UPSCALING LIB PRODUCTION

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SUMMARY

This study assesses environmental life cycle implications of upscaling lithium-ion battery (LIB) production and found that upscaling results in shift-of-burdens to the material extraction and production phase. This is due to the energy and material efficiency of production, typically seen in large-scale production facilities.

INTRODUCTION

The LIB production has increased due to capacity upscaling in existing plants and new giga-scale plants becoming operational. However, environmental implications of this LIB production upscaling are not well understood. Additionally, there is lack of research on how background data in life cycle assessment (LCA) studies affects results.

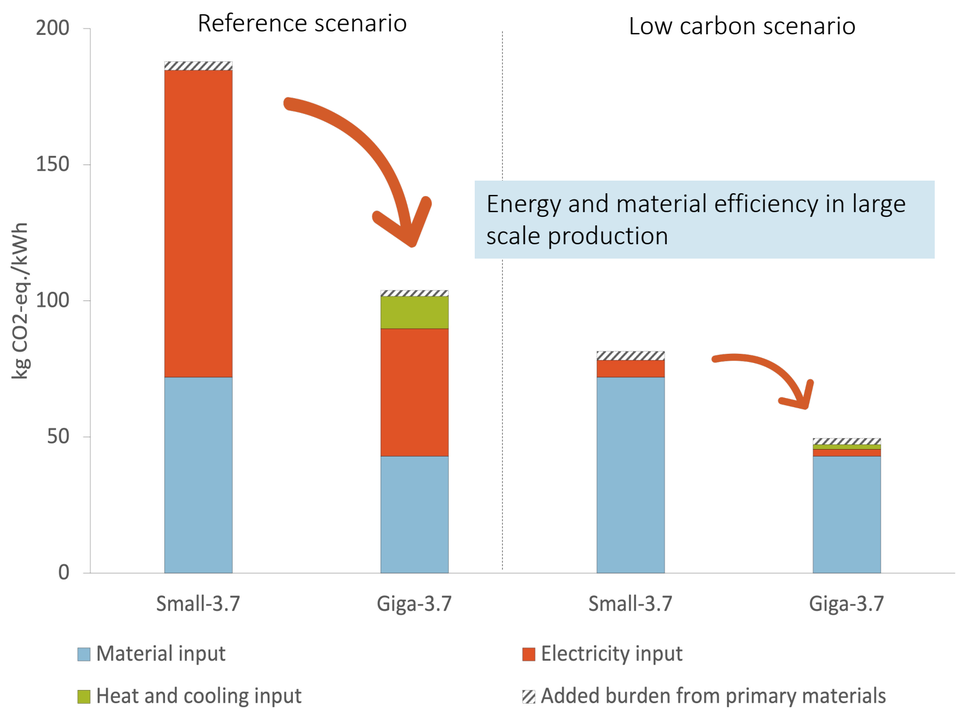
METHOD

- Cradle-to-gate life cycle assessment used to compare production in a small-scale (MWh/year) and large-scale (GWh/year) LIB production facilities.
- Small-scale factory modeled using different versions of Ecoinvent databases to analyze the effect of changing data availability and quality on overall results.
- Two different indicators (ReCiPe and Crustal Scarcity Indicator) used to analyze the resource use impacts.

RESULTS

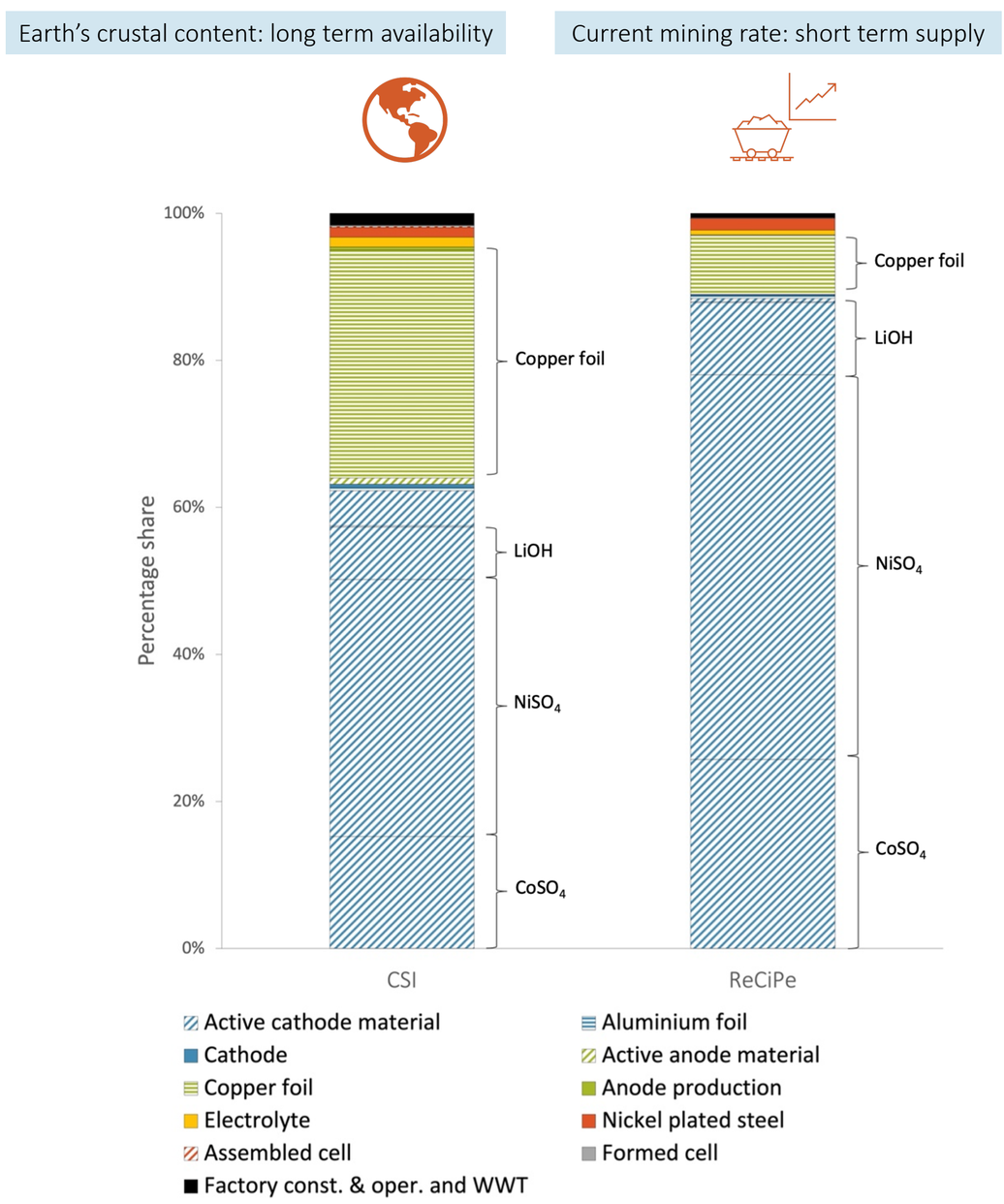
1. The climate change impacts of the large-scale facility reduce by 45% and 22% in the reference and the low-carbon intensity scenarios respectively, compared to the small-scale facility.
2. Changes in background databases are technological and data quality indicators and can affects the overall results of the study.
3. From a long-term resource scarcity perspective, copper has the highest impacts followed by nickel and cobalt.

1 CLIMATE CHANGE IMPACTS: SMALL AND LARGE-SCALE PRODUCTION



2 CHANGING BACKGROUND DATABASE

3 RESOURCE USE IMPACTS: LARGE-SCALE PRODUCTION



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