The environmental impacts of recycling portable lithium-ion batteries

Environmental impacts, pollution sources and pathways of spent lithium-ion batteries W. Mrozik, M. A. Rajaeifar, O. Heidrich and P. Christensen, Energy Environ.Sci., 2021, 14, 6099 DOI: 10.1039/D1EE00691F This article is licensed under a Creative Commons Attribution 3.0 Unported Licence. You can use material from this article in other publications without requesting further ...

The recycling of lithium-ion batteries reduces energy consumption, reduces greenhouse gas emissions, and results in considerable natural resource savings when compared to landfill. ...

Solid-state batteries (SSBs) have emerged as a promising alternative to conventional lithium-ion batteries, with notable advantages in safety, energy density, and longevity, yet the environmental implications of their life cycle, from manufacturing to disposal, remain a critical concern. This review examines the environmental impacts associated with the ...

Demand for high capacity lithium-ion batteries (LIBs), used in stationary storage systems as part of energy systems [1, 2] and battery electric vehicles (BEVs), reached 340 GWh in 2021 [3].Estimates see annual LIB demand grow to between 1200 and 3500 GWh by 2030 [3, 4].To meet a growing demand, companies have outlined plans to ramp up global battery ...

16.2.1 Recycling Avoids the Impact Caused by Non-material-Recovery End-of-Life Activities. Under the absence of attractive economic benefits or policies that promotes recycling, a battery system (or parts of it) could end up in common streams of electric and electronic waste being dumped in landfills, incinerated or informally recycled in secondary markets in ...

Recycling lithium-ion batteries in particular reduces energy consumption, reduces greenhouse gas emissions, and results in 51.3% natural resource savings when compared to landfill . The majority of benefits occur as a result of avoiding virgin materials production .

Due to increasing environmental awareness, tightening regulations and the need to meet the climate obligations under the Paris Agreement, the production and use of electric vehicles has grown greatly. This growth has two significant impacts on the environment, with the increased depletion of natural resources used for the production of the lithium-ion batteries for ...

Figure 2 - Mobile phone battery chemistry - "The environmental impacts of recycling portable lithium-ion batteries" ... "The environmental impacts of recycling portable lithium-ion batteries" Skip to search form Skip to main content Skip to account menu. Semantic Scholar''s Logo. Search 221,882,699 papers from all fields of science.

: With the emergence of portable electronics and electric vehicle adoption, the last decade has witnessed an

increasing fabrication of lithium-ion batteries (LIBs). The future development of LIBs is threatened by the limited reserves of virgin materials, while the inadequate management of spent batteries endangers environmental and human health. According to the ...

As lithium-ion batteries are an efficient energy storage mechanism, their use in vehicles is increasing to support electrification to meet increasing average mileage and decreasing ...

The life cycle of lithium-ion battery (Fig. 1) defines the complexity in disposition of spent LIBs due to presence of various interim routes like reuse in batteries, use of remanufacturing material in batteries, and regeneration of cathode before recycling for use as battery grade material by stoichiometric additions. A detailed environmental ...

Lithium-ion batteries have recently gained much attention with the increasing production and marketing of electric vehicles to reduce emissions from the transportation sector. Rapid growth in the electric vehicle industry has led to an increase in used batteries. The improper disposal of these spent lithium-ion batteries will result in environmental pollution and waste of ...

Lithium-ion batteries (LIBs) are crucial for consumer electronics, complex energy storage systems, space applications, and the automotive industry. The increasing requirements for decarbonization and CO2 emissions reduction affect the composition of new production. Thus, the entire automotive sector experiences its turning point; the production capacities of new ...

General Information. Lithium-ion (Li-ion) batteries are used in many products such as electronics, toys, wireless headphones, handheld power tools, small and large appliances, electric vehicles and electrical energy storage systems.

1 INTRODUCTION 1.1 The current status of lithium-ion battery (LIB) waste and metal supply-demand scenario. Increasing global energy demands and environmental devastation 1, 2 have fueled the development of green technology and energy storage devices. With their high efficiency, better power density, extended durability, and compact size, LIBs have evolved into ...

However, a switch to lithium iron phosphate-based chemistry could enable emission savings of about 1.5 GtCO 2 eq. Secondary materials, via recycling, can help reduce ...

Hydrometallurgical recycling processes were reported to impose environmental risks on freshwater and terrestrial acidification. 18 Mohr et al. (2020) compared the environmental impacts of recycling of different battery chemistries (i.e. NMC, NCA, LFP and solid-state) using a conventional pyrometallurgical, a conventional hydrometallurgical ...

chemistries like lithium-air, sodium-ion, lithium-sulfur (Battery University, 2020), and vanadium flow

batteries (Rapier, 2020). However, this report focuses on lithium metal batteries and LIBs because they are the most common types in use and primary cause of battery-related fires in the waste management process.

Environmental Impacts of Graphite Recycling from Spent Lithium- Ion Batteries Based on Life Cycle Assessment October 2021 ACS Sustainable Chemistry & Engineering 9(43):14488-14501

It has been shown that recycling batteries is beneficial to the environment. Recycling lithium-ion batteries in particular reduces energy consumption, reduces greenhouse gas emissions, and results in 51.3% natural resource savings when compared to landfill .

The significant deployment of lithium-ion batteries (LIBs) within a wide application field covering small consumer electronics, light and heavy means of transport, such as e-bikes, e-scooters, and electric vehicles (EVs), or energy storage stationary systems will inevitably lead to generating notable amounts of spent batteries in the coming years. Considering the environmental ...

Keywords: spent LIBs; recycling; environmental impact; pretreatment; green hydrometallurgy 1. Introduction Lithium-ion batteries (LIBs) have conquered portable device and electrical automotive markets since their first commercialization in the early ...

1 INTRODUCTION 1.1 The current status of lithium-ion battery (LIB) waste and metal supply-demand scenario. Increasing global energy demands and environmental devastation 1, 2 have fueled the development of green ...

Table 10 - Available energy consumption data - "The environmental impacts of recycling portable lithium-ion batteries" ... "The environmental impacts of recycling portable lithium-ion batteries" Skip to search form Skip to main content Skip to account menu. Semantic Scholar''s Logo. Search 221,232,963 papers from all fields of science.

Direct Recycling Technology for Spent Lithium-Ion Batteries: Limitations of Current Implementation. The significant deployment of lithium-ion batteries (LIBs) within a wide ...

This study aims to quantify selected environmental impacts (specifically primary energy use and GHG emissions) of battery manufacture across the global value chain and their change over time to 2050 by considering country-specific electricity generation mixes around the different geographical locations throughout the battery supply chain ...

Recycling reduces normalized & weighted environmental impact of cells by 75%. o. Benefit of recycling on CO2eq emissions is comparably small. o. Low scrap improves costs ...

This study introduces the current status of recycling technology for waste lithium-ion batteries, with a focus

on the environmental impact during the recycling process of waste lithium-ion battery cathode materials. Composition of lithium-ion battery was analyzed in order to estimate which components are potentially dangerous to the environment. Heavy metals are main ...

The CO2 footprint of the lithium-ion battery value chain The lithium-ion battery value chain is complex. The production of a battery cell requires sourcing of as much as 20 different materials from around the world, which will pass through several refining stages, of which some are exclusively designed for making batteries and some are not.

Abstract: Lithium-ion batteries (LIBs) can play a crucial role in the decarbonization process that is being tackled worldwide; millions of electric vehicles are already provided with ...

Improving the "recycling technology" of lithium ion batteries is a continuous effort and recycling is far from maturity today. The complexity of lithium ion batteries with varying active and inactive material chemistries interferes with the desire to establish one robust recycling procedure for all kinds of lithium ion batteries.