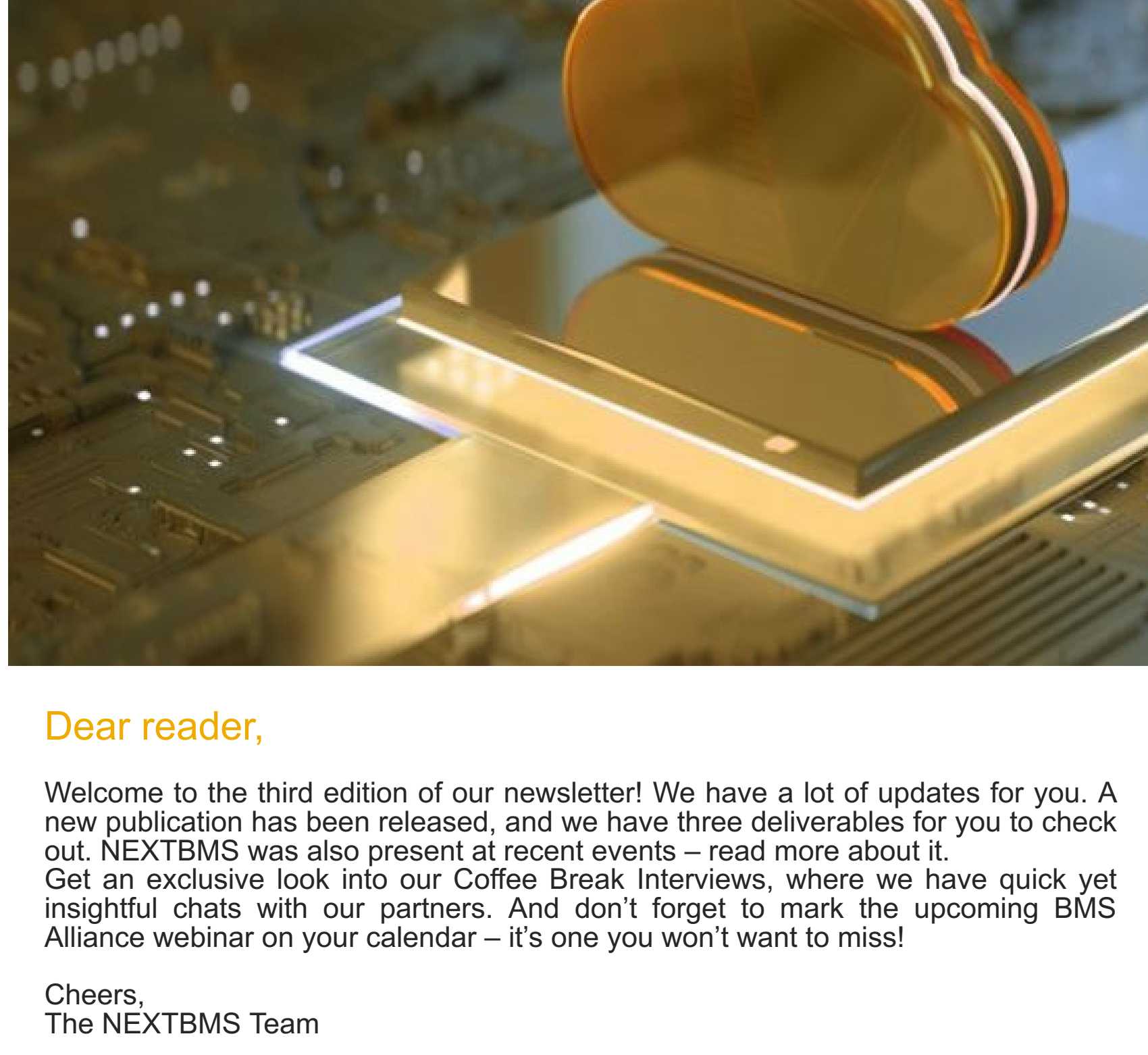




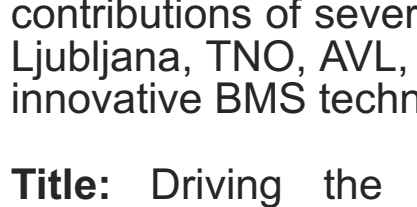
# Advanced physics and data-based BMS for optimal battery utilization

Newsletter # 3 | February 2025



Dear reader,

Welcome to the third edition of our newsletter! We have a lot of updates for you. A new publication has been released, and we have three deliverables for you to check out. NEXTBMS was also present at recent events – read more about it. Get an exclusive look into our Coffee Break Interviews, where we have quick yet insightful chats with our partners. And don't forget to mark the upcoming BMS Alliance webinar on your calendar – it's one you won't want to miss!



The MOBI-EPOWERS Research Group at Vrije Universiteit Brussel has released a new publication. This research offers an in-depth exploration of the latest advancements in Battery Management Systems (BMS), highlighting key challenges and future directions in the field.

The paper provides valuable insights into the evolving role of BMS and its connection to the emerging battery passport concept. It reflects the contributions of several academic and industrial partners, including the University of Ljubljana, TNO, AVL, and AVL-SFR, who have played a significant role in advancing innovative BMS technologies.

**Title:** Driving the future: A comprehensive review of automotive battery management system technologies, and future trends

**Written by:** Pegah Rahmani, Sajib Chakraborty, Igor Mele, Tomaž Katrašnik, Stanje Bernhard, Stephan Pruefling, Steven Wilkins, Omar Hegazy

**Highlights:**

- Review of future-proof BMS focusing on hardware, software, safety and performance
- BMS real-world challenges: modelling, aging, fault tolerance and fast charging.
- Future technologies: V2X, battery swapping, advanced SoX and cyber-secured BMS.

To access the full paper, please click [here](#).

## Deliverable reports

### Deliverable 3.1

The development of a battery module focuses on cell selection, design development, and the integration of essential components such as sensors, thermal management systems, and electronics. The aim is to create a robust and efficient battery module to demonstrate the innovations of the NEXTBMS project. Generation 3b prismatic cells with Nickel-Manganese-Cobalt (NMC) chemistry and a nominal capacity of 58 Ah were chosen for the demonstrator. The design process includes structural design for durability, electrical design for effective power distribution, and thermal management for safe operation. Innovative sensors are integrated to monitor critical performance parameters like temperature, voltage, and current, which are essential for enhancing the battery management system (BMS). The entire design is meticulously documented, detailing sensor concepts, thermal management strategies, and electronic components, ensuring the battery module is efficient, reliable, and well-documented for future reference and development.

Read the [full report](#) on our website.

### Deliverable 3.2

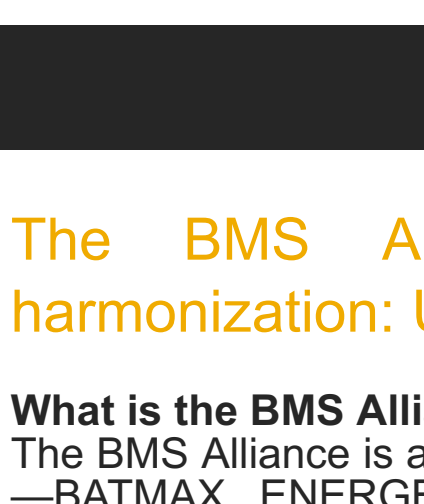
NEXTBMS has completed the hardware design for its next-gen Battery Management System (BMS), focusing on high performance, safety, and reliability. Key features include:

1. **Daughter Board:** Integrates voltage and current measurement, EIS capabilities, and battery balancing.
2. **Main Board:** Includes Slave and Master Control Units for advanced battery models, state estimations, and robust data communication. It also features a Battery Protection Unit for safety.
3. **Temperature Sensing Technology:** Ensures precise thermal monitoring for safe battery operation.

This design marks a significant step forward in battery management technology, aligning with NEXTBMS's goals for enhanced performance and efficiency.

Read the [publishable summary](#) on our website.

### Deliverable 6.3



The NEXTBMS project has released the updated Data Management Plan (D6.3), building upon the initial version (D6.2). This updated plan outlines the procedures, standards, and responsibilities for managing project data from M1 to M18, ensuring the quality and proper handling of results. It highlights the commitment to creating Findable, Accessible, Interoperable, and Reusable (FAIR) data in line with Horizon Europe requirements. The plan will be continuously reviewed and updated through the project's duration, with the final version (D6.4) expected by M42. All partners in the project have accepted and are adhering to the plan.

Read the [publishable summary](#) on our website.

## Upcoming event

### The BMS Alliance Webinar – Data access and harmonization: Unlocking the potential of BMS

**What is the BMS Alliance?**

The BMS Alliance is a collaboration among four groundbreaking EU-funded projects —BATMAX, ENERGETIC, NEXTBMS, and NEMO—focused on advancing next-generation Battery Management System (BMS) technologies. The goal of the Alliance is to develop BMS solutions that improve performance, extend battery life, enhance reliability, ensure safety, and optimize the overall use of battery systems.

**When?**  
March 20, 2025, 09:30-11:00 CET

**Webinar Title:**  
Data Access and Harmonization: Unlocking the Potential of BMS

This webinar will provide insights into how The BMS Alliance is driving innovation in BMS technologies, with a particular focus on data access, harmonization, and management.

Be sure to check out the detailed [agenda](#).

### REGISTER HERE

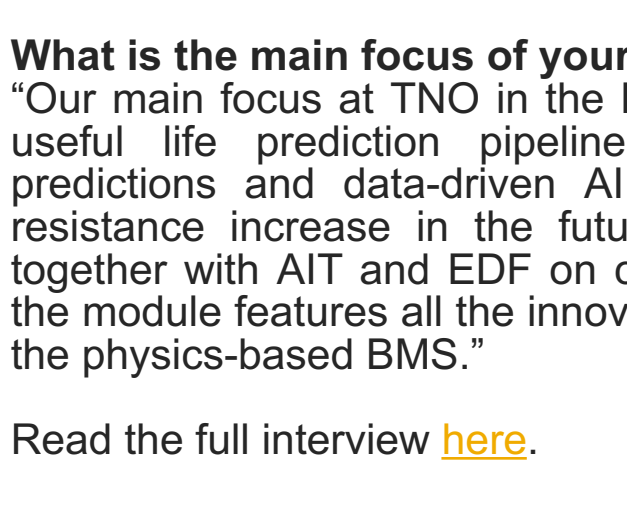
## Past events



### NEXTBMS at the 9th BEPA GA & brokerage event

On November 28, Alessio Lodge from TNO proudly represented the NEXTBMS consortium at the BEPA General Assembly and Brokerage Event in Barcelona. The event provided an excellent platform for showcasing some of the groundbreaking research on physics-based modeling for Battery Management System (BMS) functionalities. These innovative approaches form the backbone of NEXTBMS's ambition to develop a next-generation BMS that integrates cloud computing, advanced physics-based modeling, and artificial intelligence (AI) to optimize battery performance and extend lifespan.

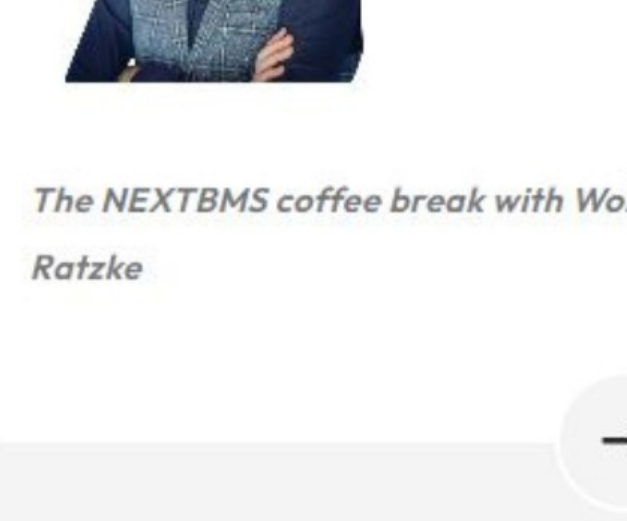
Read the entire news item [here](#).



### 12th research networking day

On October 24th, 2024, the AVL ITS R&T Research Networking Day took place in Leibnitz, bringing together industry professionals, researchers, and innovators to discuss the latest developments in intelligent transportation systems (ITS) and cutting-edge technology trends. The event featured a series of insightful presentations, networking opportunities, and exhibition pitches that showcased groundbreaking research and technological advancements shaping the future of mobility.

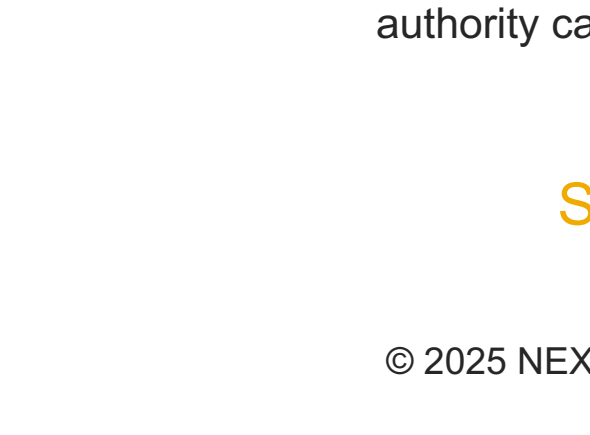
Read the entire news item [here](#).



### Third General Assembly NEXTBMS in Regensburg

The third General Assembly of NEXTBMS was held in Regensburg on October 16 and 17. This meeting focused on the initial results regarding the development of new physics-based models for the BMS, including advanced modeling features based on cell measurements, degradation, and lithium plating in relation to fast charging. It also highlighted how the new model is unique in calculating parameters (parameter identification). In addition, important steps were taken in the final design of the battery housing and in presenting the outline of the testing and validation activities during the second part of the project.

Read the entire news item [here](#).

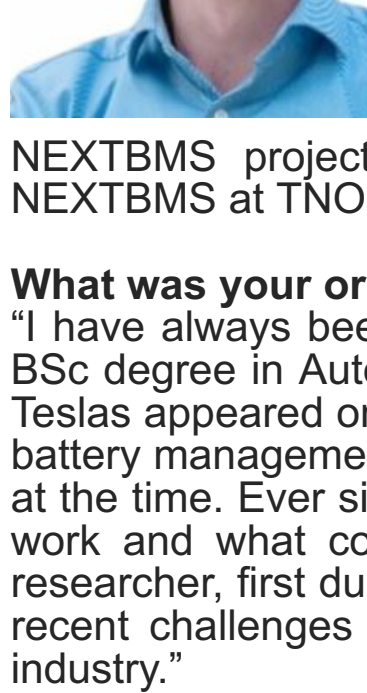


### Cluster workshop NEXTBMS and InnoBMS

On Thursday 17 October 2024, the first cluster workshop was organized between the two BMS projects NEXTBMS and InnoBMS. Sharing some of the same partners, the workshop was a great opportunity to align the two projects on objectives, mutual results and future (commercial) steps.

Read the entire news item [here](#).

## Get to know Feye Hoekstra from TNO



He is a battery scientist working at TNO, the applied research institute of The Netherlands, with a primary focus on Battery Management-related challenges, such as battery behavior modeling and algorithm design for battery state estimation and control. He obtained both an MSc and a PhD degree in Systems & Control from Eindhoven University of Technology, with his research focusing on leveraging control theory to address battery management challenges. In the technical lead for the team involved in NEXTBMS at TNO.

**What was your original motivation to become a researcher?**  
"I have always been interested in how technical stuff works. In the last year of my BSc degree in Automotive engineering, which was just after the time when the first Teslas appeared on the road in The Netherlands, I had the choice to do research on battery management and battery testing, something I knew absolutely nothing about at the time. Ever since that moment I have been fascinated with batteries, how they work and what control engineering can do to increase their performance. As a researcher, first during PhD and now at TNO, I have the freedom to chase the most recent challenges in batteries and to stay connected with the practical needs of industry."

**What is your (main) research area today?**  
"I work fully on battery management related questions such as battery modelling, state estimation and control algorithms. At TNO we both do theoretical work on algorithms but also put our work to the test in our lab through cell, module and pack validation testing. We are positioned between academia and industry, which means that we focus on applying scientific research and how it can benefit industrial partners."

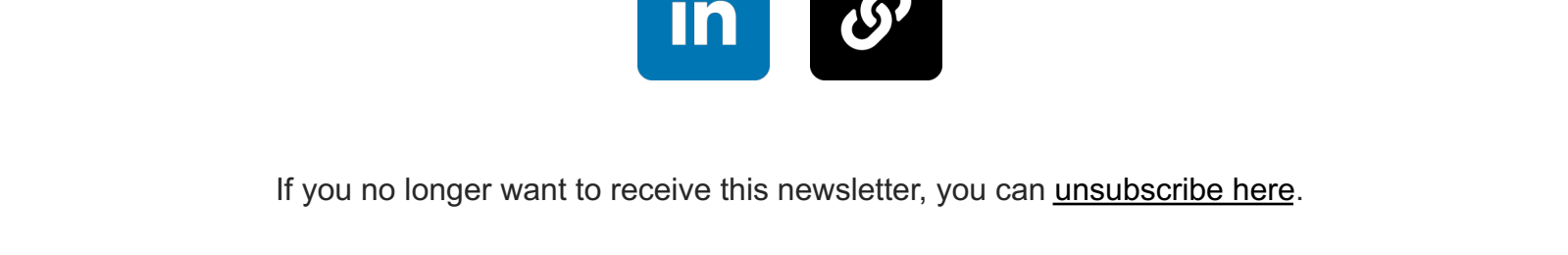
**What is the main focus of your team in NEXTBMS?**  
"Our main focus at TNO in the NEXTBMS project is on developing of a remaining useful life prediction pipeline which uses both physics-based degradation predictions and data-driven AI algorithms to predict the capacity decline and resistance increase in the future. Besides this, we also have testing activities together with AIT and EDF on cell-level ageing testing and module testing, where the module features all the innovations developed in the NEXTBMS project, such as the physics-based BMS."

Read the full interview [here](#).

### More coffee break interviews

Click on the images to read the interviews.

## Partners NEXTBMS



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