



CHALMERS

MISTRA
CARBON
EXIT ▶▶



GLOBALA MÅLEN
för hållbar utveckling

Sustainable Battery Materials for Swedish Electric Cars

A passenger car system completely powered by renewable energy seems to be within reach. Improved performance and rapidly decreasing costs in areas like renewable energy technologies, electricity storage and electromobility is promoting this development. Increasingly stringent policies aimed at phasing out internal combustion engines (ICEs) and fossil fuels from the transport sector are being discussed at both Swedish and European levels, which can result in fast electrification of passenger cars and, also high demands for batteries.

Material and value flows associated with extracting and transforming raw materials such as lithium and cobalt, to take a few examples, into a battery electric car are complex. This project builds on currently ongoing research into the material demand for battery manufacturing and potentials for battery recycling. In this project, the student(s) will explore the sustainability impact of batteries in the context of the UN 2030 Agenda Sustainable Development Goals (SDGs), depending on from where those materials are sourced.

The project will provide valuable input to the Mistra Carbon Exit research program (www.mistracarbonexit.com). Mistra Carbon Exit has the aim to analyze and demonstrate how supply chains of buildings, infrastructure and transportation can be transformed to comply with the Swedish target of net-zero GHG emissions by the year 2045, at the latest. Program partners includes Polestar, Volvo Cars and Volvo CE who all have an interest in the development of sustainable practices for battery material production.

Aim and method

The Master thesis project is aimed at exploring *the sustainability implications of switching from globally sourced battery minerals to locally sourced in Sweden*. Analyzing current sustainability implications of globally sourced strategic minerals for battery production and comparing the results to prospective sustainability implications of sourcing the same minerals from Sweden. Sourcing and extraction of battery minerals are one of the main sustainability issues of battery electric vehicles. Given the plausible transition towards an electrification of the transport system, alternative sourcing options need to be explored. Implications will be analyzed according to the SDGs and expressed as impacts on the SDGs qualitatively and/or quantitatively.

Persons involved in the project

Supervisor: Johannes Morfeldt (johannes.morfeldt@chalmers.se), Physical Resource Theory, Chalmers

Co-supervisor: Anders Ahlbäck at Gothenburg Centre for Sustainable Development (GMV)

Examiner: Daniel Johansson, Physical Resource Theory, Chalmers

Apply to this proposal by submit a CV and a short description on how you aim to tackle the problem. Basic understanding of Swedish in order to interpret government documents is preferred, but not required.

Background reading

UNECE (2021). Policy Brief: Transforming Extractive Industries for Sustainable Development. <https://unece.org/info/Sustainable-Energy/UNFC-and-Sustainable-Resource-Management/pub/356790>

Morfeldt, J., Davidsson Kurland, S., & Johansson, D. J. A. (2021). Carbon footprint impacts of banning cars with internal combustion engines. Transportation Research Part D: Transport and Environment, 95, 102807. <https://doi.org/10.1016/J.TRD.2021.102807>

European Commission (2022). Critical Raw Materials Act: securing the new gas & oil at the heart of our economy. https://ec.europa.eu/commission/presscorner/detail/en/STATEMENT_22_5523