Recycling and reusing critical minerals - Lithium-ion batteries

Lithium-ion batteries have replaced traditional batteries in several applications, the world over. Developed in the 1970s and first commercialised by Sony in 1991, for the company's handheld video recorder, today Lithium-ion batteries are popular because of the power they can put out at a given size and weight.

Minerals such as cobalt, graphite and lithium are mined from the earth and used to make Lithium-ion batteries. These minerals are considered critical minerals because they have no substitutes as of date, and there is a high risk of their supply being disrupted.

Recovering critical minerals

It is estimated that by as early as 2030, 2 million metric tons of lithium-ion batteries will be trashed, every year.

Despite their critical nature and widespread use, Lithium-ion batteries have a lifespan. When they reach end-of-life, these batteries are dumped, even though they can be recycled. The valuable metals and other materials can be recovered, processed, and reused, but as of now, this recycling process has been largely unorganised.

When Lithium-ion batteries are disposed of as trash, or dumped in landfills, we lose these critical resources and stand the risk of them being damaged or crushed, creating toxic fire hazards that could be highly disastrous to life and the environment.

Unorganised battery recycling in India – a looming health and environment hazard

In developing countries collecting trashed electronic goods from landfills and retrieving different components for resale is an occupation and livelihood for several people – particularly women and children, in the unorganised sector

The process is done manually, without using any protective gear. While waste components that do not have value are burnt and disposed of, resaleable battery components are recovered using crude, hazardous methods like smelting. The people involved in this process are exposed to toxic, carcinogenic fumes and dangerous, slow-poisoning chemicals which they inhale all day long.

Massive need for certified battery recyclers

With the alarming rise in disposed batteries, it has become imperative to ensure that devices that use Lithium-ion batteries must be sent to companies that have the expertise and technology to recycle the batteries – in other words, they should be sent for recycling to certified battery recycling plants.

However, this is not an easy task in India as certified battery-recycling plants are few and far between. There is a lack of adequate expertise and infrastructure for this niche and relatively new area of operations. The reasons for these gaps include unskilled labour, technical constraints, economic barriers, logistic issues, and regulatory gaps. In many countries, the lithium-ion battery industry lacks a clear plan regarding large-scale economical recycling. As a result, battery researchers and manufacturers have traditionally not focused on improving recyclability. Since much progress has not been made on improving recyclability, only a small percentage of lithium-ion batteries get recycled.

Driven by the prospect of vast quantities of end-of-life Lithium-ion batteries start-up companies are commercialising new battery-recycling technologies.

More research is being conducted to study the problem and expand the pool of people who are trained in battery recycling. What is more, battery manufacturing companies and recycling experts have started to form collaborations to tackle the challenges of recycling lithium-ion batteries.