

THE ECONOMIC POTENTIAL OF RECYCLING LITHIUM-ION BATTERIES

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The ongoing electrification of transportation is set to significantly increase the demand for lithium-ion batteries (LIBs). This growth will demand an exorbitant amount of raw materials and will generate a lot of used LIBs, which is hazardous waste. To increase the supply security of battery resources and reduce the environmental impact of LIBs, recycling of used batteries is inevitable.

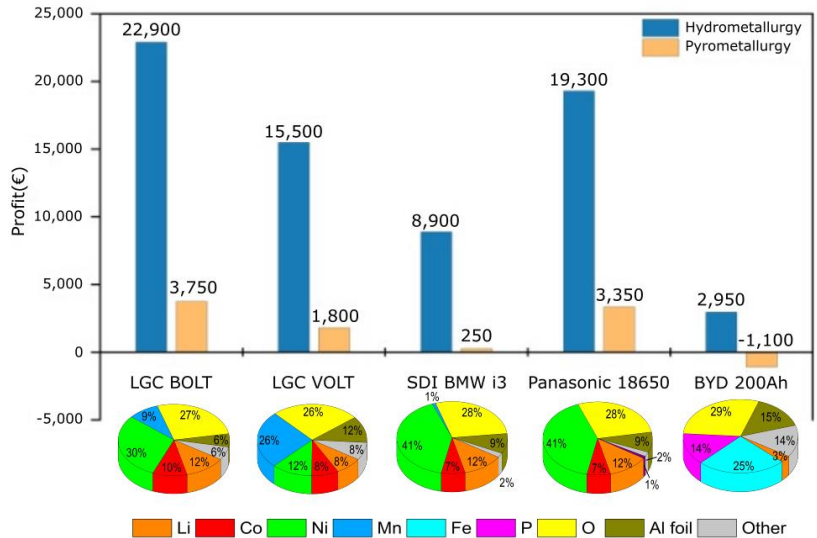


Figure 1. Calculated profit values per tonne for five common cells used in electronic vehicles. Below are the cathode compositions of the cells.

In this work, the main problems with the industry, raw materials, and other factors that affect the profitability of recycling LIBs (logistics, recycling method used, energy and material costs) were analyzed. Five common LIB cells used in electronic vehicles were used to calculate profit margins for pyrometallurgical and hydrometallurgical pathways (Fig.1). The results showed that all cells could be profitably recycled using hydrometallurgy. For pyrometallurgy, all cells could be profitably recycled if the batteries were transported as non-hazardous waste, although the profit margins were still much lower than for hydrometallurgy. A theoretical mix of these five shells gave a profit margin of 16,450 €/tonne when recycled hydrometallurgically.



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