Stara

Helsinki

Finnish-Estonian Business Forum on smart and sustainable mobility and transportation

Green transition and CO2 tracking
Retrofitting present fleet

Sami Aherva
30.03.2023

Some drivers for green transition in Helsinki

Clean Vehicles Directive

https://transport.ec.europa.eu/transport-themes/clean-transport-urban-transport/clean-and-energy-efficient-vehicles/clean-vehicles-directive_en

https://lvm.fi/-/lisaa-vahapaastoisia-ajoneuvoja-suomen-teille-eu-direktiivi-toimeenpanoon-elokuussa-1438505?languageId=en_US

Green Deal – Zero emission construction site + logistics

https://bigbuyers.eu/working-groups/past/zero-emission-construction-sites

https://sitoumus2050.fi/en_US/paastotontyomaa#/

Carbon Neutral Helsinki 2030

https://helsinginilmastoteot.fi/en/city-act/helsinki-climate-objectives-monitoring/

https://helsinginilmastoteot.fi/wp-content/uploads/2019/06/HNH_Climate_Neutral_Action_Plan.pdf

Helsinki Stara

New things such as Drones and robots in Helsinki

Yes, We are testing maintenance and logistics robots and drones in Helsinki

We are building digital twins and utilizing machine learning and other new technologies

But are we paying enough attention to present fleet?

Helsinki **Stara**

New clean vehicles in reality

Waste collection, street cleaning and maintenance vehicles are used daily in urban areas, and most public authorities are looking at changing their city fleet towards clean solutions in the short term.

However, the market is not offering a wide array of Heavy Duty EV and prices remain high with a lower level of performance compared to diesel or biogas equivalents.

The charging infrastructure for these vehicles is also a crucial part of their development and implementation.

Can't we just buy new vehicles?

Average life cycle for a heavy truck is 15 years in Finland

Purhasing cost for new diesel engined heavy truck is 230.000€

Similar new e-truck cost is 730.000€

Similar hydrogen truck cost is 1,5M€

Heavy e-vehicle public charging is new challenge – it is different system

There are no public hydrogen filling stations in Finland

What are we talking about?

The City of Helsinki has 1400 vehicles today (cars, vans, trucks, multipurpose vehicles, loaders, tractors, graders, excavators etc.)

Additionally our subcontractors use another 1400 heavy vehicles

Helsinki **Stara**

Data could solve many challenges

The large gap in Total Cost of Ownership compared to diesel equivalents, combined with the operational limitations such as range constraints, running time, or payload losses, are the main factors hindering the transition to zero emission vehicles

Models and data are required to understand the possible differences in Total Cost of Ownership optimization, renting and subcontracting of services. They would support the development of new business models, which would bring buyers from owning vehicles to contracting services.

Big byers initiative https://bigbuyers.eu/working-groups/electric-heavy-duty-vehicles

Electric heavy-duty vehicles for waste collection, street cleaning and maintenance

Helsinki **Stara**

Data could solve many challenges

Making the right procurement decisions takes a lot of planning and data. The acquisition of a few different models allowed cities to understand and compare products and collect data based on the use of vehicles in real life. In particular, data is necessary to understand the total cost of ownership (TCO) and the differences between electric and hydrogen vehicles.

It is also crucial to use daily data to calculate the best balance between energy carried and the load and potentially adjust operational shifts accordingly.

Helsinki **Stara**

Retrofitting could be inexpensive possibility

The use of electromobility in waste collection, transport of heavy material and street cleaning promises a significant reduction in noise and pollutant emissions in line with many European entities' climate ambitions and air quality targets.

E-vehicles can also be used in low emissions zones, which are becoming increasingly common in many European cities.

Various market options are currently available for the electrification of passenger cars and light commercial vehicles. That's not the case for heavy duty vehicles. The market is still relatively small, lacking new models from existing manufacturers and options for retrofitting existing vehicles.

Helsinki **Stara**

eRetrofit project

Stara eRetrofit project explored the practicalities of electrifying Helsinki City Construction Services Stara's vehicle fleet and its consequences on operational level.

The project converted Stara's 7-year-old truck into an electric vehicle in order to find out total lifecycle costs of electrifying. Learnings will speed up transition into electric vehicles. Additionally, the project will contribute to establishment of IoT and data solutions expertise.

eRetrofit

Transforming a seven years old diesel heavy duty truck into e-truck

Not just a truck anymore:

Heavy duty chargers 600V

Electric attachments and tools

Real time data optimization + 5G/6G network

IoT data-analytics and optimization

Spare parts + predictive maintenance

Learning & procurement (incl. pre-commercial)

Maintenance vehicle in action

Helsinki Stara

eRetrofit project objectives

The project is evaluating impacts of electrification on the total lifecycle costs and Stara's routine operations. eRetrofit enables knowledge and experience attainment in electrifying current vehicle fleet instead of procuring new electric ones

In this project, power consumption of the truck is analysed for a typical operational time-slot to discover required battery capacity in the first place. The aim is that the electrified truck can perform seamlessly without excessive interruptions due to charging and therefore, drivers' downtimes stay at the minimum viable level.

eRetrofit project

The calculation results serve as the basis to create the technical plan for electrification, covering both the electrical and mechanical implementation thereof. The idea will be tested using Stara's truck which has already been in use for seven years.

After conversion, the performance of electric truck will be monitored via telemetry and IoT technology. Acquired test data will then be analysed to support integration and management of converted vehicles. Afterwards, learnings from project will be published and shared.

Data and planning operation

The EV operation planning needs to consider mileage, speed, topography, temperature, superstructure use and driving culture. More data sharing and analytics are necessary for real-time optimization, planning operation (i.e. schedule, routes) and maintenance.

Similarly, charging times must be taken into consideration when planning operations.

As such, the operationalization of EVs might need a complete rethinking of operational systems compared to using diesel or biogas equivalents. The development of city digital twins is seen as a way to calculate fleet, traffic, power, and dynamic conditions necessary for running vehicles.

Helsinki **Stara**

Thank you!