Lithium-ion battery environmental assessment

Who are the authors of a life cycle assessment of lithium-ion batteries?
Maeva Lavigne Philippot, Daniele Costa, Giuseppe Cardellini, Lysander De Sutter, Jelle Smekens, Joeri Van Mierlo, Maarten Messagie. Life cycle assessment of a lithium-ion battery with a silicon anode for electric vehicles.

What is the life cycle assessment of battery electric vehicles?
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.

Are lithium-ion batteries environmentally benign?
Lithium-ion batteries have been identified as the most environmentally benignamongst BESS . However,there is little consensus on their life cycle GWP impacts requiring further LCA study as this paper offers. 2. Literature Review for the Technical and Environmental Performances of BESS

Do lithium ion batteries have environmental impacts?
Akasapu and Hehenberger,(2023) found similar conclusion that Global Warming Potential (GWP) and Abiotic Depletion Potential (ADP) are critical factor for environmental impacts . The current findings also reveal that climate change(fossil) contribute the major environmental impacts during LCA of lithium ion batteries.

Are lithium-ion battery production and applications affecting the environment?
Therefore, a strong interest is triggered in the environmental consequences associated with the increasing existence of Lithium-ion battery (LIB) production and applications in mobile and stationary energy storage system.

What are the goals of a battery sustainability assessment?
For instance, the goal may be to evaluate the environmental, social, and economic impacts of the batteries and identify opportunities for improvement. Alternatively, the goal may include comparing the sustainability performance of various Li-based battery types or rating the sustainability of the entire battery supply chain.

This acceleration in grid-scale ESS deployments has been enabled by the dramatic decrease in the cost of lithium ion battery storage systems over the past decade (Fig. 2).As a result of this decrease, energy storage is becoming increasingly cost-competitive with traditional grid assets (such as fossil-fueled power plants) for utility companies addressing ...

Purpose Life cycle assessment (LCA) literature evaluating environmental burdens from lithium-ion battery

(LIB) production facilities lacks an understanding of how environmental burdens have changed over time due to a transition to large-scale production. The purpose of this study is hence to examine the effect of upscaling LIB production using unique ...

The lithium-ion battery pack with NMC cathode and lithium metal anode (NMC-Li) is recognized as the most environmentally friendly new LIB based on 1 kWh storage capacity, with a cycle life approaching or surpassing lithium-ion battery pack with NMC cathode and graphite anode (NMC-C). ... Life cycle environmental assessment of lithium-ion and ...

Comparison of lithium-ion battery supply chains - a life cycle sustainability assessment. April 2023; Procedia CIRP 116(2) ... ReCiPe v.1.13 (H) method for the environmental assessment,

This article presents an environmental assessment of a lithium-ion traction battery for plug-in hybrid electric vehicles, characterized by a composite cathode material of lithium manganese oxide ...

Majeau-Bettez G, Hawkins TR, Strømman AH (2011) Life cycle environmental assessment of lithium-ion and nickel metal hydride batteries for plug-in hybrid and battery ...

Life Cycle Assessment (LCA) is a systemic tool for evaluating the environmental impact related to goods and services. It includes technical surveys of all product life cycle stages, from material acquisition and manufacturing to use and end-of-life(Nordelöf et al., 2014).With regard to the battery, the LCA is one of the most effective ways of exploring the resource and ...

Integrated Environmental Assessment and Management published by Wiley Periodicals LLC on behalf of Society of Environmental Toxicology & Chemistry (SETAC). Key Points. Chemical hazard assessment was conducted for 103 electrolyte chemicals, categorized into seven groups, used in lithium-ion batteries.

Vandepaer et al. (2017) compares the performance of Li-ion and Lithium metal polymer stationary batteries (LMP). Here lithium iron phosphate (LFP) is used as a cathode with graphite as anode in LIBs, and a new polymer-based electrolyte is used in lithium metal battery. Eco invent 3.1 was used as the source of background LCI data.

Purpose The purpose of this study was to analyze the environmental trade-offs of cascading reuse of electric vehicle (EV) lithium-ion batteries (LIBs) in stationary energy storage at automotive end-of-life. Methods Two systems were jointly analyzed to address the consideration of stakeholder groups corresponding to both first (EV) and second life ...

The battery systems were investigated with a functional unit based on energy storage, and environmental impacts were analyzed using midpoint indicators. On a per-storage basis, the NiMH technology was found ...

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This study is a critical review of the application of life cycle assessment (LCA) to lithium ion batteries in the automotive sector. ... shows most of the environmental consequences of the battery ...

Lithium-Ion Battery Recycling: Bridging Regulation Implementation and Technological Innovations for Better Battery Sustainability. Cite. Citation; ... and the environmental impact assessment of low-carbon transportation technologies. References. This article references 6 other publications. 1. International Energy Agency (IEA). Batteries and ...

An increasing number of used automobile lithium-ion batteries (LIBs) require appropriate treatment, such as disposal as solid waste, recycling of materials, or repurposing as second-life LIBs, to avoid undesired environmental consequences. However, the economic feasibility of these treatments affects industrial development.

This article presents an environmental assessment of a lithium-ion traction battery for plug-in hybrid electric vehicles, characterized by a composite cathode material of lithium manganese oxide (LiMn 2 O 4) and lithium nickel manganese cobalt oxide Li(Ni x Co y Mn 1-x-y)O 2. Composite cathode material is an emerging technology that promises to combine the ...

A lithium-ion battery (LIB) is a rechargeable energy storage device where lithium ions migrate from the negative electrode through an electrolyte to the positive electrode during discharge, and in the opposite direction when charging (Qiao & Wei, 2012).Among the rechargeable batteries, lithium-ion batteries are widely used for electric vehicles due to their ...

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