Road freight models to accelerate green transition in Europe

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ABSTRACT

Overview and Motivation

Road freight transport has a vital role for Finnish business and transport system now and in the future. In domestic transport in Finland, around 85% of tonnes transported is transported by road (Traficom, 2023). Finland's goal is to be a carbon-neutral by 2035, and to achieve this, the aim is to halve transport emissions by 2030 and eliminating them completely by 2045 (LVM, 2021). About a third of road traffic emissions are caused by trucks, and truck emissions are estimated to decrease by only 25% by 2030 and 31% by 2045 (Data.Traficom, 2022). Therefore, new measures to reduce truck emissions are urgently needed.

However, decarbonizing road freight transport is difficult due to its reliance on fossil fuel internal combustion engine vehicles (ICEVs). Several actions and methods have been introduced to reduce transport emissions and to achieve ambitious carbon-neutral goal. Technological vehicle development and implementing electric freight vehicles in transport operations are some of the main actions. Moreover, one important way to reduce freight transport emissions is by efficient use of data and digitalization of logistics. Therefore, by linking and analysing different characteristics and statistical data, like the general freight transport volumes, types of transport vehicles, time management and energy generation and use, a road freight model can be generated as a policy support tool to assess development towards the zero-emission goals. In the best-case scenario, a national road freight transport model would illustrate the current situational picture, supports decision-making, and enables actions to achieve more efficient and environmental-friendly road freight transport. To get the best possible result, the electric freight vehicles should be added to this kind of freight transport model.

The purpose of this study is to understand how to integrate electric freight vehicles in the future national road freight model of Finland. The aim is to identify and describe the existing road freight transport models and road freight traffic flows in different European countries. The study answers the following research questions: 1) What are the current road freight transport models? 2) How are the road freight transport models developed and for what purposes are they used? 3) How can electrified road freight transport be modelled to strengthen the green transition by adoption of electric freight vehicles?

Methodology, Results and Main Contributions

The paper is based on literature review, where we examined existing situation of road freight transport models and the operation of freight vehicles in terms of the flow of freight traffic and goods in different European countries. This information would help to estimate, for example, the time available for charging- or refuelling hydrogen in electric trucks, and to decide on the optimal location of the charging or refuelling infrastructure in logistics centres and on the road network. With our study, we found out how the above factors vary in different European countries and in Finland. We also found out how the road freight transport are modelled in different countries, what data has been used, for what purposes these models are used, and how the models can consider or have considered green vehicles. Illustrating current situation, traffic flows on the roads, amount of different freight vehicle types, freight demand and predicting the future are examples of road freight transport models.

In our future research, based on this literature review study, we aim to create a national road freight transport model in Finland to facilitate green transition. The model would help both public authorities and companies, for example, to determine charging points and hydrogen refuelling stations for electric freight vehicles (BEVs and FCEVs). The model would also be a tool to support decision making to achieve emission reduction targets and to efficiently implement green vehicles on the road.

Original/value

This paper gives valuable new information and decision support for public authorities and companies when considering investments in charging stations and hydrogen refuelling stations for electric freight vehicles (BEVs and FCEVs). In order to reach the sustainability targets and decreasing emissions, it is important to provide the necessary infrastructure to support the transition to electric freight vehicles for road haulage companies.

The paper is part of the research project SIX HOVE (Sustainable industry X – Heavy on-road vehicles ecosystem), which is being conducted in Finland (2023-2025). The aim of the SIX HOVE - research project is to produce a roadmap for the promotion of electrification of trucks in Finland.

Key Words

Road freight transport; electric freight vehicles; green transition; freight demand; freight transport model

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