

Recycling Strategies for Sustainable Utilization of Spent Lithium-Ion Batteries from Electric Vehicles in the Philippines

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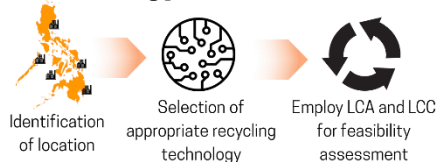
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Abstract: To reduce greenhouse gas emission (GHG), the Philippines is aiming to penetrate 10 to 50% electric vehicles (EVs) in its transport sector by 2040, which results in accumulation of used lithium-ion batteries (LIBs) in the following years. Used LIBs are referred to as general e-waste in the Philippines, thus, proposing strategies for sustainable utilization of spent LIBs. Present state is the landfills or incineration without recycling, which causes significant environmental impacts and wastes valuable elements (Scenario 0). It is not feasible to collect, and export used LIBs because of the risks of venting, overheating, spontaneous ignition, fire, explosion, and the discharge of potentially dangerous compounds during long distances transport (Scenario 1). In small-scale facilities distributed around the Philippines, used LIBs shall be collected, discharged, dismantled, stabilized, and sorted into parts to ensure these can be exported safely with added value (Scenario 2). The materials can be refined further to battery materials in centralized factories in the Philippines (Scenario 3). If Scenarios 2 or 3 are realized, the Philippines can attract LIB manufacturers to invest (Scenario 4). We identify Scenario 2 to be the key for the sustainable use of LIBs in the Philippines (and other developing countries) and will propose the research for the small-scale distributed factories for treating used LIBs.

Advantages:

- Reduced risk for land and water pollution.
- Reduced risk for fire and harmful gas generation during long-distance transportation.
- Cost-effective and better accessibility.

Methodology:



SDGs covered:



Scenarios for assessment:

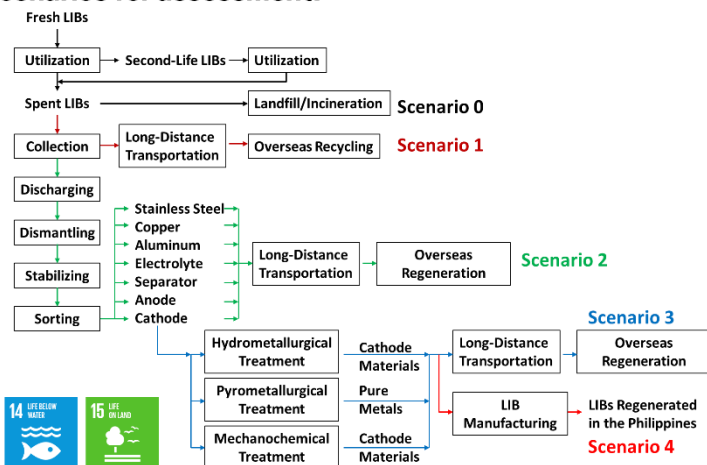


Fig. 1. Small-scale distributed LIB recycling facilities in the Philippines.

Keywords: Lithium-Ion Batteries; Electric Vehicles; Recycle, Life-Cycle Assessment

Related SDG Goals: SDG1,7,9,11,12,13,14,15