

PRESS RELEASE

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FUTURE4BATT Workshop

Roundtables insights: Paving the Way for a Circular Battery Ecosystem in Europe

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Europe's transition to a competitive, sustainable, and circular battery value chain took a decisive step forward at the FUTURE4BATT Workshop held on 5 June 2025 in Brussels and online.

Through four expert-led roundtables, participants tackled regulatory barriers, recycling infrastructure, black mass valorisation, and second-life battery reuse. A series of cross-cutting recommendations emerged—highlighting the urgency of aligning regulation, technology, and collaboration across the European battery ecosystem.

Roundtable 1: Policy — Coherence, Transparency & Global Competitiveness

Participants emphasised the urgent need for regulatory coherence and simplification. With multiple sustainability objectives - such as cost-efficiency, critical raw material security, competitiveness, and environmental integrity - intertwined, new EU battery regulation ambitions (e.g., *Regulation (EU) 2023/1542* [link]) must ensure predictable and streamlined implementation across Member States.

Key insights included:

- **Coherence and Simplicity in Regulation**: Stakeholders emphasised the need for harmonised, clear, and easy-to-implement rules that balance sustainability goals with competitiveness and supply chain realities.
- Recycling Targets and Flexibility: The introduction of ambitious recycling targets such as 95% for cobalt and nickel, and 70% for lithium—is a landmark policy shift. However, predictability in calculation rules remains a barrier. In response, the REVITALISE project commits to exceed these thresholds, aiming to recover over 89.4 weight % of LIBs, with recovery rates of Co: 95%, Ni: 95%, Li: 75%, Cu: 95% by 2030—



outperforming even the "high-level ambition" of Measure 5 in the EU Battery Regulation.

- Battery Passport & Data Transparency: The upcoming Battery Passport initiative developed under the European Battery Alliance is expected to revolutionise traceability, compliance, and material origin verification. However, the lack of highquality primary data and hesitance from manufacturers to share sensitive information continues to limit verification capabilities.
- **Carbon Footprint Verification & Greenwashing Risks**: A lack of verifiable evidence for the origin of electricity—especially outside the EU—poses a risk of greenwashing, echoing concerns flagged by the European Court of Auditors [link].
- **Member State Disparities in Enforcement**: Fragmented enforcement—where each country independently applies EU battery regulations—creates a disjointed compliance landscape.
- **Global Standardisation Needed**: To support a global battery supply chain, stakeholders called for international regulatory alignment, especially around recovery rate definitions, certification, and carbon footprint assessments.
- **Collaboration is Non-Negotiable**: Harmonised practices and shared knowledge across companies and EU projects are vital for system-wide progress.

Roundtable 2: From Batteries to Black Mass — Infrastructure and Eco-Design Bottlenecks

This session uncovered significant gaps in collection infrastructure, preprocessing efficiency, and design for recyclability.

Key highlights:

- Infrastructure Gaps: Existing recycling processes (pyrometallurgical and hydrometallurgical) are still energy-intensive, expensive, and polluting, and lack of collection infrastructure further limits efficiency.
- metallurgical REVITALISE's Direct Recycling Pathway: While industry still relies on costly pyrometallurgical and hydro-metallurgical processes, REVITALISE pioneers a hybrid solution—recovering 40% of cathodes and 40% of anodes through direct recycling, while the remaining 60% is treated via green hydrometallurgy—fully eliminating pyrometallurgy and associated emissions.
- **Redefining "Waste":** Current waste definitions prevent batteries from being classified as valuable resources. Recasting EoL batteries as "used products" would facilitate transport, reuse, and valorisation. This aligns with the EU Circular Economy Action Plan [link].
- **Eco-Design Challenges**: Battery pack complexity and welded module architecture inhibit dismantling. Modular, standardised design, especially with reversible



connectors and robotic dismantling, is seen as key to scaling up. Tools such as the EU's Eco-Design Directive [<u>link</u>] which introduces tools like the Digital Product Passport can support this shift.

- **Toxic Emissions in Preprocessing**: Emissions from PFAS and fluorine-containing compounds (very high concern under REACH regulation [link] during shredding are emerging environmental threats.
- Need for Upstream Sorting: Industry participants stressed the value of classifying anodes and cathodes before black mass creation, to improve yield and reduce downstream separation costs, which could dramatically improve material recovery and purity.

Roundtable 3: Black Mass Valorisation — Closing the Loop with Confidence

A recurring issue was the heterogeneity of black mass inputs, which challenges purity, market acceptance, and processing reliability.

Takeaways:

- Market Development for Recycled Materials: Recycled graphite remains undervalued despite its high potential. Despite its reusability, recycled graphite lacks an established offtake market, a gap also highlighted in the Strategic Research Agenda of the Battery2030+ initiative [link].
- Heterogeneity of Input Materials: Variability in battery chemistries and compositions hinders the development of unified recycling processes.
- Black Mass Composition Remains Unknown: Limited information about the chemical composition of black mass makes it difficult to design cost-efficient recovery processes.
- **REVITALISE's Valorisation Targets**:
 - o Achieve **≥97% purity** in cathode and graphite fractions via pre-treatment, without hammer mills.
 - O Hydrometallurgical flowsheet targets: Li₂CO₃ (>99% purity), precursor NMC salts (>99%), Fe salts (>99%), graphite (>99%), and >70% lithium recovery.
- **Trust, Quality, and Traceability**: To increase adoption, industrial buyers must trust the performance and consistency of recycled materials—supported by standardized certification and digital traceability.
- **Regulatory Clarity on Black Mass Classification**: Stakeholders urged the EU to recognise black mass as a secondary raw material, not waste, to ease regulatory burdens and logistics.
- AI & Blockchain for Optimisation: Technologies like blockchain for traceability and AIdriven process control are gaining traction as tools to enhance efficiency and transparency.



Roundtable 4: Reuse & Repurposing — Unlocking the Second Life of Batteries

Repurposing holds tremendous promise for circularity but is blocked by legal and commercial inertia.

Key findings:

- **Repurposing is Essential for Circularity**: Reuse of batteries in stationary applications can extend lifespan and reduce environmental impact significantly, but legal roadblocks remain.
- Legal Barriers Across Member States: In Italy, and some other countries, reuse and repurposing are obstructed by narrow definitions of waste and complex permitting processes, strict interpretations of battery waste limit reuse and repurposing. A more aligned EU legal framework is needed.
- **Battery Ownership and Recovery:** Since batteries are typically owned by car users, collection for reuse is difficult. Return incentives, like those proposed in the Battery Directive [link], must be implemented more broadly.
- **OEM Reluctance to Participate:** Many OEMs are not engaged in second-life battery models, due to low margins and unclear accountability frameworks.
- **Eco-Design and Modularity**: Standardised, modular designs and wireless BMS systems would facilitate dismantling and repurposing.
- Need for End-User Education: Greater awareness and responsibility-sharing among consumers, manufacturers, and recyclers are essential to building second-life ecosystems.
- **New Business Models**: Collaborative models that include shared guarantees, reverse logistics, and service contracts are needed to make reuse viable.

Cross-Cutting Takeaways Across Sessions

Several themes emerged across discussions, reinforcing the systemic nature of battery circularity challenges:

- 1. From Waste to Value: Cultural and legal reframing is required. Batteries and black mass must be seen as valuable inputs, not waste.
- 2. **Policy vs. Reality Gap**: Regulations must become enforceable, harmonised, and business friendly.
- 3. Transparency and Traceability: The Battery Passport will be essential for this purpose.
- 4. **Infrastructure & Tech Need to Align**: Even the most advanced tech will stall without adequate logistical and industrial infrastructure.



- 5. **Collaboration is Core**: From co-design of policy to data sharing platforms, a cross-sectoral approach is essential.
- 6. **Design for Circularity**: Modular, recyclable, and repurposable battery designs are not optional—they are imperatives.
- 7. **Market Signals Needed**: Valorisation of recycled graphite and viable second-life business models need stronger demand-side signals and economic pull mechanisms.

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