

SolarTech Power Solutions

Energy consumption analysis of lead-acid batteries in communication base stations



Overview

Repurposing spent batteries in communication base stations (CBSs) is a promising option to dispose massive spent lithium-ion batteries (LIBs) from electric vehicles (EVs), yet the environmental fea.

Do lead-acid batteries affect the environment?

E-mail: friedrich.jasper@kit.edu Received 3rd March 2025 , Accepted 15th May 2025 Although lead-acid batteries (LABs) often act as a reference system to environmentally assess existing and emerging storage technologies, no study on the environmental impact of LABs based on primary data from Europe or North America since 2010 could be found.

Should a data centre use a lab or LFP battery?

From an LCA point of view, while the LAB is potentially the better environmental choice for a data centre (with few charge/discharge cycles), an LFP battery should be used in applications with many charge/discharge cycles, like in an HSS. This indicates that batteries always need to be investigated and compared on an application-specific basis.

Can repurposed EV batteries be used in communication base stations?

Among the potential applications of repurposed EV LIBs, the use of these batteries in communication base stations (CBSs) is one of the most promising candidates owing to the large-scale onsite energy storage demand (Heymans et al., 2014; Sathre et al., 2015).

Can a full LCA be used as a reference battery technology?

This work fills a research gap by providing a full LCA of an industrial LAB, serving as a reference battery technology in many studies.

Does secondary use of lithium ion batteries reduce the MDP value?

The findings of this study indicate a potential dilemma; more raw metals are depleted during the secondary use of LIBs in CBSs than in the LAB scenario. On the one hand, the secondary use of LIBs reduces the MDP value by

extending the service life of the batteries, although more metal resources are consumed during the repurposing activities.

Which battery should be used in the application case data centre?

In conclusion, from a purely environmental point of view, the LAB should be preferentially used in the application case data centre (or similar applications with comparable load profiles), while the LFP battery is preferred in the case of HSS.

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