

# Recycling and Repurposing of EV Batteries

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**Abstract:** *It is a fact that electric vehicles (EVs) are beneficial for climate protection. However, the current challenge is to decide on whether to reuse an EV battery or to recycle it after its first use. This paper theoretically investigates these areas i.e., recycle and reuse. It was found that there are several commercially used recycling processes and also some are under research to regain maximum possible materials and quantity. The concept of reusing (second life) of the battery is promising because, at the end of the first life, batteries from EVs can be used in several applications such as storing energy generated from renewable sources to support the government grid. We built a system dynamics model to capture the decision factors for repurposing or recycling end-of-life EV batteries. Our findings reveal that the EV battery regulation is effective when it comes to building the required recycling capacities. Our simulations highlight that the current recycling capacities are insufficient to meet the growing demand, thereby highlighting the need for investors to expand the current facilities. On the other hand, the EV battery regulation, which promotes recycling with mandatory recycling shares, leads to a considerable dropping of shares in the emerging repurposing market. Our study concludes that, to achieve a circular economy for EV batteries, balanced support for recycling and repurposing is needed. We call for a complementary policy framework that ensures that repurposing is an integral part of the closed-loop system.*

**Keywords:** battery recycling; battery reuse; battery second life; circular economy; lithium-ion cells; electric vehicles; battery components recycling; sustainability in mobility; battery safety; battery cost analysis

