

EUROPEAN COMMISSION

HORIZON 2020 PROGRAMME - TOPIC H2020-LC-BAT-2020
Sodium-Ion and sodium Metal BAtteries for efficient and sustainable
next-generation energy storage

GRANT AGREEMENT No. 963542



SIMBA – Deliverable Report

<< D6.5 – Techno-economics and Life Cycle Analysis
including environmental impact of full-size industrial
capacity unit >>

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| Deliverable No. | SIMBA D6.5 | |
| Related WP | 6 | |
| Deliverable Title | Techno-economics and Life Cycle Analysis including environmental impact of full-size industrial capacity unit | |
| Deliverable Date | 2024-06-30 | |
| Deliverable Type | REPORT | |
| Dissemination level | Confidential – member only (CO) | |
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| Status | Draft Final | 2024-06-26 |



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 963542.

Publishable summary

This deliverable, part of Task 6.3 in WP6, presents a comprehensive techno-economic and life cycle analysis (LCA) of SIMBA cell technology. The focus is on evaluating the environmental impacts and economic feasibility at full industrial scale for SIMBA baseline and solid-state cells.

The LCA covers material extraction and production phases, excluding use and end-of-life. Key findings reveal significant environmental impacts associated with electricity use in electrode and cell manufacturing, as well as with the electrolytes and their pre-chains. Recommendations include optimizing material usage and adopting carbon-neutral energy sources.

A detailed data inventory was compiled for recycling processes designed for SIMBA cells at industrial scale, facilitating future LCA assessments. The inventory ensures comprehensive data on energy requirements, material flows, and operational parameters.

Economic assessments were conducted for mechanical sorting and hydrometallurgical treatment processes. Total investments were €12.75 million for mechanical treatment and €27.13 million for hydrometallurgy, with operational costs calculated at €541 and €2,119 per ton, respectively. The gate fee for battery recycling was estimated at €3,771 per ton, with processing fees amounting to 20% of initial battery prices for EV packs.

Overall, the findings highlight the potential for cost reductions through process optimization and scaling, emphasizing the need for improvements in building costs, manpower efficiency, tax considerations, material valorisation, chemical reuse, and renewable energy integration. These optimizations are crucial for enhancing the economic and environmental sustainability of SIMBA cell recycling processes.

Appendix C - Acknowledgement

The author(s) would like to thank the partners in the project for their valuable comments on previous drafts and for performing the review.

Project partners:

| # | Partner | Partner Full Name |
|----|---------|--|
| 1 | TUDa | TECHNISCHE UNIVERSITÄT DARMSTADT |
| 2 | UU | UPPSALA UNIVERSITET |
| 3 | UBham | THE UNIVERSITY OF BIRMINGHAM |
| 4 | WMG | THE UNIVERSITY OF WARWICK |
| 5 | KIT | KARLSRUHER INSTITUT FÜR TECHNOLOGIE |
| 6 | CEA | COMMISSARIAT À L'ÉNERGIE ATOMIQUE ET AUX ÉNERGIES ALTERNATIVES |
| 7 | IFE | INSTITUTT FOR ENERGITEKNIKK |
| 8 | SAS | USTAV ANORGANICKEJ CHEMIE SLOVENSKA AKADEMIA VIED (Institute of Inorganic Chemistry, Slovak Academy of Sciences) |
| 9 | FHG | FRAUNHOFER GESELLSCHAFT ZUR FÖRDERUNG DER ANGEWANDTEN FORSCHUNG E.V. |
| 10 | JM | JOHNSON MATTHEY PLC |
| 11 | Elkem | ELKEM AS |
| 12 | YUN | YUNASKO-UKRAINE LLC |
| 13 | SAFT | SAFT |
| 14 | Altris | ALTRIS AB |
| 15 | Recupyl | TES RECUPYL SAS |
| 16 | UNR | UNIRESEARCH BV |

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 963542. The information and views set out in this publication does not necessarily reflect the official opinion of the European Commission. Neither the European Union institutions and bodies nor any person acting on their behalf, may be held responsible for the use which may be made of the information contained therein.