

Battery swapping for electric trucks

Overview and previous work

The electrification of road transport is essential for achieving climate goals, but successful implementation depends not only on vehicle and charging technologies, but also economic perspectives, policy instruments and behavioural aspects (IEA, 2025). Research on charging infrastructure and charging patterns increases, especially for depot charging, logistic hub charging and en-route charging, but less research exists on battery swapping.

Our previous pre-study funded by the Swedish Electromobility Center (SEC) investigated how electric truck driver behavior can be better aligned with charging patterns and charging business models to support freight electrification, including battery swapping. This proposed Master thesis project should build on the previous study and analyse the opportunities and barriers for battery swapping for electric trucks in Europe and in China. While battery swapping is very uncommon in Europe, including in Sweden, it is frequently used in China.

Project aim for Master thesis study

The project aims to analyze the opportunities and barriers for battery swapping for electric trucks in Europe and China, thereby supporting an increased understanding of an efficient and affordable electrification of heavy-duty road transport.

Research questions

- What is the share of battery swapping for electric trucks in Europe (including Sweden) and other world region (especially China)?
- Why does China have higher shares of battery swapping for electric trucks than Europe?
- What operational arrangements support battery swapping for electric trucks (e.g. routes, distances, driver arrangements)?
- What are the cost perspectives and prevailing business models for battery swapping for electric trucks?
- What policy instruments are favourable for battery swapping for electric trucks?
- How and under which conditions can battery swapping for electric trucks be viable for Europe and what limitations exist?

Methods

The planned methods could include both qualitative and quantitative methods, potentially including:

- Literature review
- Business model analysis
- Cost-benefit analysis
- Interviews and focus group discussions

Expected outcomes

This research operates at the integration of the transport and energy sectors, as well as at the interface of technical, business and behavioral aspects for transport electrification.

This study will contribute to new knowledge on how battery swapping could become an option for charging electric trucks in Europe and to increase the understanding of the opportunities and barriers for this charging option.

Industry collaboration

The project can build on the previous pre-study which included interaction with industry experts, including EV manufacturers, truck driver representatives, logistics companies, energy sector, charging infrastructure and transport researchers.

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