The recycling and utilization of new energy batteries

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Abstract. As the main energy storage component of new energy vehicles, the retirement tide of power batteries is coming. The large-scale retirement of power batteries has brought huge benefits to the treatment of power batteries challenge. From the aspects of environment, resources and economy, the significance of power battery recycling is expounded, and the current status of power battery recycling is analyzed. It is aimed at strengthening new energy vehicles power battery recycling, from the aspects of improving laws and regulations, improving the recycling system and improving recycling technology, put forward countermeasures and suggestions. At present, the main technologies are mechanical separation technology, pyrolysis technology and wet extraction technology. Mechanical separation technology mainly uses vibration separation, eddy current separation and electrostatic separation methods to separate different substances in the battery. Pyrolysis technology refers to the heating of waste to a certain temperature in an oxygen-free or low-oxygen environment to decompose organic matter, gas, liquid and solid products. The pyrolysis technology method mainly recovers heavy metals such as nickel and zinc, and the recovery efficiency is high. However, air participation in the operation is easy to cause secondary pollution. Wet extraction technology mainly extracts valuable materials and valuable heavy metals through sorting and sorting, shelling, dissolving in acid and alkali solutions, extraction and ion exchange methods. This technology has a wide range of applications, high recycling rate and little impact on the environment, and is currently one of the mainstream technologies in the field of new energy vehicle battery recycling. However, the process is complex and lengthy, and the recovery of electrolyte and leaching residue is easy to cause secondary pollution, and the recovery cost is high.

Keywords: battery, recyclability, Application.

1. Introduction

Traditional energy sources such as coal, oil and natural gas have been widely used for many years. However, the dangers of these energy sources are also evident. Not only do they cause serious damage to the environment, such as producing large amounts of greenhouse gases and pollution, but they also face the risk of depletion because they are non-renewable resources. Under these circumstances, the development of new energy sources has become crucial. New energy sources are renewable, clean and environmentally friendly energy sources, such as solar, wind, water and geothermal energy. This energy source is sustainable and will not run out like traditional energy sources. Additionally, new energy sources produce little or no pollution in the production process and have less impact on the environment. Therefore, the development and utilization of new energy is an important part of sustainable development [1].

A battery is a device that can store and release electrical energy which is widely used in various fields [2], such as cars, cell phones, computers and so on. There are many types of batteries, including lead-acid batteries, nickel-cadmium batteries and lithium-ion batteries. Each of these batteries has its own advantages and disadvantages. For example, lead-acid batteries have the advantages of low cost and long life, but also have the disadvantages of large size and heavy weight. Lithium-ion batteries have the advantages of high energy density and long service life, but also have the disadvantages of high cost and slow charging speed. New energy and battery development complement each other. On the one hand, the development of new energy needs the support of battery technology. For example, solar and wind power need efficient batteries to store energy so that it can be used when needed. On the other hand, the development of new energy also promotes the progress of battery technology. For

example, the development of lithium-ion batteries has benefited from the promotion and adoption of electric vehicles. In the future, with the continuous development of new energy technologies, we expect battery technology to make even greater advances and advancements. With the arrival of the peak period of new energy vehicle battery recycling, the issue of new energy vehicle battery recycling has gradually become a research hotspot for scholars at home and abroad [3]. At present, domestic and foreign scholars mainly focus on research on new energy vehicle battery recycling issues, including the impact of waste battery recycling on the environment and economy, the current status of battery recycling and the impact of policies on recycling strategies, the impact of waste battery recycling on the environment and economy.

As the main energy storage component of new energy vehicles, the retirement tide of power batteries is coming. The large-scale retirement of power batteries has brought huge benefits to the treatment of power batteries challenge. From the aspects of environment, resources and economy, the significance of power battery recycling is expounded, and the current status of power battery recycling is analyzed. It is aimed at strengthening new energy vehicles power battery recycling, from the aspects of improving laws and regulations, improving the recycling system and improving recycling technology, put forward countermeasures and suggestions.

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2. Analysis of battery recycling methods

Yu et al. developed a new battery recycling method. According to the structure and composition of used batteries, the recycling process was divided into three stages: pretreatment, secondary treatment and deep recycling [4]. The streamlined and efficient recycling technology can improve ecological efficiency, and analyze the challenges and prospects of the current recycling process; research on the recycling of new energy vehicle power batteries mainly focuses on power battery recycling technology, application paths of used power batteries, and the theory of power battery recycling model's exploration. There have been many studies on the impact of government incentive policies on reverse logistics. The research results show that government incentive policies can have a positive impact on reverse logistics activities.

A study on the secondary use of electric vehicle batteries through case analysis was developed [5], and the results showed that centralized battery recycling can achieve more economic value and environmental benefits than dispersed battery recycling. The research will draw on reverse logistics theory and supply chain theories, combined with the characteristics of non-renewable energy batteries, to construct a recycling supply chain of new energy vehicle energy batteries, including the energy production, sale and recycling process. batteries. This supply chain, unlike the general closed supply chain of electronic products, enriches research on reverse logistics of electronic products.

Yao et al. comprehensively compared the recycling and processing technologies of retired new energy vehicle batteries in foreign countries, proposed several battery recycling and recovery

technologies according to the current situation of China's new energy vehicle industry [6]. Based on market demand, recycling of waste batteries, gradual use of batteries and intensive development of recycling technologies are proposed. The research not only studies the impact of government subsidies on battery recycling activities, but also presents specific government subsidy strategies that have some reference value for studying the impact of government promotion policies on reverse logistics.

According to the whole life theory of the battery, it is proposed to connect the electric battery to the power plant, which is good for recycling and reusing the oil lamp [7]. Cascading batteries have a strong market value and can reduce the cost of generating electricity. Our electric vehicle battery recycling and recycling closed-loop supply chain consists of battery manufacturers and recyclers. The best value for money is created by manufacturers and business developers to maximize the profit from all the products. Mathematical models were used to quantitatively study the recycling problems of electric batteries of new energy. According to the non-state subsidy mechanism and the state subsidy mechanism, a new energy vehicle battery recycling chain model was developed, and the solution model was compared and evaluated, to get the best energy battery energy channel ideas in different mechanisms and learn about government subsidies and government subsidies for the battery recycling chain.

In order to maximize the material performance, minimize environmental pollution. The CLSC model of new energy vehicle battery recycling of block chain technology is selected [8]. Block chain technology has the impact of traceability information and has a positive response to consumers. At high utilization, members are more willing to take the risk of recycling, and higher costs are more profitable for manufacturing and retailers. After that, the higher the information transmission rate, the higher the profit gained. This article provides new insights into the recovery of new energy vehicles. The first is to use block chain technology to enhance the recovery rate and the price of recycling. Next, when the recovery price is high, this technology can obtain higher information transmission rate and profit. It is difficult to collect cross-industry information, and the recovery and processing costs are too high, but the use of block chain technology can avoid these occurrences. Third, without block chain technology, sales of new products will decline linearly as the price increases, causing irreparable losses to manufacturers. The CLSC usually chooses to ask other members to recycle the batteries that they don't want, but with the block chain technology, they will choose to recycle their own batteries. In the future, this research can be more advanced.

The recycling and utilization of new energy vehicle batteries have always attracted the attention of business and academia [9]. The research examines the reverse supply chain, which consists of consumers, manufacturers, and third-party companies. It also analyzes the two recycling models of manufacturers and third-party companies, and the impact of different parameters on consumer prices, recycling rates, and supply chain profits. Although different parameters have a certain impact on profits, the main impact is on consumers' sense of responsibility for environmental protection through some informal channels. Therefore, it is suggested to adopt the following points. Actively publicize and improve consumers' environmental awareness. Consumers can improve the awareness of environmental responsibility through the publicity of battery recycling and disposal, and deal with some environmental hazards caused by improper treatment, and encourage consumers to recycle old batteries in a correct way. The government can also improve the battery recycling platform and strengthen the control of consumers who will be fined if found violators. Strengthening the investment of scientific research can improve the recovery rate and processing income of old batteries. The government can help the recycling industry to process, and some subsidies can be given. Lithium batteries are prohibited from entering formal occasions, and informal workshops are closed to ensure that the battery recycling industry is on the right track.

With the rapid popularity of NEV, most of the power batteries will be retired [10]. But recycling old photovoltaic batteries is full of prospects and opportunities. In order to protect the environment, save energy and maintain health, government businesses and consumers need to cooperate to rebuild recycling resources in a circular economy. At the present stage, the analysis of policy and technology

in the actual problems of industrial development, after examining the current power battery echelon has been the concern of the world. At present, there are four modes of battery recycling: battery manufacturer recycling mode, new energy vehicle enterprise recycling mode, industrial cooperative recycling model and third-party recycling model, as shown in Fig. 1. Summarizing policies and recycling systems, the use of power batteries is a focus in the future. Finally, the government departments should establish an absolutely clear, effective recycling mode and recycling system.

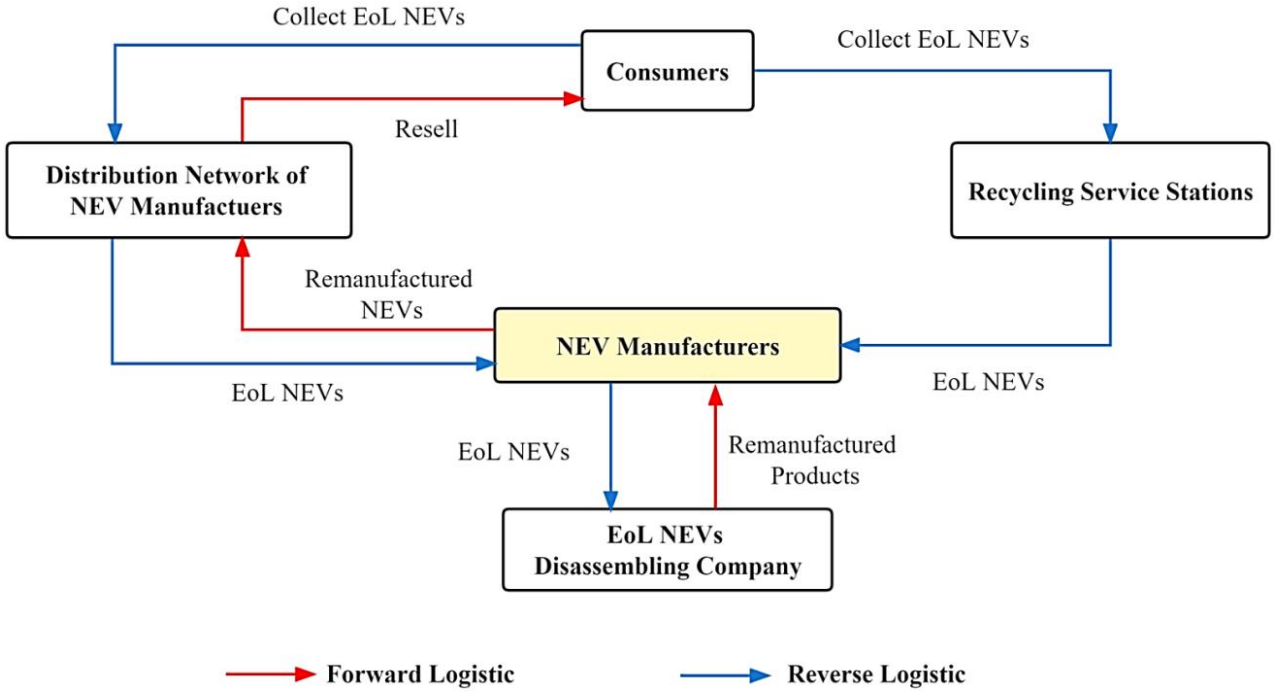


Fig. 1 NEV enterprise recycling model [10].

3. Conclusion

In conclusion, through research on new energy battery regeneration, it will help promote the development of China's new energy automotive industry and electric battery recycling. Therefore, in the coming years, electric battery recycling enterprises should focus on how to improve the effectiveness of recycling and disposal of such electric batteries, and formulate a series of effective recycling and disposal plans and programs, to achieve this goal. to expand the long-term development path of the new energy industry on the premise of ensuring efficient and scientific recycling of electric batteries, and thus to improve the production efficiency of their own enterprises while achieving the scientific and industrial development of battery recycling. At the same time, the scientific and industrial development of battery recycling was achieved.

Authors Contribution

All the authors contributed equally and their names were listed in alphabetical order.

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