



VOLVO
VOLVO GROUP

**Together we shape
the world we want to live in**

V O L V O

Decarbonisation Roadmap

Volvo Trucks

2022-06-09

Decarbonisation

2007 Carbon Neutral Assembly



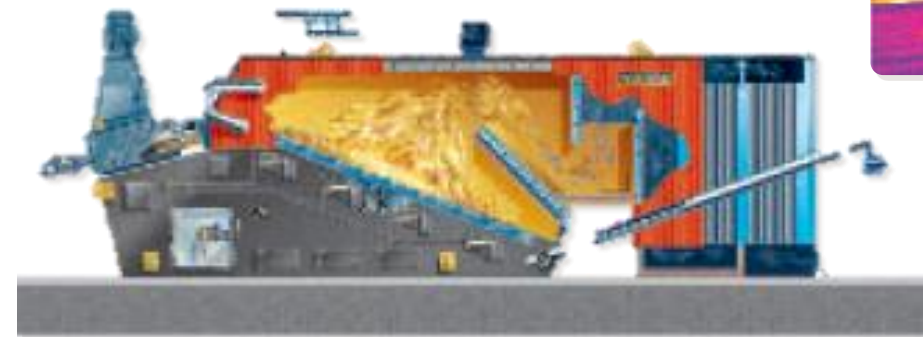
**The World's first CO2 neutral
automotive factory**

Wind Turbines
3,450t



Bio-oil Boiler 1,200t

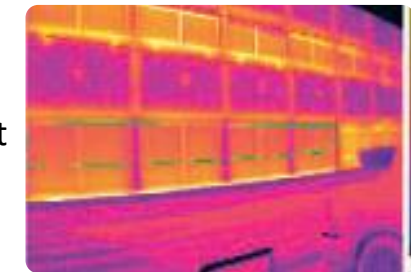
Wood Residue Boiler 2,800t



Alp Hydro Electricity
3,450t



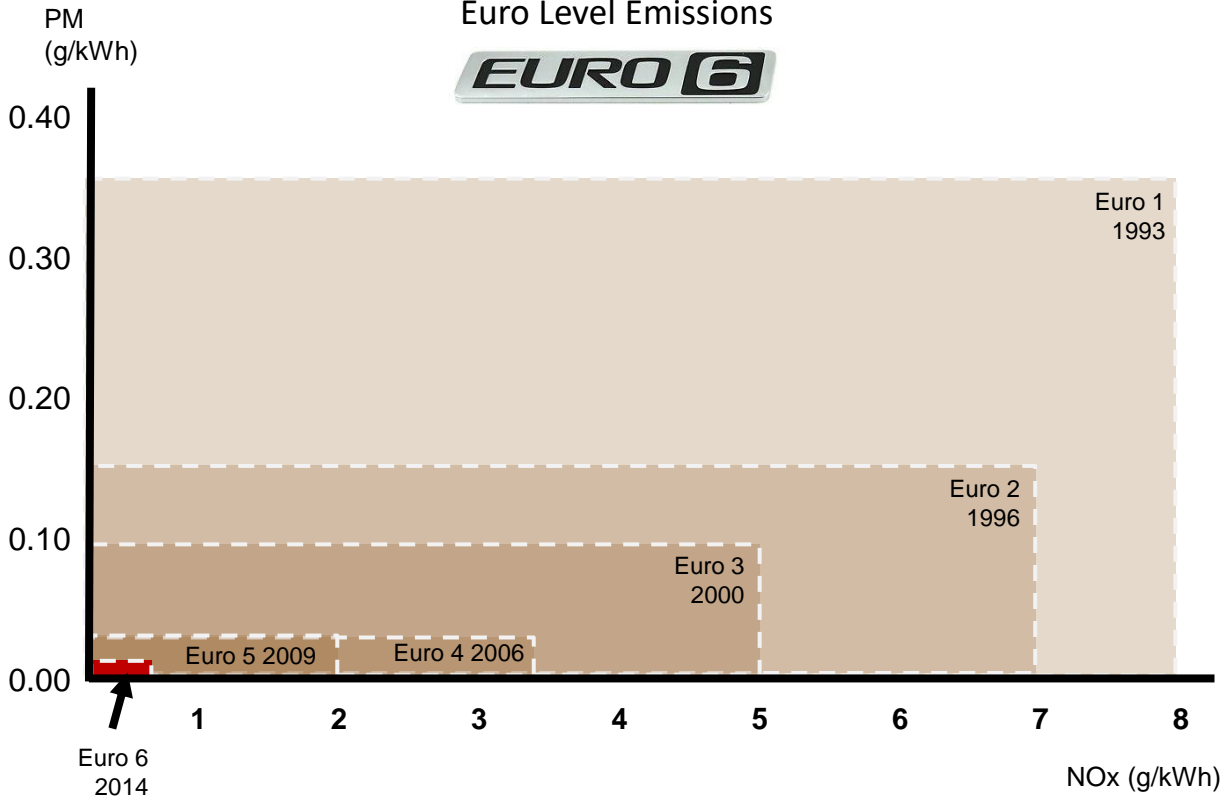
Solar Panels 8.4t



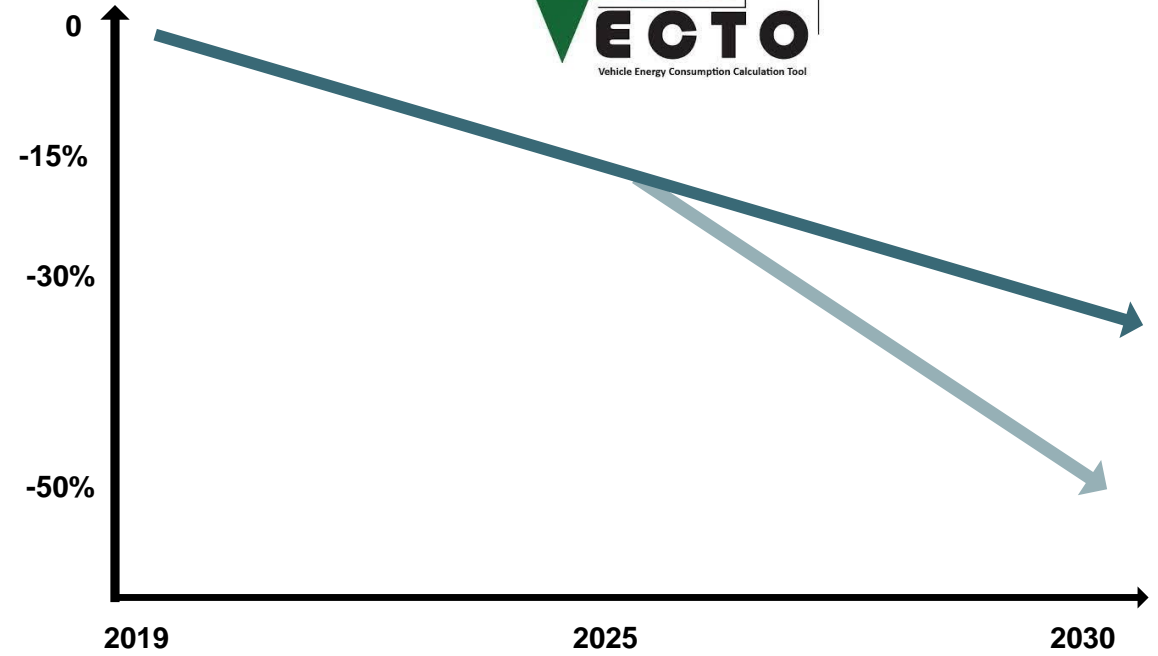
Energy Efficiency
3,500t

Emission Standards and Frameworks

Air Quality
Euro Level Emissions
EURO 6



Decarbonisation
VECTO
VECTO
Vehicle Energy Consumption Calculation Tool



FH Tractor VECTO specifications – changing the base



**55.64
g/t.km**

NO delete option
without air deflector package



+ 3.1

**Application
Recommendation
6x2 Pusher
52.6g/t.km**



2.47 + 0.1



**Dual Clutch
+ 1.2**

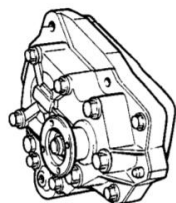


B rated + 1.3 to 1.5

C rated + 2.5 to 2.8



**Retarder
+ 0.4**



**PTO
+ 0.1**



Clean lines LED lights and integrated roof spotlights

Cleaner, less noisy and cheaper than bolt on brackets



+ 0.9



+ 0.6



500TC + 0.1

460 + 2.6

500 + 2.6

540 + 3.0

Always check your VECTO rating when you complete your specification and include a print off in the vehicle order pack

U.K. New Regulatory Framework

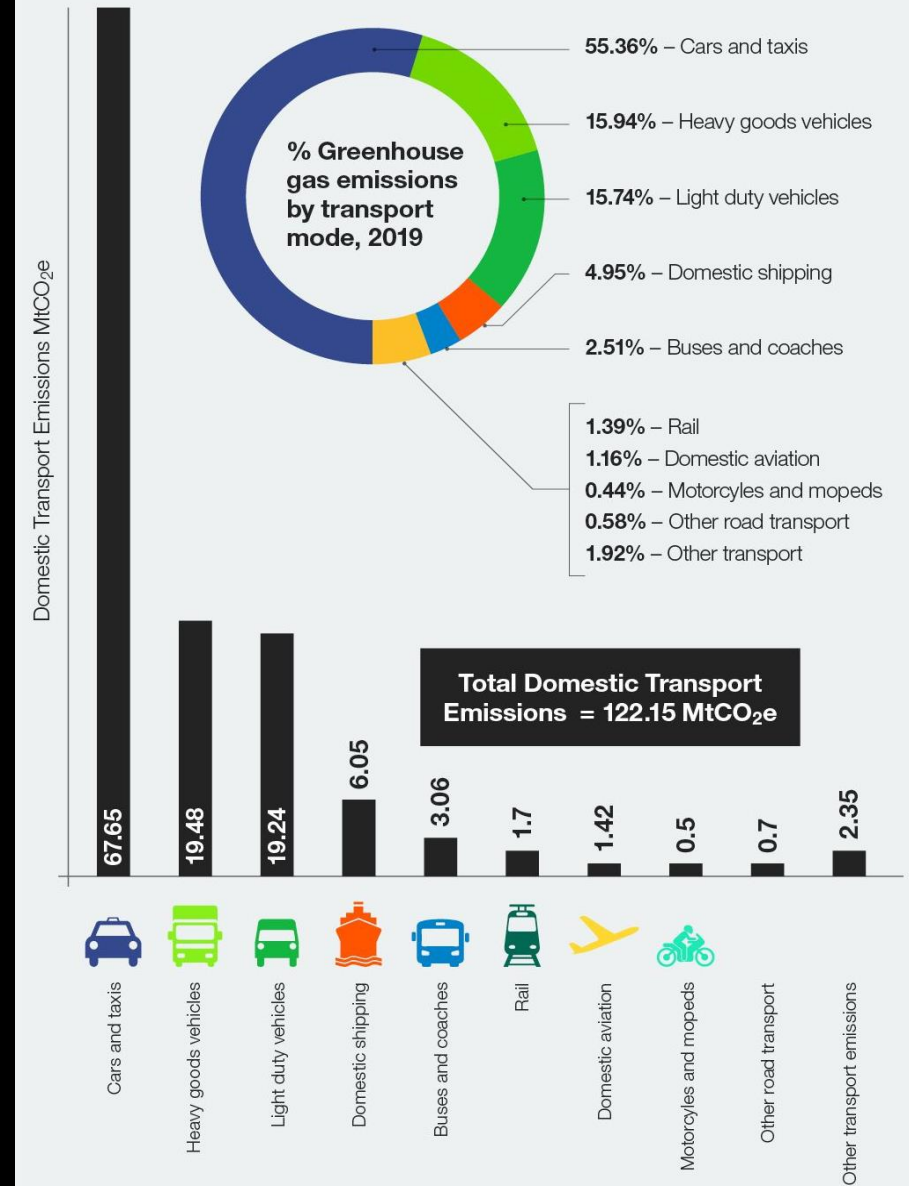
A New Road Vehicle CO₂ Emissions Regulatory Framework

- Green Paper was published on 14th July and the consultation lasted for 10 weeks - closed on the 22nd September looking at 2030 and 2035 commitments
- Questions over extending sales targets/ZEV mandates to HDV types that are not in VECTO
- Two framework proposals:
 - Efficiency
 - Efficiency + ZEV Mandate

Transport Decarbonisation Plan

- 2035 end sale of new non-zero emission HGVs under 26T
- 2040 end sale of new non-zero emission HGVs above 26T

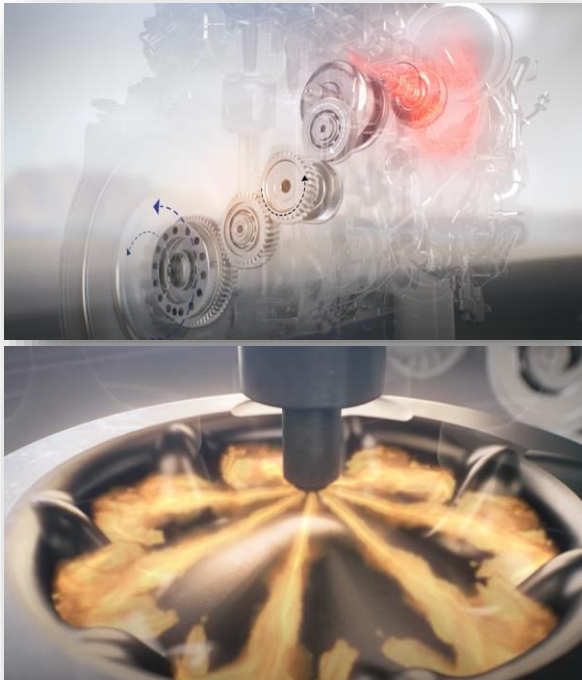
UK domestic transport emissions 2019



Well-to-wheel decarbonisation

What are our options?

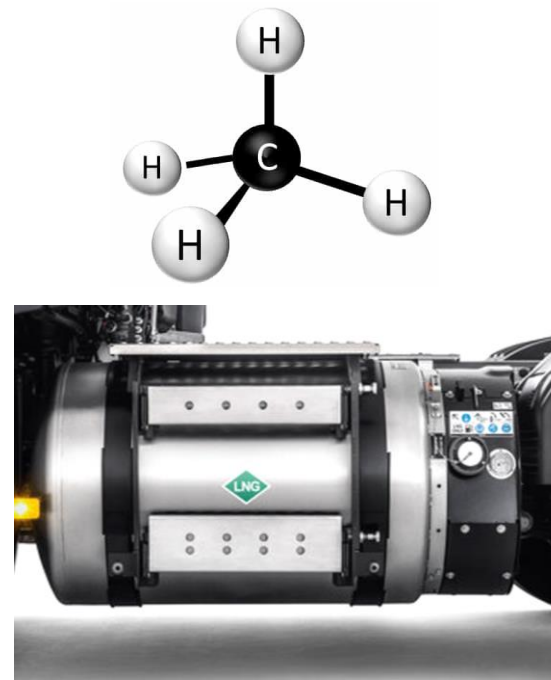
Improving current diesel technology



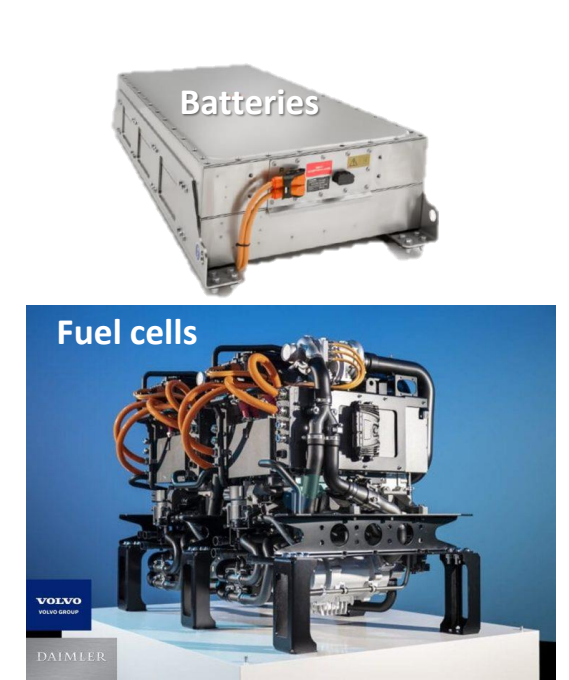
Renewable 'drop-in' fuels



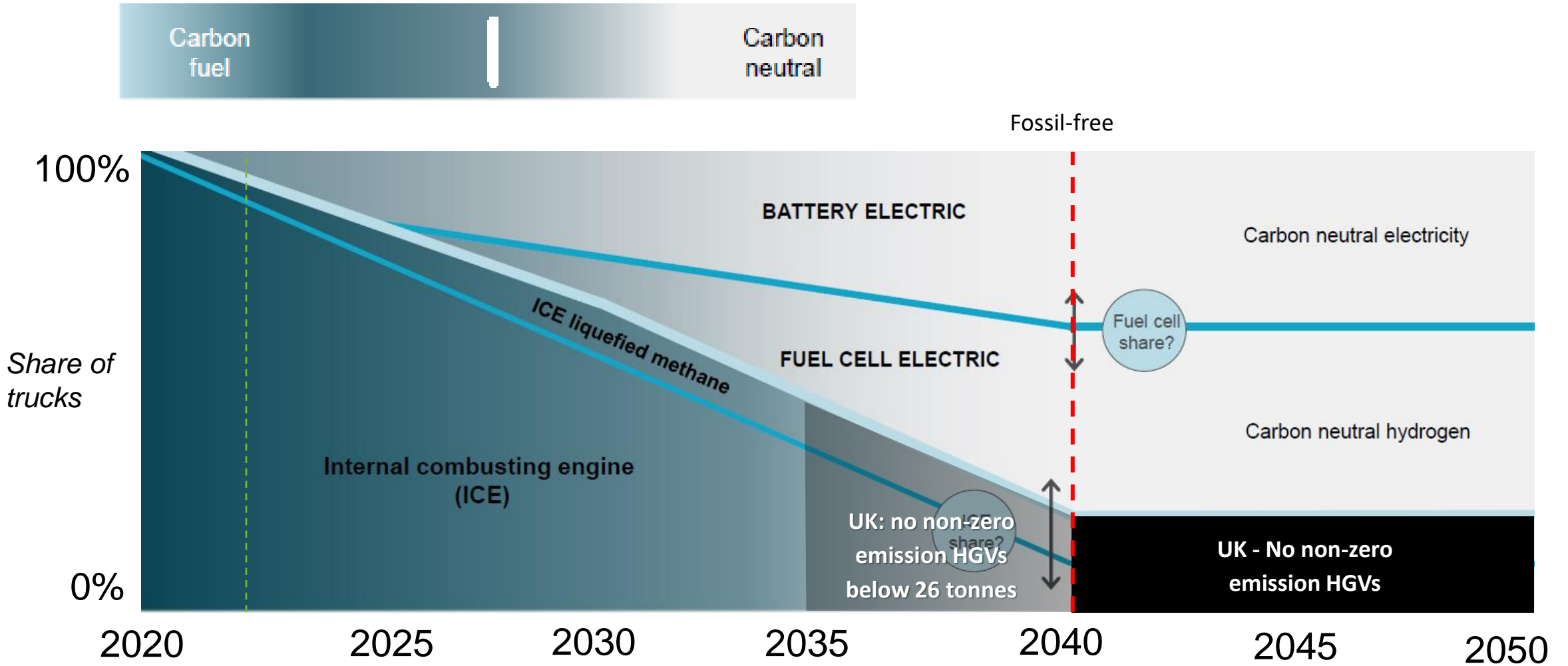
Liquified methane/biomethane



Electric



The Volvo Roadmap



Key Enablers for the Transition

AN EFFICIENT TRANSPORT SYSTEM

RANGE

PAYLOAD

CHARGING



SUBSIDIES FROM GOVERNMENTS

PURCHASE OF VEHICLES

INFRASTRUCTURE

TAXES

Early adaptation

Elevated adaptation

Broad adaptation

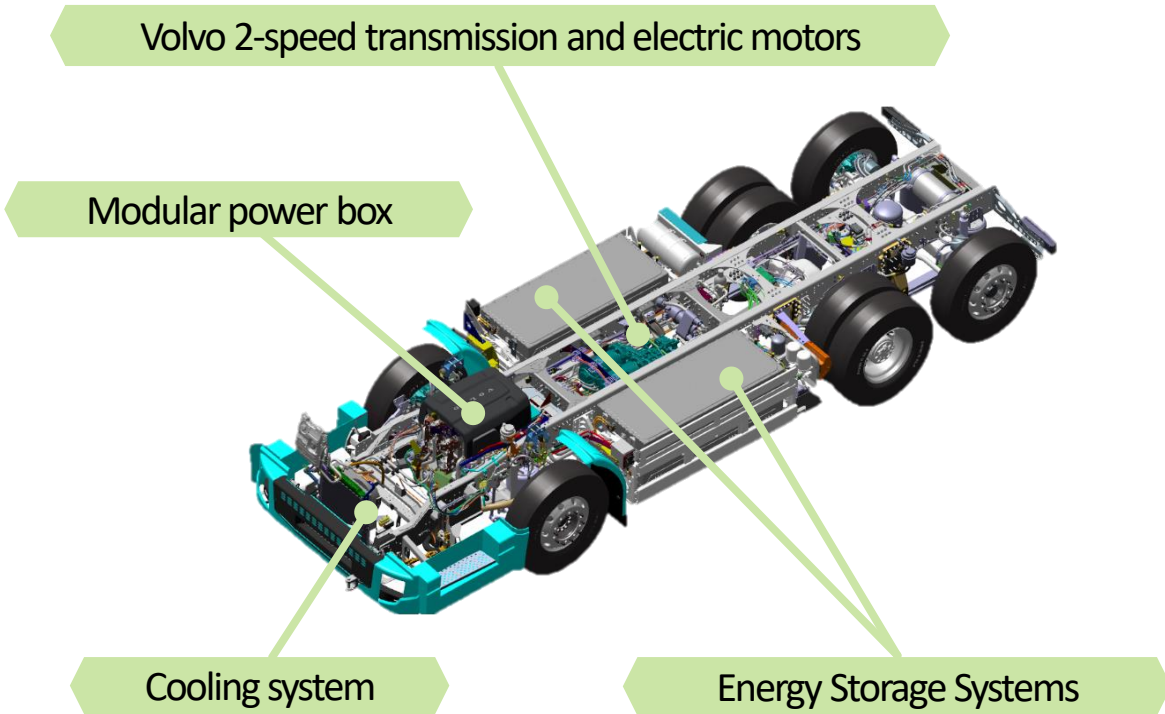
Image driven customers

Financial Logic
Selected Segments & Markets

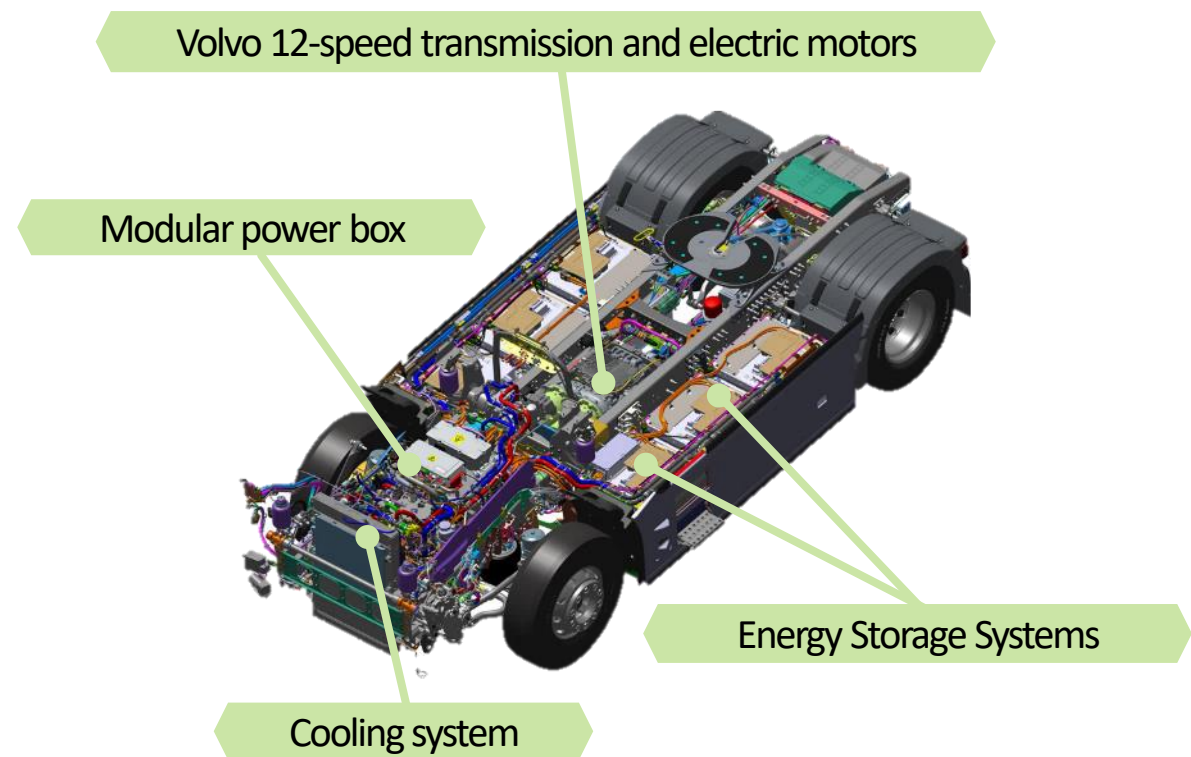
Financial Logic
Wide-spread

Battery Electric Vehicles





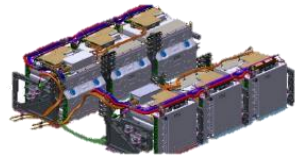

Medium Duty Vehicles



Heavy Duty Vehicles




















Charging a Volvo Electric Truck

	Batteries	Maximum Charging Rate	Approx. Minimum <u>Full</u> Charge Time (4 batteries, 70% SOC)	Charging Infrastructure Solutions
 <p>FE & FL</p>	 <p>Weight: 520 kg Capacity: 66 kWh</p>	<p>AC-charging (slow) up to 22 kW</p> <p>DC-charging (fast) up to 150 kW</p>	<p>AC Charging - 8-9 hours</p> <p>DC Charging - 1-1.5 hours</p>	 <p>22 kW wallbox (included with truck)</p> <p>OR</p> <p>Site charging infrastructure solution</p>
 <p>FM, FMX & FH</p>	 <p>Weight: 500 kg Capacity: 90 kWh</p>	<p>AC-charging (slow) up to 43 kW</p> <p>DC-charging (fast) up to 250 kW</p>	<p>AC Charging - 5-6 hours</p> <p>DC Charging - 1-1.5 hours</p>	 <p>22-44 kW AC charger</p> <p>OR</p> <p>Site charging infrastructure solution</p>

Volvo Battery Electric Rigids



GVW tonne	GVW Incentive - tonne*	FL** 	FE 	FM 	FMX 	FH 
16	2 axle up to 1 tonne					
18						
26	3 axle up to 1 tonne					
32		No incentive for 4 axles			 	 

Volvo Battery Electric Tractors

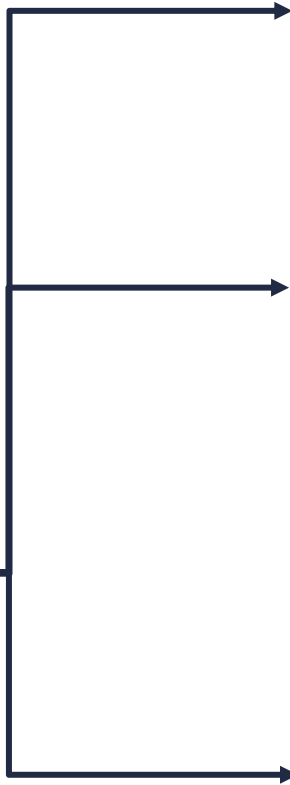
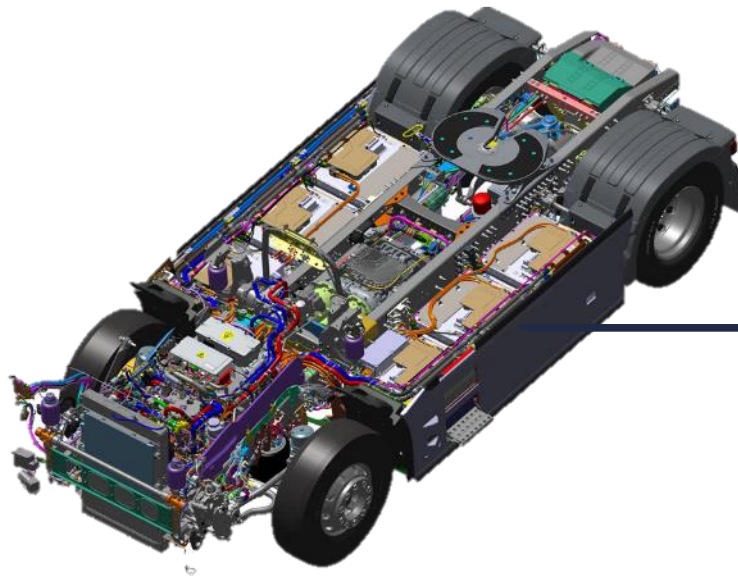


GCW tonne	GCW Incentive - tonne	FM	FMX	FH
40	No incentive for 40 tonne			
44	No incentive for 44 tonne			

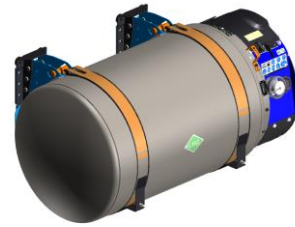
Scale Comparison

Energy Density

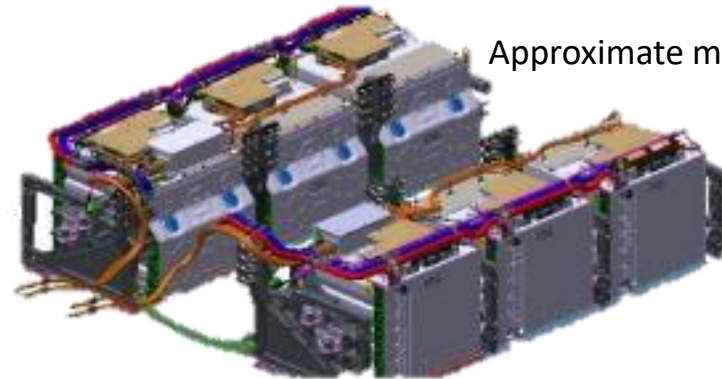
What's required for 300km of range?



100 litres of diesel + tank
Approximate mass = 130kg

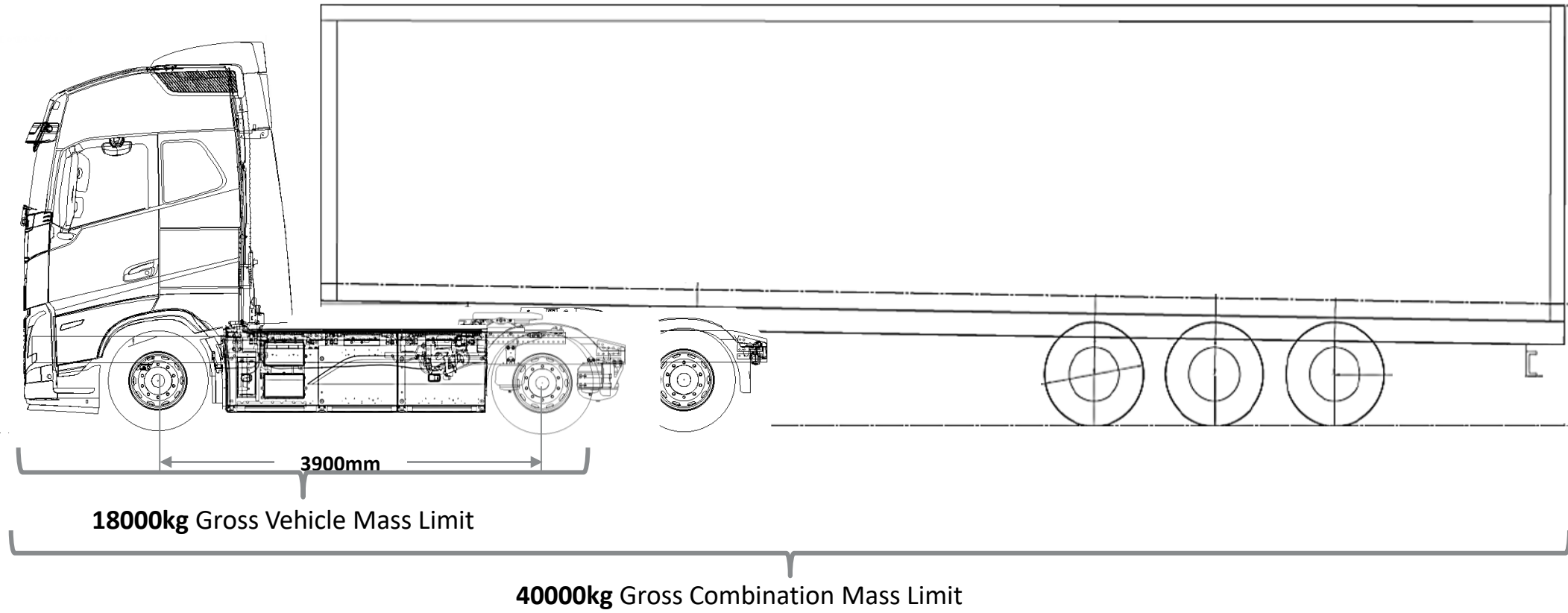


70kg LNG + tank
Approximate mass = 150kg



x6 Energy Storage Systems
432kWh of useable energy
Approximate mass = 3000kg

Vehicle Architecture



A key change for construction

No mass incentive for 4 axle at 32tonne



Electric Tridem

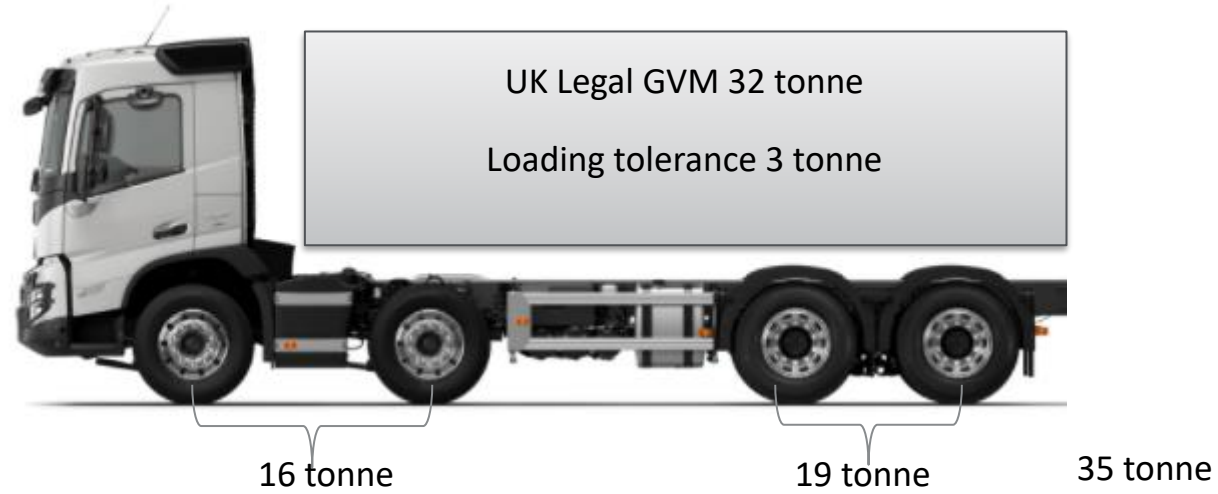


Diesel double front axle



8x4 tipper comparison

The 8 wheeler accounts for

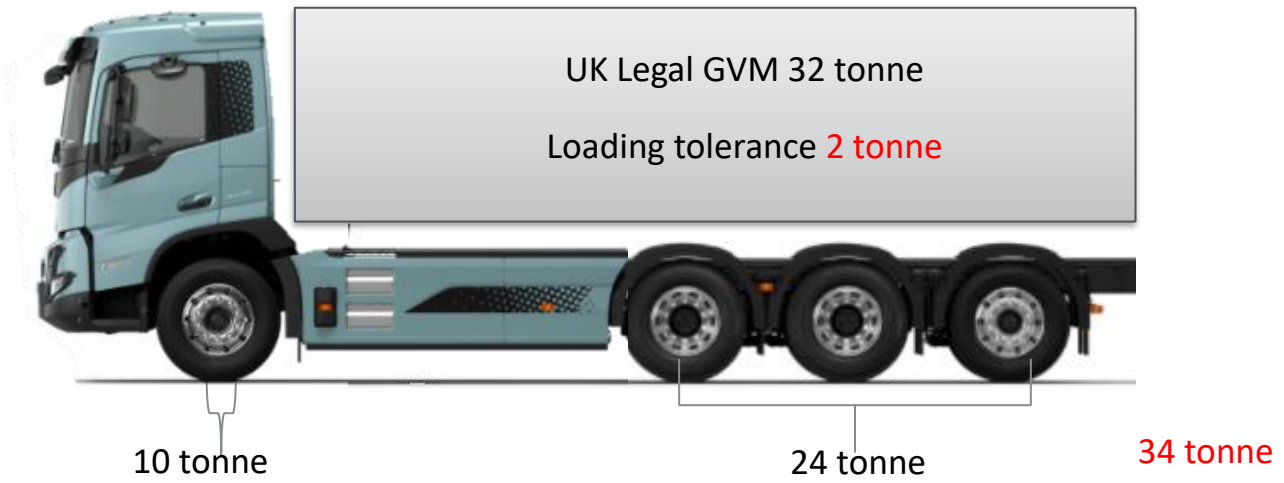
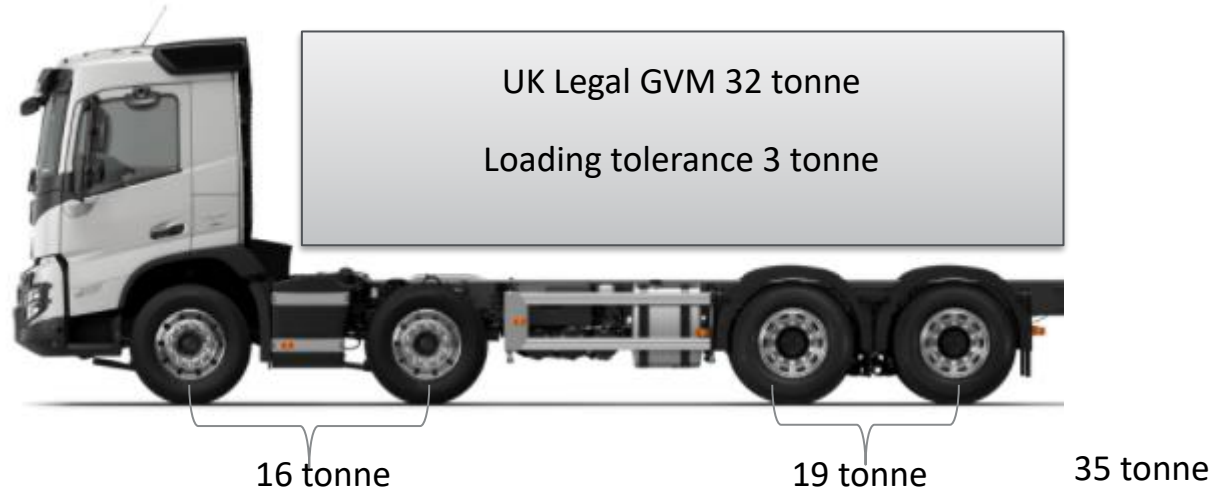


FMX13 8x4 B ride X-High

- Chassis unladen diesel 9850kg

8x4 tipper comparison

The 8 wheeler accounts for



FMX13 8x4 B ride X-High

- Chassis unladen diesel 9850kg

FMX13 8x4 Tridem High Full Air Suspension

Chassis unladen diesel 10115kg

Convert to 6 Battery diesel 540kWh

With no consideration for any change in body weight

Tridem weight increase	265 kg
removal of engine	-1250 kg
6 batteries	3120 kg
Body subframe	400 kg
Loss of payload	2535 kg

Minimum payload loss 2.5tonne

No payload incentive for electric 4 axle rigids

Reduced tolerance for loading

Front axle cannot increase – tyre technology maneuvering

Rear bogie is 26.5 tonne in Europe – vehicle rear end heavy

A Collaborative Approach

ROUTE
SIMULATIONS

ELECTRIC
TRUCKS

FINANCIAL
SERVICES

CHARGING
INFRASTRUCTURE

MAINTENANCE
& REPAIR

FINANCE

LEASING

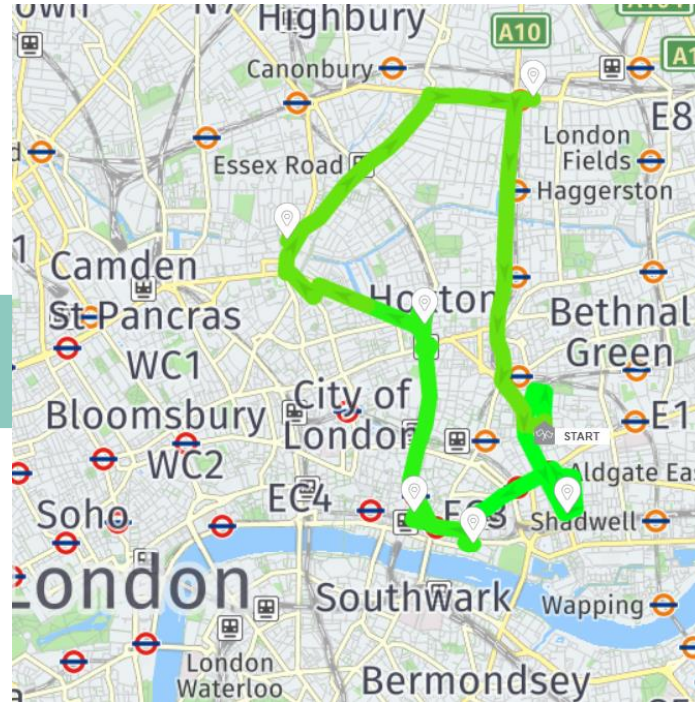
RENTAL

SUBSCRIPTION

The key considerations for adopting electric trucks into an operation



Payload & Axle Configurations



Range

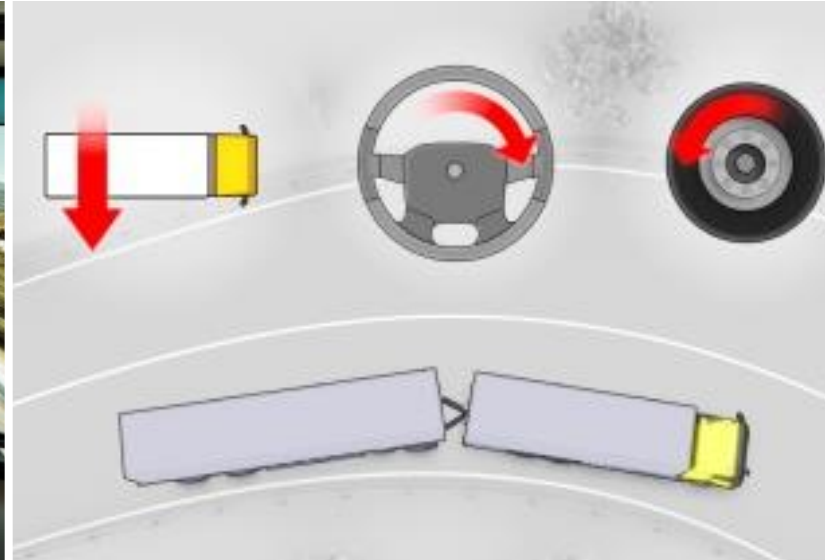


Charging

Safety - Basic vehicle needs



See
Visibility



Steer
Handling



Stop
Braking

The motivation for Advanced Emergency Braking

“The aim is to help reduce incidents and hence reduce casualties in which a truck drives into the back of a vehicle in front.”

– the most common form of truck incident on motorways and A roads.



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Looking Good?



London Direct Vision Standard

TFL going out to consultation on the changes that come into effect on 26th October 2024 call the PSS progressive safe scheme

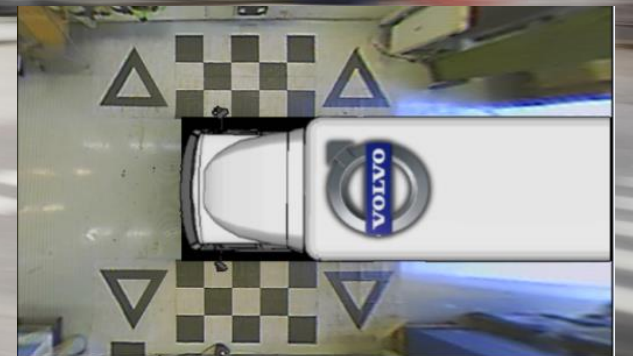


Beyond human eyes

We need a standard that not only considers direct vision
But also latest technology too



Improved Direct Vision



Camera Systems

Truck in road, cyclist on cycle path are these two
road users aware of each others presence?

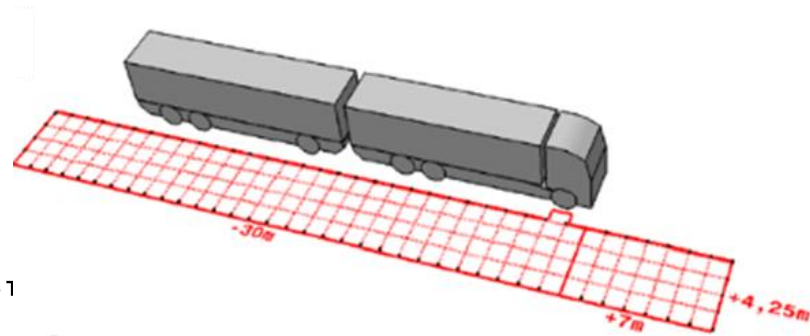
Increasing the awareness
in society



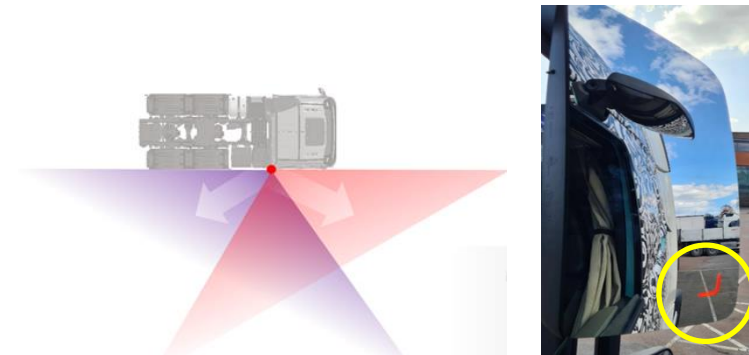
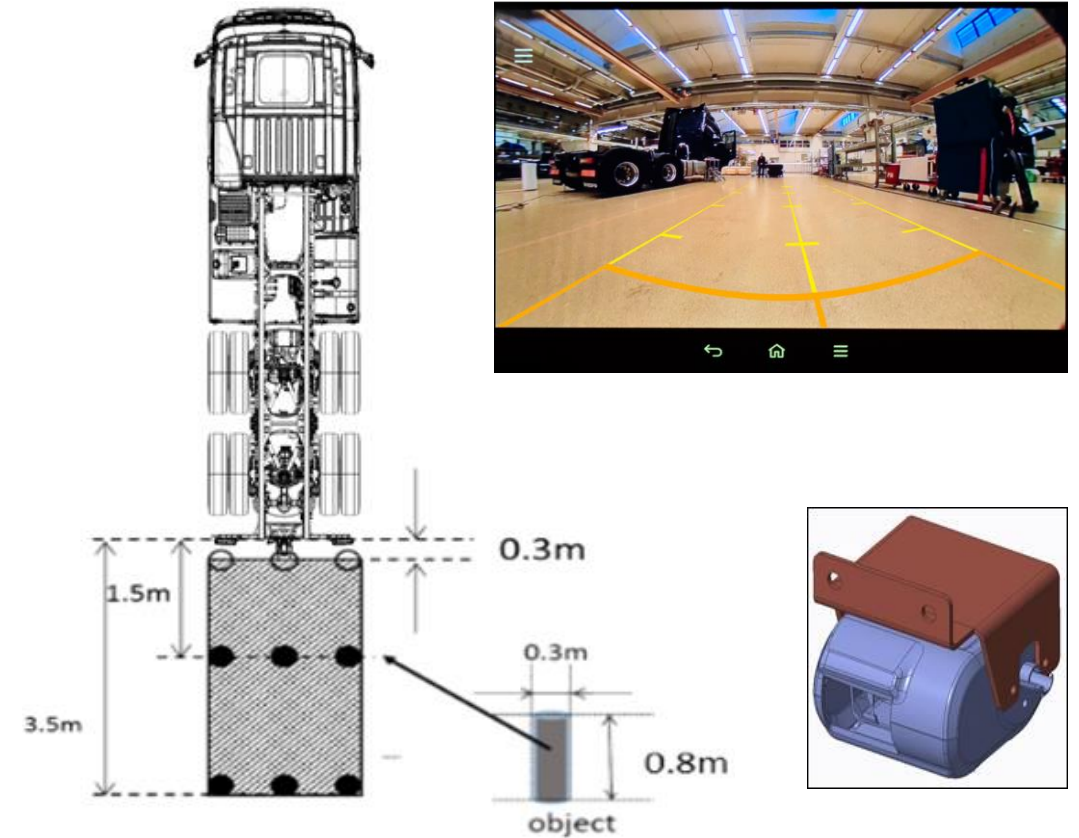
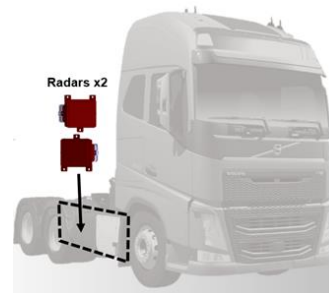
General safety regulation

Mandatory July 2024

- Tyre pressure monitoring TPMS (UN R141)
- Alcohol Interlock installation facilitation (EU 2021/1243)
- Emergency Stop Signal (UN R48.07)
- Moving-Off Information System - MOIS (UN R159)
- Blind spot information system - BSIS (UN R151)
- Reversing safety (UN R158)
- Intelligent Speed Assistance - ISA (EU 2021/1958)
- Cybersecurity



Volvo T





New Decade, New Journey

General Safety Regulations



New Types from July 2022 and New registrations July 2024

- Emergency stop signal
- Intelligent speed assistance
- Reversing detection
- Tyre pressure monitoring system
- Alcohol interlock installation facilitation
- Drowsiness and attention detection

New Types from July 2024 and New registrations July 2026

- Distraction recognition and prevention

New Types from January 2026 and New registrations January 2029

- Vulnerable road user improved direct vision
- Event (accident) data recorder

V O L V O

Together

we shape the world

we want to live in