

Metso

Lithium Hydroxide Process

Proprietary technology.
Simply sustainable.

Metso
PLUS





Soaring demand for lithium

According to forecasts, the demand for lithium is predicted to triple over the next decade. Electric-vehicle (EV) boom, fueled by the urgent need to implement solutions and technologies limiting global warming, are driving lithium-ion battery development and production.

With the growing share of renewable energy in the global energy mix, the demand for effective energy storage technologies becomes increasingly important to ensure a stable and resilient power supply.



Transition to electric vehicles
and a net zero economy

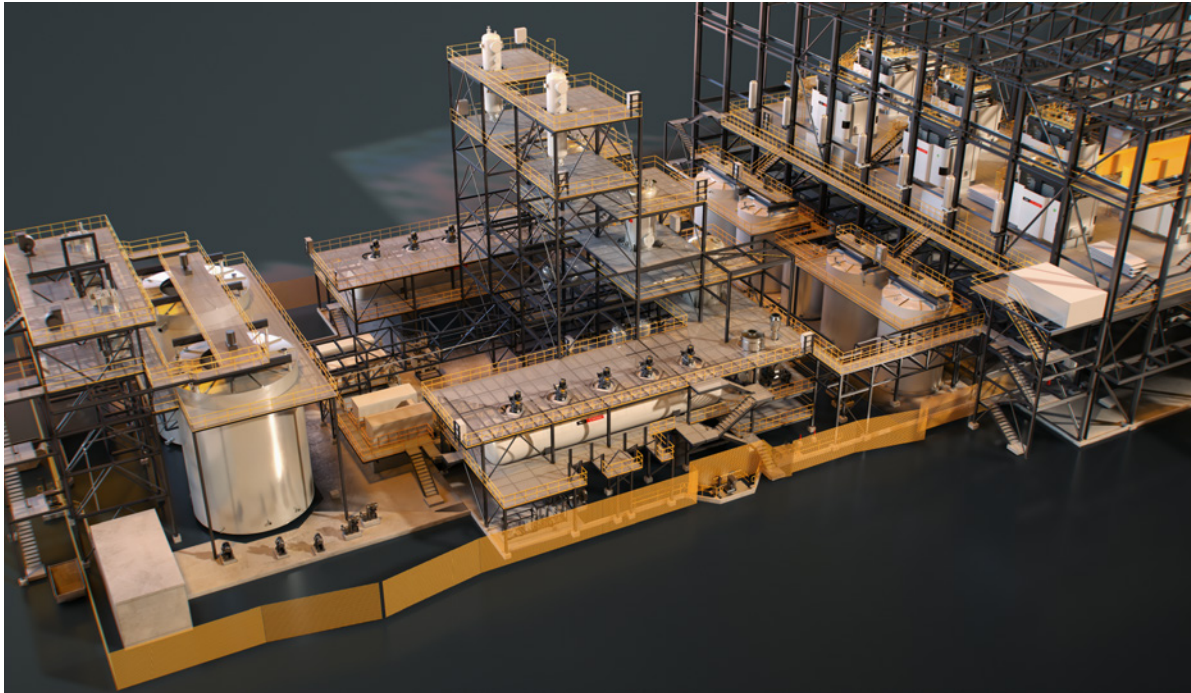


Developing renewable energy
storage ecosystem

Introducing: Metso Lithium Hydroxide Process

Metso's proprietary technology offers a short-cut process concept for spodumene concentrates: direct alkaline leach process for lithium extraction and solubilization, followed by crystallization of the lithium product.

Furthermore, the leach process provides better sustainability: acid & sulphate free, without undesired crystallized salts or by-products, produces inert & neutral mineral residue for re-use or disposal.



Vast expertise and offering for the whole value chain; from ore to refinery

Proprietary technology for refining spodumene concentrate

Years of extensive R&D and test work on the alkaline leach process

Acid and sulphate free process

Better sustainability, simple and safe process

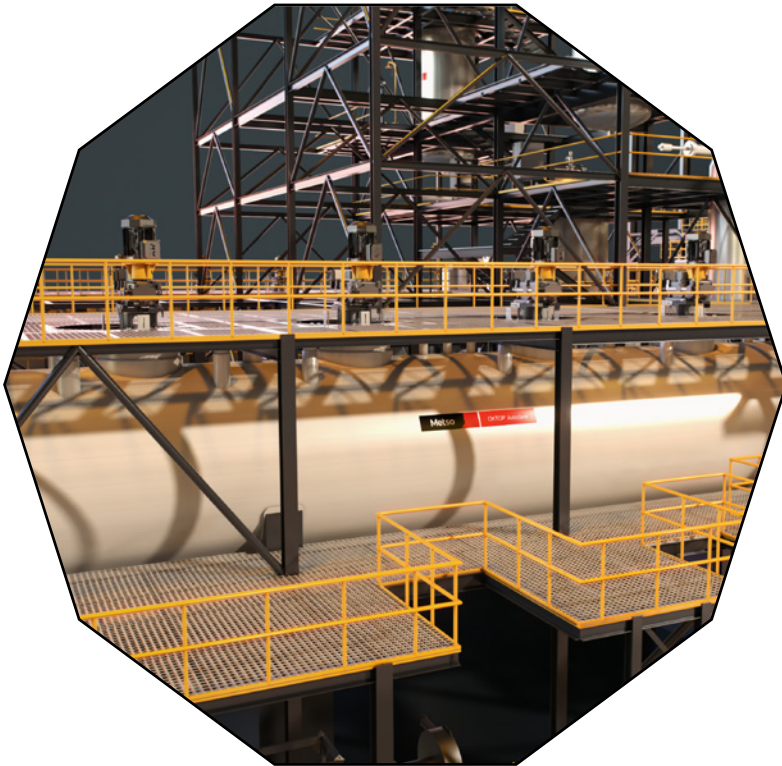
Produces battery grade end product Lithium Hydroxide Monohydrate (LHM) or Lithium Carbonate (LC)

Intensive R&D ongoing for other lithium pegmatites: petalite, zinnwaldite, lepidolite processing

World-class service support

Industry's most comprehensive scope of supply

We have the robust proprietary technology, knowhow and insight needed to help improve the efficiency and sustainability of the entire lithium hydroxide value chain.



Core

- OKTOP® autoclave plant unit
- OKTOP® reactor plant unit
- Larox® PF filter
- LSF filter

Ancillary

- Ion Exchanger (partnered)
- Feeding systems (including partnered)
- Crystallizers (partnered)
- Packing system (partnered)

Enablers

- Courier® analyzer
- Geminex™ metallurgical digital twin
- Metallurgical testing
- Plant and process engineering

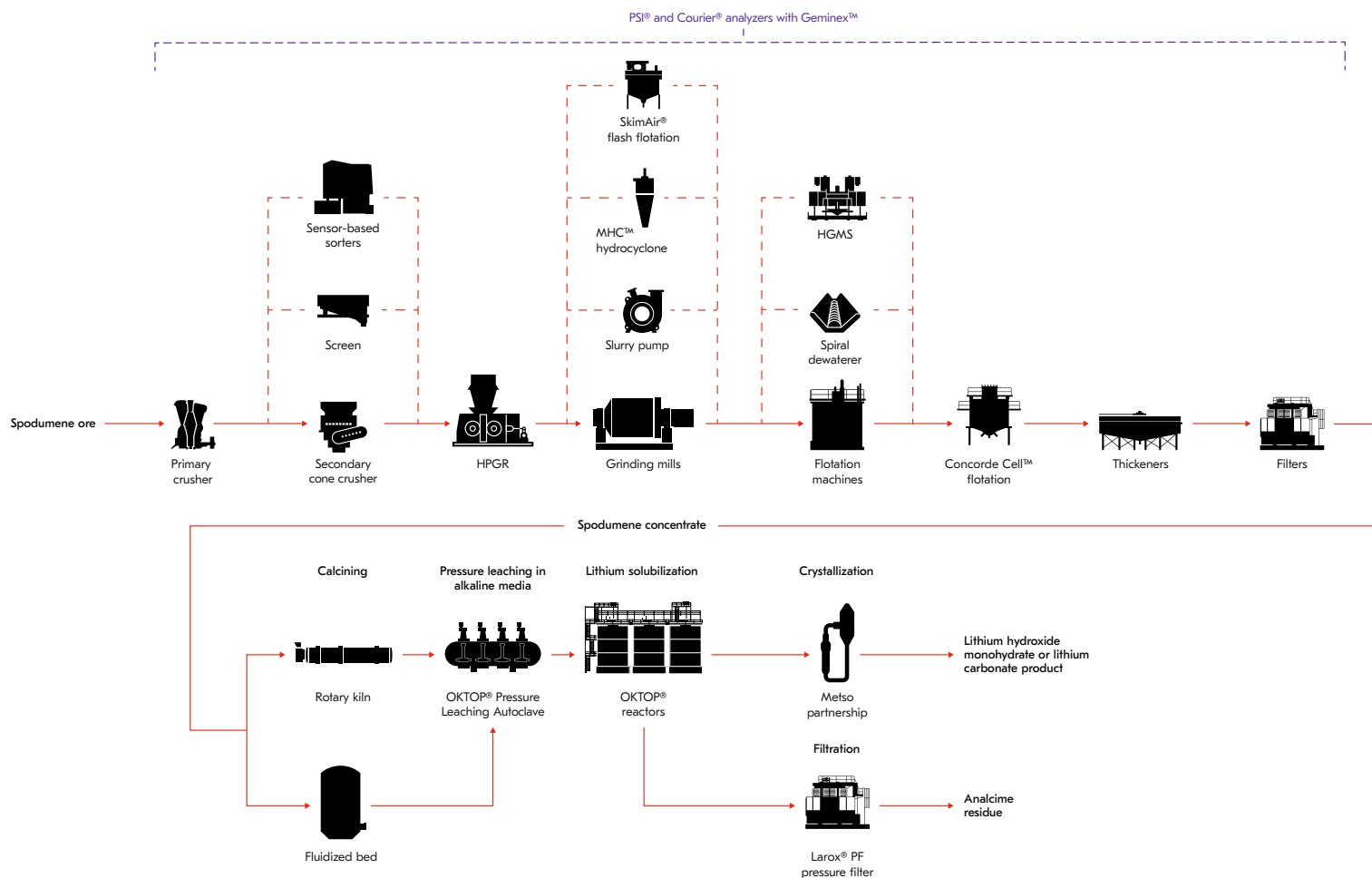
Services

- Life Cycle Services
- Spare parts
- Installation and commissioning
- Start-up services
- Asset maintenance readiness
- Equipment inspections and upgrades
- Training services
- Consignment stock spare part services

Closer look at the big picture

Concentrator plant and hydrometallurgical LiOH process

Metso offers optimized solutions and complete plants to produce high-purity lithium salts. Our innovative and proven comminution, beneficiation, dewatering, calcination, extraction and lithium recovery technologies cover the whole range of production, from raw materials to battery grade lithium products: most importantly Lithium Hydroxide Monohydrate and Lithium Carbonate.



Comprehensive research and testwork capabilities

As part of our commitment to strong and on-going research and development, we strive to develop new and improved equipment and processing technologies that satisfy the ever-changing needs of our customers. To meet the evolving needs of the battery industry, Metso has expanded its process piloting capabilities at the Pori Research Center.

We have successfully tested and piloted the process with several spodumene concentrates to produce battery-grade end product. Additionally, the alkaline leaching concept is under development to cover also other lithium minerals like petalite, zinnwaldite and lepidolite.



Batch tests



- Batch leaching tests in 1-3 gallon autoclaves and 2 to 10 liter reactors
- Establish operational parameters and leach extractions or precipitation efficiency

Continuous pilot testwork



- Used to verify the flowsheet in longer periods of time, ~1-2 weeks to finalise Process Design Criteria
- Produced solids (residue) are used for dimensioning tests for filters

In-house analytical laboratory facilities



- Pilot facility is expanding operations in order to keep up with the demands of the battery minerals industry



Lithium hydroxide technology for better sustainability

40-60%

reduction in water use, as well as acidification and eutrophication impact categories, based on LCIA (Life Cycle Impact Assessment) results of lithium hydroxide production

Lower impact to water, air and soil with neutral and sulfate-free residues

Minimized plant footprint & embedded carbon

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Metso is a frontrunner in providing sustainable technologies, end-to-end solutions and services for the aggregates, minerals processing and metals refining industries globally. By helping our customers increase their productivity, improve their energy and water efficiency and environmental performance with our process and product expertise, we are the **partner for positive change**.

