

# Electrification through retrofits - Heavy duty vehicles

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# Electric delivery trucks – first in Scandinavia

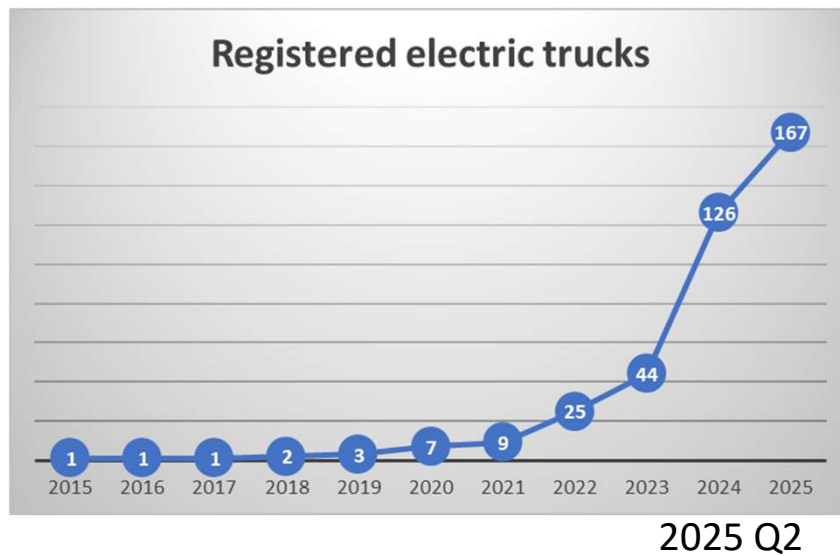
- Started to operate in 2015, second one in 2018
- Retrofit from diesel to electric was done in Holland
- Total weight 16t/18t, payload about 9t
- Max power 235 kW
- Max torque 3400 Nm
- Battery voltage 640VDC
- Battery capacity 160 kWh/200kWh (LFP)
- Charging power 44 kW (AC, Type2)
- Max range 250 km
- IoT equipped – real time bidirectional data transfer



History...

# Electric trucks in Finland

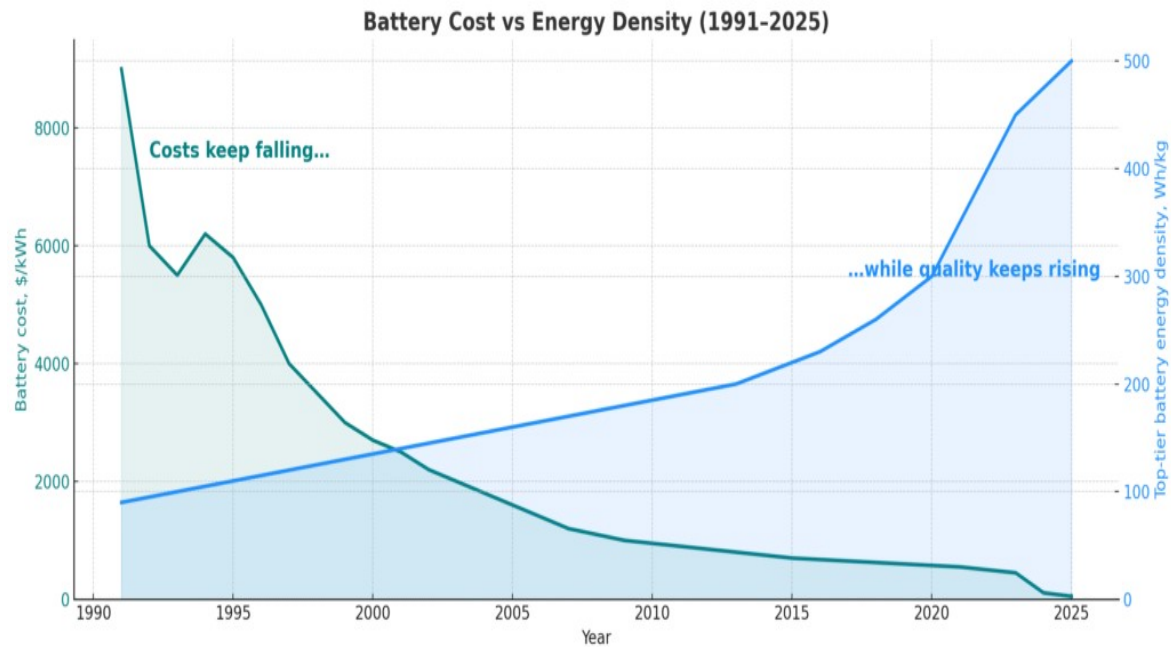
- Development



Source: Traficom statistics



# Battery prices vs energy density



# Development

- Etrucks Oy started to make prototypes of retrofitted electric trucks in 2020
- ECE sector is developing fast -> a separate RDI-operation is clearly needed!
- A specific RDI-center for heavy electric vehicles was started in 2022
- Co-operation with research and educational institutes
- First 55t electric truck tractor and 12t electric delivery truck were developed



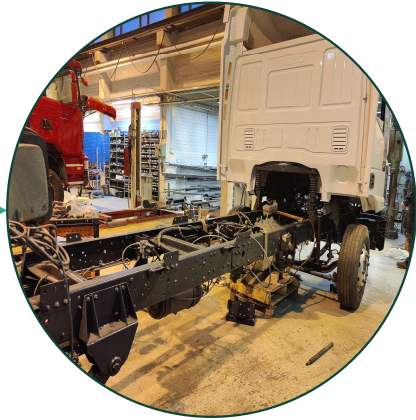
# Retrofit? Why?

- Diesel powertrain taken out, including engine, gearbox, fuel and exhaust systems
- Electric powertrain installed, including electric traction motor, power electronics, control system and battery system
- Chassis, cabin and brakes refurbished
- Flexible customization and update
- Recycling point of view
  - New life for the vehicle
  - Removed parts recycled or reused as spare parts
- Cost savings
  - Investment
  - Operational cost





Selection of the conversion object



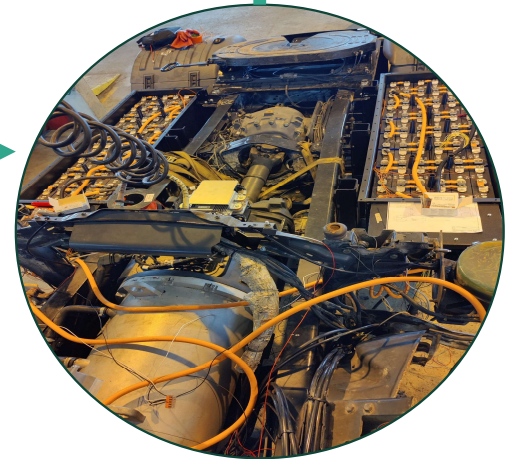
Dismantling of the old diesel powertrain



Refurbishment of the frame and chassis



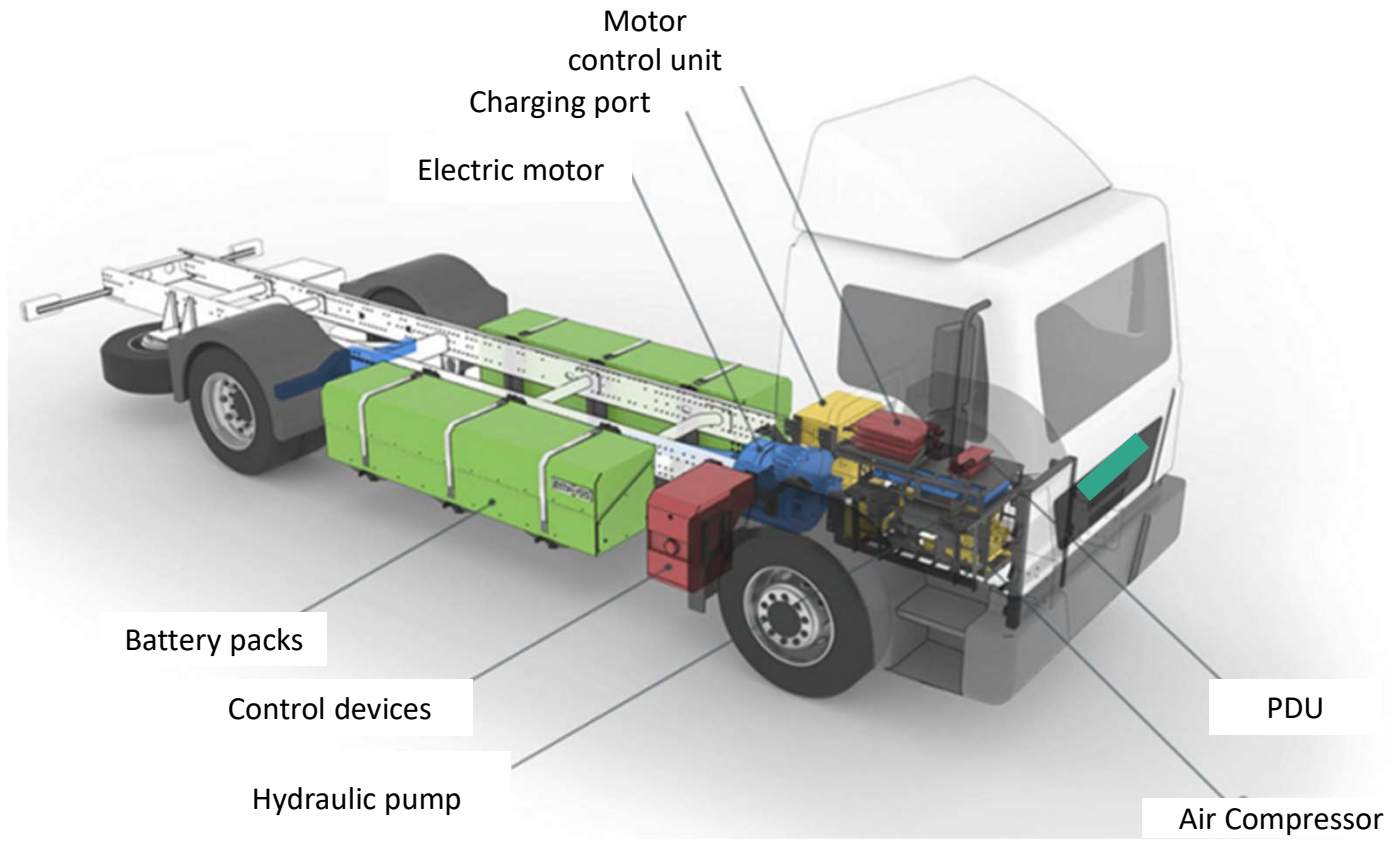
Installation of the electric powertrain and digital control system



Testing and inspection/registration



Retrofitted electric truck



## Main components



## The first electric conversion truck in Finnish Post's fleet

"I used to be diesel - now my deliveries are clean with electricity"



## Technical specification

- Retrofitted to one of the vehicle of Posti's fleet
- Battery capacity 150 kWh, voltage (nominal) 540 VDC
- Traction motor power 150 kW constant, 200 kW peak
- Electric air compressor (400 VAC)
- Electric power steering pump (400 VAC)
- Electric cabin heater (PTC) 8 kW
- No gearbox, no clutch
- CCS2 charging, max power 150 kW (DC)
- No AC charging
- Own software development in Finland – easy to update and customize
- Weight increase + 500kg



## The second electric conversion truck in Finnish Post's fleet

" I used to be diesel - now my deliveries are clean with electricity"



## Technical specification

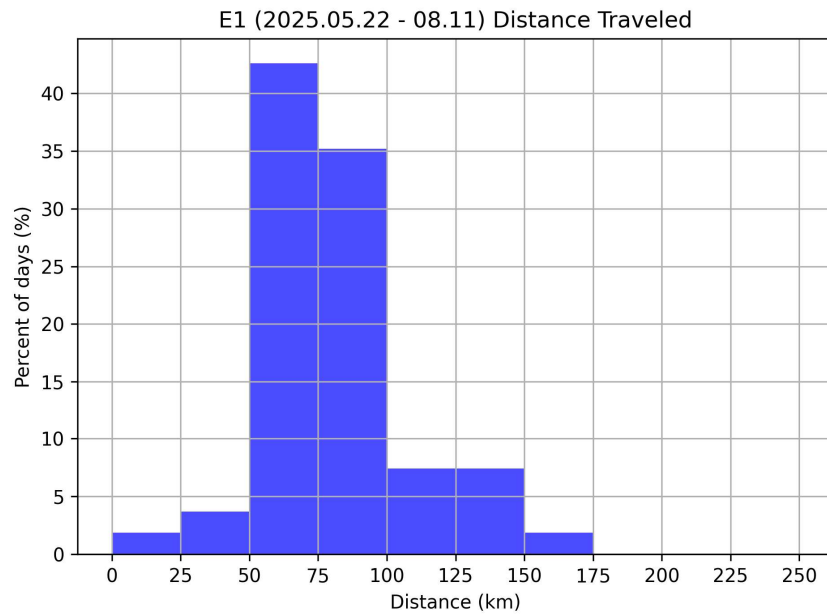
- Retrofitted to one of the vehicle of Posti's fleet
- Battery capacity 200 kWh, voltage (nominal) 600 VDC
- Traction motor power 150 kW constant, 200 kW peak
- Electric air compressor (400 VAC)
- Electric power steering pump (400 VAC)
- Electric cabin heater (PTC) 8 kW
- No gearbox, no clutch
- CCS2 charging, max power 170 kW (DC)
- No AC charging
- Own software development in Finland – easy to update and customize
- Weight increase + 600kg

# Experiences

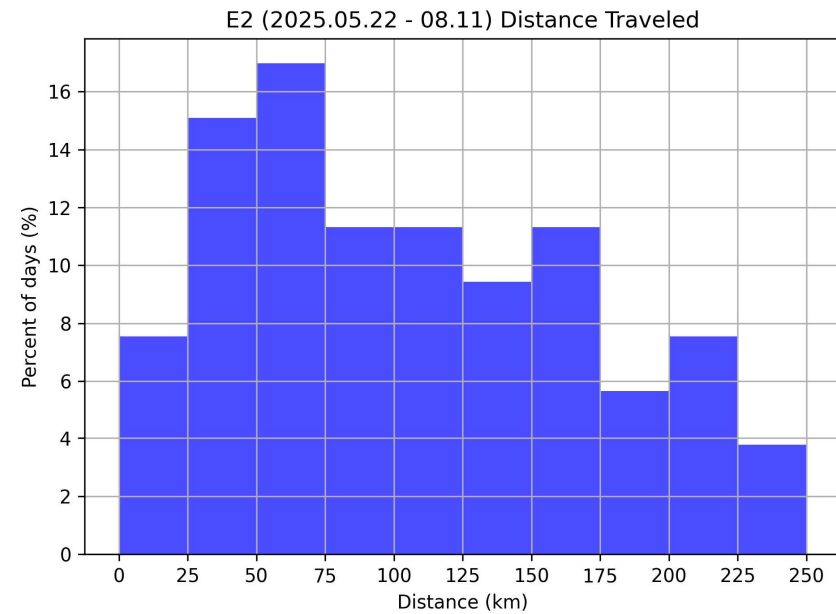
- The two retrofitted delivery trucks have been operating in Tampere area for almost two years
- Both trucks have been equipped with IoT devices and data acquisition facilities (SixHove project/VTI/Joel Anttila)
- Positive experiences and feedback
  - Low energy consumption
  - Truck's operating system has developed features
  - Smooth operation
  - Constant updates possible



## E-Trucks 1 24



## E-Trucks 2 25

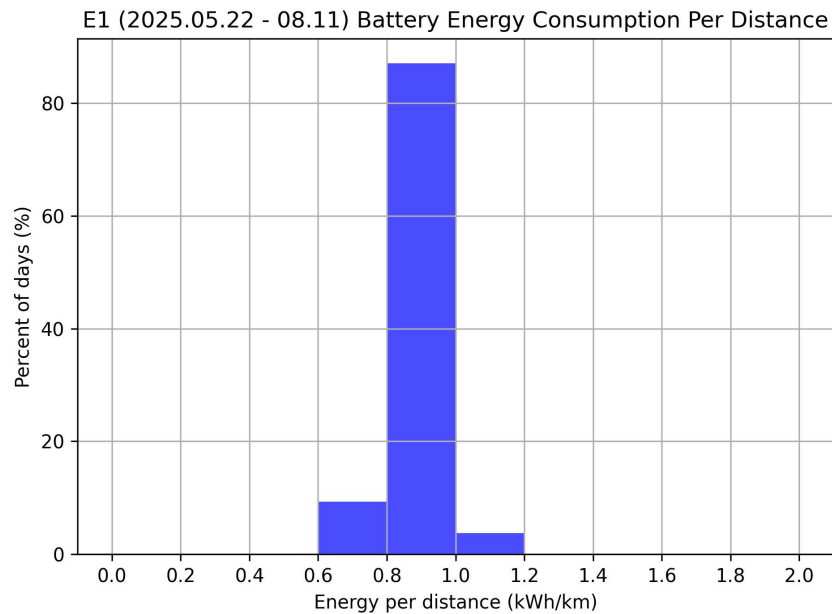


- E-Trucks 2 25:llä enemmän vaihtelua ajomatkoissa sekä pidempiä ajoja.

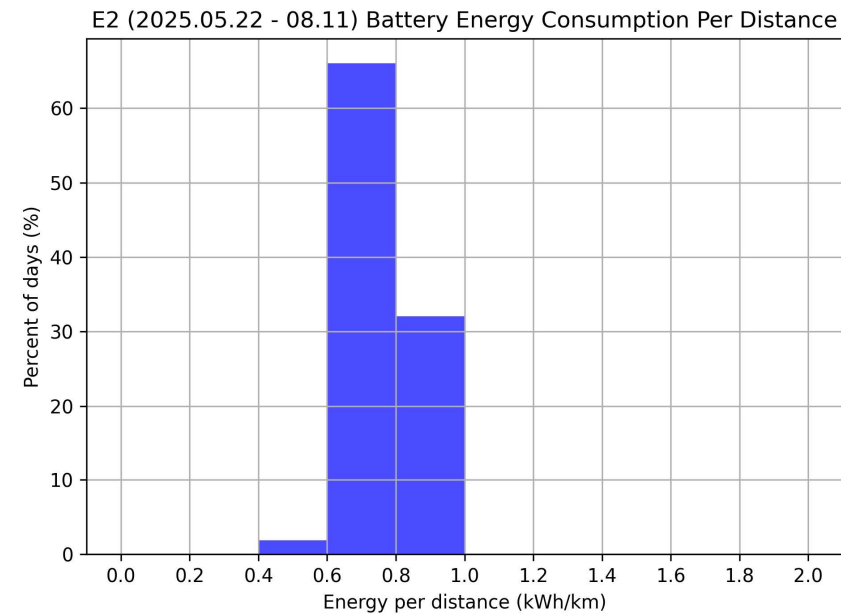
# Akkuenergian kulutus kilometriä kohden



## E-Trucks 1 24

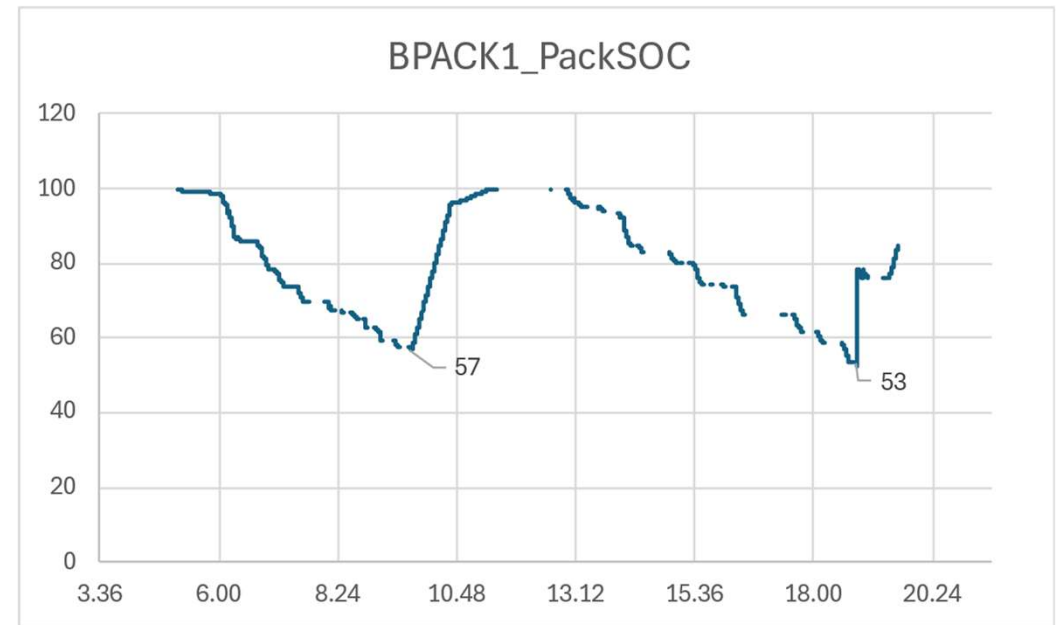
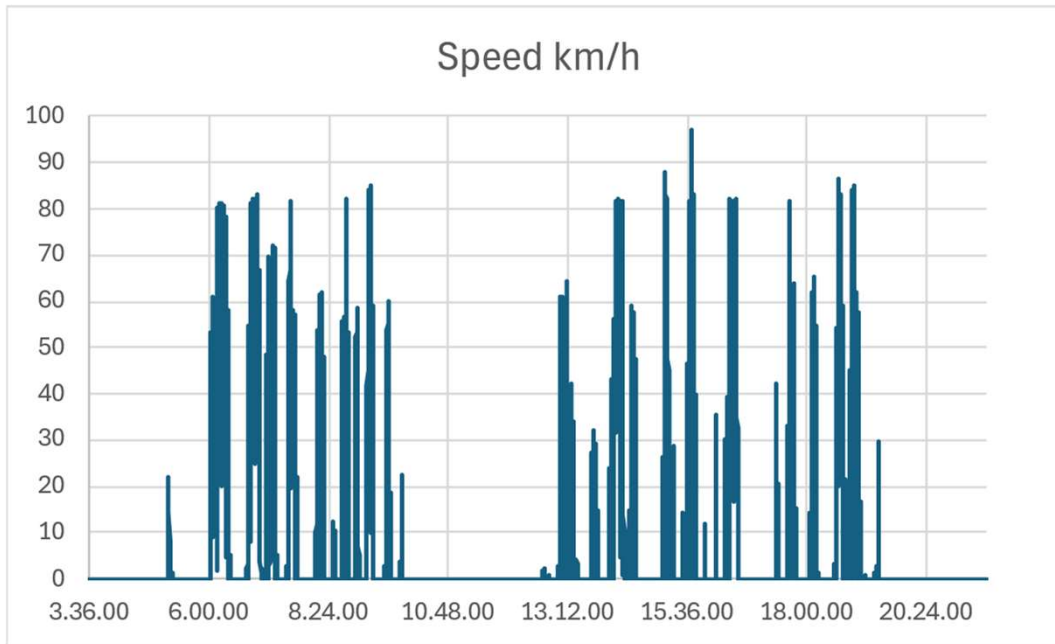


## E-Trucks 2 25



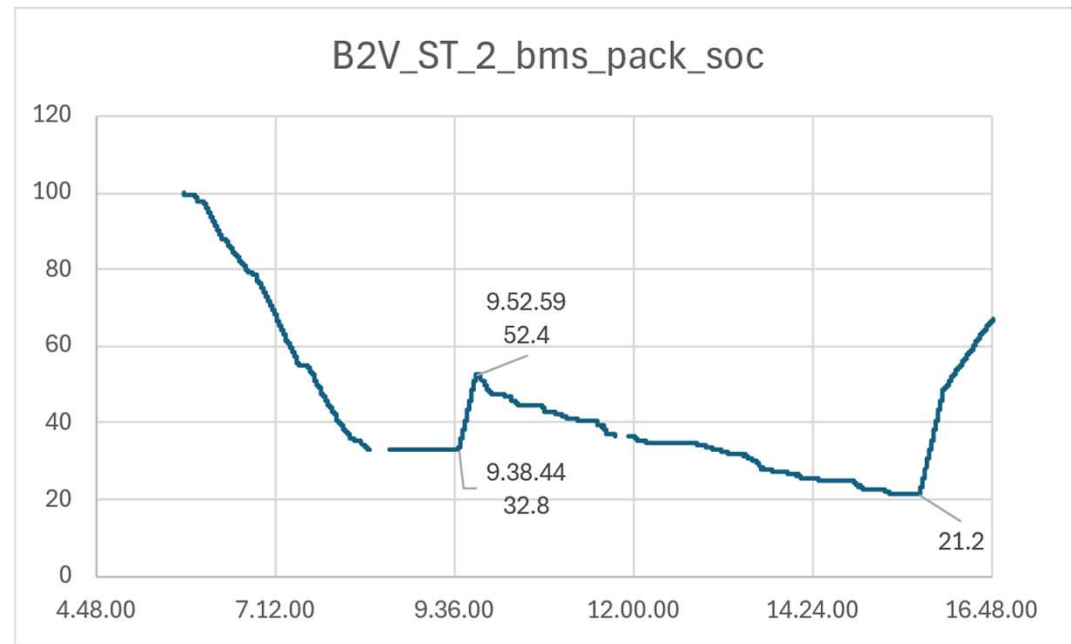
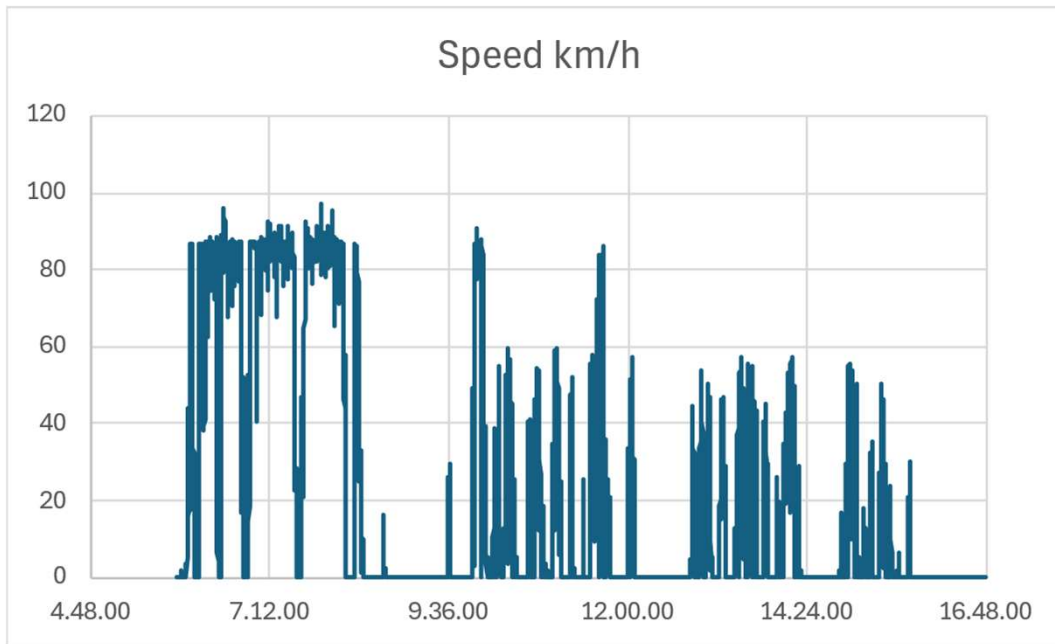
- Energiankulutus kilometriä kohden samalla vaihteluvälillä
- E-Trucks 2 25:llä enemmän hajontaa
- E-Trucks 2 25:llä hieman matalampi keskipulutus
  - E-Trucks 1: 0,89 kWh/km vs. E-Trucks 2: 0,76 kWh/km

# 4.6.2025 – E-Trucks 1 24



- Ajomatka 163 km (yksi E-Trucks 1 24:n pisimpiä)
- Ajoa pääosin 80 km/h nopeudella
- Välilataus päivällä. Akku ei olisi välttämättä riittänyt ilman latausta (liian vähän puskuria)
- Kesikulutus: 0,97 kWh/km

# 4.7.2025 – E-Trucks 2 25



- Ajomatka 232 km (yksi E-Trucks 2 25:n pisimpiä)
- Ajoa pääosin 60 km/h ja 80 km/h nopeudella
- Välilataus päivällä. Akku ei olisi riittänyt ilman latausta.
- Kesikulutus: 0,80 kWh/km



## 55t electric tractor

- 365 kW electric motor
- 6 speed gearbox developed to be used with electric motors
- 4WD
- About 190 kWh of battery capacity
- Operating in Äänekoski



## 76t electric tractor

- Two electric motors with about 700 kW
- 4 speed gearbox developed to be used with electric motors
- About 200 kWh of battery capacity
- First 76t retrofitted electric tractor officially registered in Finland
- Operating in Pietarsaari port moving almost 200t loads

# Next steps

- Serial production aiming to 100 trucks per year
- Increase of domestic content
  - Battery packs
  - Power electronics
  - Motors
  - Control units
  - Telematics
  - Displays
  - Charging
  - Etc...





# Thank you!

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