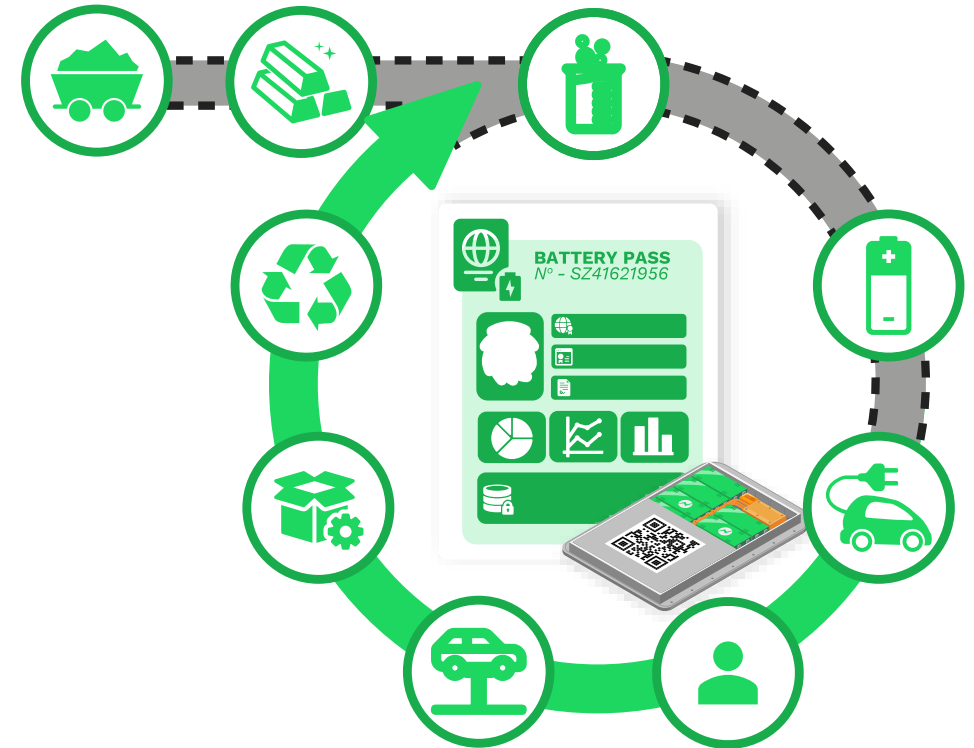


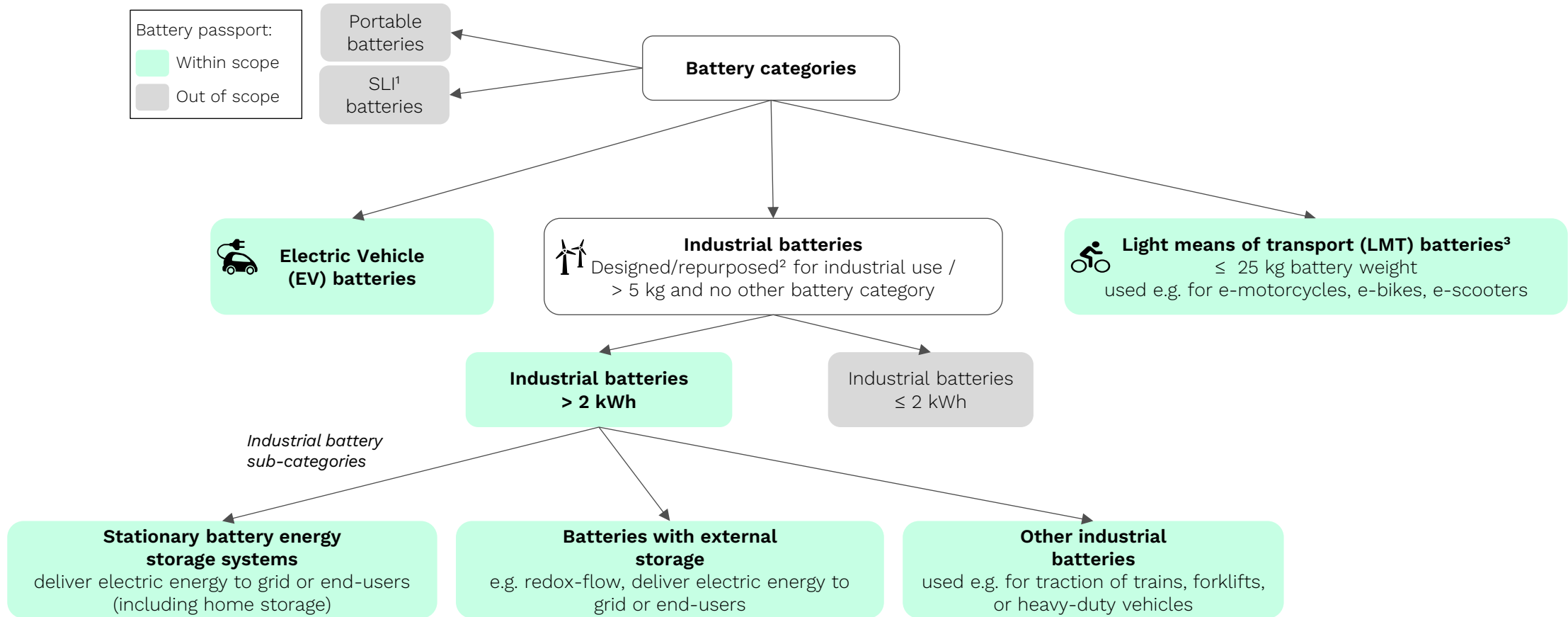
Spotlight on LMT and Industrial Batteries

Battery Passport Insights



December 2024

How are industrial and light means of transport (LMT) batteries defined and what are typical applications?



1. Starting, Lighting, Ignition
2. A number of industrial batteries may be repurposed batteries (e.g. a former EV battery is repurposed into an industrial battery). However, repurposing used industrial batteries is a less likely scenario.
3. Provide electric power for traction of wheeled vehicles that can be powered by the electric motor alone or by a combination of motor and human power.

What characteristics specific to industrial batteries and LMT batteries impact the value of the battery passport?

Exemplary differences, see [value assessment full document](#) for detailed analysis



Industrial batteries

Diverse use patterns and business processes:

- Longer service life in applications like stationary storage
→ limiting relevance of second-life application
- Differing aftermarket operations, e.g. predefined service contracts and monitored take-back processes
→ less room for impact through improved data availability

A broad range of technologies/chemistries:

- Chemistries: Li-ion, Pb-acid, Ni-based,...)
→ e.g. different handling and recycling processes
- Batteries with and without BMS¹ /connectivity
→ availability of dynamic data from use phase limited for some batteries, e.g. lead-acid



Light means of transport (LMT) batteries

Fragmented market:

- LMT market characterised by SMEs, independent workshops (e.g. repair), and shared mobility providers
→ varied business models and levels of digitalization
- Missing connectivity in many, mainly privately-owned, LMTs during use phase
→ availability of dynamic data from use phase limited

LMT-specific legal requirements:

- Specific collection rates²;
→ battery passport with higher relevance for compliance
- Removability and replaceability of batteries and individual cells³ + Right to Repair Directive
→ information for disassembly more relevant

Market and technological differences, as well as legal requirements influence the battery passport's value, presenting unique opportunities and challenges for its implementation for industrial and LMT batteries

How is the value of the battery passport for industrial and LMT batteries different in our use case analysis?

All use cases described in the value assessment are relevant for industrial and LMT batteries. The following non-exhaustive¹ use cases exemplify the impact of the differences in both categories.



Exemplary takeaways for industrial batteries

Market and technology affect this use case:

- Independent workshop servicing is limited. Predefined service contracts and processes dominate, where BP data can mainly support predictive maintenance.
- Batteries without BMS²/connectivity have no detailed dynamic data that can be used for eased servicing.

Use patterns and technology affect this use case:

- Industrial batteries have long service lives and are rarely used in second-life applications. Residual value determination is mainly needed for ownership transfers within the same application.
- Batteries without BMS²/connectivity have no detailed dynamic data that can be used for residual value assessment.

Battery passport use cases

C) Eased Servicing

F) Residual Value Assessment

I) Increased end-of-life collection³



Exemplary takeaways for LMT batteries

Legal requirements and market affect this use case:

- BP data can support handling of battery removability and replaceability requirements.
- Voluntary inclusion of Right to Repair directive information could facilitate customer support.
- Voluntary inclusion of repair history details could enhance safety and facilitate future servicing.

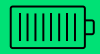
Legal requirements and market affect this use case

- The battery passport can enhance responsible disposal practices and LMT-specific collection rates, by providing clear information on waste prevention, collection points, and take-back programs.
- For business-owned LMTs (e.g., shared micromobility services), impact of battery passport data is minimal due to existing high collection rates.



The battery passport has strategic value for industrial and LMT batteries. To maximise its value, variances within the respective markets (e.g. application, technology, legal requirements) must be carefully considered for each use case.

How do these differences affect the implementation of the battery passport for LMT or industrial battery economic operators?



Differences for LMT and industrial batteries

Multiple SMEs especially in LMT vehicle market

- Fragmented market; higher share of SMEs in LMT vehicles market
- Low market power; reliance on single suppliers
- Lower market volume for industrial batteries compared to the electric vehicle market

Lower battery value to cover expenses

- Lower unit price → higher relative effort for passport implementation, especially for LMTs
- Lower battery value with less precious materials → less incentive for recycling investments

Differing effort for data collection

- Several attributes do not apply or only apply to industrial/LMT batteries (e.g. capacity threshold for exhaustion or initial self-discharging rate)¹
- Connectivity: batteries w/o BMS or connectivity module require added effort to collect performance data (e.g. remaining capacity) and fulfill regulation
- LMT batteries face different handling operations, e.g. more frequent repair/maintenance events



Differences for SMEs

Lower economies of scale

- Estimated 90%+ of effort will be fixed costs → spread across fewer batteries sold, increasing effort per unit of production
- Smaller scale also entails lower market power and potentially higher variable costs (e.g. lower bulk order benefits)

Lower economies of scope

- Lower likelihood for SMEs to benefit from using existing technological, financial, and human resources to implement the battery passport
- Required investments potentially higher for SMEs relative to larger enterprises

Easier change management

- Lower internal complexity could reduce management costs of the passport implementation



Implications

Battery passport as a service (aaS)

Likely beneficial for SMEs to work with DPP providers that:

- Spreads fixed costs across multiple clients
- Possess existing solutions and resources to supply the battery passport

Providers could be dedicated DPP-aaS companies or battery (system) manufacturers providing passport with batteries sold

Industry collaboration

Consortia or alliance with other companies to share costs and resources for passport implementation

Government support

Potentially high relative costs to SMEs, especially for LMT and industrial batteries, may necessitate EU support