Environmental assessment of new energy 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 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.

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.

Can Li-S batteries reduce environmental impact?
In comparison to the baseline scenario,a 67% increase in Li-S battery specific energy would result in a 54% reduction in energy use,potentially making it the greatest alternative for reducing ecological impact(Arvidsson et al.,2018).

What are the life cycle inventories of Li-ion batteries?
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.

Which battery has the smallest environmental impact per unit?
In terms of cumulative energy demand (CED),global warming potential (GWP),and six other intermediate environmental impacts,lithium vanadium oxide solid-state batterieswere determined to have the smallest impact per unit energy storage.

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 ...

With the rapid increase in production of lithium-ion batteries (LIBs) and environmental issues arising around the world, cathode materials, as the key component of all LIBs, especially need to be environmentally sustainable. However, a variety of life cycle assessment (LCA) methods increase the difficulty of

environmental sustainability assessment. ...

Among different battery technologies, lithium ion batteries (LiBs) are the most desirable ones for the automotive applications because of high power, energy capacity and long lifetime [2].Due to increase in electric vehicle (EV) sales in recent years, LiB pack price has fallen from US$ 1000/kWh in 2010 to US$ 273/kWh in 2016, which represents 73% drop.

When the capacity of lithium-ion batteries declines to less than 80 % of the initial capacity, they can no longer be used in EVs [3]. A huge number of new energy vehicles create potential battery recycling pressure. End-of-life (EoL) lithium-ion batteries would cause great waste of resources and environmental pollution if not properly handled.

The rapid evolution of Li-ion battery technologies and manufacturing processes demands a continual update of environmental impact data. The general objective of this paper is to publish up-to-date primary data on battery manufacturing, which is of great importance to the scientific community and decision-makers. The environmental impacts have been calculated ...

Novel material factor: The third-generation prototype battery showcases a high-voltage cathode (NMC622), high-capacity anode (silicon alloy with no significant environmental impact on any category), and a stable and safe electrolyte, offering environmental advantages compared to a graphite-based battery [59]. The lithium-ion battery pack with ...

Auxiliary processes are also included, such as energy generation for charging electric automobiles. To completely examine the environmental effect of Lithium-Ion batteries, ...

Lithium-ion batteries (LIBs) are the ideal energy storage device for electric vehicles, and their environmental, economic, and resource risks assessment are urgent issues. Therefore, the life cycle assessment (LCA) of LIBs in the entire lifespan is becoming a hotspot.

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