



Euroopan unionin rahoittama –
NextGenerationEU

VTT

Summary of SIX HOVE VTT

Mikko Pihlatie, VTT
Traficom event 30.9.2025

05/11/2025 VTT – beyond the obvious

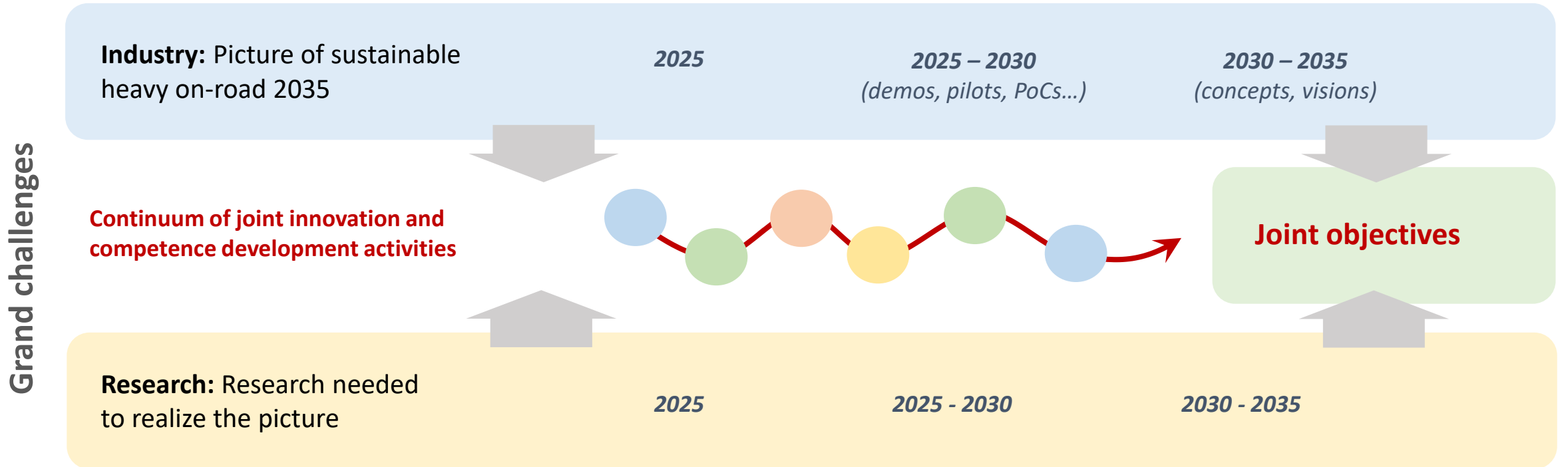


HEAVY
ON-ROAD
VEHICLES

JOINT ROADMAP FOR SUSTAINABLE HEAVY ON-ROAD 2035

30.10.2025 Traficom, Kumpula

The roadmap



BUSINESS
FINLAND

TIEKARTTA 2035

Kestävän raskaan tieliikenteen
tiekartta 2035

Harri Nieminen & Johannes Hyrynen & Mikko Pihlatie, VTT
Erika Kallionpää & Heikki Liimatainen, TAU

RAPORTTI 7/2025



https://www.businessfinland.fi/49cf54/globalassets/finnish-customers/news/news/2025/business_finland_tiekartta_2035.pdf

SIX : HEAVY
Sustainable : ON-ROAD
Industry X : VEHICLES

Roadmap themes

Human

Fleet

Infrastructure

System /
process

Value
network

Sustainable business: Contractual and finance aspects, novel business models



Zero emission system (including powertrains, vehicles, infrastructure)



Control systems for intelligence (clarified component, vehicle and system levels)



Customer / human in the loop



Data-intensive services, connectivity and intelligence



Autonomy /automation in logistics





Zero emission system

Vision 2035

Electrification is not just about achieving zero emissions - it enables new value.



Control systems for intelligence

Vision 2035

Fleet and operational control is based on data and knowledge obtained



Customer / human in the loop

Vision 2035

Sustainability brings
competitive advantage
over the entire value
network - people, profit,
planet



Data intensive services

Vision 2035

Changes in the logistics chain are strong and extensive enablers of new value.

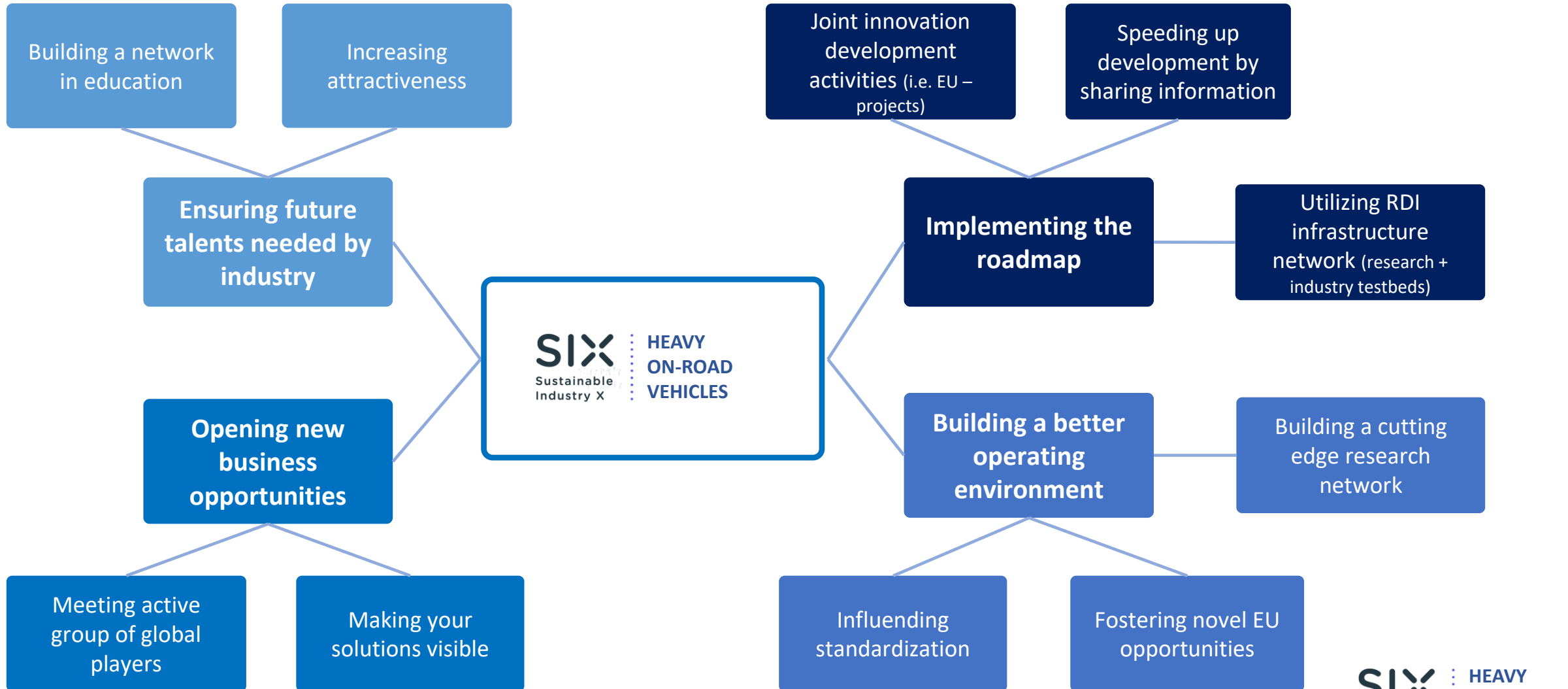


Autonomy and automation in logistics

Vision 2035

Autonomy of the logistics chain is highly advanced. Driver assistance solutions increase safety and quality of the performance, independent of the driver.

Benefits of cluster-based collaboration





SSAB



posti



kuljettava



**BUSINESS
TAMPERE**



TRAFICOM
Liikenne- ja viestintävirasto



**Euroopan unionin
rahoittama**
NextGenerationEU

SIX : HEAVY
Sustainable : ON-ROAD
Industry X : VEHICLES

Vuosiseminaari 23.9.2025

Esitykset <https://www.six.fi/heavy-on-road>

Welcome to the Annual Seminar on Zero-Emission Heavy-Duty Transport SIX HOVE

When: Tuesday 23.9.2025 at 9 - 16

Where: Innopoli 1, Tekniikantie 12, Espoo, room Leonardo

Please register by Tuesday, **18th of September** via the [registration page](#).

Provisional programme (subject to changes)

09:00-10:00 (Registration starts at 8:30)

Session 1:

1. Opening: zero-emission transport – value network, challenges and opportunities – Jarkko Vesa, TEM (10 min)
2. Introduction, programme of the day, Mikko Pihlatie (5 min)
3. Policy update: actions driving decarbonisation of heavy-duty transport – Saara Jääskeläinen & Sara Österberg, Finnish Ministry of Transport and Communications (15 min)
4. SIX HOVE roadmap and position – Harri Nieminen, VTT (20 min)
5. Way forward towards heavy duty transport electrification – Markku Kivistö, BF (10 min)

10:15 – 10:45

Coffee break & networking

10:45 – 12:00

Session 2a: SIX HOVE, industry and pilots

5. Rauanheimo experience with heavy-duty retrofits – Pasi Salmela, Rauanheimo & Jukka Pellinen, Keulink (15 min)
6. Posti strategy for zero-emission transports – Kari Mäkynen, Posti (15 min)
7. SSAB industrial transports – Minna van der Most, SSAB & Jussi Saukkonen, Kuljettava Oy (15 min)
8. Battery truck with FC extension for piloting in ESCALATE – Juho Laine, SISU (15 min)

12:00 – 13:30

Lunch at Oasis (60 min)

zero-emission trucks on display outside Innopoli (30 min)

13:30 – 14:15

Session 2b

9. Megawatt charging with MCS in ESCALATE & MACBETH projects – Ville Naumanen, Kempower & Marko Antila, VTT (15 min)
10. Plugit HDV charging network development – Joonas Töyräs, Plugit (15 min)
11. Challenges and opportunities in organising charging for transport electrification in ports – Jani Lindroos, Port of Helsinki (15 min)

14:15-14:45

Coffee break & networking

14:45-16:00

Session 3: Research results

12. Spatio-temporal charging demand analysis Finland – Antonio Fadel da Costa/Nino Chkhartishvili, VTT (15 min)
13. Trip chain analysis of electric truck charging demand – Mehdi Jahangir Samet, TAU (15 min)
14. Energy consumption analysis for HDV vs GVW and conditions – Mikaela Ranta, VTT (10 min)
15. WeTRaC: Scalable EV Charging Demand Forecasting for Heavy-Duty Fleets – Alex Aushev, VTT (10 min)
16. On system-level analysis and techno-economics of BET – VTT (10 min)
17. TAU & VTT MSc theses summaries:
 - Production cost of charging as a service – Niilo Kantoniemi, VTT (5 min)
 - Battery swapping technology – Sepideh Salehi Barzegar, TAU (5 min)
 - Truck use patterns and electric truck charging – Pekka Heininen, TAU (5 min)
18. Concluding remarks and way forward – Johannes Hyrynen, VTT

Moderators: Mikko Pihlatie, VTT & Heikki Liimatainen, VERNE



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Energy consumption of heavy-duty BEVs depending on GVW, payload and temperature

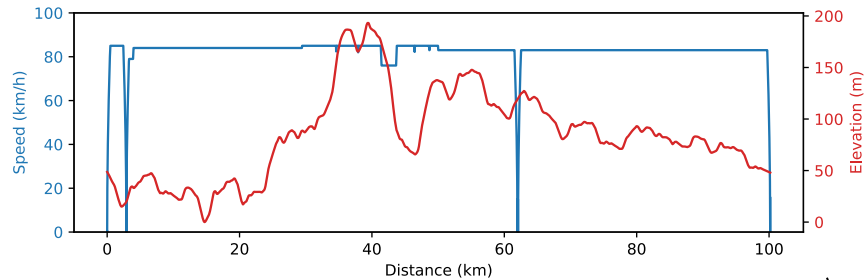
Mikaela Ranta

Research work to be submitted to eTransportation in autumn
2025

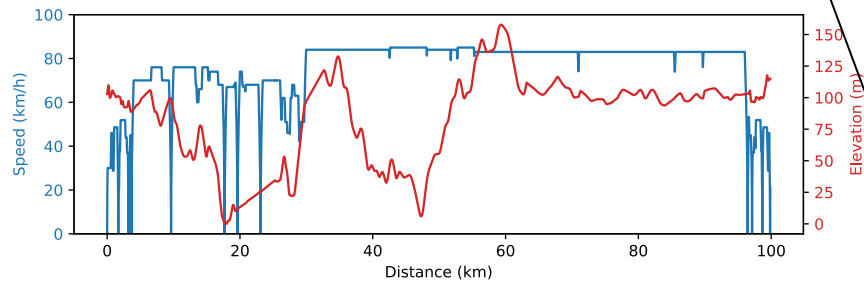
05/11/2025 VTT – beyond the obvious

Vecto long haul cycle

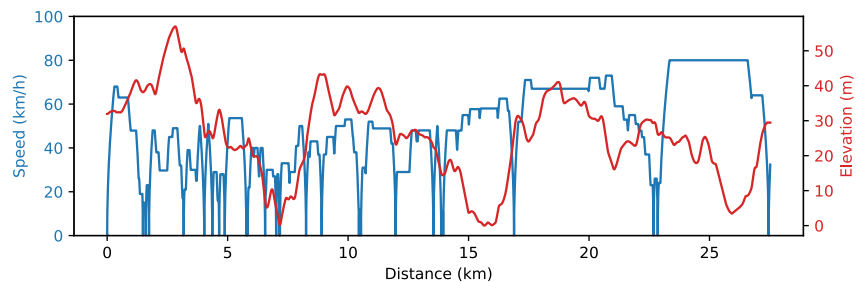
VECTO
Long haul



VECTO
regional delivery



VECTO
urban delivery



Truck category	GVW (tons)	Energy cons. (kWh/km)
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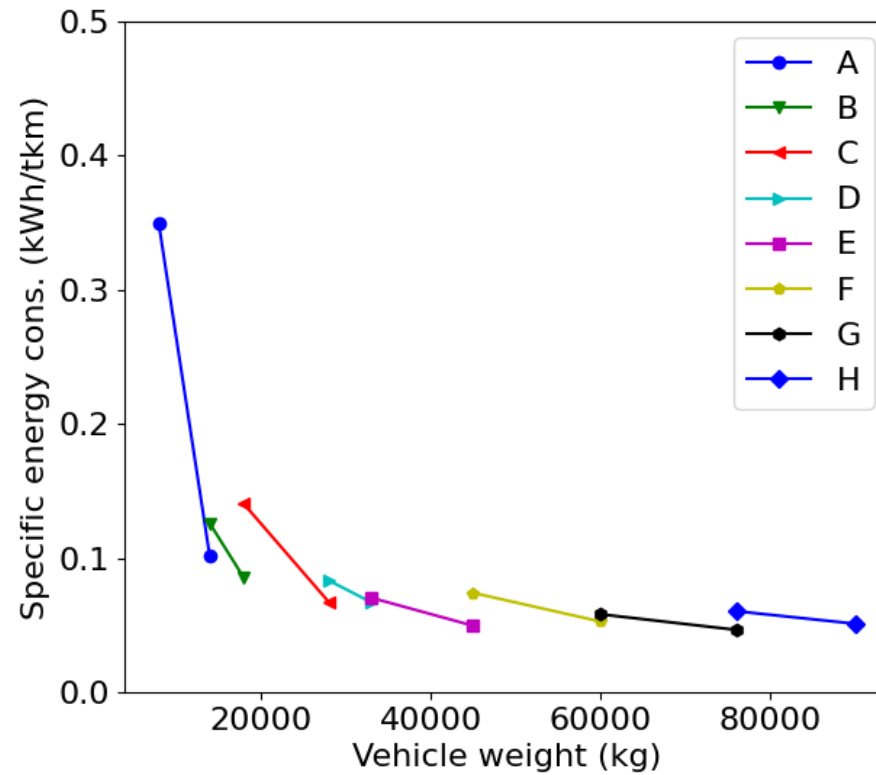
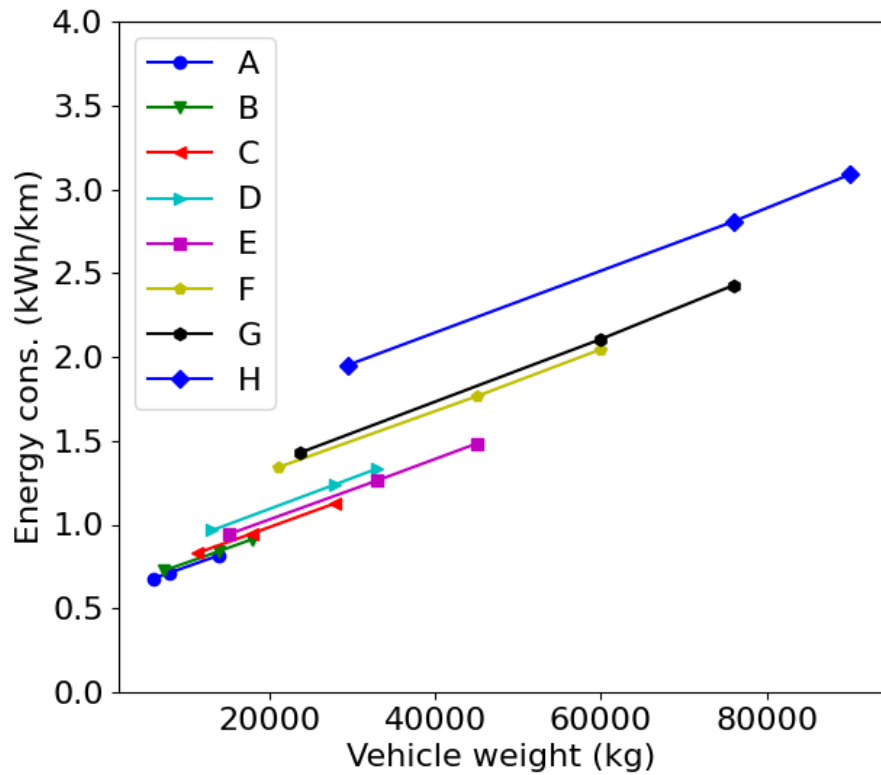
A	14	0.82
B	18	0.91
C	28	1.13
D	33	1.33
E	45	1.48
F	60	2.05
G	76	2.43
H	90	3.09

Long haul cycle – battery dimensioning

Truck category	Diesel empty weight (kg)	Battery capacity (kWh)	BEV empty weight (kg)	Payload capacity BEV vs. diesel (%)
A	6811	349	7326	92.8
B	8681	390	8900	97.6
C	10815	482	10970	99.1
D	12647	570	12970	98.4
E	15250	634	15927	97.7
F	20815	874	22402	95.9
G	22647	1038	24703	96.1
H	27248	1320	30366	95.0

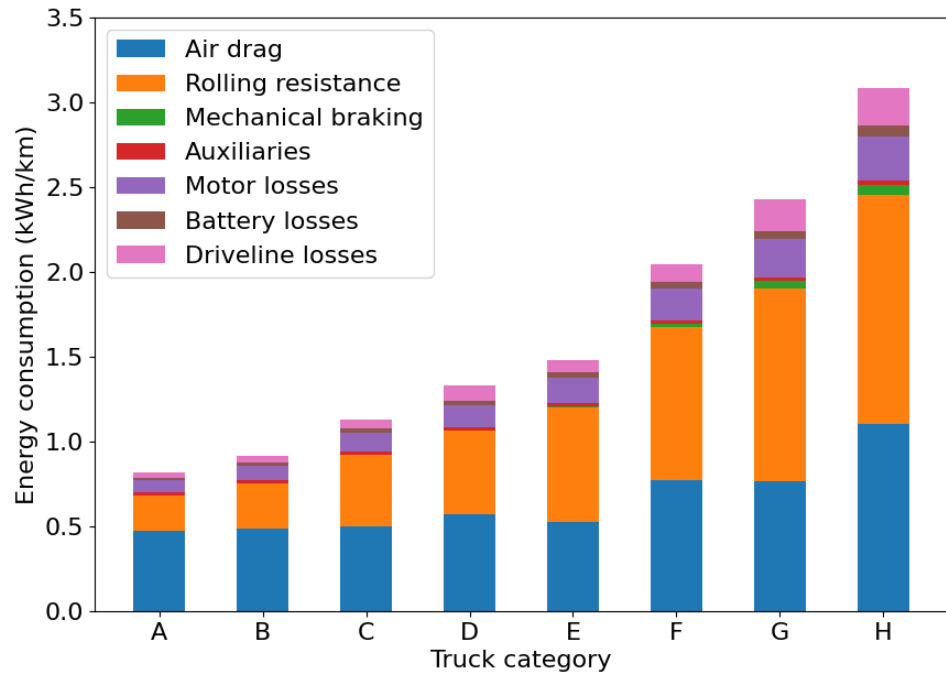
- Battery density: 5 kg/kWh
- Diesel powertrain: 8.03 kg/kW
- BEV powertrain: 1.07 kg/kW
- 4.5 hours operation

Long haul cycle - energy consumption

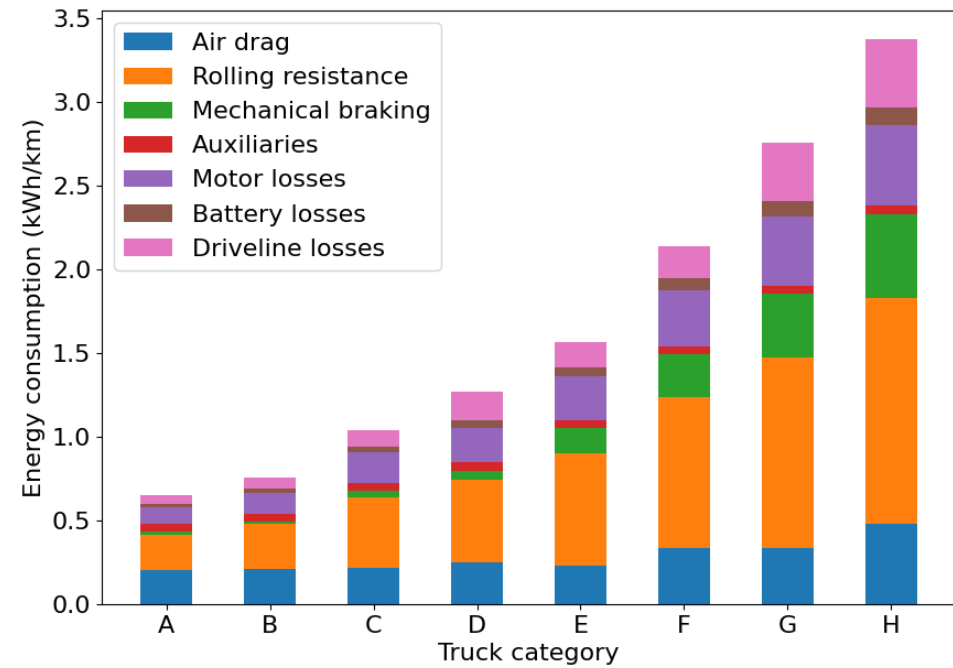


Energy breakdown

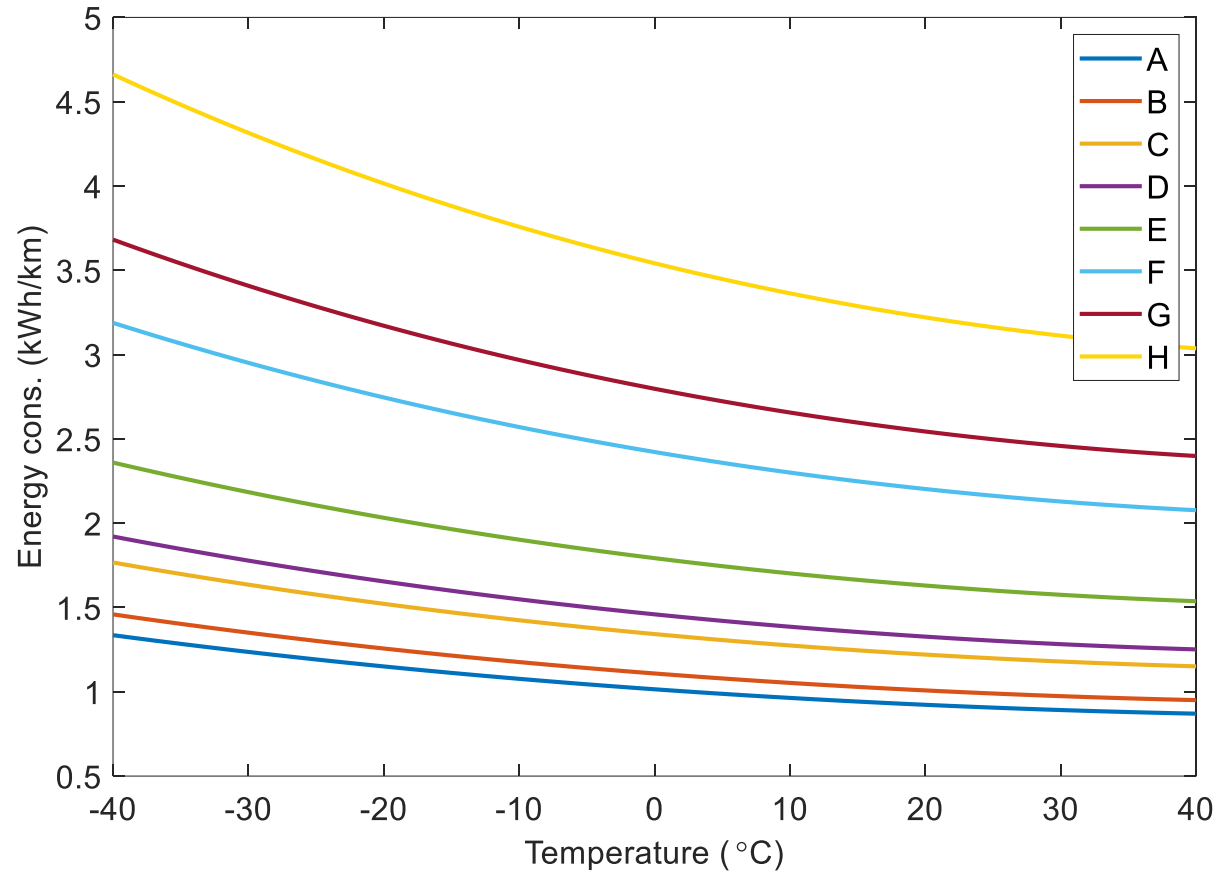
Long haul cycle



Urban delivery cycle



Impact of temperature



- Operation on ESCALATE Jyväskylä – Vuosaari cycle
- Driving resistances increase in cold temperatures → higher energy consumption



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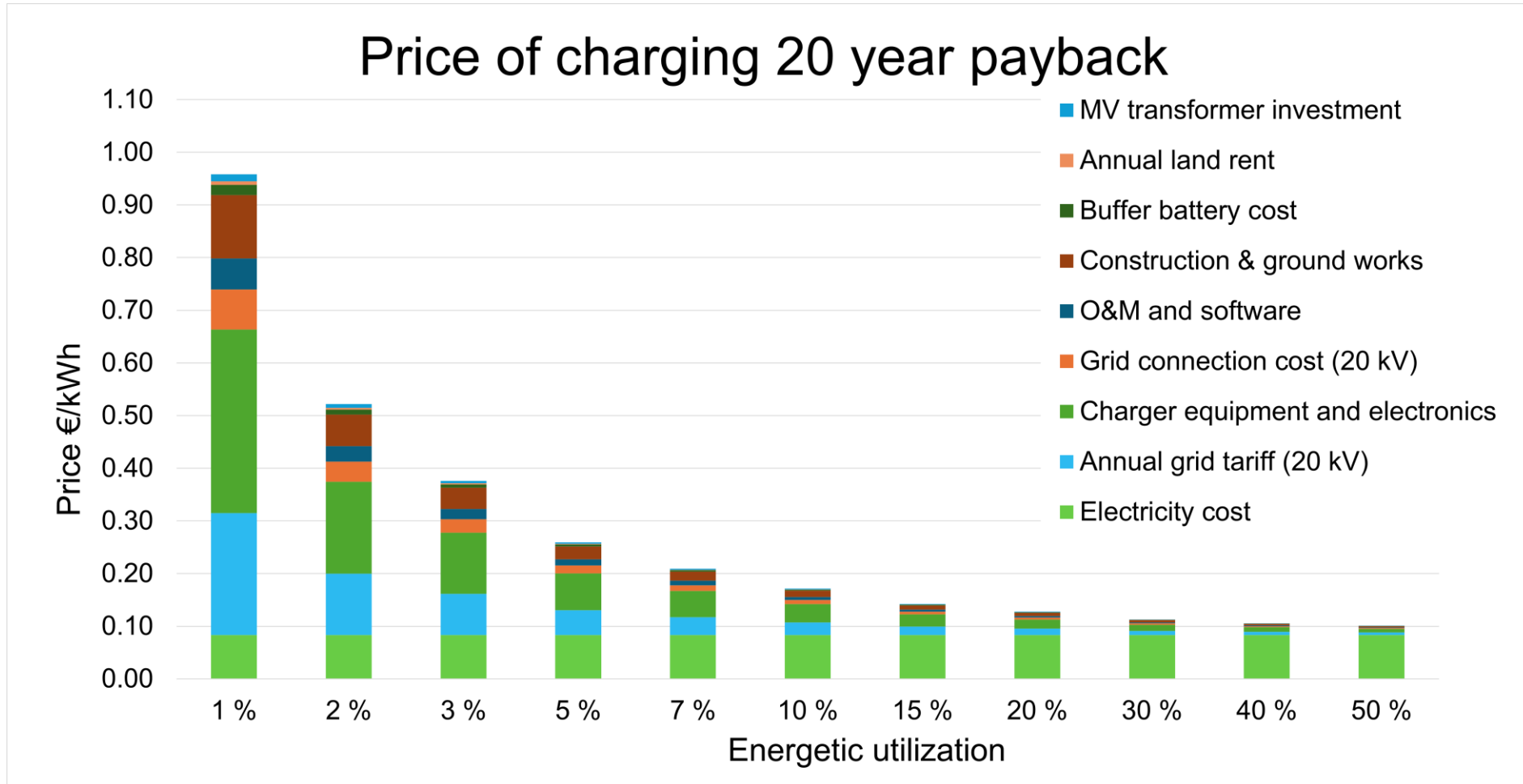
On the production costs of large-scale charging as a service

Niilo Kantoniemi

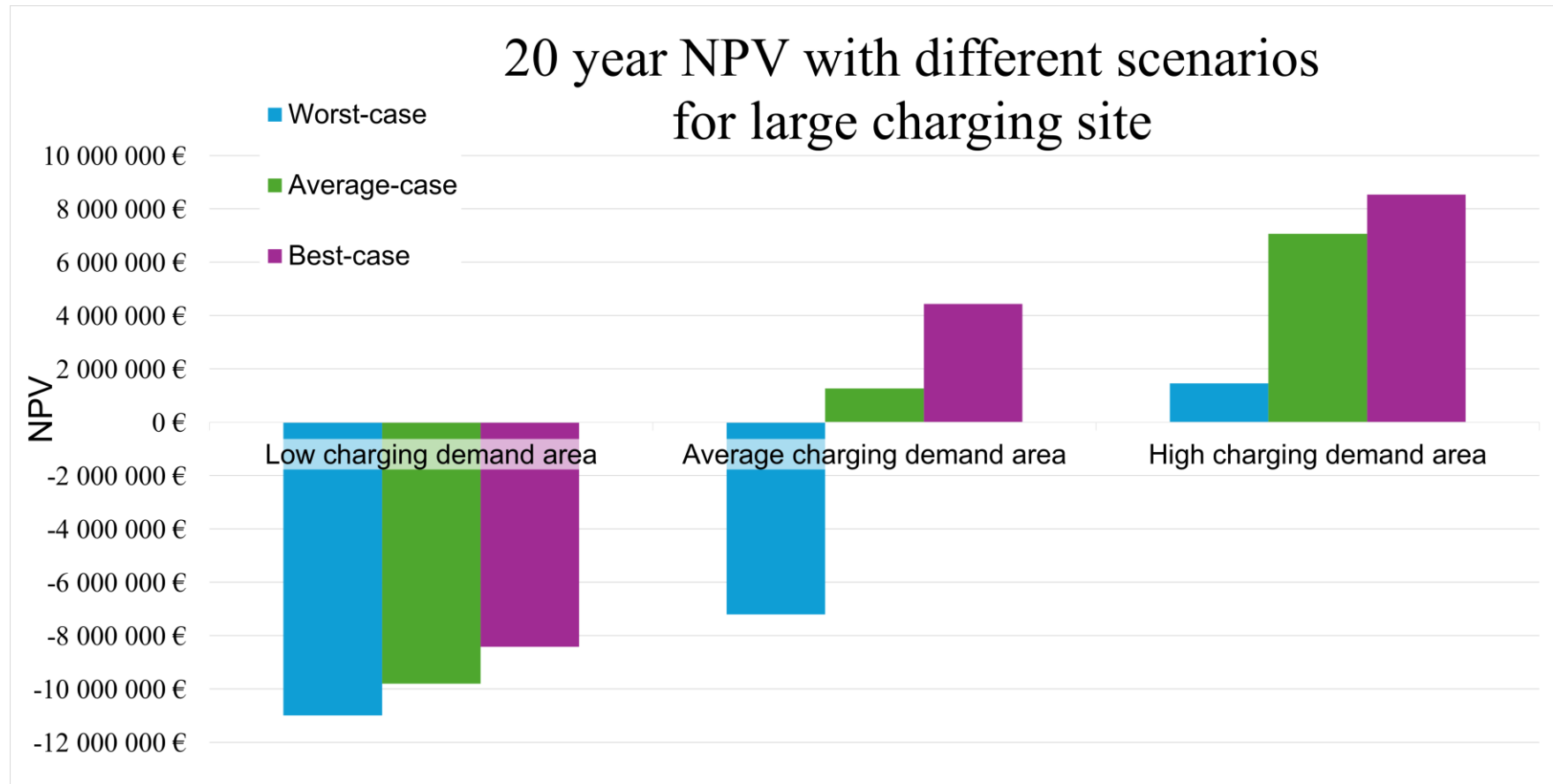
M.Sc thesis work to Aalto university to be submitted autumn 2025

23/09/2025 VTT – beyond the obvious

How the cost of charging varies based on usage



Profitability of charging site



- No profit assumed, 6% discount rate, site has all user types cars charge 49kWh truck charge ~230 kWh

Thank you for collaboration!

- The value proposition from HDV electrification is there and BET will be TCO-competitive
- It still takes **SISU** to push it forward!
- But, we need much more of everything
 - Better progressive policies
 - Bold innovation
 - Fair and forward looking transport contracts
 - More information exchange
 - More collaboration
- What's next Finland?



<https://www.escalate-eu.com/>