



TECH 2019S4: Cobalt Extraction Technologies

Cobalt Extraction Technologies is one in a series of reports published as part of Nexant's 2019 Technoeconomics – Energy & Chemicals (TECH) program.

Overview

The cobalt sector, traditionally important for chemicals, metallurgy, and pigments, is receiving increasing attention due to its strategic importance to the production of rechargeable lithium-ion batteries. However, cobalt production is complicated by its status as a byproduct of copper and nickel production. With sedimentary copper-cobalt sources in the DR Congo under threat by legal changes, security concerns and poor logistics, laterite processing options are increasingly strategically favorable. However, current laterite processing options for cobalt recovery are perceived as unsatisfactory and a wave of innovative processes is rising to challenge the previous generation of hydrometallurgical recovery options.

Additionally, battery recycling technologies are nascent but are expected to become more important for global cobalt supply, but the existing ecosystem has limited ability to handle expected volumes of batteries using cobalt anodes or relies on relatively expensive processes based on ore leaching. New technology providers are rising to the challenge of producing refined cobalt products with processes specialized to the unique feedstock handling and contaminant removal challenges of lithium-ion batteries.

The objective of this TECH report is to address key questions such as:

- What are the major technologies used for cobalt production, and how do they differ?
- What are the current costs and projected technoeconomics for new cobalt ventures?
- What is the potential effect of a new generation of hydrometallurgical processing on cobalt supply and production costs?
- What is the current status of cobalt recovery from the battery recycling sector, and what new technologies are being developed to address current challenges?
- How is the strategic environment for new cobalt investment affected by major policy changes and geopolitical vulnerabilities?

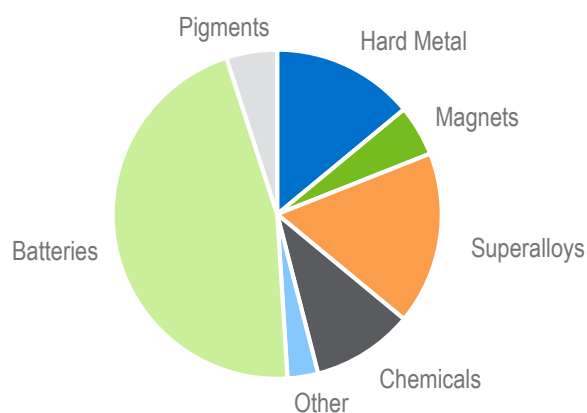
Technology Analysis

This report focuses on technology available for cobalt refining, including options both innovative and established for processing sedimentary copper-cobalt ores and laterite nickel-cobalt ores. Options for replacing pressure acid leaching (PAL) processes in laterite processing are examined in particular. In addition, the report analyzes new technologies in the emerging battery recycling sector and their potential to produce refined cobalt independently of existing nickel smelters and other limited downstream options.

Process Economics

This report assesses economics of major copper-cobalt and nickel-cobalt ore processing methods against innovative technologies. Process scenarios cover mine-gate production of cobalt-containing intermediates to offsite raffination processes as well as mine-integrated onsite product of refined cobalt metal. In addition to commercial technologies, the report includes speculative economics on two novel processes for hydrometallurgical laterite processing that are approaching commercialization.

Cobalt Demand by End-Use, 2017



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The TECH program (formerly known as PERP) is globally recognized as the industry standard source of process evaluations of existing, new and emerging of interest to the energy and chemical industries.

TECH's comprehensive studies include detailed technology analyses, process economics, as well as commercial overviews and industry trends. Reports typically cover:

- Trends in chemical technology
- Strategic/business overviews
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- Chemistry
- Process flow diagrams and descriptions of established/conventional, new and emerging processes
- Process economics – comparative costs of production estimates for different technologies across various geographic regions
- Overview of product applications and markets for new as well as established products
- Regional supply and demand balances for product, including capacity tables of plants in each region
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Technology and Costs comprises the Technoeconomics – Energy & Chemicals (TECH) program (formerly known as PERP), the Biorenewable Insights program (BI), the Sector Technology Analysis, and the new Cost Curve Analysis. These programs provide comparative economics of different process routes and technologies in various geographic regions.

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