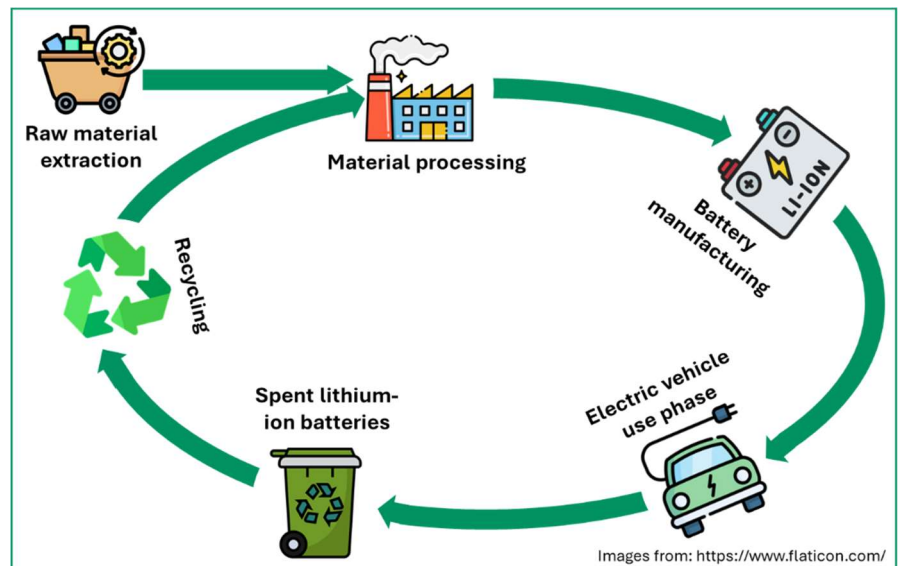


## Lithium-ion battery anode material recycling: key issues and recent advances

Lithium-ion batteries (LIBs) have gained massive attention in the quest for sustainable energy transition. LIB cells are made up of cathode and anode electrodes. The cathode typically contains lithium, nickel, manganese, cobalt, etc. On the other hand, graphite is the state-of-the-art anode material for LIBs. At the end of the use phase, each component of the spent LIB should be recycled to ensure resource sustainability. The recovery of economically valuable cathode metals such as cobalt and nickel has gained huge attention, leaving out graphite, which is rarely recycled. This is believed to be due to the relatively low cost of graphite and its natural abundance. However, natural graphite is one of the European Union's critical raw materials, confirming its economic importance and potential supply risk.

Ensuring a closed loop for all battery raw materials is critical and could soon be supported by regulations. Hence, it is imperative to understand the key issues surrounding LIB anode material recycling, the recent



advances that have been made in this regard, and the opportunities that exist.

In this thesis, a study on LIB anode material recycling will be conducted. To achieve this, the following will be carried out:

- Comprehensive literature review of the current state of research and industry practise on anode material recycling,
- Identification of the key challenges and recent technological advances,
- Critical discussion of the findings (including technological, environmental, economic, and resource depletion aspects) and recommendations for action.

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