



Europe's Leading Partner for Lithium-Ion Battery Recycling

May 2026

For customers & partners only - not to be distributed further

Collect production scrap and end-of-life batteries to produce black-mass on behalf of our customers

Local & International Collection
of manufacturing scrap & end-of-life batteries

9'000 tons/year
of capacity

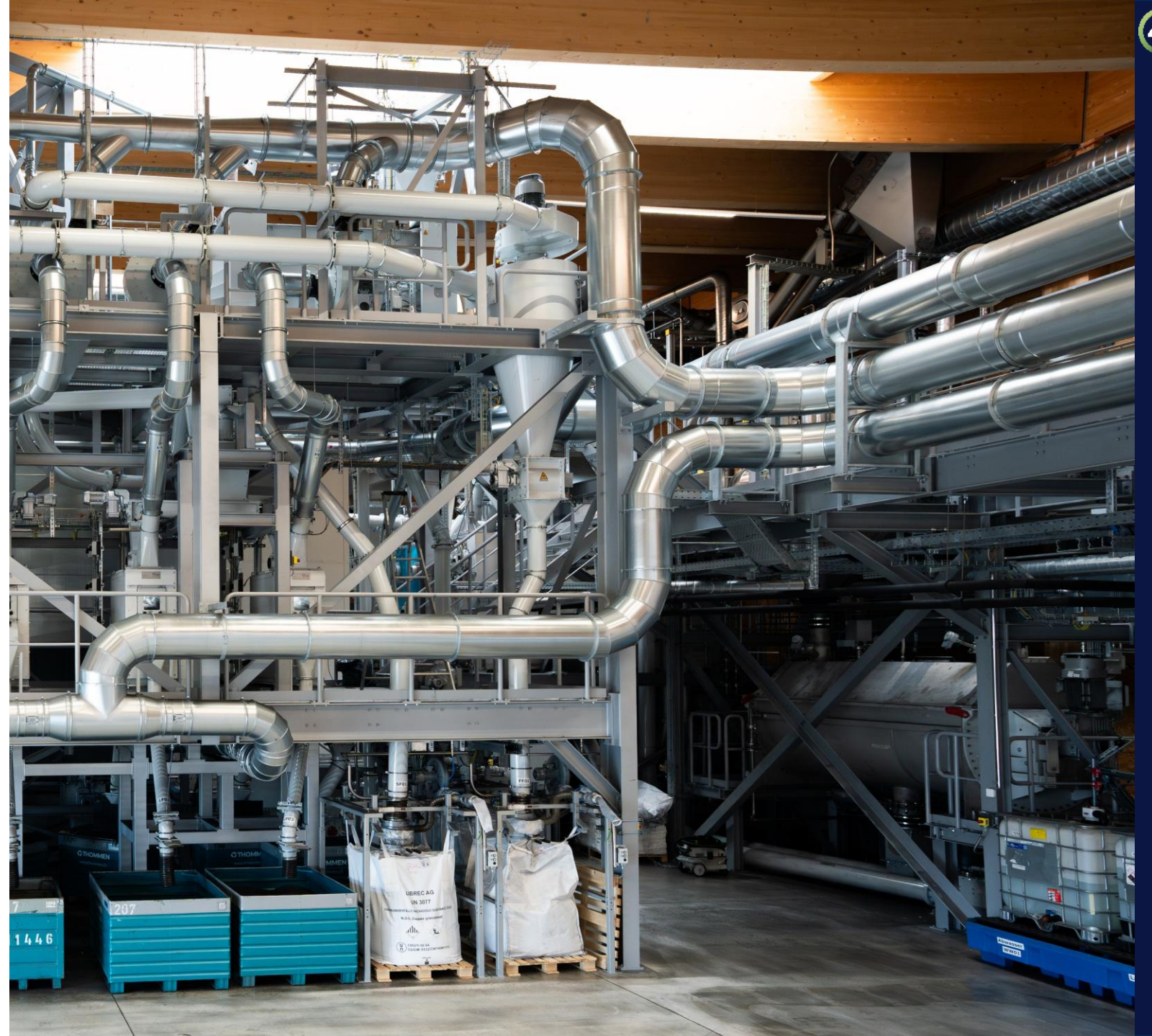
> 97% Recovery Rate
of valuable materials, including lithium and CAM

< 2.5% Black-Mass Impurities
of copper and aluminium

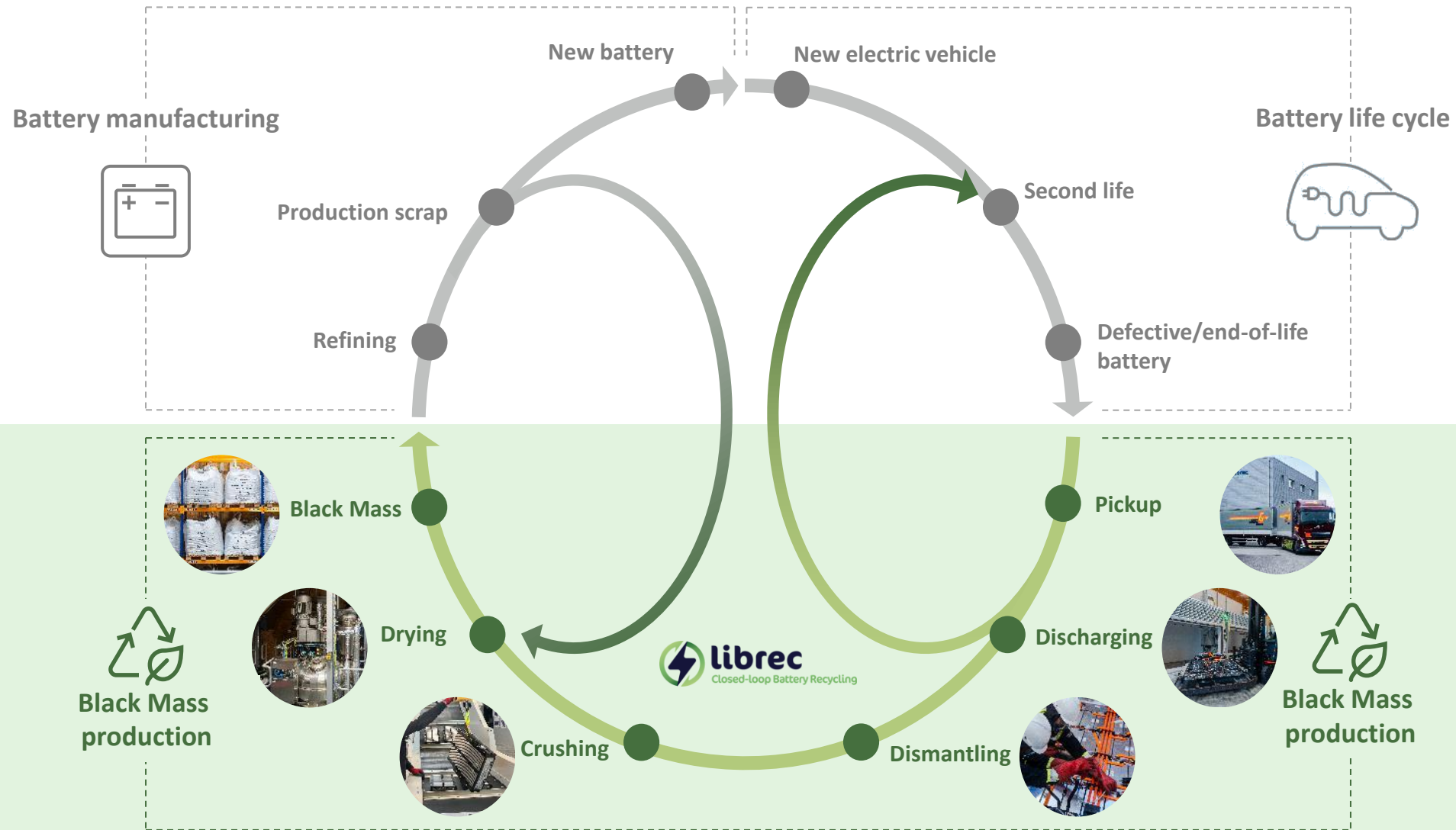
25kg CO₂ - Record Low Footprint
equivalents per ton of recycled material

100%
powered by renewable energy

Highest Standard
in fire protection and sustainability



LIBREC - Collection of production scrap and end-of-life batteries to produce black-mass to close the loop for battery recycling

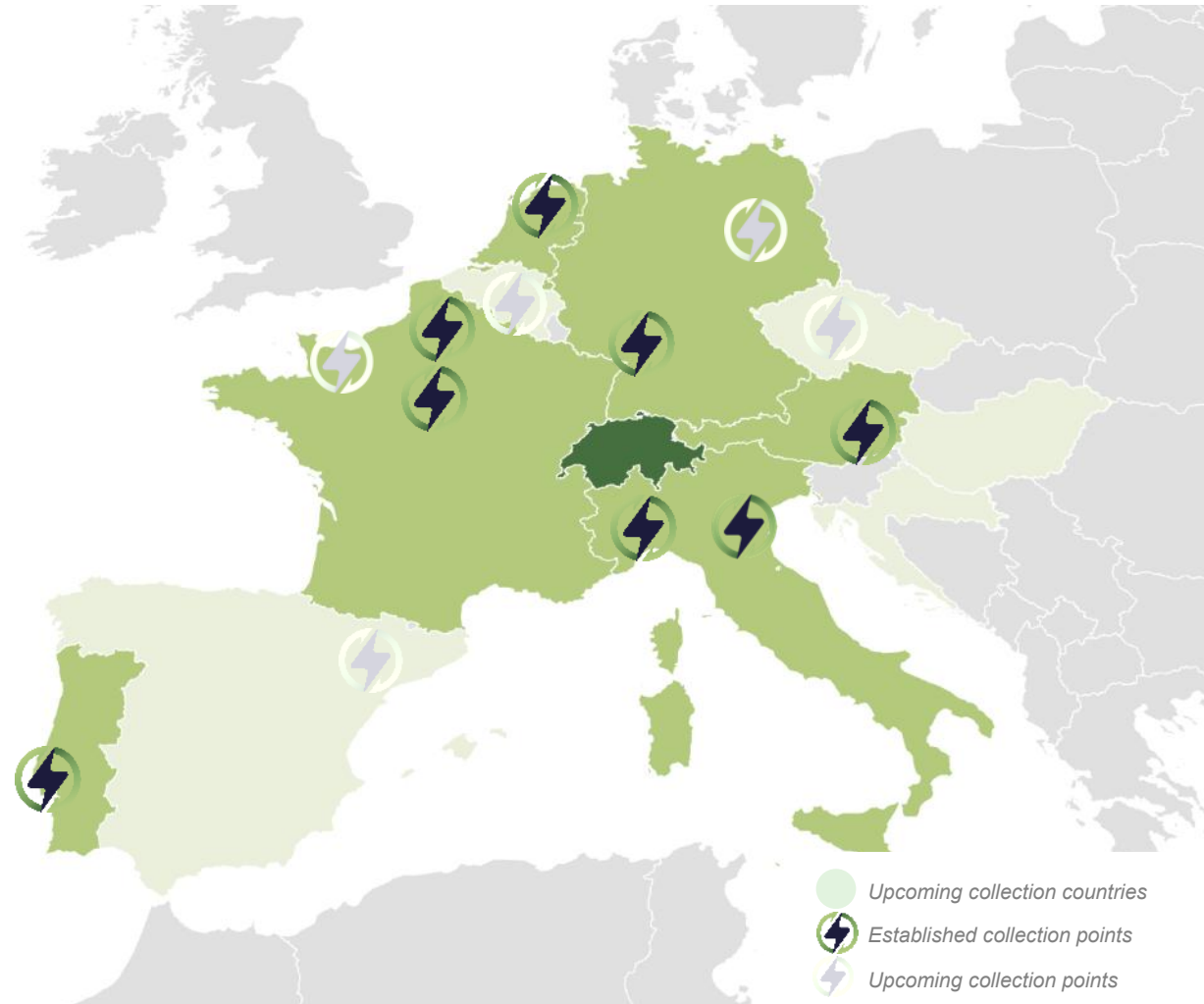


LIBREC - Strategically positioned collection points and inbound notification network across Europe

Home base and notifications



Collection points





Warehousing

1. Fire Protection is Key



Construction materials, structure of hall, air/heat exchange, evacuation, etc.

2. Unloading, Inspection, Registration



Incoming hazardous waste is inspected and registered, ERP structure and trained labour for battery identification to perform at high speed

3. Handling of empties, filling material, etc.



Empties and filling material are addressed in layout and process



Discharging

1. **Lowest Cost through Highest Speed through Highest Safety**

2. **Lowest Cost through Best Use of Space**

3. **Lowest Cost through Re-use of Residual Energy in Process**

Massive chambers for discharging with hot-gas exhaust ventilation

Relaxation shelves on top of chambers

Use of residual battery energy in black mass production process



Dismantling

1. Manual Work:
Well Organized

2. Partial Automation:
in the Future

3. Pro's & Con's re Full
Automation/Robots

We achieve maximum speed
through LEAN organization of the working stations

LIBREC, on purpose, has not invested in own R&D
for automated dismantling systems. LIBREC observes the market very closely
and acquires technology when ready





Full Automation/Robots (Siemens, BOSCH, ABB, Fanuc, etc.) is perfect if
feedstock is homogeneous, if plant receives all sort of end-of-life batteries,
RoI to be assessed carefully



Technology Benchmark

THOMMEN
www.thommen.ch

LIBREC - Unmatched recovery rates and purity in BM

	Smelting	Pyrolysis	Cold	librec Closed-loop Battery Recycling
				
Rate of recovery valuable materials	20-40%	30-50%	~70%	97%
Purity	Matte with Ni, Co, Cu	Heavily contaminated	Above 85%	Above 97%
Energy consumption	~1'250 kWh/t	~650 kWh/t	~250 kWh/t	~250 kWh/t
Lost materials	Li, Al, Graphite, Salt, Electrolyte, Separator, Binder	Li, Graphite, Salt, Electrolyte, Separator, Binder	Graphite, Salt, Binder	Binder



Black Mass Production

1. Change in material affects flow

LIBREC's experience allows for quick change in material and fully automated operation for very low labour cost

2. Vacuum Drying is Crucial Component

LIBREC's vacuum drying competence is unprecedented in battery recycling and allows for lowest CO₂-footprint

3. Off-Gas Cleaning

LIBREC treats the exhaust and off-gas in two steps: wet scrubbing and regenerative thermal oxidation (RTO) to destroy hazardous air pollutants, volatile organic compounds and odorous emissions



Superior Black Mass Quality



LIBREC - Demonstrated Benchmark Black-Mass Quality & Composition from undisclosed NMC622-module 2024

Suisse Technology Partners AG
 Querstrasse 5
 8212 Neuhausen am Rheinfl, Switzerland
 Tel +41 52 551 11 00 | Fax +41 52 551 11 98
 info@suisse-tp.ch | https://suisse-tp.ch

SUISSE
 TECHNOLOGY
 PARTNERS

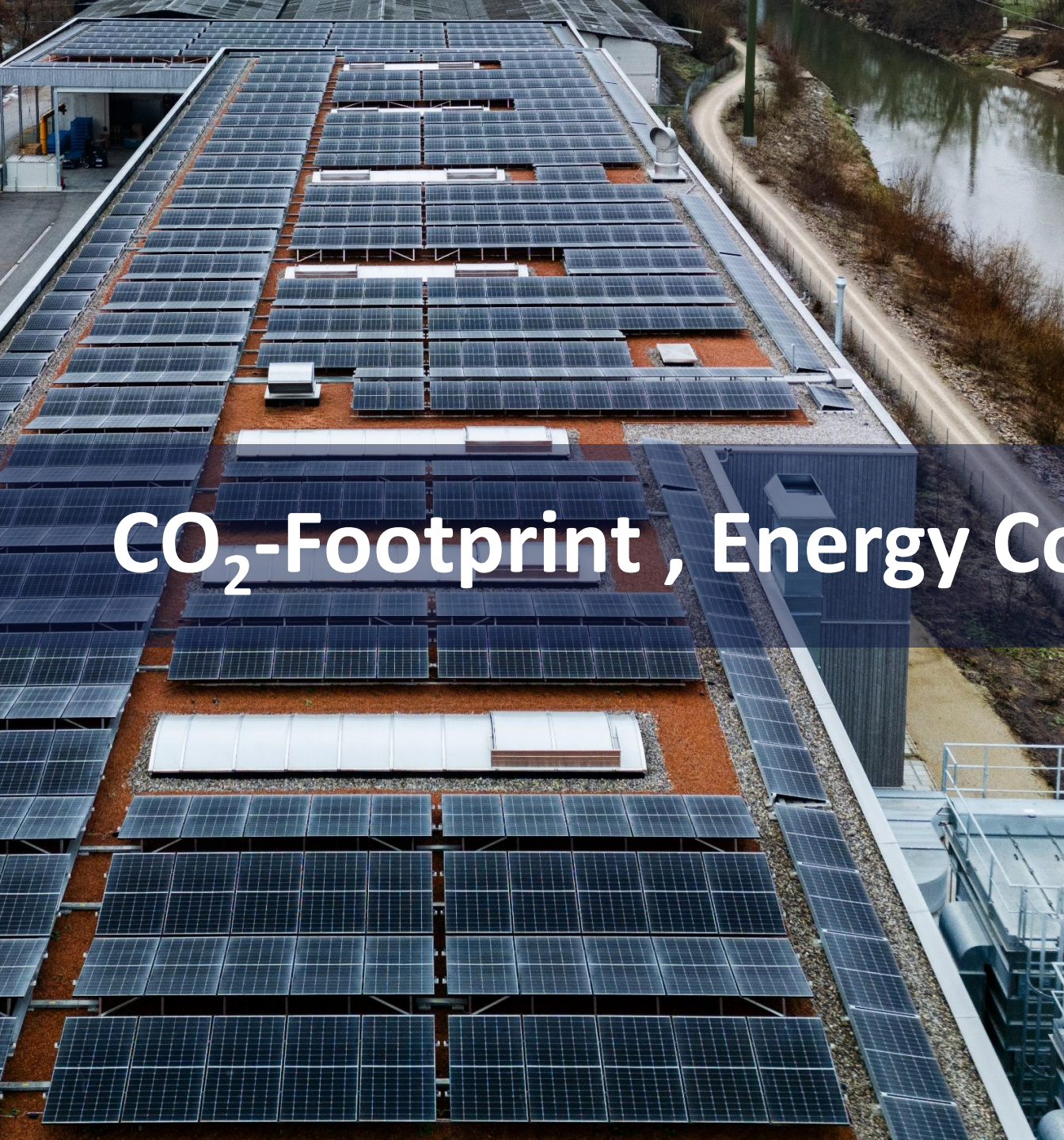
Test report Q24-0376

Date of report: 10.12.2024

Page 2/4

Parameter	Unit	001 240034, BM1	002 240035, BM1	003 240036, BM1	Reporting Method Limit	Limits min/ max
Physical and phys.-chem. parameters						
Moisture	%	0.3 ± 0.1	0.3 ± 0.1	0.4 ± 0.1	0.1	GRA-F-TR
Elements / Cations						
Aluminium (Al)	%	1.37 ± 0.04	1.37 ± 0.04	1.39 ± 0.04	0.0005	ICP-F1
Cadmium (Cd)	µg/g	< 1	< 1	< 1	1	ICP-F1
Cobalt (Co)	%	6.35 ± 0.19	6.36 ± 0.19	6.26 ± 0.19	0.0005	ICP-F1
Chromium (Cr)	µg/g	16.3 ± 2.8	11.8 ± 2.7	9.4 ± 2.6	5	ICP-F1
Copper (Cu)	%	1.17 ± 0.04	1.19 ± 0.04	1.18 ± 0.04	0.0003	ICP-F1
Iron (Fe)	µg/g	446 ± 14	307 ± 10	240 ± 8	2	ICP-F1
Mercury (Hg)	µg/g	< 15	< 15	< 15	15	ICP-F1
Lithium (Li)	%	4.08 ± 0.12	4.12 ± 0.12	4.05 ± 0.12	0.0001	ICP-F1
Manganese (Mn)	%	6.29 ± 0.19	6.32 ± 0.19	6.28 ± 0.19	0.0001	ICP-F1
Nickel (Ni)	%	20.3 ± 0.6	20.5 ± 0.6	20.2 ± 0.6	0.0005	ICP-F1
Phosphorus (P)	%	0.410 ± 0.013	0.397 ± 0.013	0.387 ± 0.012	0.0015	ICP-F1
Lead (Pb)	µg/g	< 10	< 10	< 10	10	ICP-F1
Zinc (Zn)	%	0.152 ± 0.005	0.148 ± 0.005	0.141 ± 0.004	0.0003	ICP-F1
Sum parameters						
TC (Total Carbon)	%	35.9	36.1	36.3	0.01	LECO-CS





CO₂-Footprint , Energy Consumption & Safety

LIBREC - Record Low CO₂ eq/ton Footprint and Innovative Safety & Environmental Protection beyond Legal Requirements



Innovative Safety & Environmental Protection beyond Legal Requirements

- **Fire protection:** Separate fire compartments plus quarantine pool
- **Environmental safety:** Containment of extinguishing water, electrolyte, and brine
- **Air treatment:** Off-gas scrubbed in brine and cleaned via RTO



Record-low energy consumption and GHG emissions



- **Energy-efficient process** implemented by LIBREC
- **~250 kWh/t energy use** and **~25 kg CO₂-eq/t**, clearly outperforming mining
- **100% renewable energy** powering the entire plant

Highest Safety Standards

100% Renewable Energy

Record low CO₂ footprint

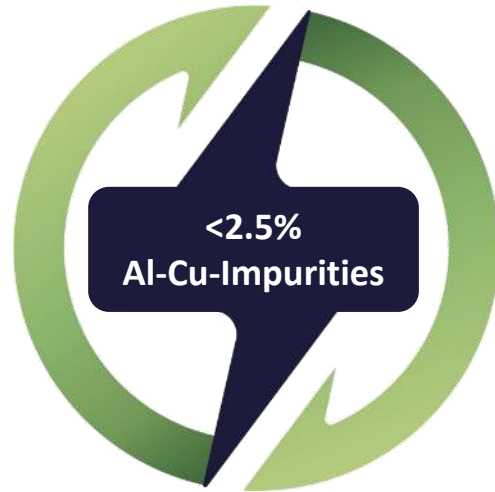
Strong Power Efficient



LCA assessment of LIBREC black-mass production, EMPA, February 2024

librec.ch/de/downloads/

LIBREC - Key Strengths



LIBREC - Contacts



Beat Seiler
CSMO

beat.seiler@librec.ch
+41 79 206 16 07



Dominik Lembke
CBDO

dominik.lembke@librec.ch
+41 79 860 75 48