns of a sharp profit fall as high raw-material costs and tougher competition hit its core lead-acid battery business.

- **Sea Legend** opens an Arctic route for Chinese EVs, lithium batteries and photovoltaic products to Europe, potentially cutting weeks from conventional shipping times.

- **Clarios** and **Boliden** sign a low-carbon lead supply agreement for European battery production, tightening the link between decarbonisation and closed-loop materials sourcing.

- **Leoch International** reports a 33% first-half profit increase despite trade disruption and higher energy costs, with network-power batteries still central to the business.

- **Asahi Kasei** opens a new US lithium-ion separator coating line at its Celgard site in North Carolina after disposing of Daramic's lead separator business.



ENGINEERED FOR PERFORMANCE

Advancing Separator Technology, Through Engineered Excellence.

Our advanced manufacturing processes and carefully selected raw materials ensure top-tier performance for Lead-Acid, Lithium, and Absorbent Glass Mat batteries—making us the go-to partner for dependable battery manufacturing and energy storage solutions.

ENTEK

BATTERY SEPARATORS

PE • AGM • Pasting Papers • Lithium

US +1 541 259 3901 • UK +44 191 268 5054
Singapore + 65 9757 9621 • India +91 738 883 3999
Japan / China +81 584 24 3733

www.entek.com • LinkedIn @entek-international

Hammond unveils $15m-plus investment and expansion drive

Two years after giving *Batteries International* editor, Shona Sibary, his first major interview at the helm, Bobby Lucas sits down with her again for ELBC to exclusively reveal plans for new US red lead capacity, further overseas expansion and the scaling up of its fast-growing Malaysian operation.

The last time I spoke to Bobby Lucas, president of Hammond group, he'd been in the job just 86 days, and told me his modus operandi was to listen, learn and ask questions. "I don't know, what I don't know," he said.

We touched base again in July, at the company's HQ just outside Chicago, and I was keen to see exactly what has changed at Hammond since the start of his tenure and whether the ambitions he outlined back in 2024 have come to fruition.

Lucas was hardly a stranger to Hammond when he took over from Terry Murphy in June 2024. He'd been legal adviser to its management team for more than 15 years and sat on the board for three. But running the company has given him a rather different perspective on the lead battery industry. In particular, just how collaborative it is.

Lucas spent much of his previous career in law, working in mergers and acquisitions and private equity, an environment where competitors were rather more protective of their territory.

"Big law firms tended to be all type A and, 'stay away from my clients,' he says. "This feels different.

"Of course, we're all still competitors at heart, and we want to win. But then there's this bigger cause, the whole industry and everybody wanting it to continue on and succeed."

Initially, Lucas was reluctant to make grand pronouncements about what he intended to change at Hammond. He talked instead resisting the temptation to change things simply for the sake of it.

But he did identify some priorities.

One was investment. Another was taking Hammond's international business to the next level. A third was ensuring its R&D was driven by what customers actually wanted.

Bobby Lucas,
president, Hammond group

Today, all three are very much in play.

Putting the money in

Over the next three years Hammond expects to invest around $15 million, potentially more, across the business.

"For us, it's a meaningful investment both domestically and overseas," Lucas says.

A significant focus is red lead.

When we last spoke, Lucas talked about the decline in externally supplied oxide as battery manufacturers increasingly brought production in-house.

That remains true of grey oxide.

"By and large, folks have internalized," he says, although Hammond continues to supply some customers and Lucas believes the industry values retaining external oxide suppliers for emergencies, equipment failures and as a second source.

Red lead, however, is another matter.

"That has not internalized in any way, and that's a growth market for a number of customers, especially Clarios."

AGM is an important part of the story, with Hammond expecting rising demand for red lead as customers expand production.

Lucas says there is currently no meaningful excess red lead capacity in the US, something Hammond has been discussing at board level as it looks at "filling that void and trying to grow with our customers."

And the company has already started.

Towards the end of last year Hammond installed a new electric red lead furnace from Eagle Oxide, which Lucas says produces around three times the output of its traditional furnaces. Further capacity could follow.

"We're looking at potentially investing in another furnace or two over the next year or two."

And while Hammond initially expected the electric furnace to produce a noticeable increase in electricity consumption, Lucas says that hasn't happened.

"I think it's just the efficiency and the output."

Did they follow the customers lead?

Perhaps more interesting is what has happened to another of Lucas's ambitions.

In 2024 he told *Batteries International* Hammond needed to let its customers lead where innovation should go.

There was little point, he said then, in developing "the next big thing" if none of its customers actually wanted it.

Two years later, he hasn't changed his mind.

"You can't force a customer to be concerned about what you think

they should be concerned about," he says.

"They have their own concerns, they have their own focus, they have their own mandates… ultimately you have to be responsive to it."

That has meant bringing Hammond's sales and R&D teams closer together.

The commercial team can identify what customers are asking for; the laboratory can investigate whether Hammond can provide it. But the two also need to establish whether an idea makes financial sense.

"Even if you've got the greatest idea in the world, if it's going to cost $50 a pound, you're never going to sell that as a value add to a battery manufacturer."

One example is SureCure® Hammond's additive used to accelerate formation.

Energy consumption was one of the issues Lucas highlighted in our original interview as becoming increasingly important to customers.

Now he can point to a product already addressing it.

"It helps accelerate formation time. Therefore, customers are using less energy to form their batteries," he says.

"They're making their plates, forming their plates a lot quicker with less energy."

The requirements vary enormously from customer to customer, from cycle life and cold cranking amps to charge acceptance, formation time and energy consumption.

Lucas's answer is much the same as it was when I first posed the question.

"Be responsive to what your customers are saying, be responsive to where they're having their problems, and then bring that back and try to solve for it in some way."

Going to them

Then there's the rest of the world.

In our first interview Lucas acknowledged that Hammond had not always been proactive enough internationally.

The company already sold into most markets, but he wanted to establish stronger foundations, particularly in Asia.

"In the past, I think we as an organization were a little passive internationally," he says. "I think we perhaps assumed that because we are an established name, international customers would find their way to our door. Now we're going to them."

The company has strengthened its international sales operation, with Anir Chakraborty based in Thailand and covering India and Southeast Asia, while Nourhan Moustafa, based in Dubai, covers the Middle East and Africa and also supports Hammond's European activities.

Hammond's Malaysian plant is also growing.

Success, however, presents another challenge.

"We're going to be up against it from a capacity perspective in the not too distant future," Lucas says, "and we are actively looking how to address that."

Lucas describes it as "a good problem to have".

"The most immediate need is just scaling, ourselves up in order to keep pace with what our customers need."

Not just 'buy my product'

There has been another lesson from Hammond's international push.

Customers want access to the technical people as well as the sales team.

Hammond has consequently been sending members of its laboratory and technical operation out alongside its commercial team.

"They want that partnership on the technical side," Lucas says.

"It's not just, 'Hey, buy my product.' It's, 'Hey, let's talk about what can this do. Here's how we can support you.'"

It is an approach Lucas says has gone "exceedingly well", and one that could ultimately see Hammond add more technical resources internationally.

Passport ready?

A tour of Hammond's expander facility gives a glimpse of what sits behind all that customer support.

The plant makes around eight batches a day, depending on product mix, equating to between 30,000lb and 60,000lb daily and roughly 10.5 million annually (4.8 million kg).

Around 200 different product mixes can be produced using different ratios and grades of the principal ingredients.

But in a Europe increasingly preoccupied with battery passports and traceability, it is Hammond's ERP system that catches the eye.

Unique lot numbers allow material to be traced backwards through production to the raw materials used, where they came from, when a batch was made and on which production line.

"We're already doing the battery passport right here," Lucas says, "It's just not government imposed."

A bigger pie

And what about lead itself?

The extraordinary growth predicted for energy storage, from renewables and grids to the voracious power requirements of data centres and AI, should theoretically present an enormous opportunity.

Lucas, however, is realistic about what the forecasts currently say.

"If you look at the way data centers or energy storage is ramping up overall, it still shows lead bumping along a little bit of an increase and everything else spiking," he says.

"The forecasts are not telling the story that lead is going to play an outsized role."

But when the pie itself is growing so dramatically, even a relatively small slice can be worth having.

Lucas describes lead as "the base case": established, proven and continuing to do its job while other technologies compete for emerging applications.

That doesn't mean Hammond is ignoring what comes next.

"We're very committed to lead, but we'd also be thrilled to get into one or more of the what's next."

The company is watching emerging technologies, including flow batteries, to see where its knowledge of materials and additives might translate into new opportunities.

Two years ago, Lucas was careful not to pretend he had all the answers.

Today, asked to score Hammond on where he wants the business to be, he gives it around seven out of 10.

There is still international growth to pursue, capacity to build and that $15 million or more to invest.

But perhaps what is most striking two years on is how closely the strategy resembles the one Lucas tentatively described after those first 86 days.

Listen to customers. Invest where the opportunity is real. Don't chase innovation simply for the sake of it. And don't assume the business will come to you.

Back then, Lucas said some of the best ideas would come from other people and that his job was to let them be heard.

Today, it seems he is still listening. ■

FURNACES | MELT POTS | SILOS | REACTORS | MILLS | AUTOMATION | CONVEYORS | MIXERS | GRID SYSTEMS

ENGINEERS
EQUIPMENT
EXPERTISE

ELBC 15–18 September Vienna, Austria 2026

CONTIGRID™ *Imagine your entire* ***Grid Manufacturing*** *flow in a single engineer-optimized line.* ***More at... BOOTH 79.***

We Engineer Tough Machines To Fit Battery Manufacturing Lines Around the Globe

Eagle builds a wide range of equipment for oxide production and handling. From Ball Mills and Barton Reactors to integrated automation systems, conveyors, and material handling solutions, Eagle products are designed for reliability, efficiency, and seamless operation within demanding production environments.

VISIT THE EAGLE **EQUIPMENT** PAGE ON OUR WEBSITE

EAGLE
ENGINEERS | EQUIPMENT | EXPERTISE

EngineeredByEagle.com

5605 West 74th Street, Indianapolis, Indiana USA 46278

CALL: (317) 290-8485

ELBC
15–18 September
Vienna, Austria 2026

AFTER HOURS

Let's take a look at what's on the doorstep!

Here's our definitive map of top spots within easy reach of the conference.

Whether you have a free hour, a spare evening or just want to explore more of this incredible city, we know your time is precious. So here are some great suggestions for making the most of your visit, on the clock.

7 MINS

1 ST STEPHEN'S CATHEDRAL

U1 + short walk

Vienna's Gothic heart and the perfect starting point for exploring the old city. Climb 343 steps for unforgettable views.

BEST FOR: An iconic first stop.

12 MINS

2 LOOS AMERICAN BAR

U1 + short walk

A 27-square-metre cocktail bar designed by Adolf Loos in 1908. Marble, mahogany and martinis – open until 4am.

BEST FOR: One drink that becomes three.

YOU ARE HERE

AUSTRIA CENTER VIENNA

Bruno-Kreisky-Platz 1, 1220 Vienna

U U1 Kaisermühlen-VIC

7 MINUTES TO OLD VIENNA

The U1 runs directly from Kaisermühlen-VIC to Stephansplatz in just seven minutes.

FLYING INTO VIENNA? READ THIS

From 7 September 2026, major works close the central section of Vienna's S-Bahn line, changing the usual airport connections.

- The City Airport Train (CAT) is replaced by premium buses between Vienna Airport and Wien Mitte.
- S7/REX7 services are operating altered routes.
- The Vienna Airport Bus serves Kaisermühlen-VIC, beside the Austria Center.
- Railjet and Intercity trains continue to run directly to Vienna Hauptbahnhof, with an easy change to the U1.

Allow a little extra time and check your route before travelling.

35 MINS

10 MAYER AM PFARRPLATZ

U1 + bus or taxi

A traditional Viennese Heuriger dating back to 1683. Beethoven lived here in 1817 while working on his Ninth Symphony. Sit beneath the vines and enjoy the house wine.

BEST FOR: The evening you remember from ELBC.

35 MINS

9 SCHÖNBRUNN PALACE

U1 + U4

The magnificent former Habsburg summer residence. State rooms, vast gardens and the Gloriette overlooking Vienna.

BEST FOR: Going properly imperial.

3 ZUM SCHWARZEN KAMEEL

U1 + short walk

A Viennese institution for centuries. Famous for its wine, open sandwiches and beautiful atmosphere.

BEST FOR: Lunch, wine and impressing a client.

4 KLEINES CAFÉ

U1 + short walk

Tiny, atmospheric and delightfully unpolished. Sit outside on Franziskanerplatz and watch Vienna go by. Open until 2am during ELBC.

BEST FOR: Coffee without the chandeliers.

5 THE PRATER

U1 + short walk

Home to the iconic Wiener Riesenrad and a huge amusement park. A Vienna classic, just minutes from ELBC.

BEST FOR: Fabulous views and a bit of fun.

WHILE YOU'RE THERE...

SCHWEIZERHAUS

Vienna's legendary beer garden. Fresh beer, crispy pork knuckle and chestnut trees. Open daily 11am–11pm.

BEST FOR: Beer, pork kunckle and good company.

6 HUNDERTWASSERHAUS

U1 + short walk

Vienna without a ruler. A riot of colour, trees and irregular windows from artist Friedensreich Hundertwasser. You can't tour the apartments, but the exterior alone is worth the trip.

BEST FOR: The photograph everyone will ask about.

7 BELVEDERE PALACE

U1 + short walk

Baroque splendour and home to Klimt's *The Kiss*. The Upper Belvedere is open 9am–6pm during ELBC (the Marble Hall at the Lower Belvedere is closed until 17 September).

BEST FOR: Art, history and grand gardens.

8 NASCHMARKT

U1 + short walk

Vienna's best-known market stretches for 1.5 kilometres, with stalls, cafés and restaurants serving everything from Austrian produce to global flavours.

BEST FOR: Grazing.

US declares 'national emergency' amid fears of cyber attacks on BESS, power sector

Picture credit: Envato

The US has declared a cyber security national emergency in a bid to protect battery energy storage systems and the wider power infrastructure from Trojan horse-style attacks.

BESS and UPS systems are specifically included in an extensive list of potential cyber warfare targets among bulk-power system electrical equipment (BPSEE) produced abroad — which the US fears are at heightened risk.

The energy systems cyber alert was outlined in an executive order signed by US president Donald Trump on August 26.

The order — covered by the International Emergency Economic Powers Act and the National Emergencies Act — largely prohibits certain foreign-made equipment from being bought or installed in the US, including critical software and digital capabilities.

BPSEE covers a wide range of equipment and installations including power stations, backup power systems and grid-connected inverters.

Trump said energy secretary Chris Wright will now work with cabinet colleagues and others to identify BPSEE that may pose risks and draw up a safeguards action list, with a particular focus on equipment linked to US-designated foreign entities of concern (FEOC).

'Supply disruption'

"Since my first term, the threat to the US regarding foreign supply of bulk-power system electric equipment has become even more acute," Trump said.

"The rapid growth of advanced manufacturing, datacentres, artificial intelligence and defence production has increased the nation's dependence on abundant, reliable electricity and magnified the consequences of a successful attack or supply disruption on the bulk-power system."

The president's directive follows a report issued last month by the US Solar Energy Industries Association (SEIA), which warned as solar and energy storage continues to expand, cybersecurity protections become increasingly important to support grid reliability and resilience.

SEIA cited a 2022 ransomware attack against the IT infrastructure of a wind turbine manufacturer in Germany, followed a year later by an attack that saw a third-party service provider lose remote data monitoring capabilities for around 2,000 turbines.

'New risks loom'

Separately, in 2025, Poland successfully thwarted what officials described as the largest cyberattack on its energy infrastructure in years, SEIA said.

Emerging technologies, including the deployment of advanced artificial intelligence models to optimise energy assets, create new cybersecurity risks and expand the attack surface.

The association revealed it now runs a monthly cybersecurity working group dedicated to sharing latest cybersecurity policy, threat information and defence tactics for solar and energy storage systems.

In the UK, the government confirmed that a power plant was shut down during a cyber attack in July 2026. Reliable media sources reported that the attack was carried out by hackers affiliated to the Iranian regime.

The UK government declined to give details but said the Department for Energy Security and Net Zero and National Cyber Security Centre have since warned power companies to be on their guard.

EU cyber concerns

A white paper published in December 2025, by global consulting firm the Brattle Group and US-based international operational technology cybersecurity specialists Dragos, said experts agreed that US infrastructure security concerns would likely lead to more stringent security measures towards FEOCs.

In terms of the European Union, the white paper said the bloc's Cyber Resilience Act, which goes into effect in 2027, will certify every product for sale in the EU meets European cybersecurity standards.

However, while experts agreed that consistent, EU-wide policy was the correct method to approach grid cybersecurity, the white paper warned that member states without the same agenda or policies would create a lack of harmonisation among operators on the same grid.

"Diverging rules between European countries create vulnerability to the highly interconnected European power network, resulting in higher regulatory compliance costs for investors and differing levels of cybersecurity implementation in the European internal energy market."

The white paper said BESS deployment over the next five years is expected to grow at 30% annually in the US, 45% in the EU and 20–25% across Japan, South Korea, Southeast Asia and India.

"As BESS deployment accelerates, it is important that the increasing role of batteries in facilitating efficient clean energy and grid reliability is not undermined by cybersecurity vulnerabilities.

"Conversely, BESS additions with strong cyber protection will contribute to lower levels of vulnerability for the grid as a whole." ■

DROSS ENGINEERING OFFERS COMPLETE RECYCLING SOLUTIONS FOR NON-FERROUS METAL

We are a French company with more than 50 years of experience in design and manufacturing equipment for recycling non ferrous metal: **lead, aluminium, zinc** and **copper.**

Battery breaker line

AIMS & OBJECTIVES

- + Improve **productivity**
- + Improve **working conditions**
- + Respect the **environment**
- + Increase recovery
- + **Decrease waste**

TRF : Tilting Rotary Furnace

OUR ACHIEVEMENTS

WORLD WIDE PRESENCE

+150	+80	+50	+25	+15	+15	+15
TRF: tilting rotary furnace	loaders	kettles	breakers	dust filters	stackers	battery breaker line

ONE STEP BEYOND FOR THE PLANET

dross-engineering.com

DROSS ENGINEERING

HADI® Accumaschinen

Special machines for the pro

CC-6

Fully automatic die-casting machine for the production of tubular lead-grids.

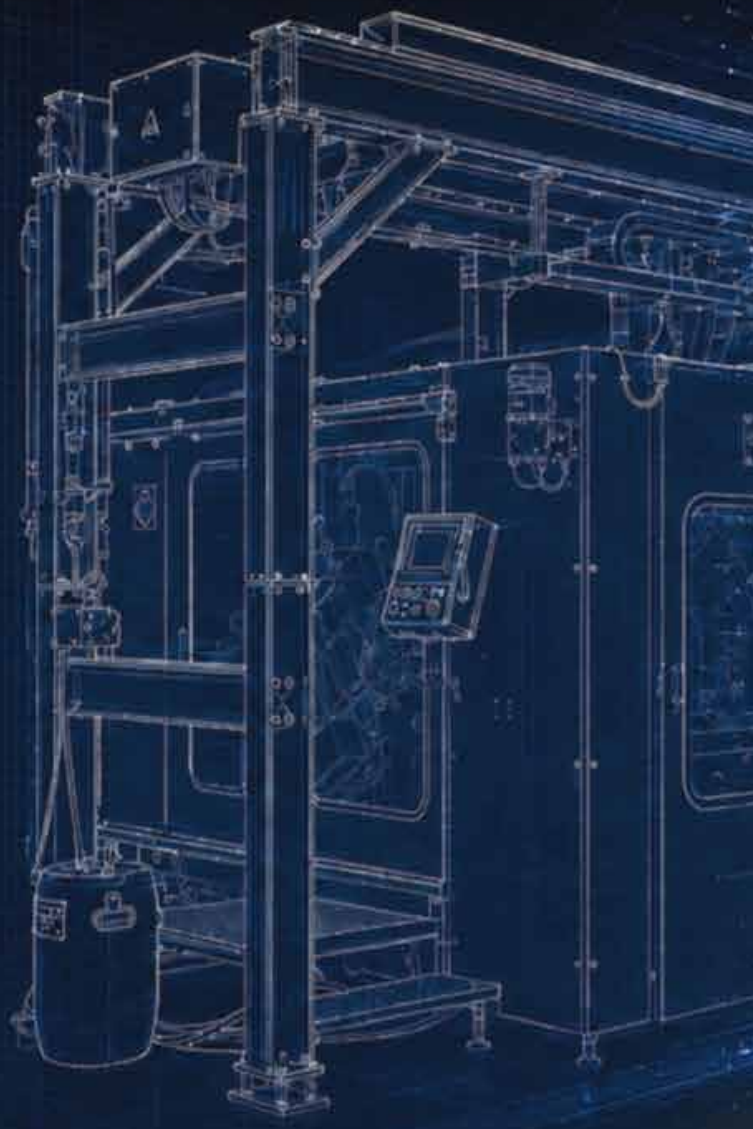
- proven technology
- modular system

Designed for DIN and BS grids or oversized grids (submarine)

Cycle-time: approx. 20 sec. *

output / min :
either
3 double-grids per cast
= 6 single-grids
or
3 oversized grids (submarine)

* depending on grid design



VISION

HADI Offermann Maschinenbau GmbH
Gevelsberg, Germany
hadi-germany@hadi.com

duction of lead accumulators

HADI®
Accumaschinen

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

Is the Arctic set to be China's new battery highway to Europe?

Picture credit: Envato

China is turning the Arctic into a new maritime highway for its battery and EV industries, opening a dramatically shorter route to European markets as conflict and disruption continue to plague traditional global shipping lanes.

Chinese carrier Sea Legend has begun regularising its China-Europe Arctic Express, following a successful trial voyage last year carrying Chinese electric vehicles and other high-value manufactured goods through Russia's Northern Sea Route.

The attraction is speed. The Arctic passage can put cargo into northern Europe in around 20 days, compared with roughly 40 days through the Suez Canal and as much as 50 days when vessels are forced around Africa's Cape of Good Hope.

For battery manufacturers — particularly those shipping high-value lithium cells, battery packs and EV components — cutting several weeks from the journey could have significant implications for inventory, working capital and European supply chains.

And what began as an experiment is becoming considerably more serious.

Temperature control

Sea Legend has scheduled eight consecutive weekly sailings from Ningbo-Zhoushan between August and October this year, deploying seven vessels compared with the single ship used for its 2025 trial.

Russian Information & Analytical Agency PortNews said on August 15 that Chinese lithium battery manufacturer EVE Energy will be among firms involved in some of the early shipments to test the transport chain for a small batch of power batteries, including temperature control and customs clearance, although *Batteries International* has not independently verified that report.

Batteries International can also confirm that South Korea is also exploiting the new route to lucrative European markets, with that country's PanStar line setting off on a pilot trip through the Arctic on or around August 22.

PanStar has not disclosed detailed cargo inventories but confirmed it would be shipping "a wide range of products including automotive parts" on the voyage from Busan Port with subsequent onward journeys to Rotterdam in the Netherlands, Hamburg in Germany and Gdańsk in Poland.

Asia's Silk Road tributary through the normally frozen Arctic wastes is in part thanks to climate change, which has made the region more navigable at certain times of the year.

Warm relations between Asian nations such as China and Russia — whose state-owned atomic energy corporation Rosatom is responsible for issuing shipping permits for the NSR — are also a major geopolitical factor.

Environmental concerns

The Mediterranean Shipping Company (MSC), the world's largest container shipping line, has already ruled out operating any Asia-Europe services via the NSR.

The announcement came as the China-Europe Arctic Express initiative was launched in 2025.

MSC said while the NSR offered potential advantages — such as shorter transit times and lower fuel consumption — its stance underscored "risks and uncertainties" associated with the route, not least on environment and regulatory grounds.

Batteries International has seen the first batch of sailing schedules for the China-Europe Arctic Express that were released by the China Shipowners' Association on July 29.

In addition to Sea Legend, voyages will be undertaken by China's Xin Xin Shipping, Ningbo Hongkun Shipping, Dalian Trawind Shipping, Tianjin Yueqian Shipping and and Shanghai Dahua Shipping.

According to the published schedules, participating operators plan to deploy around 20,000 teu (20 foot equivalent unit) of container ship and multi-purpose vessel capacity, together with around 1.4 million deadweight tonnes (DWT) of bulk carrier capacity.

Sea Legend itself will run eight fixed weekly sailings though to early October, using seven vessels and targeting transit times of around 20 to 22 days.

According to the China National Shipping Service (CNSS), cargo will include lithium ion batteries, photovoltaic products and new energy vehicle/EV components.

Resilient supply chains

CNSS said the move will shorten trips between Chinese ports and key

ACCURATE PRODUCTS

Accurate Data

- Increase production output with real-time data.
- Benchmark identical machines effortlessly.
- Stay ahead of breakdowns with prescriptive maintenance.
- Receive fast online support through AP Service.
- Improve your annual profit through higher uptime and stability.

NEWS!
Cold Cubing

Save money and reduce dross by using our cubing machine for your oxide ball mill production

ACCURATE PRODUCTS

Supplier of first class equipment and services to the lead Acid Battery Industry since 1950

HOBROVEJ 74 · DK-2610 ROEDOVRE · DENMARK · TEL +45 4453 4546 · WWW.ACCURATE.DK

accurate@accurate.dk

Baltic gateways by around a third, as businesses seek more diversified and resilient supply chains amid rising risks along traditional maritime routes.

The new service will consolidate cargo from multiple Chinese ports before calling at Ningbo-Zhoushan Port and sailing for Felixstowe in the UK, with connections to other European ports including Rotterdam, Netherlands, Wilhelmshaven in Germany, and Poland's Gdynia.

Industry calculations cited by CNSS claim the Arctic route can shorten the sailing distance on some Northeast Asia-Northern Europe services by around 30%-40%, compared with conventional seaways via the Suez Canal or the Cape of Good Hope.

Sea Legend has deployed seven container vessels ranging from 1,384 teu to 4,890 teu. The first sailing, to be operated by the Dubai Tower, was scheduled to leave Ningbo on August 15 and arrive at Felixstowe on September 7.

The Chinese Communist Party-backed Global Times claimed the Arctic's "naturally low temperatures can be suitable for the transport of high-value goods such as energy-storage, helping reduce some temperature-related transport risks". However, no firm scientific evidence was cited.

PanStar general manager Kang Sang-in has said the Korean pilot voyage offered an opportunity to open a new chapter for the country's shipping industry.

"We have largely alleviated market concerns about the Arctic route, seeing it lead to actual bookings and confirming its commercial potential."

The pilot will comprehensively verify operational safety and business viability and lead to a review of potential regular services using the Arctic in the future.

New energy vehicles

China's state Xinhua news agency reported in September 2025 that Sea Legend had tested the viability of faster Arctic shipping with a single voyage last year with cargo mainly comprising new energy vehicles, lithium batteries and photovoltaic products.

The voyage from Ningbo-Zhoushan Port to Felixstowe was completed in around 20 days — despite reducing speed as a result of severe weather in the Norwegian Sea, Xinhua said.

According to Jian Junbo, director of the Center for China-Europe Relations at Fudan University's Institute of International Studies, growing trade between East Asia and Europe is providing another source of momentum.

Note: Usual Northern Sea Route shown for illustrative purposes.
Source: Sea Legend

"As a rising share of China's exports consists of higher-value advanced manufactured products, new Eurasian transport corridors have a stronger cargo base on which to develop."

Hu Qimu, a professor at the Maritime Silk Road Institute of Huaqiao University, said traditional shipping routes still hold advantages in capacity, infrastructure and established networks, but rising geopolitical tensions had pushed up fuel and operating costs on some corridors, while tighter control over key ports had added to concerns over global shipping security.

"Against this backdrop, developing alternative corridors and building a more diversified shipping network have become an increasingly necessary choice."

Gordon Chang, a distinguished senior fellow and member of the advisory board of the Gatestone Institute — a non-profit international policy council and think tank — said in analysis published on August 18: "For many reasons, the world's biggest shipping companies do not sail the NSR. It is, for instance, not passable in winter, and even in summer ships can end up trapped in ice.

"Moreover, Russia, after its 2022 invasion of Ukraine, has been heavily sanctioned and most companies do not want to deal with Rosatom, which issues permits for the NSR."

Marie-Caroline Laurent, group senior VP for maritime policy and government affairs at global container shipping company MSC, told the International Chamber of Shipping earlier this year that the firm would not use the NSR as a maritime trade route to transit the Arctic.

"There are significant safety, environmental and social issues surrounding trans-Arctic shipping. These issues also raise questions of the operational viability and economic case for the use of the NSR.

"While transit times may be reduced during a limited period of the year, any perceived gains are likely to be entirely outweighed by significantly higher costs, capacity restrictions, and the operational uncertainty inherent to the route — particularly due to heightened geopolitical tensions."

Sanctions complications

Meanwhile, insurer Allianz Commercial said in its 2026 safety and shipping review that sanctions imposed on Russia after the invasion of Ukraine could complicate rescue efforts if a vessel gets into trouble in the Arctic and requires assistance.

According to Allianz, the Arctic economy has tripled in size since 2003 to more than $650 billion, driven by resource extraction, trade route development and increased investment, particularly from Russia.

Allianz analysis showed that machinery damage or failure was the cause of almost half of the 500+ reported shipping incidents in Arctic Circle waters over the past decade. ■

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.

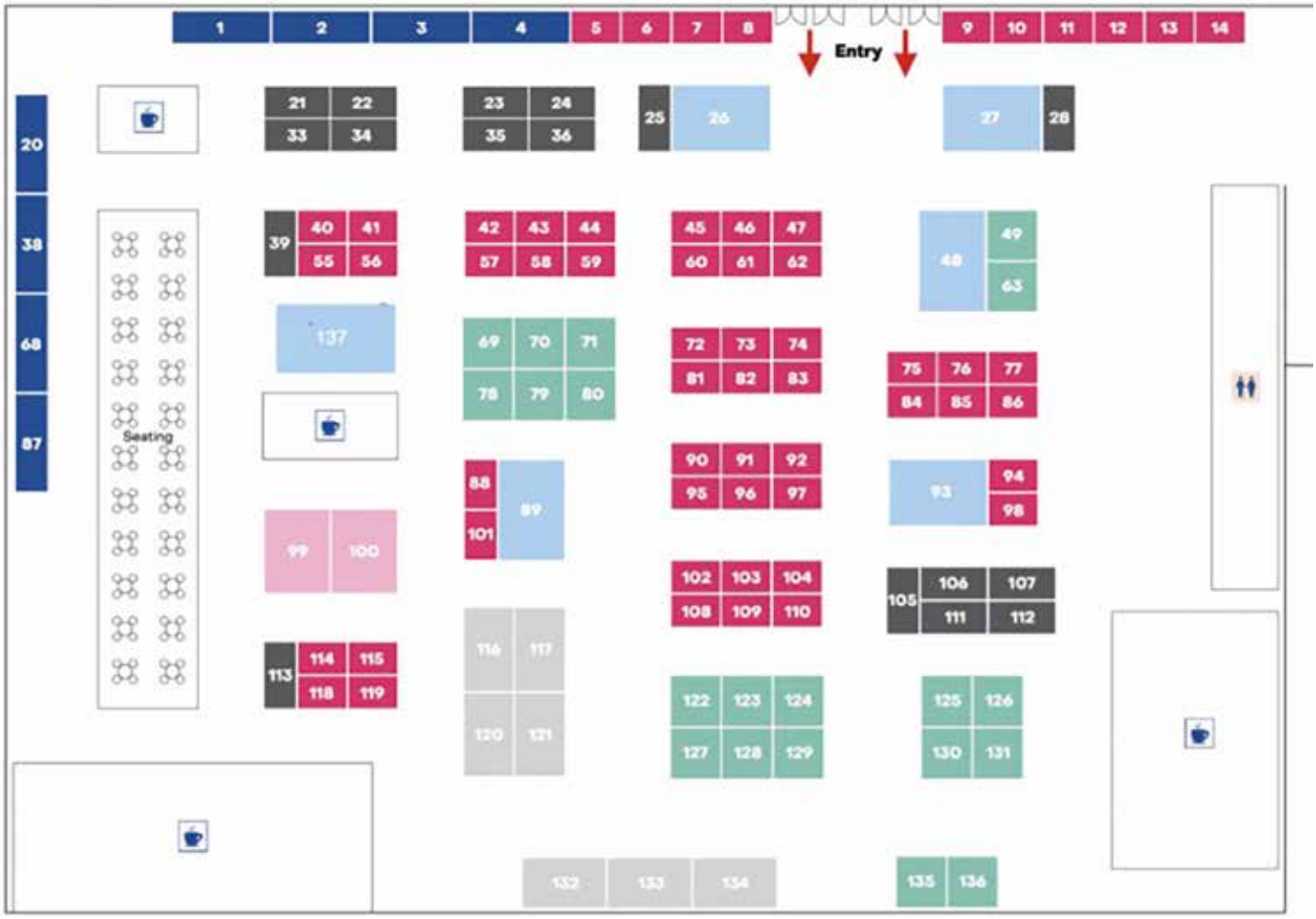
bfs batterie füllungs systeme GmbH
info@bfsgmbh.de

Kiesweg 1 | 85232 Bergkirchen | Germany
bfsgmbh.de | +49 8131 36400

ELBC
15–18 September
Vienna, Austria 2026

Alphabetical list of exhibitors and floorplan

A.T.I. Applicazioni Tecnologie ad Iniezione 37
Abertax Technologies 86
Abhison Engineering 114
Accuma 137
ACCUMALUX 35
Accumation 102
Accurate Products 41
Ahlstrom 101
AKUMSAN AKU MALZEMELERI VE ARAC DONUSUM TEKNOLOJILERI 99
Alfakutu ve plastik san tic 117
Alpha Beta Fiberglass Product 90
Amer-Sil 42
ANDRITZ Sovema 125
Aquila Forged Metals 26
Associated Electrochemicals 105
Atomized Products Group 126
Batek 122
Batteries International (Media Partner) M103
Battery Technology Source 19
Battery Watering Technologies 4
Battery-Global Web (Media Partner) M101
Bernard Dumas 45
BEST Magazine (Media Partner) M100
Better Technology Group 116
BFS batterie füllungs systeme 32
BIASIN – PP Battery Components 72
BJ Industries 51
BM-Rosendahl 29
Booyeoung Engineering 12
CAM SRL 57
Chang Zhou Jiu Lian Battery 40
Changxing Jiguang New Energy Technology 8
CMWTEC Technologie 93
COLOROBBIA 74
Consortium for Battery Innovation 36
CONTINUUS-PROPERZI 22
Creative Fibre Products 15
DARAMIC 100
Degani Aldo 135
Design India 96
Digatron Power Electronics 25
DITEC Engineering 135
DSC Group 78
Eagle Oxide 79
EBC Korea 13
Eirich Group 3
Engitec Technologies 71
Entek 48
Eswari Global Metal Industries 131
Ferrazza 135
Frimax Battery Equipment 103
FRÖTEK Group 109
GME Recycling 124
Golden Sunlight Power Equipment Technology 88
Goonvean Core Engineering 106
Goonvean Fibres 106
Gravita India Limited 64
Guangzhou TongShangDe Intelligent Equipment 46
H. Folke Sandelin 50
HADI-Maschinenbau 89
Hammond Group UK 47
Hollingsworth & Vose 111
Hubei Lham Energy Tech 59
Hunan RE Technology 11
Imerys 31
International Lead Association 36
Jiangsu Derongfu Rubber & Plastic Technology 18
Jiangsu Dongshun New Energy Tech 95
Jiangsu Jinfan Power Technology 80
Jiangsu Magicpower Equipments & Technology 44
Jiangsu Sanhuan 9
Jiangsu Shengda Environmental 7
Jiangsu Yat Fei Technology 43

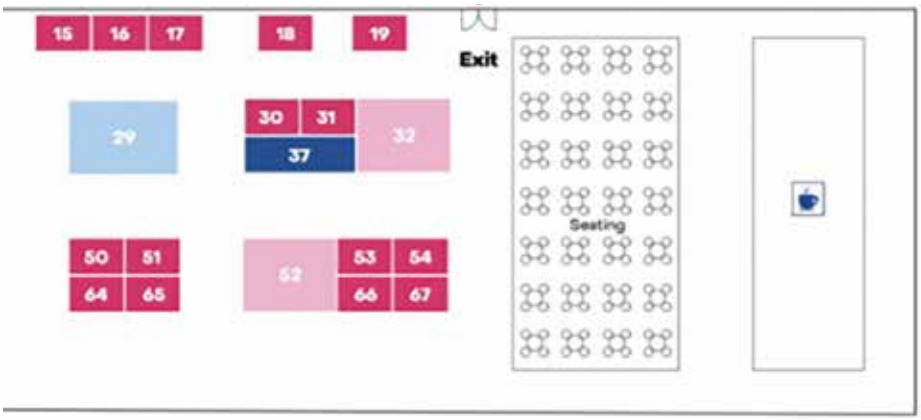


Organised by

International Lead Association

CONSORTIUM FOR BATTERY INNOVATION

Jinxin (Zibo) Power Material	82
KAE LII MACHINE MFG.	30
Källström Engineering Systems	62
KOBRATEC INDUSTRIA E TECNOLOGIA	24
Kustan	92
La Pneumatica	135
MAC Engineering	84
Magnera	113
Mate Gauge	127
Mecondor spa	21
Microporous	121
Moojin Service	49
Nanjing Fiberglass Research & Design Institute	123
Nanjing HEM Technology	27
Nanjing Ronghe Automation Technology	76
O.M. Impianti	14
Officina Meccanica Romanese	73
Otter Lake Technologies	115
PB South America (Media Partner)	M102
PeliPaper	108
Penox Group	94
Puyang HuiTong Science and Technology	104
Quanzhou Yucry Traffic Appliances	6
Rijie Group	10
Separator Technology (BengBu)	118
SERI PLAST	33
Shandong Jinkeli Power Sources Technology	107
Shandong Province Shenxian Huayang Industrial	81
Shandong Xinxu Group Corporation	55
Shenyang Huanyu Polyester Gauntlets	58
Sorfin Yoshimura	75
SSRL Battery Chemicals	17
SST	119
Taizhou Huangyan JMT Mould	110
TBS Engineering	29
Terranova Papers	129
TianChang YongChang Fiberglass Products	16
UK Powertech	39
Uniseg Products	54
VEFFIcharge	5
W. Pilling Kesselfabrik	67
WEGMANN automotive	83
Wirtz	70
Wuhan Hilans Automation Machine	77
Zhejiang Hongda Special Rubber Products	91
Zhejiang Yuanrun Intelligent	97
Zhenjiang Yunfeng Power Material	34
Zhongshan Kenpo Plastic Tech	61



Exhibitors by stand number

Eirich Group	3
Battery Watering Technologies	4
VEFFIcharge	5
Quanzhou Yucry Traffic Appliances	6
Jiangsu Shengda Environmental	7
Changxing Jiguang New Energy Technology Co., Ltd	8
Jiangsu Sanhuan	9
Rijie Group	10
Hunan RE Technology Co., Ltd.	11
Booyeoung Engineering	12
EBC Korea	13
O.M. Impianti S.r.l.	14
Creative Fibre Products Pvt. Ltd	15
TianChang YongChang Fiberglass Products Co;Ltd	16
SSRL Battery Chemicals Private Ltd	17
Jiangsu Derongfu Rubber & Plastic Technology Co., Ltd.	18
Battery Technology Source Co., Ltd	19
Mecondor spa	21
CONTINUUS-PROPERZI S.P.A.	22
KOBRATEC INDUSTRIA E TECNOLOGIA LTDA	24
Digatron Power Electronics GmbH	25
Aquila Forged Metals	26
Nanjing HEM Technology Co., Ltd	27
BM-Rosendahl	29
TBS Engineering	29
KAE LII MACHINE MFG. CO., LTD.	30
Imerys	31
bfs batterie füllungs systeme GmbH	32
SERI PLAST Spa	33
Zhenjiang Yunfeng Power Material Co., Ltd.	34
ACCUMALUX S.A.	35
Consortium for Battery Innovation	36
International Lead Association	36
A.T.I. Applicazioni Tecnologie ad Iniezione S.p.A	37
UK Powertech Ltd	39
Chang Zhou Jiu Lian Battery	40
Accurate Products	41
Amer-Sil	42
Jiangsu Yat Fei Technology Co., Ltd	43
Jiangsu Magicpower Equipments & Technology Co., Ltd	44
Bernard Dumas	45
Guangzhou TongShangDe Intelligent Equipment Co., LTD	46
Hammond Group UK	47
Entek	48
Moojin Service Co., Ltd	49
H. Folke Sandelin AB	50
BJ Industries	51
Uniseg Products	54
Shandong Xinxu Group Corporation	55
CAM SRL	57
Shenyang Huanyu Polyester Gauntlets Co., Ltd.	58
Hubei Lham Energy Tech Co., LTD	59
Zhongshan Kenpo Plastic Tech Co., Ltd.	61
Källström Engineering Systems AB	62
Gravita India Limited	64
W. Pilling Kesselfabrik GmbH & Co. KG	67
Wirtz	70
Engitec Technologies S.p.A.	71
BIASIN S.P.A. – PP BATTERY COMPONENTS	72
Officina Meccanica Romanese SRL	73
COLOROBBIA	74
Sorfin Yoshimura	75
Nanjing Ronghe Automation Technology Co., Ltd	76
Wuhan Hilans Automation Machine Co., Ltd.	77
DSC Group	78
Eagle Oxide	79
Jiangsu Jinfan Power Technology Co., Ltd	80
Shandong Province Shenxian Huayang Industrial Co., Ltd	81
Jinxin (Zibo) Power Material Co., Ltd	82
WEGMANN automotive GmbH	83
MAC Engineering	84
Abertax Technologies	86
Golden Sunlight Power Equipment Technology Co., Ltd	88
HADI-Maschinenbau	89
Alpha Beta Fiberglass Product Co., Ltd	90
Zhejiang Hongda Special Rubber products co ltd	91
Kustan GmbH	92
CMWTEC Technologie GmbH	93
Penox Group	94
Jiangsu Dongshun New Energy Tech Co., Ltd	95
Design India	96
Zhejiang Yuanrun Intelligent Co.,Ltd	97
AKUMSAN AKU MALZEMELERI VE ARAC DONUSUM TEKNOLOJILERI A.S	99
DARAMIC	100
Ahlstrom	101
Accumation GmbH	102
Frimax Battery Equipment	103
Puyang HuiTong Science and Technology Co., Ltd	104
Associated Electrochemicals Pvt Ltd	105
Goonvean Core Engineering	106
Goonvean Fibres	106
Shandong Jinkeli Power Sources Technology Co., Ltd.	107
PeliPaper	108
FRÖTEK Group	109
Taizhou Huangyan JMT Mould Co., Ltd	110
Hollingsworth & Vose	111
Magnera	113
Abhison Engineering LLP	114
Otter Lake Technologies, LLC	115
Better Technology Group Ltd	116
Alfakutu ve plastik san tic ltd sti	117
Separator Technology (BengBu) Co., Ltd.	118
SST Co	119
Microporous	121
Batek	122
Nanjing Fiberglass Research & Design Institute Co.,Ltd.	123
GME Recycling	124
ANDRITZ Sovema S.p.A.	125
Atomized Products Group, Inc.	126
Mate Gauge	127
Terranova Papers	129
Eswari Global Metal Industries Ltd	131
Degani Aldo	135
DITEC Engineering	135
Ferrazza	135
La Pneumatica	135
Accuma	137
BEST Magazine (Media Partner)	M100
Battery-Global Web (Media Partner)	M101
PB South America (Media Partner)	M102
Batteries International (Media Partner)	M103

ABERTAX®
TECHNOLOGIES

Smart Monitoring, Longer Battery Life

Enhancing Battery Longevity through Robust Monitoring Devices in Battery Applications

Precision Venting, Maximum Lifespan

Maximizing AGM Battery Lifespan – The Role of High-Quality Valve in Automotive Batteries

www.abertax.com
info@abertax.com
+356 23678100
@AbertaxTechnologies
Abertax Technologies

Mike Halls • editor@batteriesinternational.com

Lead: time to shake off its bad boy image?

Here's a story of unintended consequences, good intentions and a legacy that haunts our entire lead battery industry to this day.

Thomas Midgley Junior isn't so well known now. But until his death in 1944, he was reckoned to be one of the most brilliant men of his day.

Midgley's fame rests on his two great contributions to mankind — dichlorodifluoromethane, better known to us as a CFC, the chemical later found to destroy the ozone layer, and tetraethyl lead, the anti-knocking additive to petrol whose toxicity eventually helped bring about its worldwide phase-out from road fuels.

To be fair, Midgley's immediate contribution to the planet was, at first, a beneficial one. Oddly enough, in the 1920s and 1930s people could die at the hands of their fridges.

The first CFCs were a boon to refrigeration and air-conditioning systems and undoubtedly saved lives. The alternatives, including propane and chloromethane, could be toxic, explosive or highly flammable.

And tetraethyl lead provided the automotive industry with the push that helped make the internal combustion engine the workhorse of the planet — and the troubled dream of an entire nation.

But, some 80 years after his death, with CFCs phased out and leaded petrol banished from almost every road in the world, Midgley's legacy lingers on. And in a totally unexpected way.

By putting TEL into our cars, he put lead into the air. Or rather General Motors and the oil industry did — despite alarming evidence early on of what TEL exposure could do, including cases of madness, hallucinations and death among workers producing it.

Rather like the anti-smoking campaign, public awareness of the dangers took a long time to build. And lead was already becoming an issue from another direction: cheap paint and timber-framed houses in the US.

For poorer Americans, inexpensive wood-built houses could be spruced up nicely with the judicious use of paint — whose pigments frequently contained lead compounds.

And the mix of cheap wood and cheap paint? As the paint deteriorated, lead-contaminated flakes and dust found their way into homes and, most seriously, into children. The resulting US — and later worldwide — legislation increasingly turned attention towards finding lead anywhere and everywhere else.

So, in the 1960s and early 1970s, a seemingly powerful case for getting rid of the lead in petrol emerged. Evidence that children in US and European cities were being exposed to elevated levels of lead, with vehicle emissions a major contributor, created a ripple effect — from the tabloids to the seats of government.

In the event, legislation restricting and ultimately removing lead from road fuel was inevitable.

At this point, Robert Merton's Law of Unintended Consequences kicked in.

In the public mind, by the end of the 1970s lead itself had become as dangerous as, say, arsenic or strychnine. Probably even looking at the metal would make you blind or send you into fits.

The fact that lead was fit for purpose — and in some applications perhaps the only material that would easily, reliably and cheaply do the job — was left by the door, neatly sitting next to the open-toed sandals and the quinoa-muesli deliveries.

Even congressmen and members of parliament jumped with the lemmings. The result? For the last 30 years we have been blessed with generations of politicians who have too often failed to distinguish between uncontrolled exposure to lead and the responsible use of the metal in a properly managed industrial product.

And some of our representatives, with admirable thoroughness, have tried to legislate the metal out of existence.

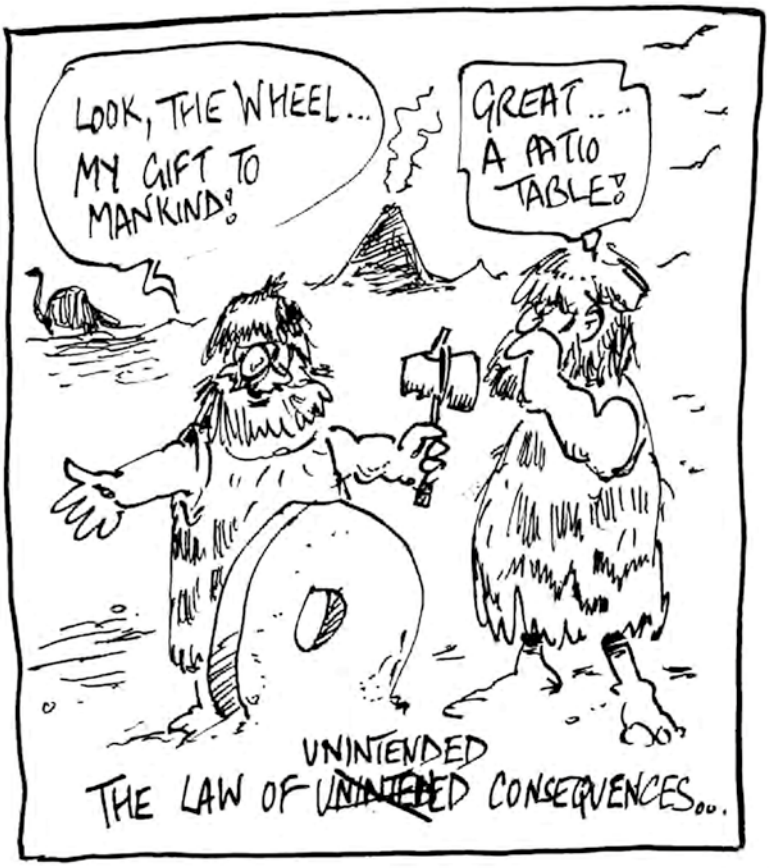
The lead community has been fighting back for a generation and more. But sometimes with only marginal impact on a media that doesn't particularly want to hear a good-news story.

Take recyclability. The argument continues to have little impact on a general public that believes recycling tins or wine bottles is worthwhile but not inherently interesting.

And let's face it, it isn't.

I, for one, have had almost two decades of our industry leaders telling us that the lead battery is among the most recycled consumer products on the planet. True enough. But how far has that message penetrated outside our own community? The short answer is not very far.

Yet the recycling story remains an important one, even if by itself it isn't enough to change public opin-



ion. It demonstrates a responsible, mature industry that can point with ample justification to a product that can be manufactured, used, collected and recycled safely — and can prove it.

The trouble is that changing public perceptions seems to work best when sensationalism is involved.

In Europe, for example, the thoroughly influential book *E for Additives,* published in the 1980s, helped persuade a continent of people — most of whom had never read it — that an 'E' number, the European classification for food additives, was not just a bad thing but a terrible one.

Never mind that some perfectly ordinary substances have E numbers too. (Forgetting of course that E948, for example, is the code for oxygen or that herbs such as oregano would nowadays be coded as too dangerous to be assigned an 'E' number.) Once the association had been planted in the public imagination, the details hardly mattered.

Lead has suffered from much the same problem.

Organisations such as the International Lead Association, Consortium for Battery Innovation, EUROBAT, Battery Council International and others continue to push back.

And, at long last — and this is something that this year's ELBC conference in Vienna would do well to remember, discuss and publicise — there are signs that the argument may be starting to turn.

In the US, we have seen lead added to the country's critical minerals list. That matters. It is an acknowledgement that lead is not simply a substance to be regulated, restricted and preferably forgotten. It is also a strategically important material with established domestic supply chains, industrial uses and an extraordinarily mature recycling infrastructure.

And there are signs of a subtler change in Europe too.

The language is shifting. The debate is increasingly about circularity, security of supply, strategic autonomy and keeping critical industrial value chains within Europe. Those are arguments in which the lead battery industry has a far stronger hand than its old public image would suggest.

A battery chemistry supported by an existing European manufacturing base, a well-established collection network and a closed-loop recycling system starts to look rather different when policymakers worry not merely about what a product contains, but where its raw materials come from, how long its supply chain is and what happens to it at the end of its life.

That does not mean Europe's regulators have suddenly become converts to lead. Far from it. The industry still faces an enormous amount of regulatory pressure and an image problem built up over half a century.

But perhaps, for the first time in years, the conversation has begun to move away from the simplistic equation lead equals bad towards the rather more intelligent question: how is lead being used, controlled and recovered?

That is a very different argument. And it is one the lead battery industry should be confident it can win.

But there's still a long way to go. A long-heralded boom in lead batteries has failed to emerge. The old idea that a rising tide floats all ships has not applied to energy storage: the massive anticipated growth in stationary storage has so far translated into only marginal increases in lead battery volumes.

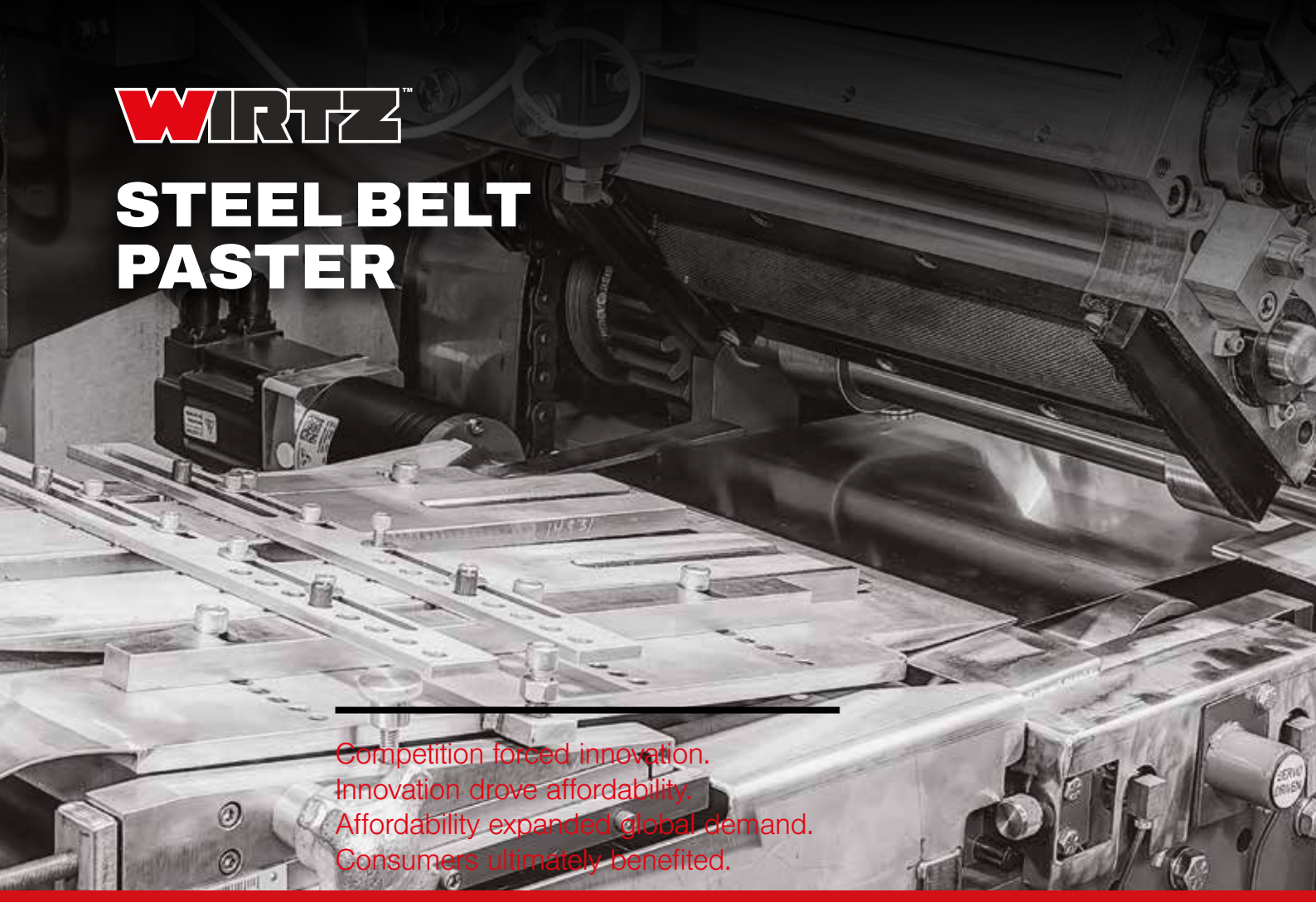
If perceptions really are beginning to change, perhaps that will be one final unintended consequence of the kind poor Tom Midgley knew all too well.

The man described by one historian as having had "more impact on the atmosphere than any other single organism in Earth's history" met a sorry fate. Crippled by polio in his 50s, he invented an elaborate system of ropes and pulleys to lift himself from his bed and give himself greater mobility.

In 1944, he became entangled in the device and died from strangulation.

There are unintended consequences — and then there are unintended consequences. ■

Mike Halls, publisher



www.wirtzusa.com

THE BENCHMARK FOR BEST IN-CLASS AGM PLATE MAKING

VISIT US IN BOOTH 69+70 AT ELBC
15–18 September
Vienna, Austria 2026

The Wirtz Steel Belt Paster is a ruggedly built machine that is designed for high speed production of continuous strip with pasting paper or glass mat. The system achieves accurate control of pasted plate weights and plate thicknesses at pasting speeds up to 150 feet per minute.

The machine can be configured to run continuous cast grid strip, single or double panel, lugs in or lugs out. It can also paste punched grid or expanded metal grid strip (customer to specify). The internal hopper roller design allows adjustment to crush oxide particles or lumps in the paste. A change in grid height requires changeover of the upper orifice plate to cover the proper plate dimensions. A variable speed drive on the hopper provides controlled paste feed. The steel belt paster includes a precision paper/glass mat roller system that allows for fine adjustments for the placement of the paper and keeps the system under proper tension.

Discover the benefits of Steel Belt Pasting AGM plates for your organization by calling +1.810.987.7600 or emailing, sales@wirtzusa.com.

The Wirtz Group of Companies

WIRTZ | oxmaster | LEKO | CONBRO | BATTERY RECYCLING SYSTEMS

INNOVATIVE | RELIABLE | PERFORMANCE

THE ALLIANCE

ELBC
15–18 September
Vienna Austria 2026

SEE US AT BOOTH 126

BUILD BETTER BATTERIES WITH BETTER ADDITIVES

SLI • EFB • AGM • ESS • Industrial

apg
ATOMIZED PRODUCTS GROUP, INC.

Pre-Mixed Expander for Various Applications

CX EFB®, TEXEX®, CX AGM®

BLACK DIAMOND STRUCTURES™

MOLECULAR REBAR® DISPERSIONS

Pb1110N for SLI, Pb1210N for EFB, Pb1310N for AUX, Pb3300N for ESS, PbAC for improved PAM reliability, PbLite® for improved production capability

addenda

NAM & PAM ADDITIVES

Nano Barium Sulfate
addiBatt®
Non-Vanisperse Expanders
Tetra L2 4BS Seed Crystals

www.atomizedproductsgroup.com

www.blackdiamond-structures.com

www.addendallc.com