



ELBC

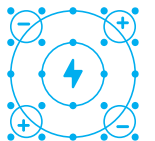
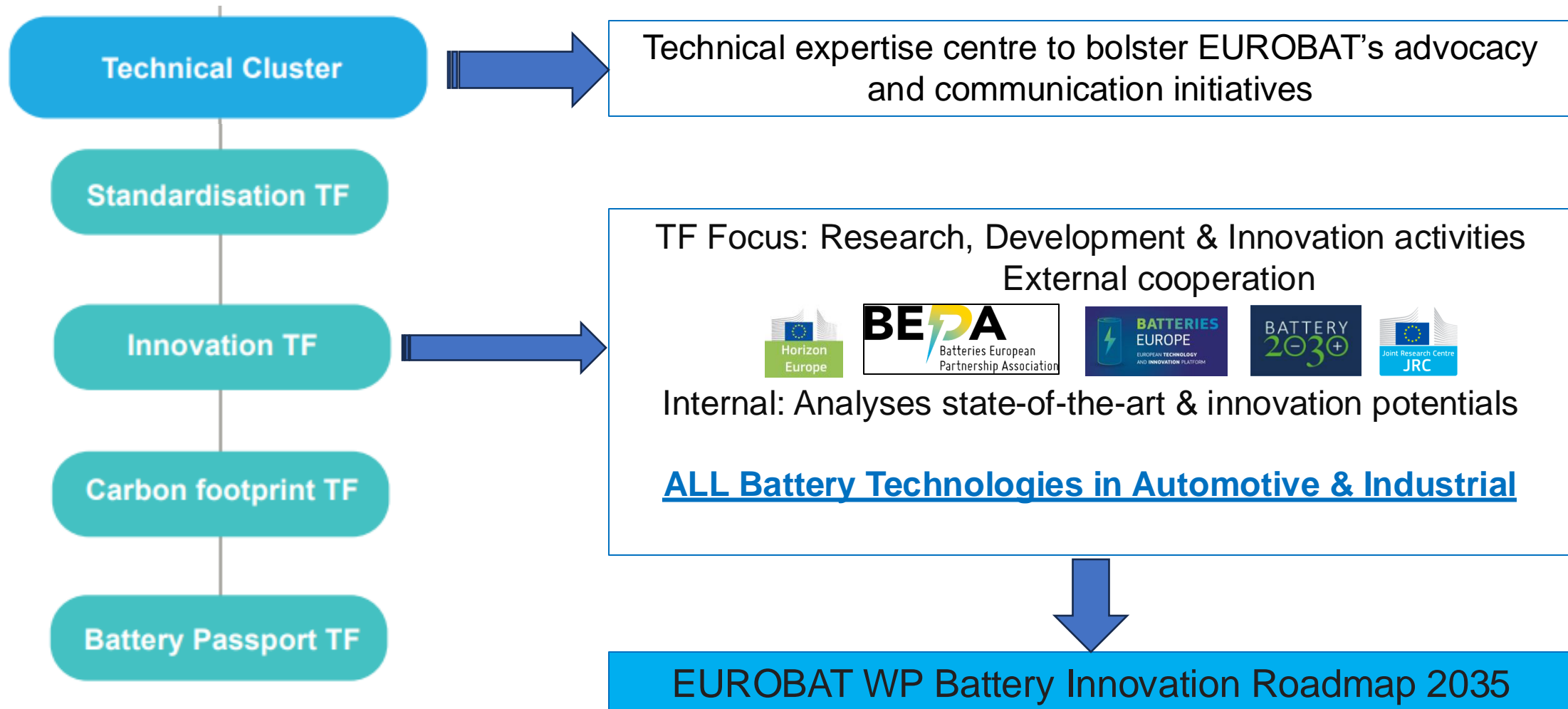
16–19 September
Milan, Italy 2024

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EUROBAT TF Innovation Leader



EUROBAT WP Battery Innovation Roadmap 2035

Key Innovations in the Industry (Part 1)

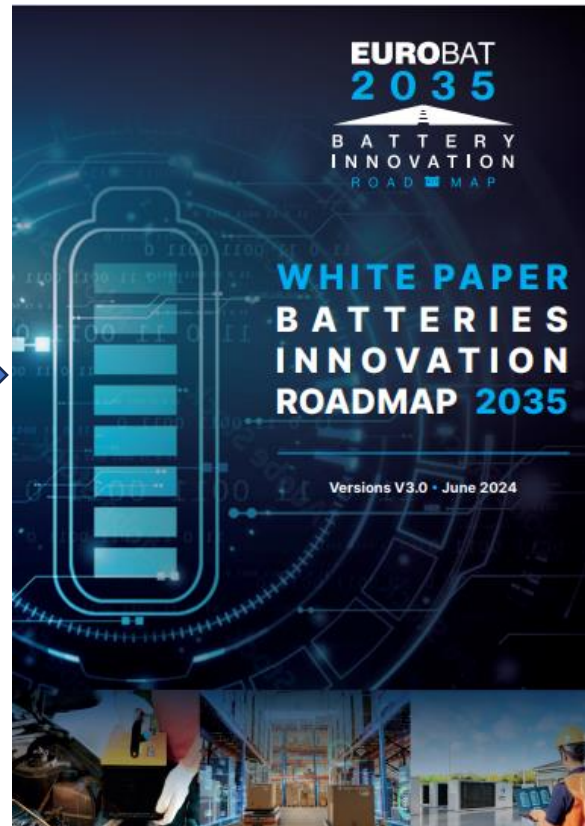


Key Innovations in the Industry (Part 1)

EUROBAT WP Battery Innovation Roadmap 2035



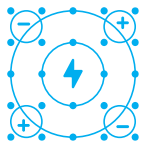
Version 2.0 – June 2022



What?

Most recent advancements in technological innovations and re-assess market evolution with outlook up to 2035

- Technological review of four mainstream battery technologies
- Review of most promising future battery technologies
- Sustainability, circularity and digitalization aspects from the BR 2023/1542
- Evolution of further electrification in end-user battery-operated applications

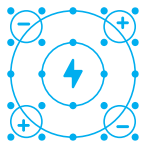


Key Innovations in the Industry (Part 1)

Why?



- Compliment the [EUROBAT Election Manifesto](#) with factual information
- Takes into account most recent **EU policy initiatives**
 - **RePowerEU**, new **Electricity market Design** and **Clean-Tech Innovation Funds** ► boosting battery demands
 - **New Battery Regulation** ► addressing new challenges related to sustainability, circularity and digitalization (**Battery Passport**)
 - **Net-zero Industrial Act (NZIA)** and **upcoming Innovation Funds** ► upscaling domestic battery manufacturing capacities
 - **Critical Raw Material Act (CRMA)** ► addressing new challenges securing the supply chains, making Europe's economic more resilient

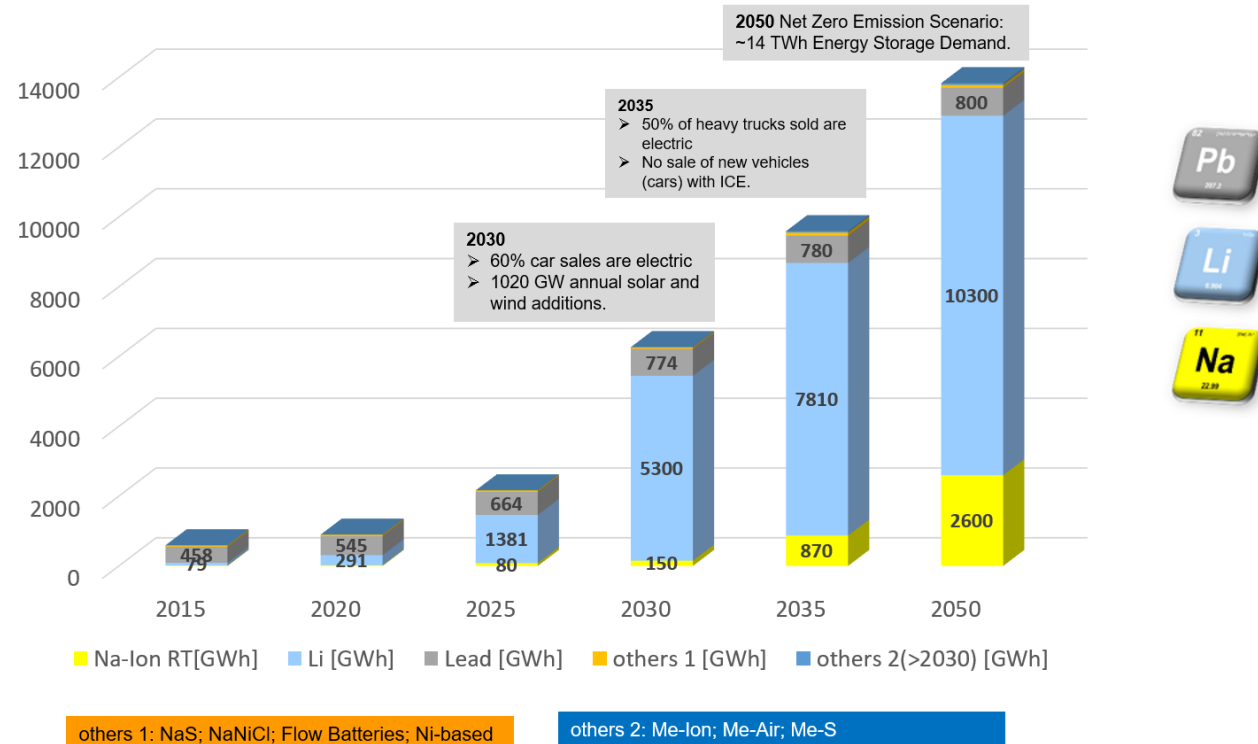


Key Innovations in the Industry (Part 1)

Global level playing field



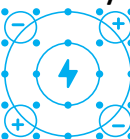
Global battery market evolution across technologies until 2050



*EUROBAT best estimates from recent data sources**

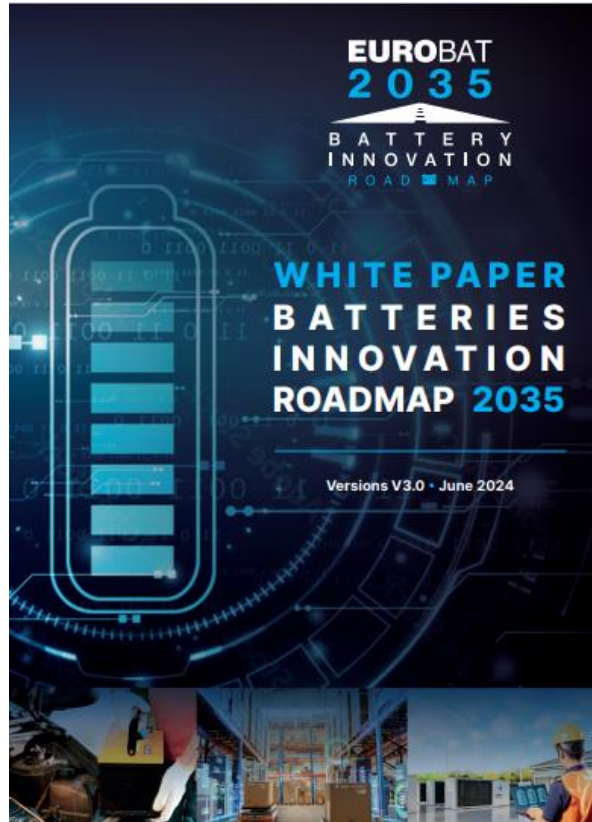
By 2050 Net Zero Emission Scenario: expect Total Storage Demand to reach 14 TWh

- Lead: stable at 800 GWh with resilient raw material supply chain & full established circular economy
- Lithium: ramp up to 10,300 GWh, mainly due to BEV & BESS increase sales
- Na-ion RT: Market uptake to 2,600 GWh, competing with Li and Pb in certain applications



Key Innovations in the Industry (Part 1)

Drivers for battery innovation



A. End-user market demand and policy support to further electrify all sectors

Driving R&D on ALL batteries in different sectors. Promising markets are BEVs & BESS, however the uprise is also significant in many other sectors.

Area 1: Automotive Mobility Applications



- 12V Auxiliary Batteries
- 12V Start-Lighting-Ignition Batteries (SLI batteries)
- Heavy Commercial Stand-by Batteries (HCV Stand-by batteries)
- Mild and Full Hybrid Vehicle Batteries (HEV batteries)
- Battery Electric Vehicles (BEV batteries)

Area 2: Motive Power Material Handling and Logistics Applications



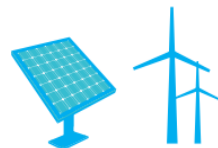
- Motive Power Batteries in all kinds of material handling and logistics machinery

Area 3: Motive Off-road Transportation applications



- Motive Power Batteries in all kinds of Industrial Vehicles
- Motive Power Batteries in railway
- Motive Power Batteries in Marine
- Motive Power Batteries in Aviation

Area 4: Stationary Energy Storage Applications



- Uninterrupted Power Supply (UPS Batteries)
- Telecommunication Power Supply (TLC Batteries)
- Residential & Commercial Storage behind the meter (BTM Batteries)
- Utility Grid-scale Storage in front of the meter (FTM Batteries)
- Stationary – Off-grid applications (developing countries, weak grids or small islands)



Technical Annex



Key Innovations in the Industry (Part 1)

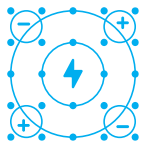
Drivers for battery innovation



B. Sustainability and circularity as laid down in the Battery Regulation



- Not all mainstream technologies are at same level of maturity
- Industry recognizes the need for further innovation on all chemistries, R&D areas identified:
 - The design: reduce hazardous substances, increase energy throughput, increase recycling rates, repair and re-use (2nd life)
 - The production: reduce carbon footprint by using energy from RES, less water, water treatment, increase use of recycled content
 - Information provision: Carbon footprint, recycled content declaration, minimum information requirement on performance and durability



Key Innovations in the Industry (Part 1)

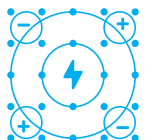
Drivers for battery innovation



B. Sustainability and circularity as laid down in the Battery Regulation



- R&D on recycling and recovery is a high priority with the purpose to create stable and diverse supply chains
- To strengthen EU's strategic autonomy, EU should continue to
 - Invest in Innovation to **diversify the supply chain** for raw materials in all mainstream battery technologies.
 - Encourage **domestic manufacturing facilities** to expand horizontal and vertical in the value chain.
 - Ensure that the Battery Regulation **treats** all mainstream and future battery technologies **equally**.
 - Recognize the **role of standards in providing a cohesive framework to enforce the regulatory measures** (CEB/CENELEC/Mandate M/579)
 - While striving for autonomy, engaging in **collaboration with international standardization** partners
 - Investing in **education and training** programs focused on battery manufacturing, battery products, and battery integration skilled to cultivate the right workforces within EU.



Key Innovations in the Industry (Part 1)

Drivers for battery innovation



C. Digitalization and Implementation of the Battery Passport

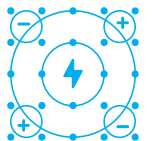


R&D&I need for

- Collaboration across the entire management battery supply chain
- Integration with International standards and regulatory frameworks
- Further developing the BMS, hardware and software
- Developing blockchain or similar technologies to secure operability
- Define the level of the information to include and the access rights to attribute

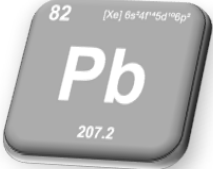


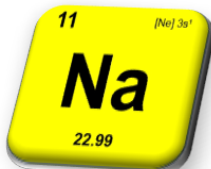
The introduction of the Battery Passport should

- Facilitate the circular economy by
 - Make recycling and recovering of materials more efficient
 - Allow smooth repurposing in less-demanding applications (2nd life)
- Help manufacturers to demonstrate compliance with the requirements by providing accessible, verifiable data
- Enhance consumer confidence and business partners allowing to differentiate their products based on sustainable credentials.
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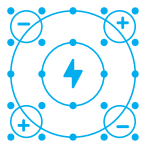
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Concluding Remarks

				
State of the Art	Flooded & VRLA, Pb-C, Thin Plate Pure Lead	NCM, LFP, LMO, NCA, LCO (C; LTO; Si/C)	NiCd, NiMH	NaS, NaNiCl (Hightemp.)
> 2025	Embedded BMS & software	Semi Solid State		Na-Ion (RT Room Temperature)
> 2030		Li-Sulfur, All Solid State		Semi → Solid State All Solid State
> 2035		Li-Air		

Through 2035, mainstream battery technologies will continue to undergo incremental improvements to meet evolving market requirements across numerous end-user applications:

- Lithium-ion: diversity of technologies provides a wide range of KPIs that can be improved upon
- Lead-based: branching into digital avenues: BMS, software, digital twins, something that was never done before and likely to generate new opportunities, also for the integration
- Sodium-ion RT: Offering a sustainable alternative, maturing faster with performance competing in specific markets, thanks to further R&D making it more competitive



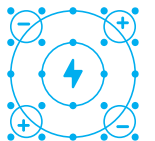
Key Innovations in the Industry (Part 1)

Recommendations



Concluding recommendations towards policy makers

- Make Europe resilient by opening-up technological evolutions in all battery technologies
- Strengthening Europe's competitiveness, while ensuring a global level playing field
- To contribute to Europe's transition to achieving a sustainable and circular economy



Key Innovations in the Industry (Part 1)

Authors



Download:

[white-paper-innovation-roadmap-2024-web-version.pdf \(eurobat.org\)](https://eurobat.org/white-paper-innovation-roadmap-2024-web-version.pdf)

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- THANK YOU! -

