

Understanding Battery-Electric Truck Investment Decisions in Forestry Freight: A Systems Perspective from Sweden

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Battery-electric trucks (BETs) are proving to be a promising solution for reducing emissions in heavy-duty freight transportation [1][2]. Still, their adoption has not gained much demand from the market, especially among haulers with tight profit margins and operational uncertainty [3][4][5]. Using a system thinking approach, this study focused on Sweden's forestry sector to understand what shapes haulers' investment decisions towards BETs [6].

Previous research has examined areas such as cost modeling [7], energy performance [8], and policy design [5]. However, the dynamic relationships between decision-making parameters — especially from the freight hauler's perspective — have received little attention. This study addresses that gap by identifying and prioritizing the key parameters influencing BET investment decisions in forestry. Insights from freight haulers and practitioners helped to explore the causal relationships between these parameters. These helped us build a visual model (causal loop diagram) that connects the dots between key factors: truck prices, payload limitations, range, charging setups, and income models.

Two key trade-offs stood out. First, haulers are still weighing the practical and financial pros and cons of BETs versus diesel trucks. Second, they are trying to decide between depot charging (which is cheaper in terms of charging cost but needs bigger, pricier batteries) and public charging (still complicated to access and expensive to utilize). Limited public charging makes it challenging to plan longer routes and adds to the risk of investment in BETs.

We found that haulers need more than just better trucks than their existing diesel ones—they need support from a policy and business perspective. That includes fair, long-term contracts, reasonable public charging costs, determining the utilization rate of public charging infrastructure for their operations, and business models designed with their specific sector (like forestry) in mind.

This research gives a clearer picture of what is driving (or slowing down) BET adoption from a freight hauler's perspective. It aligns with the SRF Workshop's goals by offering a hands-on framework to help move electric freight forward—practically and sustainably.

References

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Presenters Biography

Vivek Venkatesh Shenoy is an industrial PhD student (From Scania CV AB, Sweden) affiliated with the Integrated Transport Research Lab at KTH Royal Institute of Technology. His research focuses on understanding the transition toward sustainable zero-emission heavy-duty truck alternatives by simulating and optimizing vehicle fleets. He holds a master's degree in the field of vehicle engineering.

