Environmental Assessment of Flow Battery Production

This study aimed at a quantitative analysis of the material flows associated with End of Life (EoL) lithium-ion batteries" (LIBs) materials in Europe. The European electric vehicles fleet in 2020 was taken as a case study, assuming a 10-year ...

To apply the methodology, a modular MEF model for a representative process chain for the battery cell production is developed and applied to generate the baseline LCI in Section 4.1. This LCI is used to perform ...

The production of three commercially available flow battery technologies is evaluated and compared on the basis of eight environmental impact categories, using primary data collected from battery ...

To quantify potential environmental impacts, Life Cycle Assessment is a frequently applied approach (Weber et al. 2018; Majeau-Bettez et al. 2011;Peters et al. 2017).As all ...

Lithium-ion batteries are used for energy storage and as an energy source in a wide range of applications from small handheld to powering consumer-driven vehicles. With the global change from fuel ...

Rechargeable batteries are necessary for the decarbonization of the energy systems, but life-cycle environmental impact assessments have not achieved consensus on the environmental impacts of producing these batteries. Nonetheless, life cycle assessment ...

Batteries are one of the key technologies for flexible energy systems in the future. In particular, vanadium redox flow batteries (VRFB) are well suited to provide modular and scalable energy storage due to favorable characteristics such as long cycle life, easy scale ...

The vanadium flow battery (VFB) is an especially promising electrochemical battery type for megawatt applications due to its unique characteristics. This work is intended as a benchmark for the evaluation of ...

Batteries are one of the key technologies for flexible energy systems in the future. In particular, vanadium redox flow batteries (VRFB) are well suited to provide modular and scalable energy storage due to favorable characteristics such as long cycle life, easy scale-up, and good recyclability. However, there is a lack of detailed original studies on the potential ...

The circulation of critical and scarce materials through the recycling of spent LIBs allows for reducing the material-related environmental, economic, and social impacts of battery production and for improving supply security (Cerdas et ...

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 vanadium flow battery (VFB) is an especially promising electrochemical battery type for megawatt applications due to its unique characteristics. This work is intended as a benchmark for the evaluation of environmental impacts ...

Yajuan Yu studied the environmental impacts of LFP batteries and conventional batteries, and developed a professional software of life cycle environmental impact assessment for conventional lead-acid batteries and lithium iron phosphate batteries [2, 3].

To apply the methodology, a modular MEF model for a representative process chain for the battery cell production is developed and applied to generate the baseline LCI in Section 4.1. This LCI is used to perform an environmental impact assessment with the4.2.

This work showcases the environmental aspects of batteries, focusing on their positive and negative impacts. ... Environmental and Preliminary Cost Assessments of Redox Flow Batteries for Renewable Energy Storage Energy Technol., 8 (11) (Nov. 2020), 10. ...

Assessment of semi-organic electrolytes for redox flow battery : life cycle assessment as a tool to steer industry toward green chemistry J. Clean. Prod., 343 (2022), Article 130899, 10.1016/j.jclepro.2022.130899

Environmental Impact (EI):As shown in Table 1, this paper references the methods developed by Graedel et al. and Manjong et al., using the Life Cycle Assessment (LCA) approach to evaluate ...

The goal of this study is to understand the environmental impact associated with the production of flow batteries. We have systematically evaluated three different state-of-the-art flow battery technologies: vanadium redox flow batteries (VRFB), zinc-bromine flow batteries ...

Our attention will focus on an organic/halogen flow battery, based on anthraquinone disulfonic acid, and its environmental performances will be evaluated via Life Cycle Assessment (LCA) analysis based on primary data. As it is known from literature, there is still no ...

Life Cycle Assessment of the Battery Cell Production: Using a Modular Material and Energy Flow Model to Assess Product and Process Innovations Nicolas von Drachenfels,* Jana Husmann, Usama Khalid, Felipe Cerdas, and Christoph Herrmann 1. Introduction ...

Flow battery production: Materials selection and environmental impact. Haoyang He, Shanjun Tian, +3 authors. J. Schoenung. Published in Journal of Cleaner Production 1 ...

Environmental Assessment of Flow Battery Production

Environmental assessment of semi-organic Redox Flow Battery via LCA. o Extensively modeled inventories for semi-organic electrolyte. o Environmental impact of electrolyte is sharply dependent of synthesis pathway. o Comparative LCA of semi-organic RFB and full

After a brief introduction to flow battery technology, recent studies are summarized, methodologies are analyzed, and critical parameters for environmental concerns are assessed. Challenges are then identified and ...

In particular, vanadium redox flow batteries (VRFB) are well suited to provide modular and scalable energy storage due to favorable characteristics such as long cycle life, ...

Environmental impact and economic assessment of secondary lead production: Comparison of main spent lead-acid battery recycling processes in China Author links open overlay panel Xi Tian a b, Yufeng Wu a, Ping Hou b, Sai Liang b, Shen Qu b, ...

Flow batteries (FBs) are a versatile electric energy storage solution offering significant potential in the energy transition from fossil to renewable energy in order to reduce ...

By the means of life cycle assessment (LCA), the ecological impact of recycling and reuse of materials of three battery technologies was analyzed: lead acid, lithium-ion and vanadium redox...

Purpose The goal of this study was to provide a holistic, reliable, and transparent comparison of battery electric vehicles (BEVs) and fuel cell electric vehicles (FCVs) regarding their environmental impacts (EI) and costs over their whole life cycle. The comprehensive knowledge about EI and costs forms the basis on which to decide which technology should be ...

Production of the all-iron flow battery, by contrast, exhibited the lowest impacts according to six environmental indicators, as well as the lowest potential human health hazards, and material ...

Lithium-ion batteries (LIBs) have become a popular choice among electric vehicle (EV) manufacturers due to their low cost and high energy density (Hendrickson et al., 2015).As demand for EVs rises (Young, 2020), mining and extraction activities for LIB raw materials such as Lithium (Li), Cobalt (Co), and Nickel (Ni) will become unsustainable in the ...

Flow battery production: Materials selection and environmental impact Haoyang He a, Shan Tian b, c, Brian Tarroja c, d, Oladele A. Ogunseitan e, Scott Samuelsen b, c, Julie M. Schoenung a, * a Departmentof Materials Science and Engineering, University ...

DOI: 10.1016/j.jclepro.2020.120067 Corpus ID: 213659308 Environmental life cycle assessment of the

production in China of lithium-ion batteries with nickel-cobalt-manganese cathodes utilising novel electrode chemistries @article{Kallitsis2020EnvironmentalLC ...

A comprehensive life cycle assessment of a representative vanadium redox flow batteries is provided, finding VRFBs to be promising regarding the assessed impact categories, especially at high energy-to-power (E/P) ratios. Batteries are one of the key technologies for flexible energy systems in the future. In particular, vanadium redox flow batteries (VRFB) are ...

Considering the circular economy actions to foster environmentally sustainable battery industries, there is an urgent need to disclose the environmental impacts of battery production. A cradle-to-gate life cycle assessment methodology is used to quantify, analyze, and compare the environmental impacts of ten representative state-of-the-art Na 3 V 2 (PO 4) 3 ...

The goal of this study is to conduct a detailed environmental impact assessment of flow battery production and to evaluate the sensitivity of the results to materials selection and system ...

DOI: 10.1016/j.seta.2022.102457 Corpus ID: 250192027 Life cycle assessment (LCA) for flow batteries: A review of methodological decisions @article{Dieterle2022LifeCA, title={Life cycle assessment (LCA) for flow batteries: A review of methodological decisions}, author={Michael Dieterle and Peter Fischer and M. N. Pons and Nick Blume and Christine Minke and Aldo ...

In this research we conducted a social life cycle assessment (S-LCA) of two BESS: the vanadium redox flow battery (VRFB) and the lithium-ion battery (LIB). The S-LCA was conducted based on the guidelines set by UNEP/SETAC and using the PSILCA v.3 database.