

# Cost and financing of the sustainability transition of the Swedish road freight transport sector

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1. Parviziomran, E. (Submitted)  
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Estimating the sustainability transition cost for the Swedish heavy-duty road fleet: A circular economy perspective  
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4. Parviziomran, E., & Elliot, V. (Under Review)  
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5. Parviziomran, E., Elliot, V., & Bergqvist, R. (Submitted)  
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## **Cost and financing of the sustainability transition of the Swedish road freight transport sector**

The cost and financing of the road freight sector's sustainability transition, driven by significant greenhouse gas (GHG) emissions and cost considerations, represent an urgent yet underexplored research focus. This study investigates the costs of fleet replacement with zero-emission powertrains, battery electric vehicles (BEVs) and fuel cell vehicles (FCVs), emphasizing cost variables that have been overlooked in transition research. It explores the financing dynamics of the transition for this sector at both the strategic and tactical levels, and it investigates circular economy (CE) transition barriers specific to BEV batteries. Six studies are developed, involving multiple sources of data and methodological approaches: systematic literature review, numerical modeling and scenario testing, data-driven agent-based simulation, network analysis, and interviews.

The findings reveal that charging strategies have a substantial impact on BEV costs, especially in scenarios with higher adoption rates. This is attributed to electricity price fluctuations based on charging location, timing, power, and source. High hydrogen prices in scenarios with a high number of FCVs lead to increased fuel costs. Interestingly, the impact on loading capacity for larger powertrains in both BEVs and FCVs is relatively minor compared to other costs. The capacity of batteries depends on charging ranges and temperatures, but their impact would not significantly affect cost savings through increased BEV salvage values where a CE initiative is in place. A set of regulatory, market, structural, technological, actor-related, and task-related barriers and their complex interactions are identified that hinder BEV transition from a linear to a circular system. The availability of financing is crucial for facilitating the transition and is highly contingent on the financial strength and creditworthiness of companies, particularly given the prevalence in the sector of micro and SMEs, which often encounter challenges in accessing financing.

**Keywords:** Sustainability transition, Decarbonization, Heavy-duty vehicles, Cost, Financing, Battery, Circular economy

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