

Environmental assessment of lithium battery aluminum shell production project



2MW / 5MWh
Customizable

Overview

As an energy storage device, battery has been rapid developed in recent years with the typical environmental problems such as consumption of resources and heavy metal pollution. Therefore, it is urgent to conduc. ••Environmental impact of LAB, LMB and LIPB are quantified with LCA. ••. The battery was invented in 1859 to convert chemical energy into electrical energy (Dyer et al., 2009, Kurzweil, 2010). Nowadays the main kinds of batteries are lead acid battery. LAB, LMB and LIPB are carried out following the LCA procedure and ReCiPe midpoint (H) model analysis is performed. According to the normalized analysis results, the envir. 3.1. Environmental impact analysisThe ReCiPe midpoint (H) model is used to analyze the environmental impact of different battery production processes. The environmental im. 4.1. Optimization suggestions of LABThe sensitivity analysis results of LAB show that the key process is the unformed plate manufacturing process (Table 8) and refined lead and t.



Article Content

The Future of Aluminum in Battery Technology: Enhancing ...

Explore the future of aluminum in battery technology, enhancing efficiency and longevity for electric vehicles and portable electronics. ... aluminum's compatibility with existing manufacturing processes facilitates easier integration into current battery production lines, minimizing the need for extensive retooling and associated expenses ...

Investigating greenhouse gas emissions and environmental ...

Shell: Aluminum: 0.298: kg: 5.52%: 3.5. ... Environmental life cycle assessment of battery electric vehicles from the current and future energy mix perspective. ... Introducing inline process and product analysis for the lean cell finalization in lithium-ion battery production. *Procedia CIRP*, 104 (2021), pp. 1052-1058.

Life cycle assessment of natural graphite production for lithium ...

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related to the extraction, refining and coating of graphite as anode material for lithium-ion batteries are incomplete, out of date and hardly representative for today's battery applications.

Environmental impact assessment of battery boxes based on ...

The environmental benefits of EVs during the use phase are evident, while the production phase is constrained by the manufacturing of lithium-ion battery packs 8, resulting in higher environmental ...

THE ALUMINUM-AIR BATTERY RICHARD DAVID PEPEL

others, alternative power sources to the lithium-ion battery have been explored for application in electric vehicle. One such alternative is the aluminum-air battery, which is the overarching focus of this project. Aluminum-air batteries are a desirable alternative option to ...

Life Cycle Assessment of a Lithium-Ion Battery Vehicle Pack

Insights and implications 24 The production of the battery requires five kg of lithium. It is deemed unlikely that lithium in the battery will be recycled as only selected materials, such as nickel and cobalt, are being recycled from Li-ion batteries (Dewulf et al. 2010).

The Future of Aluminum in Battery Technology: ...

Explore the future of aluminum in battery technology, enhancing efficiency and longevity for electric vehicles and portable electronics. ... aluminum's compatibility with existing manufacturing processes facilitates ...

Life cycle assessment of lithium-ion batteries for plug-in hybrid ...

Life cycle assessment of a lithium-ion battery vehicle pack. J. Ind. Ecol. 18 (1), 113–124. Majeau-Bettez, Guillaume, Hawkins, Troy R., Strømman, Anders Hammer, 2011. Life cycle environmental assessment of lithium-ion and nickel metal hydride 9 batteries for plug-in hybrid and battery electric vehicles. Environ. Sci. Technol. 45 (10), 4548 ...

Environmental Impact Assessment in the Entire Life Cycle of ...

battery manufacturing would lessen the environmental footprints and reduce greenhouse gas emissions (GHG) and energy consumption. Thus, to prevent pollution and safeguard the environment, it is necessary to consider recycling spent LIBs and improving production and disposal methods.

Environmental Assessment of Lithium-Ion Battery Lifecycle and of ...

The literature mostly investigated batteries, including graphite anodes [9,10] combined with cathodes made of lithium nickel cobalt manganese oxide (NMC), lithium iron ...

Environmental Impact Assessment in the Entire Life Cycle of Lithium ...

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 ...

Life Cycle Assessment of Lithium-ion Batteries: A Critical Review

Life Cycle Assessment (LCA) is a tool that offers a systematic approach to estimating the environmental burdens of a battery's life cycle. As per the LCA assessment by Arshad et al., 2022, It is estimated that the production of 1 kWh of lithium-ion batteries capacity results in approximately 150-200 kg of CO₂ equivalent emissions.

Life cycle assessment of lithium-ion battery recycling using ...

Energy and environmental assessment of a traction lithium-ion battery pack for plug-in hybrid electric vehicles. Journal of Cleaner Production, 215, 634–649. Dai, Q., Kelly, J., Dunn, J., & Benavides, P. (2018). Update of bill-of-materials and cathode materials production for lithium-ion batteries in the GREET model.

(PDF) Lithium-ion Battery Production Project

The maximum production capacity of 693,000 piece of battery production per year is reached 2029 and continues until 2035. For the last two years of the company

Energy and environmental assessment of a traction lithium-ion battery ...

This article presents an environmental assessment of a lithium-ion traction battery for plug-in ... the production of aluminium, steel and copper is responsible for 80% of the overall impact. The production of the cooling system accounts for about 6.5% of the human toxicity – cancer effect and ionizing radiation – human health categories ...

Lithium-Ion Vehicle Battery Production

production of the lithium-ion batteries for vehicles. A search for standardization of LCA methodology and new information regarding recycling, and information on the supply risks for important lithium-ion battery materials was also included in the literature study. The data is presented as GHG emissions expressed as CO₂

Water footprint of battery-grade lithium production in the Salar de ...

The assessment extends to cathode material and battery production of Li₂CO₃ and LiOH•H₂O to explore the impact of electric vehicles and their battery production. The authors used primary data and literature sources to estimate the energy, GHG emissions, and water consumption through the production cycle of lithium-ion battery cathodes ...

Environmental Impact Assessment in the Entire Life Cycle of ...

Jiang et al., studied the life cycle assessment of lithium production by showing the importance of primary data in the upstream process and reported that the LIB pack by rock ...

Environmental life cycle assessment of recycling technologies for ...

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 ...

Environmental life cycle assessment of recycling technologies for ...

The boundary is from ternary lithium-ion battery production of battery materials, battery cell and battery system to their applications in electric vehicles, and then to processing ...

Energy and environmental assessment of a traction lithium-ion battery ...

The main innovations of this article are that (1) it presents the first bill of materials of a lithium-ion battery cell for plug-in hybrid electric vehicles with a composite cathode active ...

Environmental life cycle assessment on the recycling processes ...

According to statistics, the amount of retired power batteries in China is projected to reach 530,000 t in 2022. It is expected to surpass 2.6 million t/a by 2028 (Table S1) (Adhikari et al., 2023). While being commonly known as "green batteries," lithium-ion batteries still contain toxic electrolytes, organic compounds, and polymers, that poses safety and ...

Lithium-Ion Battery Production and Recycling Materials Issues

Relevance and Project Objectives Project Objectives: - Examine material scarcity issues that may influence viability of automotive lithium -ion batteries - Characterize drivers of cradle -to-gate energy and GHG emissions intensity of lithium-ion batteries and identify means for their reduction - Characterize lithium -ion battery recycling in the United States

Estimating the environmental impacts of global lithium-ion battery ...

Total battery production environmental impacts. ... Australia is the second greatest emissions source for LFP batteries due to its role in lithium and aluminum production, representing 17% of total emissions. Other countries that represent significant shares of LFP battery production are Chile (5%), Brazil (3%), and the United States of America ...

Environmental performance of a multi-energy liquid air energy ...

Liquid air energy storage concept. Adapted from Ref. []. A real application of the LAES system was demonstrated in 2011 by Highview Power which developed and operated the first pilot plant (350 kW/2.5 MWh) [], currently installed at the University of Birmingham (UK), and, subsequently in 2018 in collaboration with Viridor, the first grid scale demonstrator plant (5 MW/15 MWh) [], ...

Life cycle assessment of industrialized lithium-ion battery ...

DEGREE PROJECT IN ENERGY AND ENVIRONMENT, SECOND CYCLE, 30 CREDITS STOCKHOLM, SWEDEN 2021 Life cycle assessment of industrialized lithium-ion battery recycling Mechanical and hydrometallurgical treatment from an ex-ante perspective JONATHAN BALSVIK KTH ROYAL INSTITUTE OF TECHNOLOGY SCHOOL OF ARCHITECTURE AND THE ...

A bottom-up framework to investigate environmental and techno ...

Battery technology represents a complex system with numerous parameters, considerations, and dependencies, posing challenges in regulating environmental, economic, and technological aspects (Turetsky et al., 2020). An environmental study reveals that the impact of Li-ion batteries in the production phase remains higher than that of lead-acid batteries (Fan et ...

Investigating greenhouse gas emissions and environmental ...

In this study, the CML 2016 and ReCiPe 2016 v1.1 method in GaBi 10.6 software is used to quantitatively analyze the GHG emissions and environmental impacts of six ...

Life cycle environmental impact assessment for battery-powered ...

By introducing the life cycle assessment method and entropy weight method to quantify environmental load, a multilevel index evaluation system was established based on ...

Environmental impact of recycling spent lithium-ion batteries

Lithium and cobalt were recovered from dead cell phone batteries that were composed of Lithium Cobalt Oxide (LiCoO_2) on aluminum foils as cathodes and graphite on copper foils as anodes.

Environmental life cycle implications of upscaling lithium-ion ...

The foremost intended audience of this study are LIB production industry and policy makers driving action towards decreasing environmental burdens from battery ...

Environmental performance of a multi-energy liquid air energy ...

Increase in energy demand is shaping both developed and developing countries globally. As a result, the endeavour to reduce carbon emissions also encompasses electrical energy storage systems to ensure environmentally friendly power production and distribution. Currently, the scientific community is actively exploring and developing new storage technologies for this ...

Exploring the energy and environmental sustainability of ...

Taking NCM333-CTM as an example, the CED during the battery production stage reaches 0.67 MJ km^{-1} , accounting for 69 % of the life cycle when the lithium-first recycling was employed. Analysis indicates that cobalt sulfate is the primary source of CED in battery pack production, contributing 45 % of the total CED during this stage.

Environmental impact assessment of battery boxes based on ...

mental impacts of battery boxes can effectively enhance the environmental benefits of lithium-ion battery packs. Lightweighting, as one of the measures for energy saving and emission reduction in ...

Environmental performance of a multi-energy liquid air energy ...

Cryo-battery projects were currently deployed in the UK and US ... Aluminium alloy, AlMg3: 36294: 30: Cryoturbine CT: Steel, low-alloyed: 4332: 30: Phase Separator: 3950: 30: ... Life cycle environmental assessment of lithium-ion and nickel metal hydride batteries for plug-in hybrid and battery electric vehicles.

Environmental Assessment of Lithium-Ion Battery Lifecycle and of ...

This review analyzed the literature data about the global warming potential (GWP) of the lithium-ion battery (LIB) lifecycle, e.g., raw material mining, production, use, and end of life. The literature data were associated with three macro-areas—Asia, Europe, and the USA—considering common LIBs (nickel manganese cobalt (NMC) and lithium iron phosphate ...

Life-cycle environmental impacts of reused batteries of electric ...

The battery production phase involves extracting and processing raw materials required to produce LIBs. ... Aluminum Shell: 127: g/kWh: Others: 68: g/kWh: Battery Management System (BMS) Battery Module Board (BMB) ... The environmental assessment analysis considering all functions of batteries in the transportation and building sectors ...

Environmental impact analysis of potassium-ion batteries based ...

The functional unit of battery production (recycling) is producing (recycling) battery cells with a storage capacity of 1 kWh, while the assessment of battery use-phase is placed in the full life cycle of the battery, with the functional unit being the environmental impacts of a project providing 1 kWh of electricity.

Lithium-Ion Vehicle Battery Production

No. C 444 November 2019 Lithium-Ion Vehicle Battery Production Status 2019 on Energy Use, CO₂ Emissions, Use of Metals, Products Environmental

Energy Use and Environmental Impact of Three Lithium-Ion Battery ...

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 ...

Life cycle environmental impact assessment for battery-powered ...

NMC: NMC-C, lithium-nickel manganese cobalt oxide ($\text{LiNi}_x\text{Mn}_y\text{Co}_{(1-x-y)}\text{O}_2$) coupled with a graphite anode material, its charge–discharge efficiency is 99% and electricity consumption was 13 kWh per 100 km; NMC 442-C, lithium-nickel manganese cobalt oxide ($\text{LiNi}_{0.4}\text{Mn}_{0.4}\text{Co}_{0.2}\text{O}_2$) coupled with a graphite anode material, battery pack ...

3. Life Cycle Impact Assessment

The LCIA methodology used in this study began with an assessment of the overall material and primary energy input flows to the automotive lithium-ion battery life cycles (see Section 3.1). ...

Life Cycle Assessment of Lithium-Ion Battery Materials in ...

This study employs a life cycle assessment to evaluate the ecological footprints and greenhouse gas emissions of four battery types: Lithium-sulfur, magnesium-sulfur, ...

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