Rechargeable Batteries

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Recently, the United Nations Conference on Trade and Development (UNCTAD) released a report ‘Commodities at a glance: Special issue on strategic battery and minerals’. The report facilitated research into battery technologies that depended less on critical raw materials and had the potential to provide higher energy density. Energy density is the amount of energy that can be stored in a given mass of a substance or system, i.e. a measure of storage of energy.

Imp Points

Uncertain Supply: The report highlighted that the supply of raw materials to produce rechargeable batteries is uncertain. Lithium, natural graphite and manganese are critical raw materials for the manufacture of rechargeable batteries.

Rising Demand: Integration of EVs- There has been a rapid growth in demand for rechargeable batteries due to the gradual integration of electric vehicles (EVs) in global transportation. The sales of electric cars have increased by 65% in 2018 from 2017 to 5.1 million vehicles and it will reach 23 million in 2030.

Increased Use of Raw Material: With the increasing number of EVs, the demand for rechargeable batteries and the raw materials used in them have also increased. The worldwide market for cathodes for lithium-ion batteries was estimated at $7 billion in 2018 and is expected to reach $58.8 billion by 2024.

The demand for raw materials used to manufacture rechargeable batteries will grow rapidly as other sources of energy lose their importance.

- Concerns
  - Limited Suppliers: The security of supplies is a concern for all stakeholders because the production of the raw materials is concentrated in a few countries.
  - Over 60% of the world’s Cobalt is mined in the Democratic Republic of the Congo while over 75% of global Lithium is mined in Australia and Chile.
  - Prone of Volatility: Any disruption to supply might lead to tighter markets, higher prices and increased costs of rechargeable batteries. In 2018, the demand for cobalt surged by 25% from 2017 to 125,000 tonnes, of which 9% accounted for the EV battery sector.
  - Cobalt demand would reach 185,000 tonnes by 2023, with about 35% accounting for the EV battery sector, the report said. Growth in demand for lithium had been significant since 2015, increasing by 13% per year.

Li-ion Batteries

- A lithium-ion battery or Li-ion battery is a type of rechargeable battery.
- Li-ion batteries use an intercalated (Intercalation is the reversible inclusion or insertion of a molecule into materials with layered structures) lithium compound as one electrode material, compared to the metallic lithium used in a non-rechargeable lithium battery.
- The battery consists of electrolyte, which allows for ionic movement and the two electrodes are the constituent components of a lithium-ion battery cell.
- Lithium ions move from the negative electrode to the positive electrode during discharge and back when charging.
- They are one of the most popular types of rechargeable batteries used for military, EVs and aerospace applications.

Alternative sources of energy such as electric batteries are becoming more important as investors become sceptical of the future of the oil industry. There is a need to make a strategy for dynamic monitoring of the raw material cycles, from mining through processing, refining and manufacturing to recycling. It will facilitate early detection of supply risks and also enable the development of mitigation strategies at either company or national level.