

A new report for 2018

The first global analysis of the end of life market for lithium-ion

Report on recycling of lithium-ion batteries

Impact on raw material volumes 2018– 2025

Circular opportunities in the lithium-ion industry is an analysis of the current and future state of the end-of-life market for lithium-ion batteries.

The report answers five questions:

1. How much lithium, cobalt and graphite will be recycled between now and 2025
2. How is the end-of-life value chain for lithium-ion batteries structured and how will it evolve?
3. Can lithium-ion batteries be efficiently recycled?
4. Can lithium-ion batteries be used in other applications after its first use and what are the potential markets?
5. Which opportunities and challenges are faced by key players in the market?

About the author

Hans Eric Melin is the founder of Creation Inn, a strategy consultancy specialised in the energy storage market. He has spent more than 15 years in the energy market, of which 8 years in battery recycling industry in both Europe and North America. He frequently speaks at conferences on energy storage and recycling and is a contributing author to Benchmark Minerals Intelligence.



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 Full report in PDF, 77 pages
 Executive summary in PDF, 25 slides
 1 hour consultation and comments on the report

Circular opportunities in the lithium-ion industry
 Analysis of the global end-of-life market for lithium-ion batteries
 Volumes – Technology – Industry players – Trends

Creation Inn
circular strategies

Order contact: Benjamin Ash
+44 7739 915 381
bash@benchmarkminerals.com

Report structure

Executive summary

Sorting out opportunities from challenges

The lithium-ion EOL market demystified

- Understanding lithium-ion
- Why batteries reach end of life
- Current end-of-life market
- Current end-of-life management
- Structure of the end-of-life market
- Breakdown of recycling costs
- Hurdles for efficient recycling
- Reuse of portable batteries
- Reuse of electronics
- Consequences of low volumes
- Impact of industrial batteries
- The future of end of life

Can lithium-ion batteries really be recycled?

- Current methods and players
- Market drivers
- Recycling of lithium
- Cathode-to-cathode recycling
- Alternative technologies
- Remaining challenges

Is there a second life?

- Why batteries can be used after their first life
- Why batteries degrade
- State of health
- Is there a market?
- Second life of electric vehicle batteries
- Distributed energy storage
- Utility-scale storage
- EV-charging
- Market size
- Hurdles
- Pack design
- Diagnostics
- Liability and intellectual property
- Market integration

Conclusion and forecasts

Market opportunities

- OEMs/Recyclers
- Battery and battery material suppliers
- Collectors and sorters

- Compliance schemes
- Refurbishers
- Application companies
- E-waste and automotive recyclers
- Technology providers

Charts and figures

- Lithium-ion batteries placed on the market 1995-2025
- Chemistries and applications
- Lithium-ion cells placed on the market per chemistry 2000-2016
- Lithium-ion cells projected to be placed on the market per chemistry 2017-2025 (tonnes)
- Lithium-ion cells placed on the market 2017 by application
- Lithium-ion cells end-of-life 2000-2017 by application
- Recycling structure for portable batteries in EU
- Recycling structure for industrial batteries in EU
- Recoverable metals in different lithium-ion chemistries
- Breakdown of recycling costs
- Lithium-ion end-of-life vs collected in Europe 2000-2015
- Lithium-ion end-of-life vs collected in Europe 2005-2015, cumulative
- Comparison reuse value laptop batteries
- Worldwide market for used smartphones
- Collection rates of lithium-ion batteries in Germany 2011-2016
- Lithium-ion projected to reach end-of-life Europe 2016-2025
- Lithium-ion projected to be collected in Europe 2016-2025
- Lithium-ion projected to be placed on the market in Europe 2016-2025
- Lithium-ion projected placed and to be placed on the market per application 2010-2025
- Recyclers in Europe
- Recyclers in North America
- Recyclers in Asia
- Material values in different lithium-ion chemistries
- Profitability recycling facility
- Approximate value for cathode material vs constituents
- Average state of health 18650 cells
- Potential for second life batteries for energy storage in US 2020-2026
- Global volume lithium-ion batteries available for recycling per application 2010-2025
- Global volume lithium-ion batteries available for recycling per chemistry 2016-2025
- Lithium-ion batteries available for recycling per geographical market and chemistry 2025
- Materials from recycled batteries in 2025