

ROAD TO THE HDV STANDARDS EUROPE NEEDS

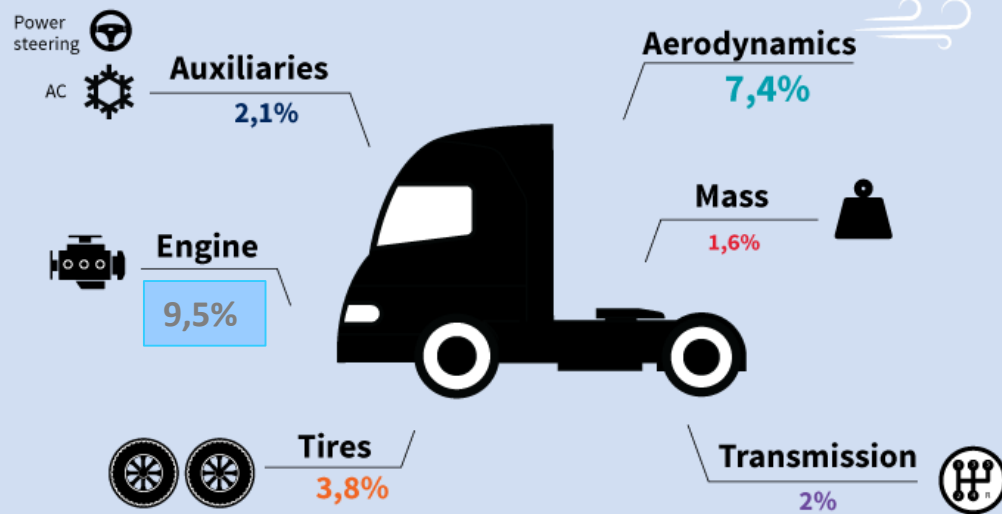
REDUCE CO2 AND KICKSTART ZERO EMISSION TRUCKING

2025 target and indicative 2030 targets

Zero emission vehicle mandate

Cost-effective fuel efficiency potential 2025

24% by 2025

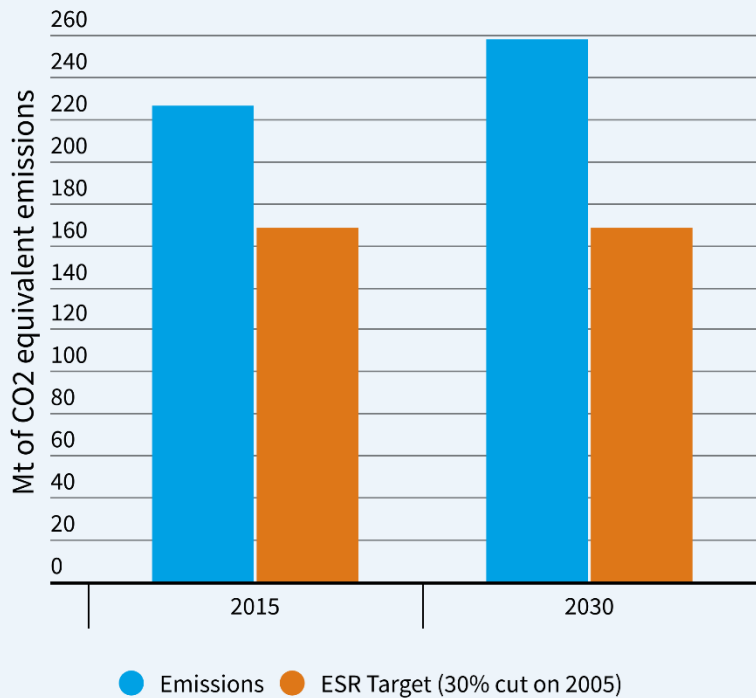


AMBITIOUS CO2 STANDARDS

FOUR REASONS WHY WE NEED AMBITIOUS CO2 STANDARDS NOW

1. Necessary to meet EU targets

HDV emissions will grow 14% between 2015 and 2030 in the EU



Emissions growth based on a business as usual scenario, which takes into account 10% efficiency gains for HDTs between 2010 and 2030. Source: EUTRM, T&E in-house model

2. Plenty of cost-effective potential

A TRUCK THAT IS 40%* MORE FUEL EFFICIENT WILL SAVE 13.2 LITRES PER 100 KM

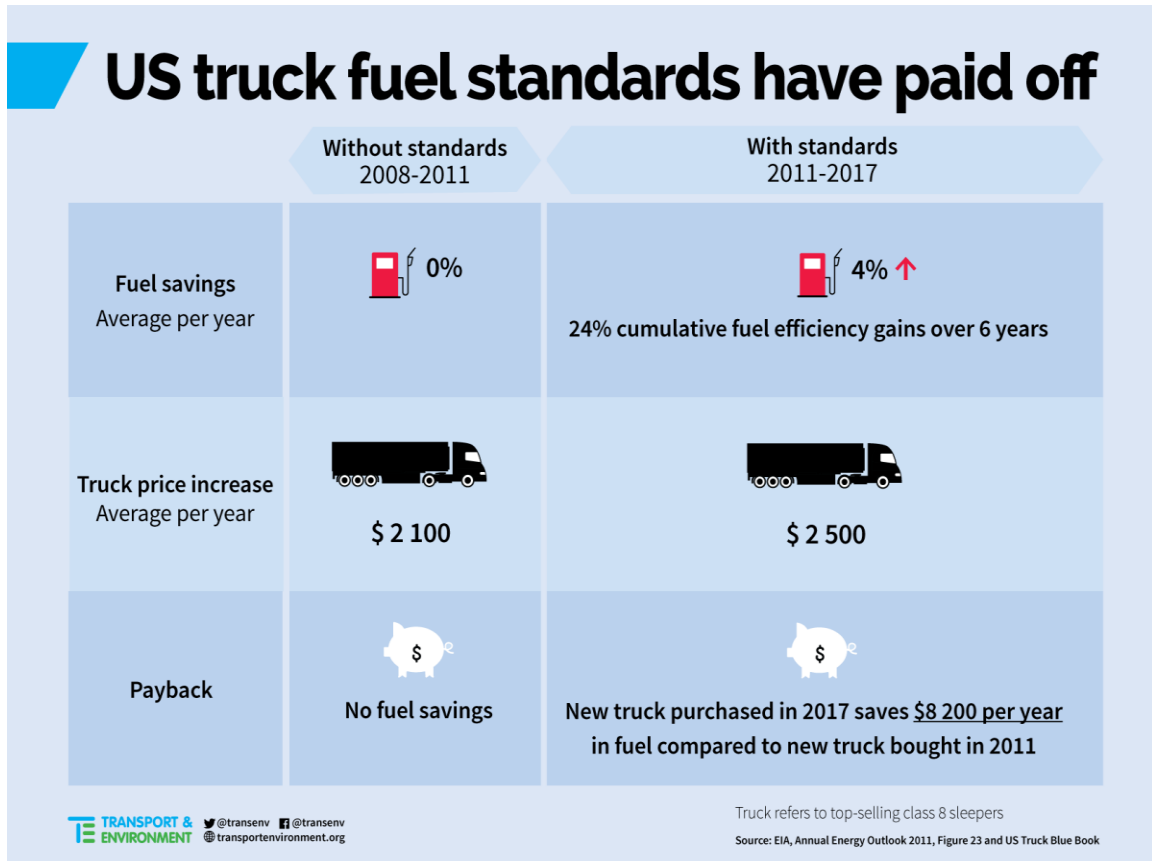
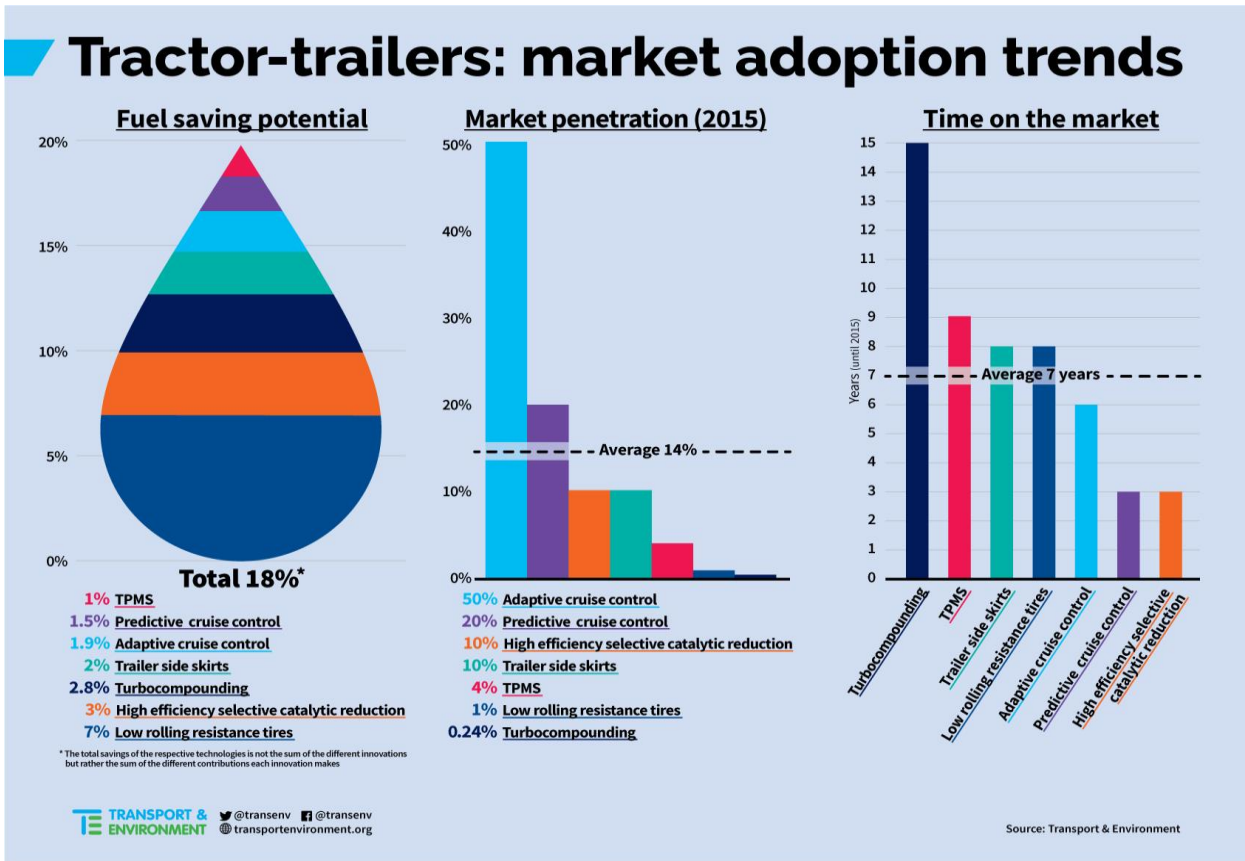
- TRAILER AERODYNAMICS**
 - Side skirts
 - Boat tails
 - Trailer gap
- DRIVELINE**
 - Axle efficiency
 - Transmission efficiency
 - Engine transmission integration
 - Down speeding
 - Direct drive
 - Predictive cruise control
- TRACTOR AERODYNAMICS**
 - Roof deflectors
 - Side fenders
 - Aerodynamic mirrors
- ENGINES**
 - Engine friction reduction
 - Accessories electrification
 - Combustion optimization
 - Turbocharging system improvement
 - Engine controls
 - After treatment improvement
 - Turbo compounding
 - Waste-heat recovery
- TRAILER TIRES**
 - Automatic tire-inflation systems
 - Low-rolling-resistance tires
 - Wheel covers
- TRACTOR TIRES**
 - Automatic tire-inflation systems
 - Low-rolling-resistance tires
- HYBRID**

THESE IMPROVEMENTS SAVE TRUCK DRIVERS €11,72 PER 100 KM WHICH AMOUNTS TO €13,000 PER YEAR**

*BASED ON ICCT PRELIMINARY RESULTS
**TRANSPORT & ENVIRONMENT TAX DATABASE

3. Overcome market barriers and create more competition

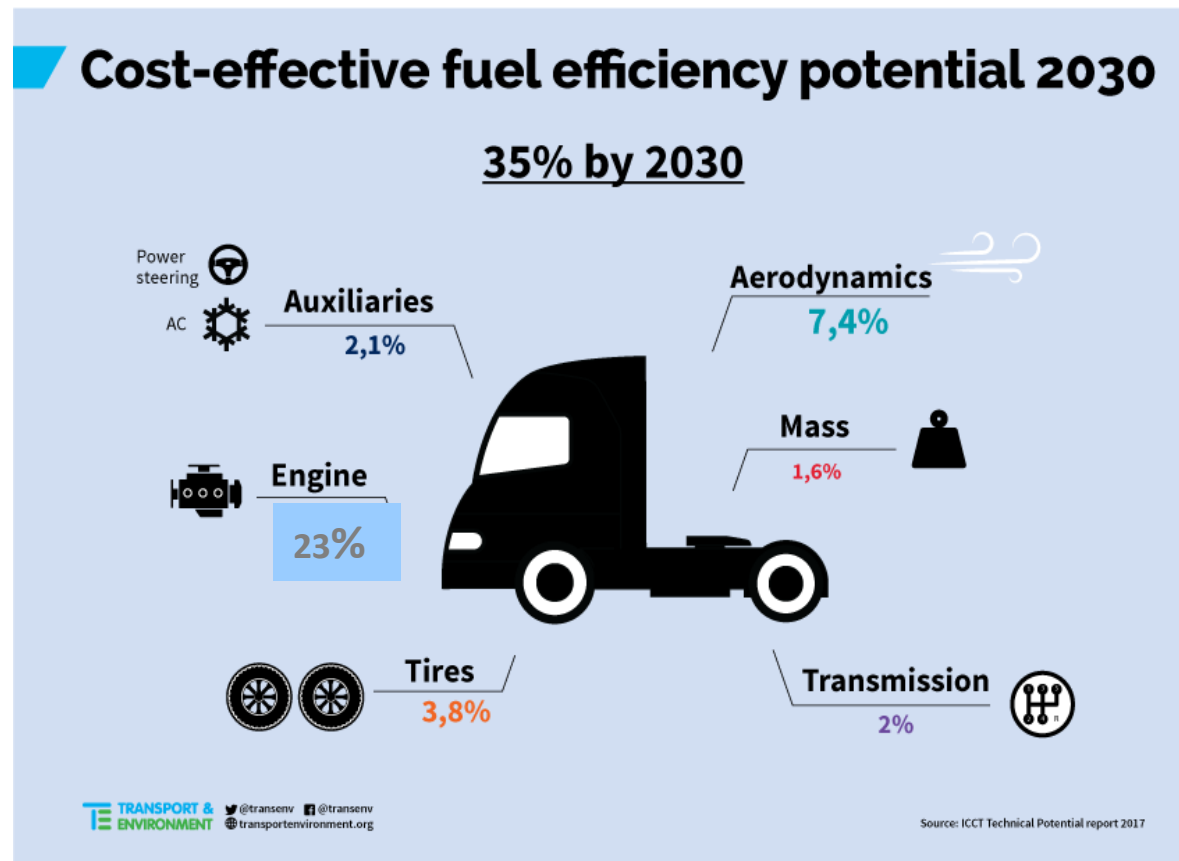
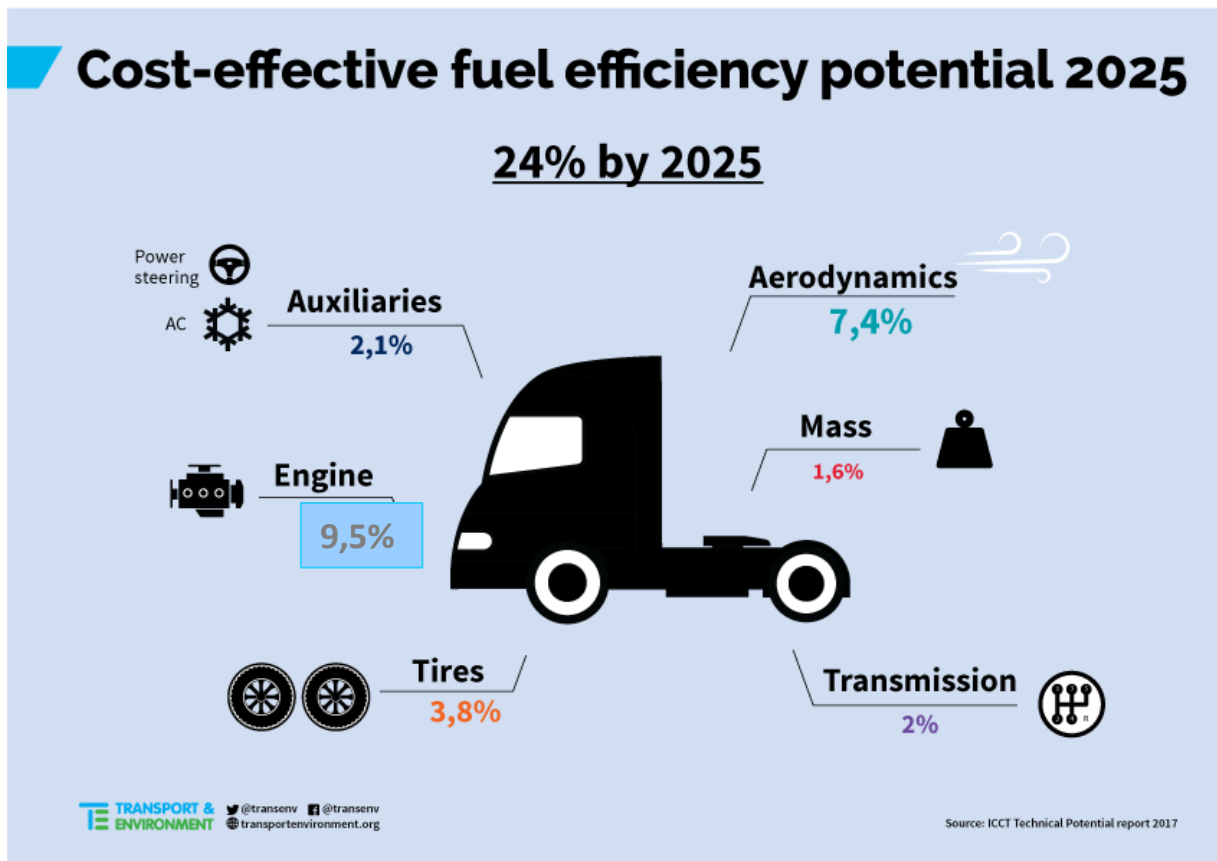
4. Reduce total costs of ownership



STANDARDS IN MORE DETAIL

THE TARGET

- Get the maximum cost-effective potential out of trucks

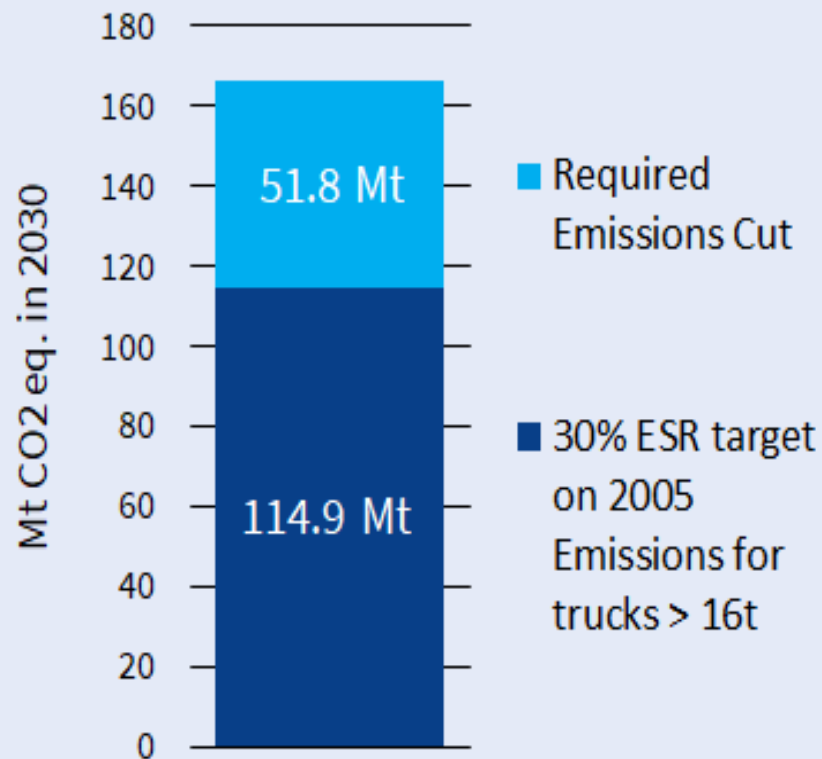


DESIGN AND TARGET

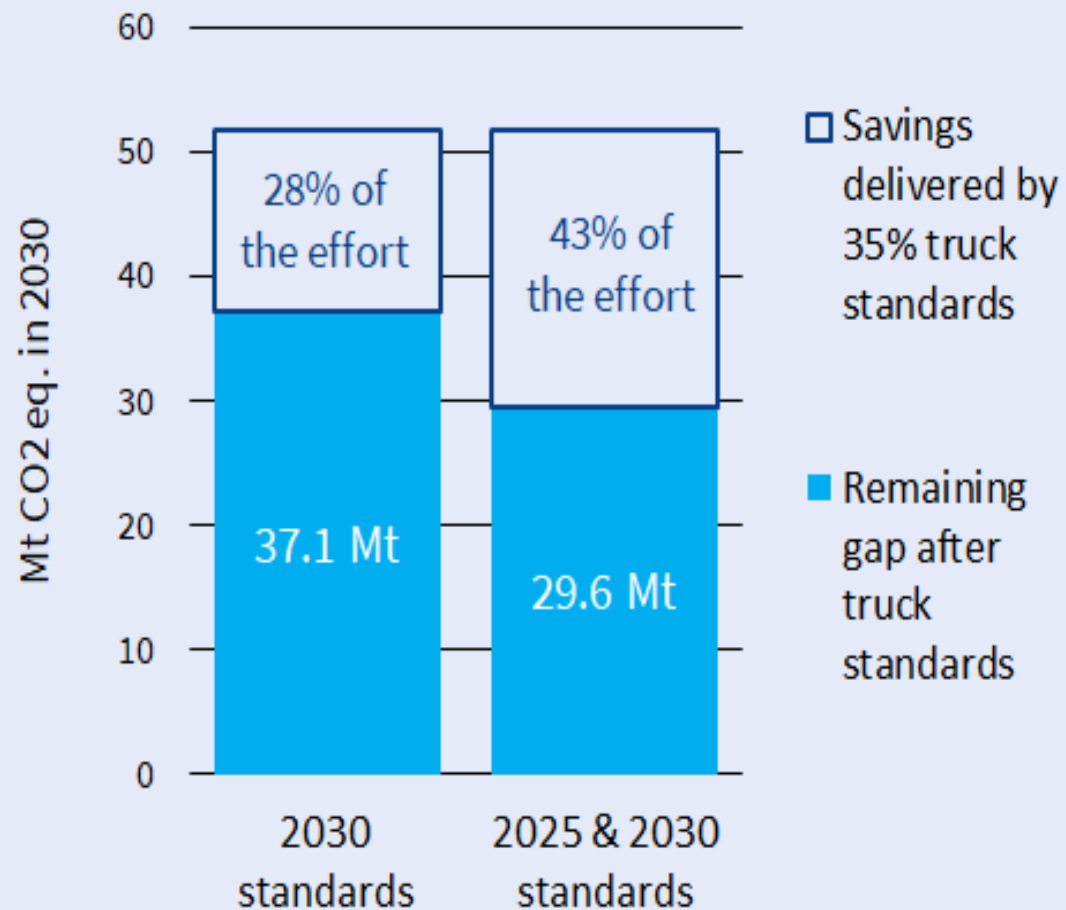
- Ambitious 2025 full vehicle and engine standards are the preferred option (as in US phase I) **(24% by 2025)**.
- Indicative 2030 target (range). Final target should be set during review in co-decision (early 2020s). Give long term guidance to OEMs.
- Engine and trailer standards should be introduced as soon as possible.

THE IMPORTANCE OF A 2025 TARGET

Truck (> 16t) emissions growth: the gap to close in the EU



What truck standards can do for the EU



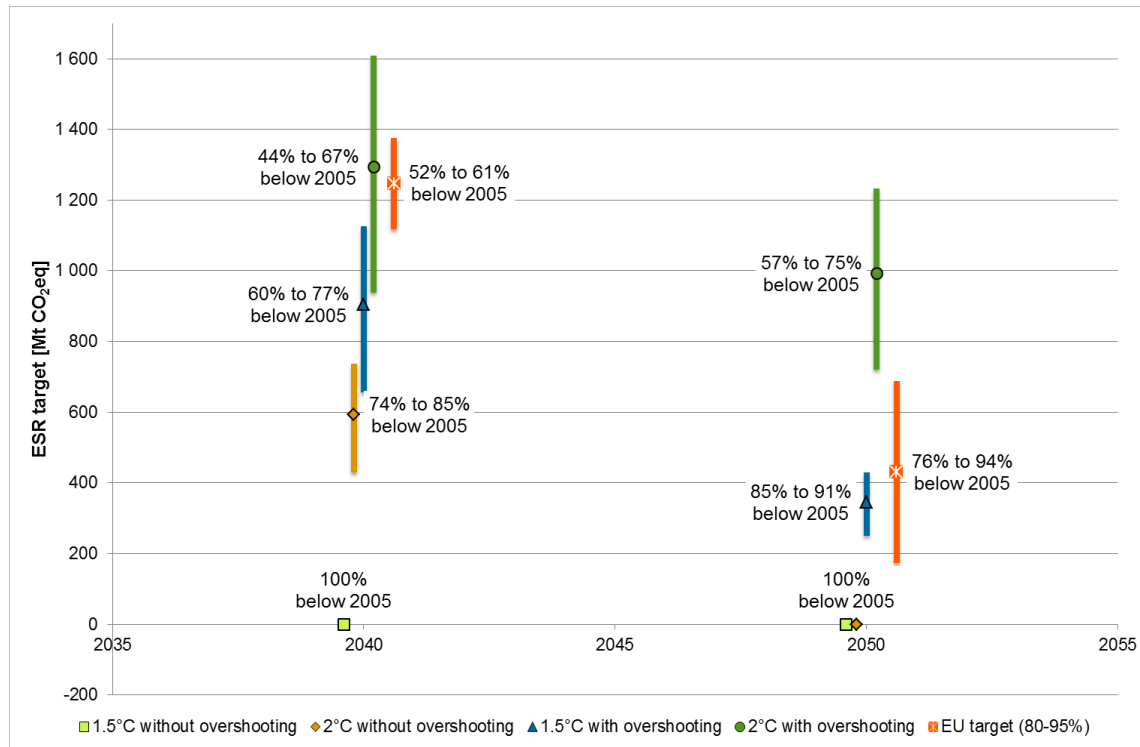
PROPOSAL IN MORE DETAIL

- Fixed 2025 **target** as for cars and vans.
- **Banking and borrowing and annual targets** add no value but more complexity.
- **Average target** per VECTO category.
- More ambition for vehicles that do more **mileages** (e.g. long haul and cost-effective potential).
- **No pooling:** Already low number of manufacturers in Europe (cartel case).
- **Trading of credits** between OEMs should be allowed to reward early adoptors.
- **No transferring:** Ensure improvements in all categories.
- We need to be careful with **exemptions.**

ROAD TO ZERO EMISSIONS

FOUR REASONS WHY WE NEED A ZEV MANDATE




A. Transport needs to be zero by 2050 (COP21)



B. Technology exists



C. It's cost-effective for all truck categories already today!

Application segment	Segment perspective	Example use cases	Range of TCO parity, ¹ year
Regional light-duty-truck (LDT) hub-and-spoke delivery 	First truck segment to reach total-cost-of-ownership (TCO) parity, lowest entry barrier for battery electric vehicles (BEVs)	Regional grocery delivery for shops and restaurants	2017
Urban LDT stop-and-go delivery 	Second truck segment to reach TCO parity due to low share of battery cost	Urban last-mile distribution with central hub and many stops	2017-21
Regional medium-duty truck hub-and-spoke delivery 	Third segment to reach TCO parity due to balanced capital and operating expenditure	Grocery store chain with logistics center for several branches	2017-23

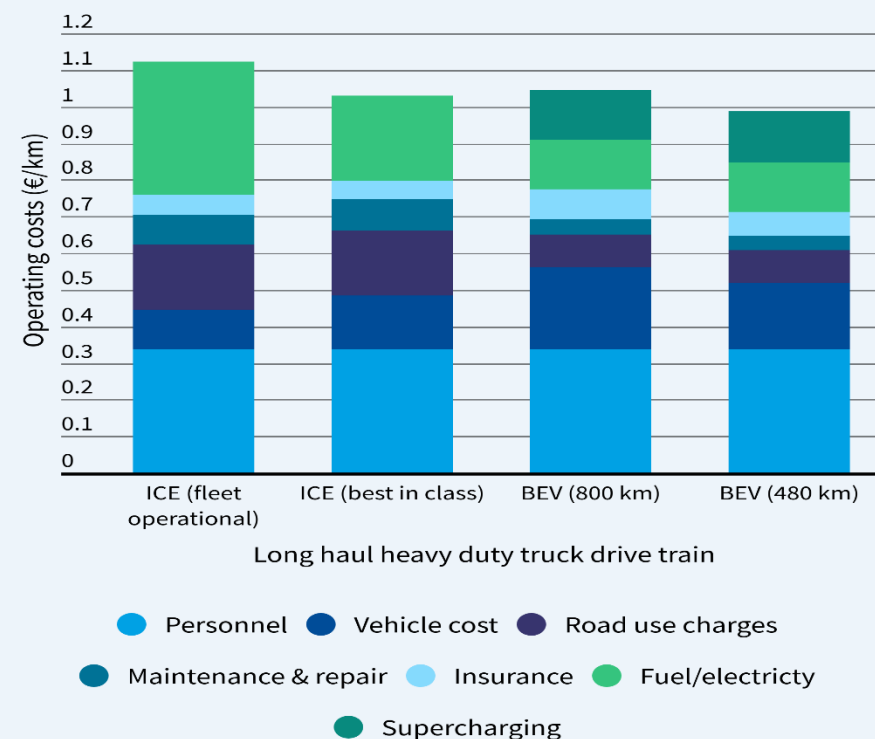
Expected ZEV sales (MHDVs)

by McKinsey

4-9% by 2025

19-31% by 2030

Stacking up the costs of a battery electric heavy duty truck



Main assumptions: Payback period of 5 years, 150 000 km/year mileage, €1/litre diesel price, €0.12/kWh electricity price (€0.12/kWh extra for supercharging), BEV pays half the infrastructure charges compared to best-in-class ICE, insurance proportional to upfront cost, maintenance and repair costs are halved for BEV.

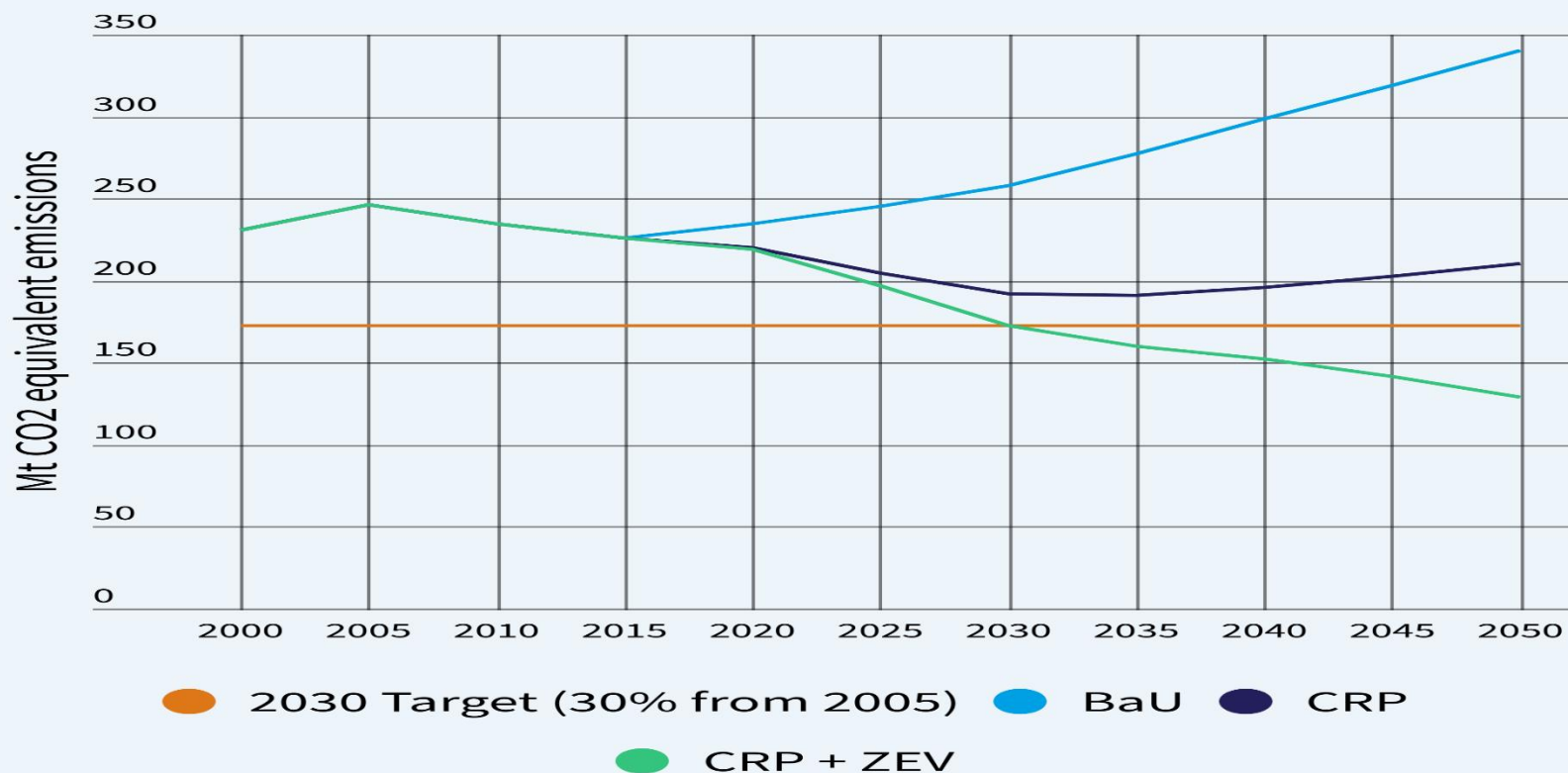
D. Sector needs it but traditional OEMs not yet delivering



Zero Emission
Stadslogistiek



Combination of HDV standards and ZEV sales to hit Europe's 2030 targets



Notes: BaU is business as usual; CRP is comprehensive reform package; ZEV refers to policy to push zero emission vehicle sales

ZEV mandate of 5-10% 2025 & 20-30% 2030 is required for meeting the targets

ZEV MANDATE IN MORE DETAIL

- ZEV trucks should get a zero rating in the CO2 standard.
- ZEV mandate for categories 4, 5, 9 and 10.
- But ZEVs from other categories can be counted (flexibilities to support market uptake).
- Need mileage weighting: Based on average lifetime and mileage (data from OEMs and fleets).
- Trading between OEMs should be allowed.

CONCLUSIONS

- Standards should aim to get all cost-effective potential out of trucks (24% by 2025 for tractors).
- First step: Ambitious 2025 targets with strong commitment for 2030 targets to be fixed in early 2020s. Trailers and engines should follow soon.
- Zero emission: HDV proposal needs to push EU OEMs to start selling ZEV trucks. Mandate is the most effective tool while providing flexibility for OEMs.

=> Win-win for climate and transport sector