

Silicon Sulfur Battery

- from circular design to industrial uptake



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First Living Lab Event - Silicon Sulfur Batteries: from circular design to industrial uptake

The *2BoSS project*, in collaboration with *Robocoast EDIH*, recently hosted its first Living Lab event, bringing together key industry experts, researchers, and project partners to explore the cutting-edge advancements in battery technology and next generation batteries. The event was held online on the 15th of June 2023 and was focused on “Silicon Sulfur Battery: from circular design to industrial uptake”. Now we are thrilled to share the highlights and key takeaways from the Living Lab experience.

The event started with a warm welcome from **Kati Kiljunen** (*Robocoast EDIH*) and **Alessandra Manzini** (*Cleopa GmbH & 2BoSS project member*), who set the stage for an engaging and insightful session which had the opportunity to host several experts in the battery and mobility fields:

- **Inga Petersen**, Executive Director of the *Global Battery Alliance (GBA)* – international affairs and sustainability professional focused on project management, implementation, and capacity building both in the public and private sectors.
- **Wouter IJzermans**, Executive Director of the *Batteries European Partnership Association (BEPA)* – leading the development of a competitive and sustainable battery value chain in Europe, driving collaboration and innovation while advocating for policies that support sustainable development.
- **Pirita Ihamäki**, International Business Manager at *Robocoast EDIH* – experienced international relations professional and advocate for innovation and collaboration, she plays a crucial role in connecting companies and organisations internationally in the robotics and automation sector.

- **Aleksi Narkilahti**, Specialist at *FrostBit Lab* – RDI expert at Lapland University of Applied Sciences with a focus on simulation and digital twins in the automotive and forest industries.

Thus, the first part of the conference was led by our esteemed keynote speakers, Inga Petersen and Wouter IJzermans, who captured the audience's attention with their presentations. **Inga Petersen** shed light on the criticality of transparency in the value chain, and the recent launch of the Battery Passport proof of concept and pilot cases proof of concept and pilot cases, a scalable solution that paves the way for the interoperative digital twin and associated sustainability report of the battery value chain. **Wouter IJzermans** shared Batt4EU's ambitious vision of establishing the best innovation ecosystem by 2030 and explored funding opportunities for new battery materials production and beyond.

The event continued with captivating project presentations from **Pirita Ihamäki** and **Aleksi Narkilahti**. Pirita highlighted the importance of connecting companies through successful cross border collaboration projects for driving innovative technologies forward; while Aleksi showcased the benefits of simulations, enabling faster and more efficient testing.

In the second part of this session our project partners took the virtual stage to present various aspects of the 2BoSS project. **Andreu Cabot** (*2BoSS project coordinator, ICREA Research Professor & leader of the Functional Nanomaterials Group at the IREC – Catalonia Institute for Energy Research*) outlined our goal to develop a high-energy density and durable battery technology. **Pascale Chenevier** (*Scientist in Nano sciences at CEA – French Alternative Energies & Atomic Energy Commission*) enlightened us on the progress of growing silicon nanowires, a crucial step towards creating a sustainable battery solution. Additionally, the Living Lab also touched upon the critical aspect of Life Cycle Assessment and its role ensuring our battery's environmental sustainability. **Isabella Bianco** (*Researcher at Department of Environment, Land, and Infrastructure Engineering – Politecnico di Torino*) shared valuable insights into LCA and social LCA, guiding us to make more sustainable choices throughout the project. Furthermore, **Michael Carboni** (*Research Scientist at CEA – French Alternative Energies & Atomic Energy Commission*) explored upcycling possibilities, creating new value from spent lithium batteries, and emphasizing the significance of recycling materials in a circular material system. Finally, the circular design phase emerged as a focal point in **Alessandra Manzini's** (*Research & Innovation project manager at Cleopa GmbH*) presentation, highlighting the importance of closed-loop supply chains and strategic partnerships for long-term product reusability. She launched a call to action for achieving the most sustainable sourcing and recycling strategy for the 2BoSS battery. By prefiguring a value chain and integrating different roles in the ecosystem, we aim to make a tangible difference in the industry.

The Q&A session triggered some interesting discussions and highlighted the topics that were the most interesting ones for the audience. Inga addressed the [vision for a sustainable battery value chain in 2030](#), directing the audience to the comprehensive publication by the Global Battery Alliance.

Transparency emerged as a crucial theme, with questions about the collaboration between the Global Battery Alliance and EU's battery regulations. Inga highlighted the collaborative efforts of numerous organisations working on the [battery passport](#), laying the foundation for transparent and sustainable battery value chains. Inga emphasized the importance of standard equivalency for ensuring transparency in the energy transition. Building trustful relationships among partners and compliance with the Battery Passport were identified as key factors for that. The voluntary sustainability reports would face challenges, but consumers' demand for more information would play a crucial role in advancing transparency.

Participants were eager to learn more about the Materials Acceleration Platform and Wouter directed them to explore the [CORDIS page for the H2020 BIG-MAP project](#), which "aims to address the absence of innovative battery technologies and hence develop a modular, closed-loop infrastructure and methodology to bridge physical insights and data-driven approaches".

In Aleksii's segment, the focus was on simulation possibilities. Attendees discovered the versatility of simulations, which include optimizing space, production flow, and simulating various sensors used in autonomous vehicles, such as cameras, lidars, and radars.

The final and most interactive part of the Living Lab was introduced by **Pauliina Harrivaara**, Innovation Manager at *Cleopa GmbH* and *2BoSS partner*. The dynamic discussion was supported in the back end by **Laura Martínez**, Design & Communication Specialist also at *Cleopa GmbH* and *2BoSS partner*, who drafted a MIRO board with the main highlights and insights of the session. Participants eagerly opened their cameras and microphones to join the conversation, led by our moderators. The first round of discussions started with *Robocoast's* representatives delving into the needs of the battery industry and emphasizing the significance of tailor-made solutions. What is more, they stressed the potential of utilizing AI, data, and simulation in battery technology advancements. *IREC* highlighted specific industries where next generation batteries are expected to make a significant impact, fostering enthusiasm for transformative possibilities. *Cleopa* concerned about what would be the most critical regulations considered by firms and emphasized the importance of compliance and environmental sustainability.

During this lively exchange, the challenges and barriers in the industry emerged as crucial points of consideration. Environmental permits were identified as a significant obstacle in establishing new factories. However, participants emphasized the drive to make battery materials compatible with new environmental regulations, paving the way for greener solutions.

The discussion also showcased the challenge of building digital twins for process optimization and how many factories are adopting this technology for optimizing performance. The need for solutions like digital twins was, in fact, emphasized, and participants acknowledged the significance of aligning with official rules to ensure environmentally friendly factories and materials.

Participants explored strategies to enhance circularity from the design phase to industrial uptake and discussed how to bring value to stakeholders, making it business effective for

everyone involved. The challenges and barriers in achieving circularity were openly addressed and recycling processes and their handling were thoroughly explored, with a focus on making recycling valuable for battery material and battery producers at the end of the value chain. However, the group recognized the complexities of achieving commercial value due to the many steps required to reach the desired purity, leading to potential cost barriers. Thus, ensuring the valorization of recycled materials emerged as a key challenge, requiring efforts to produce pure products while maintaining commercial viability.

The event was concluded with a few words from **Dina Carrilho**, coordinator of the *ERAMIN network* supporting Research & Innovation projects like *2Boss*, who invited to stay tuned on ERA-MIN network and participate to the next workshops that will shape the New Research Agenda during the Raw Materials Week in Brussels in November.

We underlined our shared commitment to develop a competitive, sustainable, and circular EU battery value chain. We extend our heartfelt gratitude to all participants, speakers, and partners for contributing to the success of this event. Together, we are shaping the future of battery technology and accelerating the transition to electric vehicles.

Stay tuned for more updates, upcoming events, and exciting developments as we progress towards our shared vision of a sustainable and electrifying future. The event was live-streamed and recorded. It can be watched [here](#) on demand.

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