The impact of the electrified long-haul truck shares on the required charging infrastructure.

Background

Heavy-duty or long-haul trucks (LHT) account for less than 2-5% of the vehicles on the road in Europe but contribute to 15-22% of CO_2 emissions from road transport in 2019, and their emissions are growing fast (+9% between 2014 and 2019). To reduce GHG emissions, long-haul battery-powered electric trucks (LBET) could soon be deployed on a large scale. LBETs have numerous advantages, including zero tailpipe emissions, fuel cost savings, and lower maintenance costs. The deployment of LBET to replace the current LHT depends on the development of a convenient public network of charging stations that can provide sufficient driving coverage and suit the charging requirements of these vehicles along their travel routes. Plans to deploy required infrastructure vary between EU states and even regions within countries. One of the factors that impact the required charging infrastructure is the share of LBET in the regions. As the share of electrification identifies the number of electrified trucks within a geographical area, it also impacts the planned charging points (types and number) installed at travelled routes. The share of electrification is impacted by the industry, economical motives/limitations, and the region's electrification targets or maybe limited by existed/planned infrastructure.

Project description

In this project, students will have the chance to investigate the probable share of electrification for Sweden and/or other EU state members. They will be able to explore the factors that impact the electrification share. The students also will explore the impact of electrified shared of LBET on the required charging infrastructure in terms of the location of required charging stations, the characteristics and number of charging points, and the daily energy requirements. The students will have access to our dataset of results that model LBET charging requirements in the year 2030 for the European continent (https://zenodo.org/record/7225261#.Y2N5O3bMKUn).

Method

The students will research the literature for relevant factors that influence the share of electrification for the heavy-duty vehicle in the studied region/country. The students will develop a model to predict the share of electrification at the required level of detail for the predicted year. The students will insert these shares to our trip chain model (https://zenodo.org/record/7225261#.Y2N5O3bMKUn) to explore their impact on the required electrification infrastructure. The students will discuss these results and report their findings.

Target group

Students with backgrounds in civil engineering (TKSAM), software engineering (TKITE), computer science (TKDAT), and global systems (TKGBS) are considered for this project. This project is appropriate for 1 group of 4-6 students. Since supervision will happen in English, a high level of English skills is also required.

Supervisors and contacts

Wasim Shoman. Wasim.shoman@chalmers.se, Fysisk Resursteori, SEE

Examiner

Sonia Yeh, Sonia.yeh@chalmers.se, Fysisk Resursteori, SEE