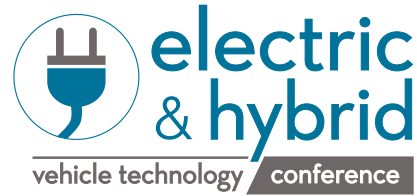


THE BATTERY SHOW CONFERENCE

EUROPE 2019



europe
2019

7 – 9 May 2019 // Stuttgart, Germany

3 / **3** / **35+** / **120+** / **750+** / **8,000+**
 days / tracks / sessions / speakers / delegates / show attendees

Join key players across the supply chain as they come together to solve the issues of driving down costs to achieve eventual parity with fossil fuels and electrification in Europe.

Get the latest battery and H/EV industry updates on:

- The emergence of a European battery value chain
- Creating material feedstock through recycling
- The reduction of cobalt in the manufacturing process
- OEM performance targets and technology roadmap
- Driving efficiency, enabling the next generation of electric autonomous vehicles and delivering MAAS
- Different hybridization models for the immediate and long term
- Latest powertrain and electric motor technology innovations
- Hybrid, battery and fuel cell developments for buses and commercial vehicles

PLUS
 PRE-CONFERENCE
 WORKSHOPS
 (MONDAY 6 MAY)



Holger Opfer
 Manager,
 E-Traction Technology
Volkswagen



Roland Biberger
 System Architect
 Electronics HV-Battery
Audi



Andreas Hintennach
 Senior Manager
Daimler AG



Maja Bakran Marcich
 Deputy Director General,
 Mobility & Transport
European Commission



Yuan Li
 Director of Powertrain,
**BAIC Motor
 Company**



Christian Rosenkranz PhD.
 VP Start-Stop
 Engineering & EMEA,
**Johnson Controls
 Battery Group, Inc.**



Bob Galyen
 CTO,
CATL



www.thebatteryshow.eu

www.evtechexpo.eu

What will you learn from attending?

- Learn about next-generation battery and H/EV development to drive down manufacturing costs
- Grow your business with commercial forecasts and opportunities affecting the battery and H/EV industries
- Discover OEM technology strategies for future battery and H/EV design
- Gain experience-based insight from the industry's most influential figures

Who attends?

- OEMs
- Battery / Cell Manufacturers
- EV Suppliers
- Battery Suppliers
- Tier 1s
- Materials Supplier
- Consultancy
- Academics
- Investors



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Workshops one-day pass	€595**
Conference one-day pass	€695
Conference two-day pass	€1295
Conference three-day pass	€1695

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***Save €100 on the pre-conference workshops when booked with a three-day conference pass*

Agenda at-a-glance

Monday 6 May 2019

	The Battery Show Pre-Conference Workshops	Electric & Hybrid Vehicle Technology Pre-Conference Workshops
10:00	Specifying Thermal Management Solutions to Optimise Battery Safety and Performance	Fast Charging & XFC Infrastructure Evolution and Impact
12:30	Networking Lunch Break	
13:30	Reducing Cost and Increasing Speed to Market Through Virtual Battery Design & Simulation	Fast Charging Continued: V2G Technology: Standards, Technical Challenges, Infrastructure
16:00	End Of Workshops	

Tuesday 7 May 2019

08:30	Realising a European Based Battery Value Chain		
10:30	Morning Break		
11:00	Driving efficiency in Electric and Hybrid Vehicles, enabling the next generation of Electric Autonomous Vehicles and delivering Mobility As A Service (MAAS)		
12:30	Lunch Break		
	Business / Market / Industry	Battery Design & Engineering	Electric & Hybrid Vehicle Technology
14:30	Assessing Battery Application Market Trends	Preventing Thermal Runaway Through Improving Thermal Management in Battery Pack Design	Hybrid & EV Market Forecasts, Analysis and Opportunities
15:45	Afternoon Break		
16:15	Forecasting Raw Materials Cost and Availability and Investigating Trends in Global Procurement Strategies	Assuring Global Competitiveness: European versus Chinese Pack Design	48V Systems: Optimising Next Generation 48V Systems and Architectures To Deliver Fuel Efficiency And Reduced Emissions In The Immediate Term
17:30	Close of Day One and Evening Drinks Reception in Exhibition Hall		

Wednesday 8 May 2019

	Optimising Automotive Battery Technology Design	Battery Chemistries: Increasing Energy Density & Future Battery Cell Design	Electric & Hybrid Vehicle Technology
08:30	Balancing Functionality and Application Design in OEM Platform & Battery Development	Moving Toward Higher Nickel Chemistries in Lithium-Ion Batteries for Increased Energy Density	Hybridization: Examining the Latest Technologies and Architectures to Deliver Electric Vehicle Efficiency and Meet Customer Demands
10:30	Morning Break		
11:00	Electrification for the Masses: Optimising 48V Battery Systems for Mild-Hybrids	Pushing the Limits of Lithium-Ion Cell Development- Developing Higher Capacity Materials	E-Motor Developments: Latest Developments In E-Motors and Powertrain Design Including; Alternatives to Rare Earth Magnets, Axial Flux Motor Technology and Thermal Management
12:30	Lunch Break		
14:00	Investigating Advances in Modular Pack Design and Applications	Future Proofing 12V Technologies: Lead Acid VS Lithium and Alternative Technologies	Powertrain Efficiency: Evaluating the Different Techniques for Improving the Energy Efficiency of The Electric Powertrain
15:45	Afternoon Break		
15:45	Extending Battery Life, Range and Performance through Battery Management System	Investigating Technology Readiness Level of Innovative Battery Technologies	Race Track to The Road: Evaluating the Latest Second Generation Race Technology
17:00	Close of Day Two and Evening Drinks Reception in Exhibition Hall		

Thursday 9 May 2019

	Charging, Validation & Testing	Battery Manufacturing Trends	Electric & Hybrid Vehicle Technology
08:30	The Fast Charging Trade Off: Fast Charging versus Battery Degradation and Energy Density	Validating Solid-State Battery Technology for Commercialising and Scale-up	Bus Operator Case Studies: Outlining the Challenges of Deploying an Electric Bus Fleet, Lessons Learnt and Future Requirements for the Manufacturers Determining the Optimum Fuel and Powertrain Architectures and Technologies to Meet the Specific Needs of Buses
10:30	Morning Break		
11:00	Complying with Global Regulations on Battery Safety and Transport	Creating Material Feed Stock Through Battery Recycling	Fast Charging: What Impact Will Fast Charging and XFC Have on Powertrain Design and What Are the Latest Developments in Dynamic Charging Systems?
12:30	Lunch Break		
14:00	Outlining Developments in Battery Performance Testing Methodologies	Ramping Up Battery Assembly to Meet Future OEM Demand: Building Gigafactories in the EU	Commercial Vehicles: Evaluating the Latest Developments in Medium and Heavy-Duty Trucks and Large-Scale Electric and Hybrid Powertrains
15:00	End of the 2019 Conference		

The Battery Show Pre-Conference Workshops

10:00 - Specifying Thermal Management Solutions to Optimise Battery Safety and Performance

Offering a deep-dive into thermal management for battery applications, one of the most popular sessions at the show, this workshop focuses on specifying thermal management solutions for battery pack designs. A team of industry experts will present key considerations in selecting thermal management systems to optimise battery safety and performance. In addition, the workshop offers the opportunity to consult the panel on questions such as:

- How do application, materials and design of the battery assembly impact thermal management and cooling?
- What are the most effective cooling methods for different battery applications?
- What are the key selection criteria for a most efficient thermal solution?
- How is it integrated into battery system and driveline?
- How to effectively measure and evaluate thermal management solutions?

Moderator

Pankaj Arora, Asia-Pacific Head of Automotive Electronics Global Market Segment Head for E-Mobility, Henkel

Speakers

Holger Schuh, EIMEA Business Development Manager - Thermal Interface Materials, Henkel

Dr Cedric Rouaud, Global Technical Expert - Thermal Systems, Ricardo

Adrian Heuer, Research Scientist, Fraunhofer ISE

Electric & Hybrid Vehicle Technology Pre-Conference Workshops

10:00 - Fast Charging & XFC Infrastructure Evolution and Impact

Charging represents the most significant barrier to growing the electric vehicle market in Europe today. The development of fast charging and XFC has played a key role in enabling longer-ranges for electric vehicles and furthering the business case but a coherent infrastructure is needed to drive mass market uptake. V2G requires more expensive two-way flow infrastructure and impacts battery degradation but is increasingly being considered as a key element of this future charging infrastructure.

This session will examine the latest developments in fast charging and V2G; their impact on the battery and powertrain of vehicles; the evolution of an effective EV charging infrastructure and the role OEMs, utility companies and governments will play within it. Attending the workshop will give you the most up to date information that you can factor into your product development and ensure you stay one step ahead of your competition.

Moderator

Matthew Keyser, Vehicle Electrification Group Manager, NREL

Speakers

Christof Kunze, Electric Vehicle Charging Infrastructure, ABB

Joachim Pucker, Director Market Segment Infrastructure, PHOENIX CONTACT E-Mobility GmbH

Emmanuel Ourry, Director, High Power Charging & Corridors, EVBox

The Battery Show Pre-Conference Workshops

12:30 - Networking Lunch Break

Electric & Hybrid Vehicle Technology Pre-Conference Workshops

12:30 - Networking Lunch Break

The Battery Show Pre-Conference Workshops

13:30 - Reducing Cost and Increasing Speed to Market Through Virtual Battery Design & Simulation

Multiscale modelling offers the opportunity to reduce manufacturing cost and accelerate the design process at the material, cell and pack level of a battery. Machine-learning tools and accurate simulations can help the designer more accurately predict thermal performance or state of health of a battery pack, thus validating their designs without expensive prototyping, reducing cost and increasing speed to market. This workshop examines virtual battery design and the opportunity it offers for design validation in several stages of the design process. The following points will be addressed:

- How to harness digital technology to improve battery design.
- Exploring the application of multiscale modelling to battery pack design.
- How accurate do we need to be? The trade-off between speed and accuracy.
- Lifetime prediction: the importance of understanding degradation.

Moderator

Jacqueline Edge, Multiscale Modelling Project Manager, Imperial College London

Speakers

Paul McGahan, Technical Specialist, Ricardo Prague s.r.o.

Christoph Heining, Consultant Engineer, Siemens

Electric & Hybrid Vehicle Technology Pre-Conference Workshops

13:30 - Fast Charging Continued: V2G Technology: Standards, Technical Challenges, Infrastructure

Speakers

Tomoko Blech, Secretary General, CHAdeMO Association Europe

Menno Kardolus, CEO, Power Research Electronics & Gautham Ram, Delft Uni

Gautham Ram Chandra Mouli, Dept. of Electrical Sustainable Energy, Faculty of Electrical Engineering, Mathematics and Computer Science, Delft University of Technology / TU Delft

The Battery Show Pre-Conference Workshops

16:00 - End Of Workshop

Electric & Hybrid Vehicle Technology Pre-Conference Workshops

16:00 - End Of Workshop

Day 1

Plenary

08:30 - Welcome Address

Speakers

Jim Greenberger, Executive Director, NAATBatt International

Track 2: Battery Engineering & Design

08:30 - **Plenary Sessions Taking Place in Track 1 Theatre**

Track 3: Electric & Hybrid Vehicle Technology

08:30 - **Plenary Sessions Taking Place in Track 1 Theatre**

Plenary

09:00 - **Agenda for Zero- and Low-Emission Mobility for Europe, As Seen By the European Commission**

Speakers

Maja Bakran Marcich, Deputy Director General, Mobility & Transport, European Commission

09:20 - **Leadership Panel: Realising a European Based Battery Value Chain**

As global demand for batteries is predicted to skyrocket over the next decade, and availability of raw materials to produce them are feared to create bottlenecks in meeting the demands, the creation of a European-based value chain for battery manufacturing is considered crucial to secure a competitive position for the region in the global marketplace as well as to enable further electrification and clean mobility.

As a response, the European Commission launched the European Battery Alliance in October 2017, with the aim to position Europe as a leader in battery innovation and manufacturing. In addition, although Europe [currently only accounts for less than 4% of global battery production](#), over the past year many key players from the entire value chain have announced investment plans to support cell manufacturing in Europe. For example, CATL announced plans to build an EV battery plant in Germany with commitment from BMW ([source](#)); Saft, Siemens, Solvay and Manz have announced a battery alliance to enter serial production in 2020 ([source](#)); and BMW Group, Northvolt and Umicore have formed a joint technology consortium ([source](#)) - with many others following suit.

However, the viability of a globally competitive European battery industry remains a topic of discussion as there are still many hurdles to be overcome: cost competitiveness, the skills gap and investment/commitment from the automotive industry being just some of them.

The opening session of The Battery Show Conference Europe 2019 will investigate what is needed to realise a European battery value chain. Questions to be addressed:

- What is necessary to make European-based cell manufacturing cost competitive with the Asian market?
- What role should/can governments play in creating a European supply chain?
- What is necessary to enable a low-cost localised battery manufacturing supply chain in Europe?
- What are the OEMs' strategies on battery sourcing and how might these support a localised

supply chain?

- How will the opening of manufacturing facilities in Europe by Asian cell makers impact the market?
- Will cell makers evolve to become module manufacturers, creating and owning their own tier of the market and moving into the battery integration space?
- How will European-based manufacturing impact the supply chain and the market?

Moderator

Jim Greenberger, Executive Director, NAATBatt International

Speakers

Anil Srivastava, Chief Executive Officer, Leclanché

Andreas Hintennach, Senior Manager, Daimler AG

Jean Baptiste Pernot, Transformation & Operations Excellence Vice-President, Saft

10:30 - Networking Break: Coffee & Refreshments in the Foyer

11:00 - Welcome Address

Speakers

Roland Irle, Co-Founder and Developer, EV-volumes.com

11:15 - Driving Efficiency in Electric and Hybrid Vehicles, Enabling the Next Generation of Electric Autonomous Vehicles and delivering Mobility As A Service

Across Europe we are seeing announcements from countries, cities and OEMs of ambitious emission reduction targets. The automotive industry is going through a period of dramatic change. This keynote session will bring together the leading automotive OEMs and tier 1 suppliers to give their views on the role of hybrid and electric vehicles and the future of transport as it moves towards electrification, connectivity, autonomy and smart city MAAS models.

- What will be the path to the emission-free future?
- As 48V becomes mass market is it a stepping stone to full electric vehicles or a long-term solution?
- What are the barriers and solutions to mass market BEV and FCEV models - what is needed in terms of technology and charging infrastructure?
- Addressing the importance of semiconductors in the intelligent powertrain, ensuring integration and control of EV and autonomous functionality
- What impact will sharing models have on the cost-effectiveness of EVs? What will be the future growth in the MAAS market and will it drive EV sales?

Moderator

Roland Irle, Co-Founder and Developer, EV-volumes.com

Speakers

Paul Freeland, Principal Engineer, Cosworth

Steve Mountain, Global Energy Storage Lead & RR Associate Fellow - Power Electric Systems, Rolls Royce

Marcin Seredynski, Head of Innovation and Research at the E-Bus Competence Centre, Volvo

Track 1: Business / Market / Industry

12:30 - Networking Lunch & Opportunity to Take Advantage of Activities on Show Floor

- Access the 400+ supplier exhibition showcasing the latest solutions for battery and HE/V applications
- Watch live product demos on the show floor:
 - 12.30: Cure in place thermal management solutions for EV batteries - 3M, stand 1113
 - 13.00: Fast charging and monitoring - LEONI, stand 639
 - 13.30: Connections: a key link in e-mobility - Stäubli, stand 314
 - 14.00: Innovative battery cell filling - IP PowerSystems, stand 924

Track 2: Battery Engineering & Design

12:30 - Networking Lunch & Opportunity to Take Advantage of Activities on Show Floor

- Access the 400+ supplier exhibition showcasing the latest solutions for battery and HE/V applications
- Watch live product demos on the show floor:
 - 12.30: Cure in place thermal management solutions for EV batteries - 3M, stand 1113
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 - 14.00: Innovative battery cell filling - IP PowerSystems, stand 924

Track 3: Electric & Hybrid Vehicle Technology

12:30 - Networking Lunch & Opportunity to Take Advantage of Activities on Show Floor

- Access the 400+ supplier exhibition showcasing the latest solutions for battery and HE/V applications
- Watch live product demos on the show floor:
 - 12.30: Cure in place thermal management solutions for EV batteries - 3M, stand 1113
 - 13.00: Fast charging and monitoring - LEONI, stand 639
 - 13.30: Connections: a key link in e-mobility - Stäubli, stand 314

- 14.00: Innovative battery cell filling - IP PowerSystems, stand 924

Track 1: Business / Market / Industry

14:30 - Assessing Battery Application Market Trends

As prices of batteries decline and energy and performance go up, it opens up a lot of new areas for electrification. Different markets have different trends and requirements: automotive industry players have different requirements for each of their platforms in range and design, while ESS look for rack solutions and entire plug-and-play systems. In Formula-e, on the other hand, space and weight requirements are magnified and the question of battery packaging and how it integrates into the car is a crucial part of the competitive advantage. Commercial and heavy-duty vehicle application require reliable and robust and modular battery systems that can withstand extreme environments, such as being outside on the chassis, have as little downtime as possible and are scalable to the user's route requirements. For short-range electric vehicles, used for example in last mile deliveries of food and mail and operating within the 140km range, the price of the battery makes up 60% of the vehicle and the key to unlocking this market is cheaper battery technologies; whereas in high-value applications such as avionics and marine technology cost is less of an issue.

This session assesses the market trends in battery application and the following questions will be addressed:

- What application areas are gaining market share within the battery industry?
- What are the application requirements?
 - What battery architectures do they require?
 - What are the application challenges that impact battery design?
 - What advances must be made in batteries to truly enable these applications?
 - What can be transferred into the automotive industry?
- What are the trends and challenges driving innovation in these different applications?
 - What will be the future technologies in the short, mid and long term?
- How might these trends impact the overall battery industry?

Moderator

James Frith, Senior Energy Storage Analyst, Bloomberg New Energy Finance

Speakers

Bruno Samaniego, Team Leader of Electrical, Power & Harness Engineering R&T Coordinator of Power & Energy Management for Space Systems, Airbus Defence and Space – Engineering Integration

Luke Gear, Technology Analyst, IDTechEx

Shmuel De-Leon, CEO, Shmuel De-Leon Energy

Track 2: Battery Engineering & Design

14:30 - Preventing Thermal Runaway Through Improving Thermal Management in Battery Pack Design

As the industry is pushing for higher-voltage batteries, thermal management of the battery is crucial to safety as overheating of the cell can cause thermal runaway. Elevated temperatures in the cell could cause materials to start decomposing, creating a domino effect of releasing more heat, explosions of the cells and subsequent fire. Potential causes include mechanical failure (penetrating, dropping), electric chemical failures or misuse of the cell such as overcharging.

There is currently ongoing development in aerospace, defence, automotive and many other industries using li-ion batteries, to make battery assemblies that are safe: to manage temperature within the battery assembly with thermal management systems as well as preventing and mitigating thermal runaway. There are several methods for temperature management within the battery pack, including passive insulation, cooling (liquid, water, refrigerant) or heat exchangers. This workshop will look at strategies for improving thermal management in battery pack design and preventing thermal runaway. Questions to be addressed:

- What are the requirements for battery cooling and thermal management?
- What are the design challenges with different thermal management strategies?
- How do OEMs set relevant performance targets for thermal management systems?
- How do battery manufacturers approach thermal management?
- Failure analysis of thermal runaway events

Moderator

Dr Cedric Rouaud, Global Technical Expert - Thermal Systems, Ricardo

Speakers

Eric Darcy, Battery Technology Discipline Lead, NASA Johnson Space Center

Alvin Wu, Distinguished Member of Technical Staff -William Henry Merrill Society Research Engineer / Commercial & Industrial R&D, Underwriters Laboratories

Christophe Dos Santos, Application Engineer, LORD

Dr Carlos Ziebert, Head of the Battery Safety Center, KIT

Stephen Neumann, Senior Manager, H.B. Fuller

Track 3: Electric & Hybrid Vehicle Technology

14:30 - Hybrid & EV Market Forecasts, Analysis and Opportunities

Over the next 20 years the automobile and industrial vehicle industries will change considerably. Alongside internal combustion engine vehicles (ICE) we will see increasing market share for plug-in hybrid electric vehicles (PHEVs), battery-powered electric vehicles (BEVs), and fuel cell electric vehicles (FCEVs).

The challenge for OEMs and tier 1 suppliers is to determine which solution will be the most cost-effective to produce and which technology customers will prefer in the immediate and long term. This session will look at the latest industry forecasts and provide manufacturers with the information needed to make decisions about fuels and powertrain technology today.

Moderator

Roland Irle, Co-Founder and Developer, EV-volumes.com

Speakers

Martin Linder, Partner, McKinsey

Neil Morris, CEO, Faraday Institution

Yuan Li, Director of Powertrain, BAIC Motor Company

Track 1: Business / Market / Industry

15:45 - Networking Break: Coffee & Refreshments in the Foyer

Track 3: Electric & Hybrid Vehicle Technology

15:45 - Networking Break: Coffee & Refreshments in the Foyer

Track 2: Battery Engineering & Design

16:00 - Networking Break: Coffee & Refreshments in the Foyer

Track 1: Business / Market / Industry**16:15 - Forecasting Raw Materials Cost and Availability and Investigating Trends in Global Procurement Strategies**

Raw material availability is one of the key challenges facing the battery manufacturing supply chain as the growing global demand for electric vehicles puts pressure on the market. As a result, many big battery manufacturers and OEMs are securing their raw material supply through strategic alliances to prevent potential bottlenecks and material suppliers are investing in European manufacturing plants in response to these demands.

This session features several keynotes investigating global raw material availability and procurement strategies, followed by a panel on how global market trends are impacting the supply chain, such as lowering material cost and driving responsible material sourcing. Topics to be addressed:

- What is the availability of raw materials in use today?
- What is the projected demand on these materials and how will this affect the global market?
- How is the industry responding and where/when is new feedstock coming online?

Moderator

Gavin Montgomery, Director – Battery Raw Materials, Wood Mackenzie LTD

Speakers

Michael Insulán, Senior Market Analyst, Eurasian Resources Group

Vincent Ledoux Pedailles, Executive Director, Infinity Lithium

Denis Sharypin, Head of Market Research, MMC Norilsk Nickel

Marcel Goldenberg, Markets and Methodolgy Development, S&P Global Platts

Nell Agate Tsui, Principal Research Analyst, IHS Markit

Track 2: Battery Engineering & Design

16:15 - Assuring Global Competitiveness: European versus Chinese Pack Design

In the EU, the design of the pack is driven by competition in the market. Each OEM has its own platforms and broad variances of cell formats and modules. Technical packaging and energy density is the driving factor for battery design as this is how platforms and OEMs are competing with each other. There is no standardisation of the battery designs, even within the different platforms and architectures within one OEM. The Chinese market on the other hand is focused very much on economies of scale and the fastest and most cost-efficient way of manufacturing. Chinese OEMs are utilising the standardisation to achieve cost reduction, which is a key difference between the Chinese and EU market. This raises key questions on how the European market will compete with its Chinese counterparts and their battery design strategies.

Key questions to be addressed:

- What are the OEM performance targets on battery system levels and how are they set?
- How are these targets viewed considering current pace of material developments by the OEMs themselves? What are their expectations?
- What are future development roadmaps of OEMs?
- How is standardisation affecting the European market?
- Differentiation of platforms: how are OEMs going to differentiate one vehicle from other electric vehicles?
- How will the convergence of electrification, autonomy and connectivity impact battery design?

Moderator

William Yue, Principal Engineer, Battery Systems, Ricardo

Speakers

Yuan Li, Director of Powertrain, BAIC Motor Company

Sven Schulz, CEO, Akasol

Track 3: Electric & Hybrid Vehicle Technology

16:15 - 48V Systems: Optimising Next Generation 48V Systems and Architectures To Deliver Fuel Efficiency And Reduced Emissions In The Immediate Term

Recently the 48V vehicle system architecture has received a considerable amount of attention as a stepping stone on OEMs' move to hybrid and full EVs.

48V systems for mild / micro hybrids using relatively compact 48V batteries enable fuel efficiency, support for innovative power electronic circuitry and reduced emissions, and they are starting to move into the mass market.

This session will evaluate the different 48V architectures, from P0 mild hybrid to P2, as OEMs move from first to second generation 48V vehicles. Speakers will discuss how to best manage costs, meet emission targets and solve technical challenges, as well as considering the long-term future of 48V systems.

- Lessons learnt from first generation 48V systems - how will the second generation evolve?
- How have the different P0-4 48V configurations performed in terms of fuel efficiency, increased electronic functionality and reduced emissions?
- What are the limits of 48V power supply systems? What functions should be using 48V systems?
- What are the Emerging trends in 48V and power supply loads?
- Addressing the challenges of meeting current and future CO2 regulations
- Managing the cost of mass production and offsetting this against increased functionality and efficiency
- What will be the long-term future for 48V? Will we see 48V systems in full HEVs and EVs?

Moderator

Roland Irle, Co-Founder and Developer, EV-volumes.com

Michael Bassett, Chief Engineer - Research & Advanced Engineering, MAHLE Powertrain Limited

Bastian Hartmann, Research Engineer Advanced Power Supply and Energy Management, Ford Motor Company

Grégory Godefroy, Belt e-Machine RFQ & Advanced projects Platform Manager, Valeo

Julian Dunn, Head of Technical Business Managers - Energy Storage, Ricardo Global Automotive

Track 1: Business / Market / Industry

17:30 - End of Track 1 Day 1

Track 2: Battery Engineering & Design

17:30 - End of Track 2 Day 1

Track 3: Electric & Hybrid Vehicle Technology

17:30 - End of Track 3 Day 1

Day 2

Track 1: Optimising Automotive Battery Technology Design

08:30 - Welcome Address

Speakers

Paul Freeland, Principal Engineer, Cosworth

Track 2: Battery Chemistries: Increasing Energy Density & Future Battery Cell Design

08:30 - Moving Toward Higher Nickel Chemistries in Lithium-Ion Batteries for Increased Energy Density

Achieving higher energy density is considered the key to reducing the cost of batteries while meeting performance weight and volume targets. The market proposes a new battery chemistry with increased nickel content, the so-called 811 NCM chemistry, which consists of eight parts nickel, one part cobalt and one -part magnesia, as well as approaches for complete cobalt-free batteries. However, these technologies are still under development and there are several challenges that need to be overcome before widespread adoption. This session examines technologies in development for increased energy density entering the market in the next five-to-ten years.

- What technologies are currently receiving increased investment in response to this trend?
 - Different technologies for different applications?
 - Consumer electronics
 - Transport (811 NCM)
 - When will they be ready for commercialisation?
 - What is needed for commercialisation?
 - What is the time frame of implementation? / What are the current barriers?
- What are the current challenges with low cobalt/cobalt free technologies?
 - Production challenges
 - Stability, safety and lifetime concerns
 - Potential bottlenecks: what about material availability of nickel/lithium?
- What other concepts or solutions in which energy density can be increased?
 - Increasing the amount of active materials and reducing the amount of passive materials

Moderator

Andy Leyland, Head of Forecasting, Benchmark Mineral Intelligence

Speakers

Claudio Brivio, R&D Engineer, CSEM

Dr Dee Strand, CSO, Wildcat Discovery Technologies

Joanna Clark, Head of Product Development, Battery Materials, Johnson Matthey

Raymond Oei, CEO, PT STERN

Track 3: Electric & Hybrid Vehicle Technology

08:30 - Hybridization: Examining the Latest Technologies and Architectures to Deliver Electric Vehicle Efficiency and Meet Customer Demands

This session offers a comprehensive overview of the different levels of hybridisation, evaluating new powertrain technologies and different P1-P4 architectures including e axles, in-wheel electric motors, CVT and clutch technology.

Panel Discussion Topics:

- Determining the optimum powertrain architecture for different vehicle specifications
- Examining the latest development in electric axles and determining the optimum implementation depending on the level of hybridisation
- Evaluating in-wheel electric motors are a viable alternative to electric axle technologies
- Evaluating the potential of Continuously Variable Transmission technology in hybrid concepts P0-P4
- Examining the latest developments in e clutch and dual clutch transmission technology

Moderator

Jared Kearby, Principal Analyst, Power Technology Research

Speakers

Sanghyun Lee, Project manager, Design Transmission System, FEV Europe GmbH

Chris Hilton, Chief Technology Officer, Protean Electric

Han-Hein Spit, Vice President, Bosch Transmission Technology B.V.

Track 1: Optimising Automotive Battery Technology Design

08:45 - Balancing Functionality and Application Design in OEM Platform & Battery Development

Battery design is a push and pull of application versus battery: it needs to be as efficient as possible in terms of ability of the battery to carry the energy required to support the application in the space that is available. As such, finding the balance between functionality, application design and manufacturability is a challenging puzzle as battery assembly is further complicated by the available cell sizes and shapes.

A new approach to battery design for BEVs is to build the platform around the battery as the batteries

are getting bigger. Consequently, platform and battery designers must collaborate more closely with each other to develop the optimal design to make the platform more stable and safer. This includes, for example, accounting for the mechanical forces transferred through the module/battery in the event of a crash. This session will bring together automotive OEMs, tier 1s and battery manufacturers to discuss:

- What are current and future designs for different vehicle applications?
- Why are some engineering choices made?
- How can platform designers and battery manufacturers collaborate to support battery integration?
- How to support the battery within the platform to ensure safety?
- How to account for the mechanical forces that are transferred through the modules/batteries in case of a crash?
- Dimensioning of battery system in vehicles/drivelines: balancing geometry, volume and performance of the battery
- Cell selection for different applications

Speakers

Dr Kai-Christian Moeller, Spokesman, Fraunhofer Batteries

Karsten Mueller, Senior Vice President High Voltage Systems Management, IAV GmbH

AK Srouji, Director of Battery Cell Technology, Romeo Power

Dustin Grace, VP of Engineering, Energy Storage and Power Systems, Proterra

10:30 - Networking Break: Coffee & Refreshments in the Foyer

Track 2: Battery Chemistries: Increasing Energy Density & Future Battery Cell Design

10:30 - Networking Break: Coffee & Refreshments in the Foyer

Track 3: Electric & Hybrid Vehicle Technology

10:30 - Networking Break: Coffee & Refreshments in the Foyer

Track 1: Optimising Automotive Battery Technology Design

11:00 - Electrification for the Masses: Optimising 48V Battery Systems for

Mild-Hybrids

Fifty-seven per cent of people in the audience at our 2018 conference thought that 48V mild-hybrid systems will leverage electrification of mobility and, as many OEMs pledge the electrification of their platforms, this technology is enabling electrification for the masses. Mild-hybrid systems are easy to implement into existing powertrains. In addition, mild hybrids have claimed very high efficiencies and low values in fuel consumption at a fraction of the cost of a full battery electric vehicle. On top of that, it is powering the auxiliary features such as driver-assist safety features, stop start, and boost recuperation.

However, mild-hybrid architectures pose some unique battery system design challenges such as high temperature resistance, due to its proximity to the combustion engine, or selecting a chemistry that maximises power density required by the application. This session will examine current and future technology challenges and trends to optimise 48V battery systems.

Questions to be addressed:

- What are the new technology requirements for 12V/48V in the next five-to-tenyears and how can they be met?
 - Weight
 - Power/energy requirements
 - Temperature requirements
 - Safety requirements
- What are the optimum battery configurations to support mild hybrid architectures?
- How will it impact the components and system?
- Which chemistry can support this?
- What chemistries are on the roadmap?

Moderator

Paul Freeland, Principal Engineer, Cosworth

Speakers

Michael Bassett, Chief Engineer - Research & Advanced Engineering, MAHLE Powertrain Limited

Ian Braime, Executive Director, Low Voltage Product Management, A123 Systems

Phil Shaw, Product Line Director, Johnson Controls

Track 2: Battery Chemistries: Increasing Energy Density & Future Battery Cell Design

11:00 - Pushing the Limits of Lithium-Ion Cell Development - Developing Higher Capacity Materials

To a large extent, battery cost is determined by performance and cost of cathode materials and it is broadly recognised that cathode materials are critical to unlocking xEV commercialisation. As voltage requirements of batteries increase their material performance is pushed to its limits and as such the industry is continuously developing higher-capacity materials.

Improvements are needed in terms of increased energy density, reduced cobalt content and reduced

cost of the materials, and not just higher-voltage cathode materials but also better surface protective materials, better electrolytes, additives, and so on. This session discusses the technology developments for higher-capacity active materials, and how they will impact performance and cost. Questions to be addressed:

- What are the upcoming materials to the market?
- What are the materials in use today and what are the supply chain implications?
- What are the materials in early development?
- Material performance on thermal stability, voltage stability, limitations, rate performance, real life performance in cell cycle test and storage tests under different conditions

Moderator

Jim Greenberger, Executive Director, NAATBatt International

Speakers

Kenan Sahin, President and Founder, CAMX Power LLC

Dr Wasim Sarwar, Technical Specialist – Battery Systems, Williams Advanced Engineering

Tobias Placke, Head of Division “Materials”, MEET Battery Research Center, University of Münster

Andrey Senyut, CEO, OCSiAI Energy

Track 3: Electric & Hybrid Vehicle Technology

11:00 - E-Motor Developments: Latest Developments In E-Motors and Powertrain Design Including; Alternatives to Rare Earth Magnets, Axial Flux Motor Technology and Thermal Management

This session will bring together the OEMs and e-motor manufacturers to discuss the latest innovations in and new designs and architectures for efficient and compact e-motors. Speakers will address the latest innovative materials to replace rare earth magnets, axial flux motor technology and thermal management techniques as well as how new powertrain architecture designs are providing better e-motor integration for optimum efficiency.

Panel Discussion Topics

- Developing specific e-motor and powertrain solutions for different vehicle needs
- Examining how new powertrain architectures are improving e-motor integration for optimum energy efficiency
- Outlining the latest developments in making e-motors lightweight and more compact including axial flux motor technology
- Reducing production costs by using alternative materials to rare earth magnets
- Developing e-motors able to endure a long lifetime mileage

Moderator

Jared Kearby, Principal Analyst, Power Technology Research

Christian Pronovost, Sr. Product Manager, Dana Incorporated

Quentin Werner, Electric Machine Design Engineer, Daimler

Michael Lampérth, CEO, Phi-Power

Peter van Duijsen, Researcher, TU Delft

Track 1: Optimising Automotive Battery Technology Design

12:30 - Networking Lunch & Opportunity to Take Advantage of Activities on Show Floor

- Access the 400+ supplier exhibition showcasing the latest solutions for battery and HE/V applications
- Watch live product demos on the show floor:
 - 12.30: Multiple product line enables a new dimension of flexibility in battery production - Bosch Rexroth, stand 721
 - 13.00: Flexible, scalable, smart manufacturing - Rockwell Automation, stand 366
 - 13.30: Conductive liquid gap filler and the processing for efficient assembly - Henkel, stand 1025

Track 2: Battery Chemistries: Increasing Energy Density & Future Battery Cell Design

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Track 1: Optimising Automotive Battery Technology Design

14:00 - Investigating Advances in Modular Pack Design and Applications

Modular pack designs offer a flexibility to cost-effectively update battery technology and as such modular battery concepts find their use in the heavy-duty vehicles market, ESS or marine industry. This session will examine different modular concepts and their applications and will discuss the following questions:

- What are the implications of modular storage concepts on future battery designs (also on cell level)?
- How to make an efficient module?

Speakers

Paul Freeland, Principal Engineer, Cosworth

Paweł Swoboda, Electric Vehicles Business Development Manager, BMZ POLAND

Martin Klein, Senior Vice President of Engineering, XALT Energy, LLC

Tobias Mayer, Technical Manager, LION Smart GmbH

Track 2: Battery Chemistries: Increasing Energy Density & Future Battery Cell Design

14:00 - Future Proofing 12V Technologies: Lead Acid VS Lithium and Alternative Technologies

Even within a fully electric car, there is always a need for a 12V battery either for starting the engine or battery initiating safety diagnosis of high-voltage supply, which currently is almost always lead-acid technology. However, [EU Directive 2000/53/EC](#) on end-life-vehicles restricts the use of lead in vehicles. Although it currently exempts lead-acid batteries in automotive applications, as there [currently is no cost-effective drop-in alternative to this technology](#), the policy is subject to regular reviews according to technical and scientific progress.

In addition, the European Chemicals Agency recently [announced](#) that it has added lead to the EU REACH candidate list of substances, which, according to the industry, would “effectively short-circuit the Commission’s battery action plan” and be counterproductive to its mobility and decarbonisation plans ([source](#)). It is likely that as alternative technologies mature, the exemption will no longer hold firm and the industry will be forced to move to lithium-ion or other technologies. However, lead-acid batteries have the advantage of being safer, more reliable and durable than li-ion systems. In addition, it is 100% recyclable and cheaper as the raw materials are more readily available, and the technology holds a substantial market share in the automotive battery market.

Although the limitations are that they are heavy, have a shorter life cycle and do not have the energy density and charging efficiencies to meet high-voltage EV requirements, manufacturers are working on optimizing lead-acid configurations and are looking at improving weight, energy return and charging, and degradation of the material to remain ahead of the competition within the 12V space.

This session will examine the potential impact of these legislative trends on the battery and automotive industry and discuss alternative technologies, as well as examine current advancements in lead-acid technology.

Questions to be addressed:

- What would be the impact on the automotive and battery industries if the exemption is lifted?
- What are the alternative technologies to the 12V lead-acid battery?
- What are the requirements for these chemistries and technologies? Cranking time? Energy management? Discharge characteristics?
- What are the current limitations of alternative technologies? Cost prohibitive? Temperature? Testing?
- What are the technologies to improve lead acid?
- Could a lead-acid battery replace lithium system in fully electric vehicles?
- Dual systems:
 - How is a dual system paired together?
 - What is the right pairing lead-acid battery with li-ion battery?

Moderator

Rene Schroeder, Executive Director, EUROBAT

Speakers

Christoph Fehrenbacher, Managing Director, A123 Systems

Jörn Albers PhD, Manager Global Requirements Analysis, Johnson Controls Power Solutions EMEA, Johnson Controls Power Solutions EMEA

Armin Warm, Supervisor Advanced Power Supply & Energy Management, Ford Research & Advanced Engineering Europe

Christian Rosenkranz, VP Start-Stop Engineering & EMEA, Johnson Controls Power Solutions

Track 3: Electric & Hybrid Vehicle Technology

14:00 - Powertrain Efficiency: Evaluating the Different Techniques for Improving the Energy Efficiency of The Electric Powertrain

This session will cover the latest innovations that increase the energy efficiency of the electric powertrain. Speakers will discuss the latest developments in waste heat recovery, improvements in powertrain torque as well as the latest energy recovering and regenerative braking systems – all increasing efficiency in electric and hybrid powertrains, increasing power or reclaiming lost energy.

Panel Discussion Topics:

- Optimising efficiency through advanced powertrain engineering
- Extending range with regenerative braking restoring energy to the battery

- Innovation in Energy Recovery Systems (ERS)
- Waste heat recovery (WHR) solutions for future electric vehicle powertrains

Moderator

Robert Stanek, Lead Electric Powertrain and Cost Management, P3 Group

Greg Harris, Global Electrification Services Leader, HORIBA MIRA

Johan Vanhuysse, Research & Application Engineer, Siemens Industry Software

Track 1: Optimising Automotive Battery Technology Design

15:15 - Networking Break: Coffee & Refreshments in the Foyer

Track 2: Battery Chemistries: Increasing Energy Density & Future Battery Cell Design

15:15 - Networking Break: Coffee & Refreshments in the Foyer

Track 3: Electric & Hybrid Vehicle Technology

15:15 - Networking Break: Coffee & Refreshments in the Foyer

Track 1: Optimising Automotive Battery Technology Design

15:45 - Extending Battery Life, Range and Performance through Battery Management Systems

The battery management system (BMS) is a critical component of the battery design as it is the technology that monitors its performance, its lifetime and determination of aging. Optimisation of this technology allows for great gains to be made in battery performance in the short term. For example, capturing data on driver behaviour and developing more elaborate battery management systems could improve charging and battery efficiency.

Topics to be addressed:

- Looking towards the future, how will vehicle charging be organised and how might this impact BMS software?
- BMS and modular systems: How to connect the different battery packs and get them to communicate them with each other?
- How much can BMS improve pack performance?
- What is the role of charging algorithms (such as CCCV) and how can they be used to speed up charging, extend battery life and improve safety?
- Using telematics of driver behaviour in BMS systems to optimise battery performance and

charging

- Determining state of charge inside BMS
- What solutions exist to manage the battery?
 - What cell technology can be charged fast?
 - What is in mass production today?
 - What will be in the market in two-to-five years?

Moderator

Paul Freeland, Principal Engineer, Cosworth

Speakers

Roland Biberger, System Architect Electronics HV-Battery, Audi

Joel Sylvester, Chief Technology Officer, Dukosi Ltd

Oskar Dondelowski, Advanced Operations Engineer, Aston Martin

Samuel Cregut, Battery Management System Expert, Groupe Renault

Alexandre Collet, Chief Technology Officer, ION Energy Inc.

Track 2: Battery Chemistries: Increasing Energy Density & Future Battery Cell Design

15:45 - Investigating Technology Readiness Level of Innovative Battery Technologies

This session will investigate the technology readiness level and cost implications of next-generation cell chemistries. It will be highly interactive and require your full participation! Each presenter will have 15 minute to outline their technology before answering your questions. You can decide which areas of development or innovation the speaker should address by voting for your favourite questions through our Slido platform.

Topics that could be discussed:

- What are the current challenges with these technologies?
- What are the barriers of implementation?
- What is the current technology readiness level?
- What is needed to enable commercialisation?

Moderator

Shmuel De-Leon, CEO, Shmuel De-Leon Energy

Speakers

Laurent Hubard, CEO, Tiamat

Stephen Voller, CEO & Founder, ZapGo

David Ainsworth, Chief Technical Officer, Oxis Energy

Track 3: Electric & Hybrid Vehicle Technology

15:45 - Race Track to The Road: Evaluating the Latest Second Generation Race Technology

The excitement around the 2018/19 Formula E car is very different from the situation less than four years ago. With its second generation racer, revealed this week, FE has moved on to a different level. A radical new chassis and aero kit means Gen 2's cars will certainly look quicker, while revised technical regulations mean they'll actually be faster – and their batteries will last an entire race, too. This session will bring together the major OEMs such as Jaguar, Nissan and BMW set to join the all-electric racing series, examine the technology that is making it possible and if and when we will see it transfer to the road.

Panel Discussion Topics:

- Outlining latest developments in efficiency, weight and cooling for Formula E cars, and how this translates when developing electric road cars
- Developing working relationships between Formula E teams and road car development
- Counterparts – designing for both race track and road simultaneously
- Outlining recent innovations in electric powertrain for the race track
- Examining the latest software innovations to manage energy usage
- Making expensive racing innovations work financially and technologically in a road car
- Adapting technology and methodologies used in F1 to improve plant efficiency, deliver a smoother ride and progress low emissions technology

Moderator

Jana Kirchen, Consultant, P3 Group

Speakers

Jason King, Business Development Director, Integral Powertrain

Rosen Daskalov, Founder, Sin Cars

Anthony Law, Head of Motorsport Batteries, McLaren Applied Technologies

Track 1: Optimising Automotive Battery Technology Design

17:00 - End of Track 1 Day 2

Track 2: Battery Chemistries: Increasing Energy Density & Future Battery Cell Design

17:00 - End of Track 2 Day 2

Track 3: Electric & Hybrid Vehicle Technology

17:00 - End of Day 2

Day 3

Track 1: Charging, Validation & Testing

08:30 - The Fast Charging Trade Off: Fast Charging versus Battery Degradation and Energy Density

The ability to fast-charge a battery is important in various application areas, from mild hybrid systems to other non-transport applications such as power tools and other consumer electronics. However, fast-charging technology has implications for battery health, health of the grid and public safety as it degrades the battery quickly and severely impacts battery life. In addition, there are several challenges to enabling this technology for high-energy-density batteries, and therefore fully electric vehicle applications, as energy density and power density are conflicting parameters.

- What is done in battery design to enable this technology?
- What are the challenges and what is being done to ensure battery safety?
- How to enable faster charging of high-energy-density batteries?
- How to enable fast charging while optimising battery life?
- Optimising cooling (weight/space) of cells to enabling fast- and ultra-fast charge

Moderator

Angelique Janse van Rensburg, Senior Cell Engineer - Battery Systems, Lillium GmbH

Speakers

Daniela Werlich, Senior Project Manager, Custom Cells Itzehoe GmbH

Masato Origuchi, Expert Electrical Energy Storage Systems, Renault Sas

Matthew Keyser, Vehicle Electrification Group Manager, NREL

Carla Cavalca de Araujo, Senior Specialist Battery Solutions, 3M Deutschland GmbH

Track 2: Battery Manufacturing Trends

08:30 - Validating Solid-State Battery Technology for Commercialising and Scale-up

With the global drive for electrification, solid-state batteries are currently considered the next-generation batteries for EVs. However, there is continued discussion in the industry regarding the viability of solid-state technology. A live poll at The Battery Show 2018 indicated that 57% of the

respondents believed the technology is 10+ years away from implementation, and some even believe it is too complex and will never make its way to full-scale production. Drawbacks of solid-state technology include the cost of manufacturing processes and long validation cycles of the automotive industry and in order for it to be scaled-up many hurdles need to be overcome. For example, sulphite-based technologies require careful management of the manufacturing environment and oxides are easier to produce but have lower conductivity.

This session will be opened by three keynotes that will examine the various solid-state technologies such as sulphite, oxide and polymers as well as their manufacturability and cost. The session will also feature a 45-minute interactive panel discussion that will allow the audience to get their questions answered through our Slido platform.

Topics to be addressed:

- What are the benefits of each technology and what technological barriers need to be overcome?
- How much funding and infrastructure is needed to scale-up these technologies?
- How to bring the cost down?
- How flexible are the current battery lines to integrate future material technologies like the solid-polymer batteries?

Moderator

Mauro Pasta, Associate Professor, Department of Materials, University of Oxford

Speakers

Richard Clark, Global Lead, Energy Storage, Morgan Advanced Materials

Andreas Hintennach, Senior Manager, Daimler AG

AK Srouji, Director of Battery Cell Technology, Romeo Power

Track 3: Electric & Hybrid Vehicle Technology

08:30 - Bus Operator Case Studies: Outlining the Challenges of Deploying an Electric Bus Fleet, Lessons Learnt and Future Requirements for the Manufacturers

This session will bring together bus operators to share experiences of implementing electric and fuel cell buses into their fleets. They will discuss successes and challenges including battery usage, charging infrastructure needs and evolving future requirements.

Speakers

Rueben Scriven, Research Analyst, Interact Analysis

Gerard Hellburg, Program manager Zero Emission Mobility, Vervoerregio

Josep Armengol Villa, Director of Engineering and New Developments, TMB

Jörn Schwarze, Member of the Board, KVB

Jens Conrad, Head of Department, RVK

09:30 - Determining the Optimum Fuel and Powertrain Architectures and Technologies to Meet the Specific Needs of Buses

Increasing zero emissions transport targets across Europe are driving growth in the electric bus market. This session will bring together the bus operators, OEMs and tier 1 suppliers to evaluate the latest technologies enabling electric buses and how barriers to their effective rollout can be overcome. Considering both fuel cell and battery models they will assess the performance of large-scale electric or hybrid powertrains and the challenges of power, range, haulage and safety concerns.

Panel Discussion:

- Examining the different powertrains options for electric buses - what are the specific requirements?
- 48V mild hybrid applications for buses - what is the current and long-term future?
- Are we seeing an increase in fuel cell vehicles or a move to pure electric vehicles?
- Examining the latest in e-motors and power electronics for electric buses
- Addressing the costs and reliability issues for fuel cell buses - how are refuelling challenges being addressed?
- Integrating the latest autonomous technology into electric buses
- Outlining China's global rollout of electric buses and the impact on the overall market

Speakers

Josh M Ley, Vice President of Engineering, UQM Technologies

David Barnett, Business Development Director, Wrightbus

Oben Uluc, Sales Director, EMEA & India, Ballard

Marcin Seredynski, Head of Innovation and Research at the E-Bus Competence Centre, Volvo

Track 1: Charging, Validation & Testing

10:30 - Networking Break: Coffee & Refreshments in the Foyer

Track 2: Battery Manufacturing Trends

10:30 - Networking Break: Coffee & Refreshments in the Foyer

Track 3: Electric & Hybrid Vehicle Technology

10:30 - Networking Break: Coffee & Refreshments in the Foyer

Track 1: Charging, Validation & Testing

11:00 - Complying with Global Regulations on Battery Safety and Transport

Questions/topics to be addressed:

- China's influence on the globalisation of electrified vehicles, particularly in the EU
- How can the global battery industry work towards common homologation in battery safety testing and standards?
- How are battery manufacturers and legislators working on cost-effective methods for battery certification?
- Update on UN battery transport regulations
 - What are the major challenges to transport li-ion battery cells by truck & rail in Europe?
 - Discussion question: How will they impact battery system development?

Moderator

Bob Galyen, CTO, CATL

Speakers

Dr Akos Kriston, Research Fellow, EC JRC

Eric Gillett, Policy Specialist Dangerous Goods, Civil Aviation Authority

Mathy Stanislaus, Lead, Circular Economy Working Group, Global Battery Alliance

Track 2: Battery Manufacturing Trends

11:00 - Creating Material Feed Stock Through Battery Recycling

As the demand for energy material increases and availability of raw materials pose a potential bottleneck in production to meet the energy demand of the future, recycling of raw materials is gaining momentum in the industry as a [valuable resource, potentially worth billions](#). Currently, the volumes of EV batteries that need to be recycled are not large enough for it to be economically viable. However, expectations are that large volumes of Li-ion batteries will hit the market in the mid 2020s, and the industry is [responding](#).

The viability of cell recycling depends on the adoption of vehicles in the EU and North America and the recycling process needs to be developed and industrialised. The technology that will support the influx of batteries that will be needed to be recycled post 2025 is in early piloting scale but is maturing very rapidly. In Asia, the process has already been scaled up successfully, with many other initiatives coming off the ground over the next few years. [Chinese battery manufacturers](#) are ramping up their recycling capacity; [Japanese automakers](#) have announced plans to unify battery recycling and Nissan has opened a processing center for [recycling of electric vehicle batteries](#) of their Leaf EV, refurbishing the cells and creating an affordable aftermarket for their platform. In addition, lead batteries are already 99% recycled in Europe - one of the highest recycling rates of any product ([source](#)). This session will look at the recycling of battery cells as a viable raw material resource and will address the following questions:

- What role should governments play in creating a closed-loop manufacturing process

to ensure resources?

- What are the current regulations and industry initiatives for recycling?
- How to industrialise the recycling process?
- How to set up a recycling infrastructure:
 - How will the logistic chain work?
 - Who will collect it, process it, ship it?
 - Can you transport used li-ion batteries out of the country?
 - What can be learned from the lead-acid industry?
- What is needed to make the process cost-effective?
- What can be learned from Asian case studies?
- What is the latest R&D ready for commercialisation in zero-cost recycling?
- Monetising recycling: how much of the industry's material needs can be met through material recycling?
- What business models exist? Leasing versus selling batteries

Moderator

Jacqui Murray, Director – Faraday Challenge and Head of Advanced Materials, Innovate UK

Speakers

Asad Farid, Associate Director, Senior Analyst, Thematics Equity Research, Berenberg

Claude Chanson, General Manager, RECHARGE

Kunal Phalpher, Chief Commercial Officer, Li-Cycle

Jan Tytgat, Director Government Affairs EU-Benelux, Umicore

Track 3: Electric & Hybrid Vehicle Technology

11:00 - Fast Charging: What Impact Will Fast Charging and XFC Have on Powertrain Design and What Are the Latest Developments in Dynamic Charging Systems?

Ultra-fast electric-vehicle chargers promise to replenish drained batteries in a matter of minutes, and the charging industry is working towards network rollouts.

However, there are still questions around whether future BEVs will be equipped to take full advantage of the advanced technology and handle the maximum charging speeds and whether the investment in powertrain and battery technology will make it cost-effective.

Panel Discussion Topics:

- Examining current and future charge rates and OEM future plans for compatibility with 350kW chargers
- Will charging limits and costs restrict the business case for BEVs?
- Managing the optimal thermal range for the powertrain while charging
- Comparing dynamic and static charging and their impact on powertrain design
- Outlining the latest developments for “in-wheel” wireless charging systems (WCS) and how they will impact powertrain design

Moderator

Hermann Pyschny, Consultant, P3 Group

Speakers

Patrick Ester, Senior Manager, E-Mobility Business Development, E.ON

Gerrit Stumpe, Business Development eHighway, Siemens Mobilty

James Galliher, GSR Charge Stations - Electric Vehicles, Volvo

Track 1: Charging, Validation & Testing**12:30 - Networking Lunch & Opportunity to Take Advantage of Activities on Show Floor**

- Access the 400+ supplier exhibition showcasing the latest solutions for battery and HE/V applications

Track 2: Battery Manufacturing Trends**12:30 - Networking Lunch & Opportunity to Take Advantage of Activities on Show Floor**

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Track 3: Electric & Hybrid Vehicle Technology**12:30 - Networking Lunch & Opportunity to Take Advantage of Activities on Show Floor**

- Access the 400+ supplier exhibition showcasing the latest solutions for battery and HE/V applications

Track 1: Charging, Validation & Testing**14:00 - Outlining Developments in Battery Safety and Performance Testing Methodologies****Speakers**

Harry Hoster, Professor & Director of Energy Lancaster, Lancaster University

Keith Ong, High-Voltage Power Net eDrive System Integration eDrive Architecture and HV System Technology (RD/EIS), Mercedes - Benz Cars | Daimler AG

Dr. William Q. Walker, Lithium Ion Battery Thermal Test and Analysis, Structural Engineering Division, Thermal Design Branch, NASA Johnson Space Center

Track 2: Battery Manufacturing Trends

14:00 - Ramping Up Battery Assembly to Meet Future OEM Demand: Building Gigafactories in the EU

According to [a recent report](#) by the International Energy Agency (IEA), the world needs at least 10 more gigafactories to support the predicted growth in demand of batteries by OEMs by 2025. A key challenge in meeting the power requirements of the future is the infrastructure that is required to enable the build of gigafactories in Europe, which would require a balance of several factors such as location, infrastructure and government policies. This session will examine the challenges in setting up battery manufacturing production lines that not only enable the volume of cells demanded by the market but also meet the increasing sustainability requirements set by governments and OEMs alike. Topics to be addressed:

- **Location:** Which countries/regions in the EU are the most attractive and suitable for battery plants? Why?
- **Logistics:** Transportation of the tons of material that needs to be supplied around the EU for a gigafactory
- **Infrastructure** to run a gigafactory: power supply, water treatment, human resources
 - Sustainability of the power supply: how to reinforce the grid with renewable energies?
- **Government policies:** how are governments policies going to support the build of these factories?
- **Construction:**
 - What concepts exists for large-scale factories?
 - What parties are involved in such a construction project?
 - What partnerships are needed?

Moderator

Markus Woland, Consultant - Expert Battery Production, P3 Group

Speakers

Patrik Öhlund, CEO, Node Pole

Gordon Bach, Senior Engineering Manager - EU Engineering Center, CATL

Marc Deyda, Global Battery&Hybrid Business Developer, Siemens AG

Martin Anderlind, Director, Northvolt

Sebastian Wolf, Sr. Director EU Operations & Managing Director, Farasis Energy Europe

Track 3: Electric & Hybrid Vehicle Technology

14:00 - Commercial Vehicles: Evaluating the Latest Developments in Medium and Heavy-Duty Trucks and Large-Scale Electric and Hybrid Powertrains

As environmental regulations increase around the world, we are witnessing a surge of innovation in electric-drive vehicle products in the medium- and/or heavy-duty sectors, with new launches almost every week. This session will examine the latest developments in hybrid and zero-emission electric trucks understanding the implications of large scale on the electric or hybrid powertrain. Speakers will outline the latest designs and discuss how they are meeting the challenges of power and range.

Panel Discussion Topics:

- Addressing power level and range requirements for heavy-duty trucks
- Examining the optimum location for an EV drivetrain in trucks
- Determining the optimum level of hybridisation for long-haul trucks
- Implementing 48V powertrains in trucks
- What are the timescales for cost-effective BEV trucks - will they ever be viable?
- What is the business case for hydrogen fuel cell technology for trucks?

Moderator

Rueben Scriven, Research Analyst, Interact Analysis

Mihai Dorobantu, Director -Technology Planning and Government Affairs, Vehicle Group, Eaton

Simon Shepherd, Head of Electrified Powertrain, Drive System Design

Ryan Maughan, Managing Director, Avid Technology Group Ltd

Track 1: Charging, Validation & Testing

15:15 - End of Track 1 Day 3

Track 2: Battery Manufacturing Trends

15:15 - End of Track 2 Day 3

Track 3: Electric & Hybrid Vehicle Technology

15:15 - End of Track 3 Day 3