电动汽车动力电池生命周期评价与分析

摘 要

近年来我国汽车不断增加，为环境带来了负担与压力，如资源消耗、环境污染等各种问题。为有效解决这一问题，新能源汽车尤其是电动汽车登上舞台，为节能减排做出贡献。本文以生命周期评价理论为方法，借助 eBalance 软件建模并进行清单分析，根据特征化与归一化结果对电动汽车动力电池给予评价。

文章以北汽新能源 EU5 为例，对磷酸铁锂电池和镍氢电池进行生命周期评价，通过在 eBalance 软件中对两款电池的原材料的获取、制造、使用、回收再利用四个阶段分别建模并进行清单分析，对模型与数据进行特征化与归一化分析得出结论。结果表明，磷酸铁锂离子电池的全生命周期的能耗和排放要小于镍氢电池，尤其是在使用阶段。就两款动力电池整体而言，使用阶段的能耗与排放远大于其余阶段，且两款电池的回收再利用都可以得到原材料以及部分能源，具有可持续意义。

本文的生命周期评价模型及结果解释是为了评价两款电动汽车动力电池在其全生命周期中对环境的影响，其结果可为电动汽车生产企业提供理论支持，也可为促进社会可持续发展做出贡献。

关键词：动力电池；生命周期评价；环境影响评价

Abstract

In recent years, the increasing number of cars in China has brought burden and pressure to the environment, such as resource consumption, environmental pollution and other problems. In order to effectively solve this problem, new energy vehicles, especially electric vehicles, have stepped onto the stage and made contributions to energy conservation and emission reduction. In this paper, the life cycle assessment theory is used as a method, and ebalance software is used to model and analyze the list. According to the results of characterization and normalization, the evaluation of electric vehicle power battery is given.

This paper takes Beiqi new energy EU5 as an example to evaluate the life cycle of lithium iron phosphate battery and nickel hydrogen battery. Through modeling and inventory analysis of the four stages of raw materials acquisition, manufacturing, use and recycling of the two batteries in ebalance software, the model and data are characterized and normalized. The results show that the energy consumption and emission of lifecycles of lithium iron phosphate battery are less than that of NiMH battery, especially in the use stage. As for the two power batteries as a whole, the energy consumption and emission in the use stage are far greater than that in the rest stage, and the recycling of the two batteries can get raw materials and part of the energy, which is of sustainable significance.

The life cycle assessment model and result interpretation of this paper is to evaluate the impact of two electric vehicle power batteries on the environment in their whole life cycle. The results can provide theoretical support for electric vehicle manufacturers and contribute to the sustainable development of society.

Key words: power battery; life cycle assessment; environmental impact assessment

目 录