Newsletter 2

Electric Vehicle Battery End-of-Life Management
Ongoing research work on battery 2nd life
R3-Mydas at AIOTI 2024 Signature Event

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Electric Vehicle Battery End-of-Life Management

The European Union's Battery Regulation mandates that electric vehicle (EV) manufacturers and their supply chain partners disclose detailed battery information to trading partners, end users, and regulatory authorities. Compliance with these regulations requires that not only must this information be shared, but its accuracy and timeliness must also be verifiable. Regulators need the ability to trace and authenticate the battery data and the related claims provided.

End-of-life (EoL) for a product is defined as the point at which it can no longer fulfil its original function, typically when an EV battery is decommissioned due to damage or insufficient operational capacity. In this context, EoL specifically refers to the conclusion of the battery's first operational life. This occurs when the battery is deemed unusable for its initial purpose, often due to performance degradation, physical damage, or other safety issues.

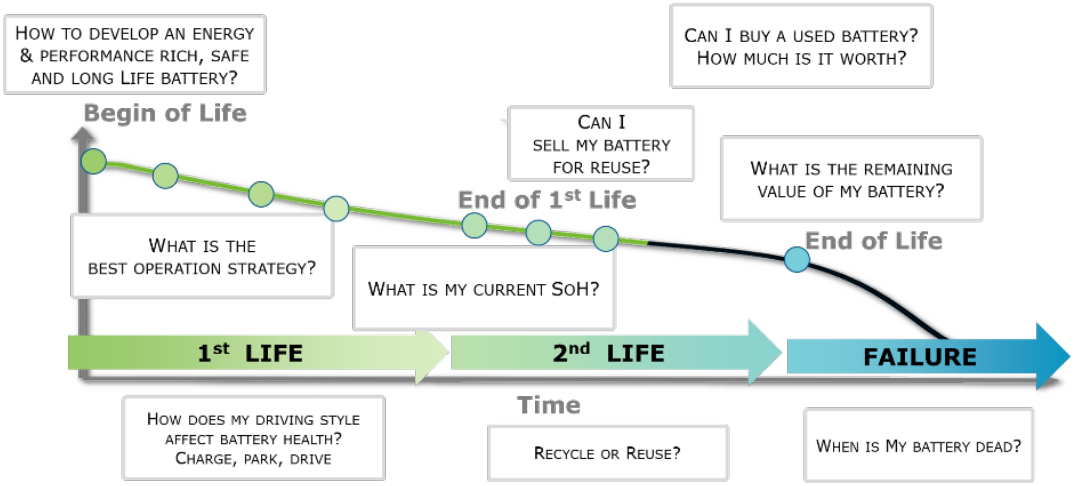

Figure 1 – Operational Capacity in batteries' life.

Battery State of Health (SoH) and State of Charge (SoC) are critical metrics for assessing a battery's performance and determining when it has reached the end of its initial usable life.

- State of Health (SoH): SoH indicates the battery's maximum capacity at any given time compared to its original (rated) capacity. Over time, this capacity diminishes.
- State of Charge (SoC): SoC measures the current available capacity of the battery relative to its full capacity.

As an EV battery ages, its SoH decreases due to wear and usage. Typically, an EV battery is considered to have reached the end of its first useful life when its SoH falls to between 70% and 80% of its original capacity.

When a battery reaches its intended EoL, it is removed from the vehicle. An evaluation is then conducted to decide if the battery should be recycled or if it can be repurposed for secondary use in other applications.

Recent regulations and policies, such as the ones mentioned above, now require stakeholders to appoint specific individuals or teams to manage the EoL processes for electric vehicle (EV) batteries. Furthermore, under the EU Battery Regulation's "battery passport" initiative, companies in the EU must maintain detailed records about their battery packs. This includes tracking information on the materials and components used, as well as other related data throughout the battery's lifecycle.

Ongoing research work on battery 2nd life

There are two major pillars of ongoing research work aiming at both, a deeper understanding of the relevant stakeholders in the EV battery supply chain, and the needs of these stakeholders when it comes to sharing SoH of the battery.

First, in task 3.1, we are identifying the various parties responsible within the automotive battery supply chain such as Battery Manufacturers, Original Equipment manufacturers (OEM-s), companies taking care of the collection, dismantling and sorting, battery recycling companies, battery repurposing companies, battery swapping/reuse companies, battery testing companies, transport companies, government regulators and policymakers, EV dealers and repair shops, and EV owners and fleet/rental companies.

Second, in task 3.3, we are investigating methods for early fault detection and reliable SoH estimation. First project achievements on "AI-based Digital Twin-Anomaly Detection and Diagnostics for HV Battery Behaviour and Performance" have recently been presented at the Advanced Automotive Battery Conference 2024 conference, AABC 2024, Strasbourg, France.

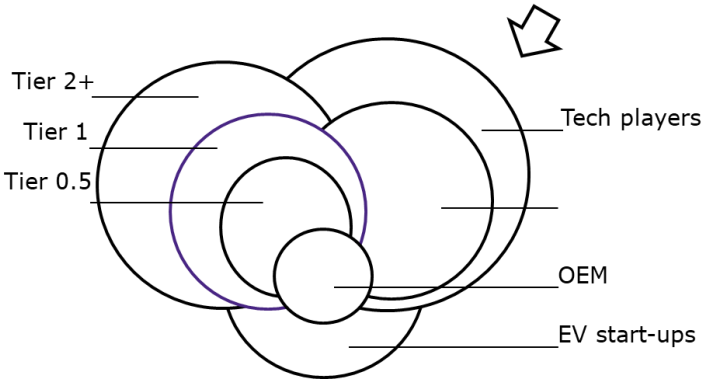

Figure 2 – Possible stakeholders' diagram.

R3-Mydas at AIOTI 2024 Signature Event

At [this year's AIOTI signature event], a dedicated session on R3-Mydas zooms in on the electrification revolution, with a keen focus on electric vehicle batteries—the lifeblood of electric mobility. Explore how predictive diagnostics and analytics are reshaping battery management systems, ensuring reliability and safety while extending battery life.
In the electric era, the stakes are higher than ever. By harnessing the power of data intelligence, we not only propel the automotive industry forward but also accelerate the transition towards sustainable transportation. Electric vehicle batteries hold the key to unlocking cleaner, greener mobility solutions, and our collective efforts in harnessing data intelligence are instrumental in realizing this vision.

Figure 3 – AIOTI Days 2024 banner.

[We invite you to join!]