Life cycle assessment of lithium ion battery

Nonetheless, life cycle assessment (LCA) is a powerful tool to inform the development of better-performing batteries with reduced environmental burden. This review explores common practices in lithium-ion battery LCAs and makes recommendations for how future studies can be more interpretable, representative, and impactful.

In order to avoid problem shifting, a life cycle perspective should be applied in the environmental assessment of traction batteries. The aim of this study was to provide a transparent inventory for a lithium-ion nickel-cobalt ...

Life cycle impacts of lithium-ion battery-based renewable energy storage system (LRES) with two different battery cathode chemistries, namely NMC 111 and NMC 811, and of vanadium redox flow battery-based renewable energy storage system (VRES) with primary electrolyte and partially recycled electrolyte (50%).

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The growing demand for lithium-ion batteries (LIBs) in smartphones, electric vehicles (EVs), and other energy storage devices should be correlated with their environmental impacts from production to usage and recycling. As the use of LIBs grows, so does the number of waste LIBs, demanding a recycling procedure as a sustainable resource and safer for the ...

The incentive policies of new energy vehicles substantially promoted the development of the electrical vehicles technology and industry in China. However, the environmental impact of the key technology parameters progress on the battery electrical vehicles (BEV) is uncertain, and the BEV matching different lithium-ion power batteries shows different ...

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Life cycle assessment of lithium-ion battery recycling using pyrometallurgical technologies. Mohammad Ali Rajaeifar, Corresponding Author. ... the research methodology and application presented by this life cycle assessment informs future energy and environmental impact assessment studies that want to assess existing recycling processes of LIB ...

In light of the increasing penetration of electric vehicles (EVs) in the global vehicle market, understanding the environmental impacts of lithium-ion batteries (LIBs) that characterize the EVs is key to sustainable EV

deployment. This study analyzes the cradle-to-gate total energy use, greenhouse gas emissions, SOx, NOx, PM10 emissions, and water consumption ...

Lithium-ion batteries (LIBs) are the ideal energy storage device for electric vehicles, and their environmental, economic, and resource risks assessment are urgent issues. ...

It is expected that the global market size of lithium-ion batteries (LIBs) will increase from USD 44.2 billion in 2020 to 94.4 billion by 2025 (MARKETSANDMARKETS 2020).The rapidly growing lithium-ion battery (LIB) market is attributed to the urgent need of mitigating and eventually eliminating carbon emissions, especially for European countries, who have agreed ...

On the basis of a review of existing life cycle assessment studies on lithium-ion battery recycling, we parametrize process models of state-of-the-art pyrometallurgical and hydrometallurgical recycling, enabling their application to different cell chemistries, including beyond-lithium batteries such as sodium-ion batteries.

This study presents the life cycle assessment (LCA) of three batteries for plug-in hybrid and full performance battery electric vehicles. A transparent life cycle inventory (LCI) was compiled in a component-wise manner for nickel metal hydride (NiMH), nickel cobalt manganese lithium-ion (NCM), and iron phosphate lithium-ion (LFP) batteries. The battery systems were ...

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As an important part of electric vehicles, lithium-ion battery packs will have a certain environmental impact in the use stage. To analyze the comprehensive environmental impact, 11 lithium-ion ...

Industrial scale primary data related to the production of battery materials lacks transparency and remains scarce in general. In particular, life cycle inventory datasets related to the extraction, refining and coating of graphite as anode material for lithium-ion batteries are incomplete, out of date and hardly representative for today"s battery applications.

Raugei et al. (2018) found that under current energy grid mix conditions, the overall life-cycle demand for non-renewable primary energy of a compact BEV in the United Kingdom is 34% lower than for a similar ICEV. ...

Finally, it is significant to highlight that while addressing the challenges of social life cycle assessment of battery research, the idea of social initiatives and the importance of socially responsible human resources presence. ... Life cycle assessment of lithium-ion batteries for plug-in hybrid electric vehicles-Critical issues. J

Life cycle assessment of lithium ion battery

Clean ...

The extraction of lithium-ion resources is a highly energy-intensive process that significantly impacts the overall resource efficiency of lithium-ion battery production [34]. In addition, the ...

By applying life cycle assessment (LCA) principles with adherence to ISO 14040/44 methodologies, this study scrutinizes the environmental repercussions of a standard excavator ...

The life cycle inventories (LCIs) of Li-ion battery contain component production, battery assembly, use phase, disposal and recycling and other related background processes. For process-based LCA, 17 ReCiPe midpoint environmental impact indicators and three end point environmental impact indicators are considered.

This article presents a comparative life cycle assessment of two types of batteries - lithium manganese oxide (LiMn 2 O 4) and lithium ion phosphate (LiFePO 4) - frequently used in EVs, addressing real-life operational conditions and battery capacity fade. The influence of the location of battery manufacturing and vehicle charging ...

The number of end-of-life (EoL) lithium-ion batteries (LIBs) has increased worldwide. Yet, current recycling technologies are unoptimized. In this study, a recycling route consisting of LIB dismantling, discharge, cell opening, thermal pretreatment, leaching and precipitation was investigated in a life cycle assessment (LCA) approach.

There is an unmet need for a detailed life cycle assessment (LCA) of BESS with lithium-ion batteries being the most promising one. This study conducts a rigorous and ...

In order to avoid problem shifting, a life cycle perspective should be applied in the environmental assessment of traction batteries. The aim of this study was to provide a transparent inventory for a lithium-ion nickel-cobalt-manganese traction battery based on primary data and to report its cradle-to-gate impacts.

Ramping up automotive lithium-ion battery (LIB) production volumes creates an imperative need for the establishment of end-of-life treatment chains for spent automotive traction battery packs. Life Cycle Assessment (LCA) is an essential tool in evaluating the environmental performance of such chains and options.

However, there are few studies focusing on the carbon footprint assessment of lithium ion battery products, failing to analyze the impact from each stage. ... Life cycle assessment of lithium-ion batteries for plug-in hybrid electric vehicles--critical issues. J. Clean. Prod., 18 (2010), pp. 1519-1529. View in Scopus Google Scholar.

This thesis assessed the life-cycle environmental impact of a lithium-ion battery pack intended for energy

storage applications. A model of the battery pack was made in the life-cycle assessment-tool, openLCA. The environmental impact assessment was conducted with the life-cycle impact assessment methods recommended in the Batteries Product

A comparative life cycle assessment on lithium-ion battery: Case study on electric vehicle battery in China considering battery evolution. Shuoyao Wang https: ... assembly, and end-of-life stages of the automotive lithium-ion battery life cycle. No. ANL/ESD/12-3 Rev. Argonne, IL: Argonne National Lab (ANL). Crossref. Google Scholar.

This study presents the life cycle assessment (LCA) of three batteries for plug-in hybrid and full performance battery electric vehicles. A transparent life cycle inventory (LCI) ...

This report contains a life cycle assessment, LCA, of recycling of lithium ion battery cells. It was performed in the context of the Swedish ReLion project. The study aims to highlight environmental hotspots with LIB recycling and show the potential of LIB recycling. In short, the results indicate that the ReLion process:

The life cycle of these storage systems results in environmental burdens, which are investigated in this study, focusing on lithium-ion and vanadium flow batteries for renewable ...