



# **HDV CO<sub>2</sub> Emissions:**

## **Trends, tips and tricks for trucks (of the future)**

**Presented by DG CLIMA C4 - Road Transport Unit  
EU Commission**

**NABU and T&E workshop, Berlin, 23 March 2017**

# Outline

## **1. Outline**

## **2. Policy initiatives**

- **CO<sub>2</sub> emission certification, monitoring & standards**
- **Supporting regulatory steps**

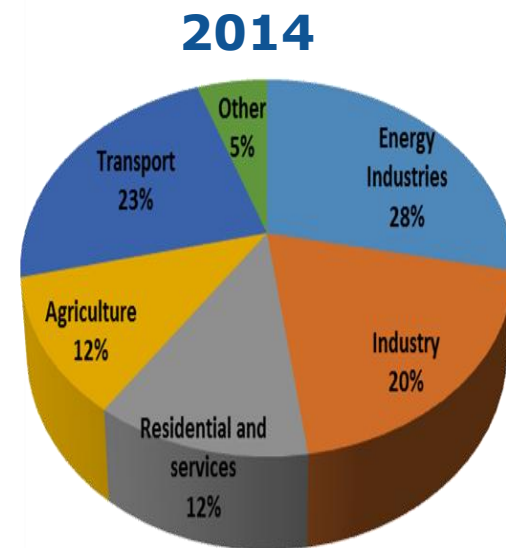
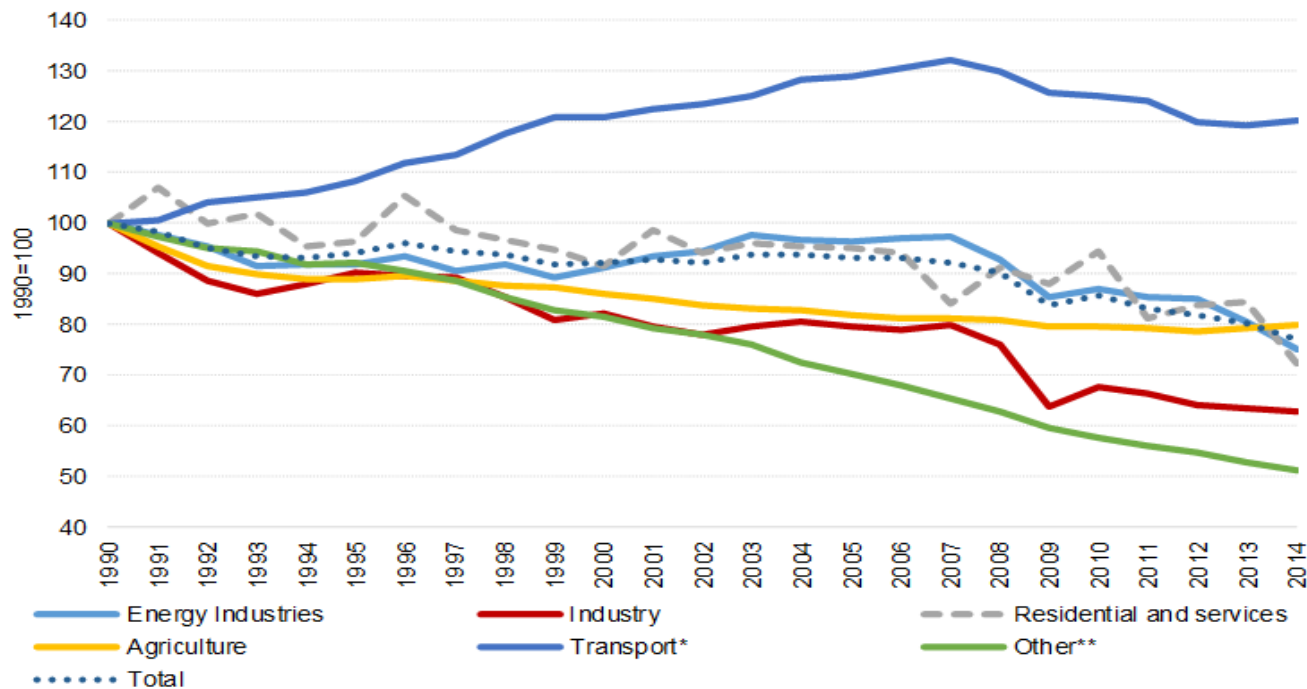
## **3. (What technologies will the future bring for trucks? )**



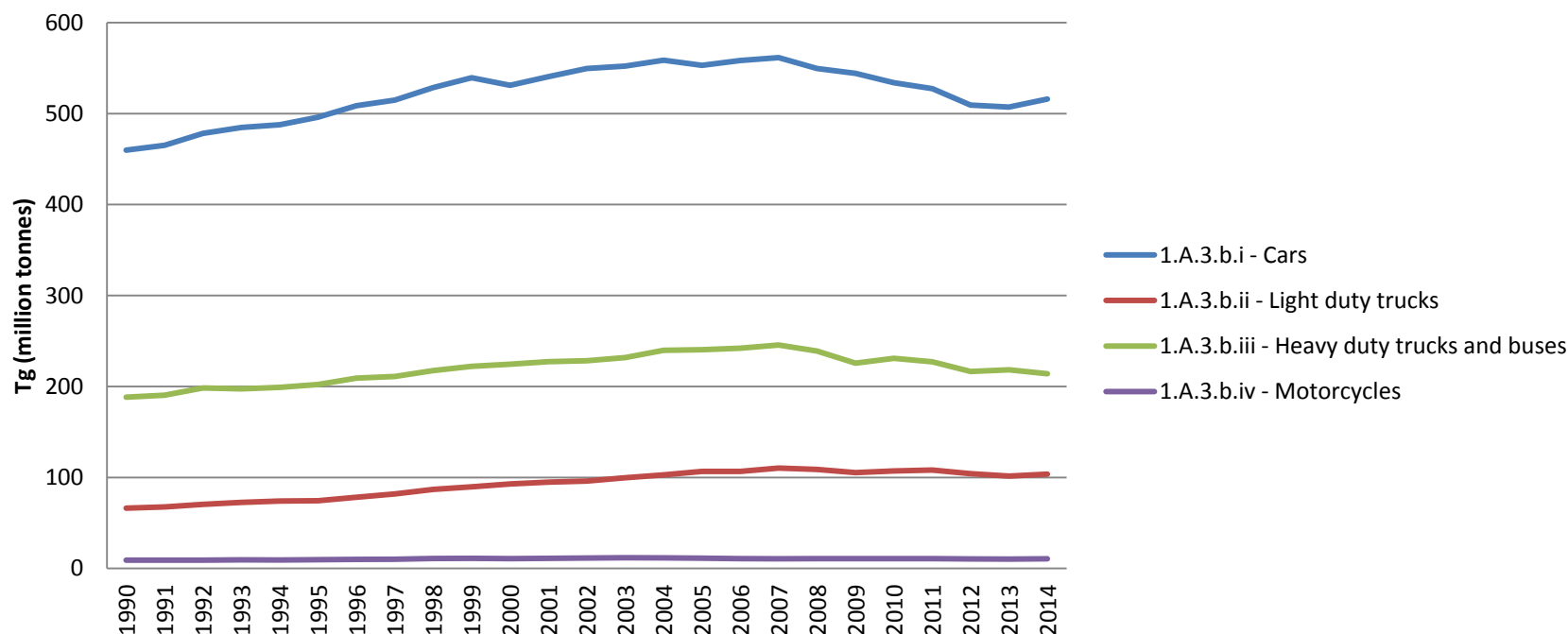
# Context

- **Low emission mobility strategy** (July 2016): *Transport, as a whole, should reduce its CO<sub>2</sub> emissions by at least 60% by 2050 compared to its 1990 level and be firmly on the path towards zero CO<sub>2</sub> emissions*
- **2030 Climate and energy framework** *requires a 30% reduction in greenhouse gas (GHG) emissions in sectors outside of the EU Emissions Trading System (ETS) by 2030 compared to 2005*
- **2014 Heavy Duty Vehicle (HDV) Strategy:** *HDV fuel consumption and CO<sub>2</sub> emissions to be measured and monitored to address some of the key market barriers by increasing market transparency and vehicle comparability*

# EU-28 GHG emissions – trend since 1990



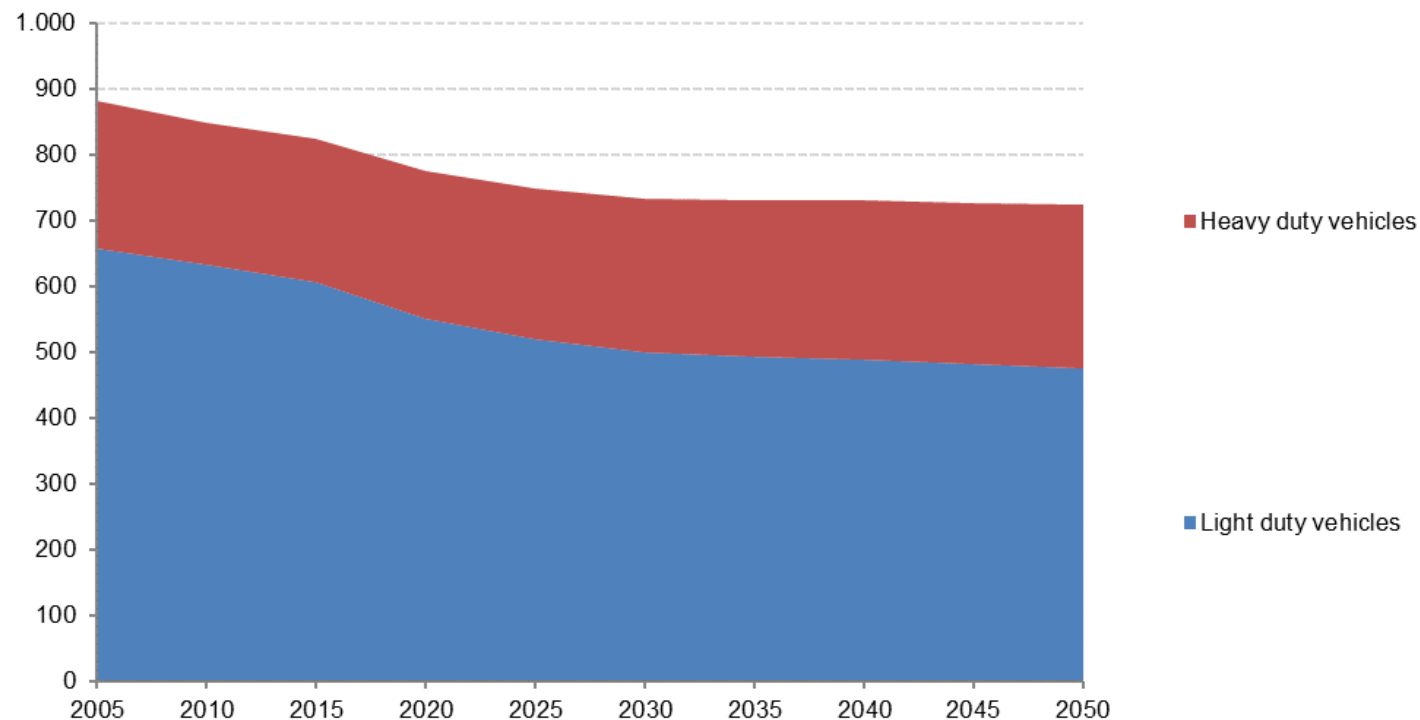
# EU28 GHG Road transport emissions 1990 - 2014



Source: GHG Emission Inventory data 2016  
<http://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer>

# Road transport - projections

**Projected emissions (Mt) by mode without additional policies  
(2016 Reference Scenario)**



## Cars and vans

Proposal  
(2017) on CO<sub>2</sub>  
standards for  
post-2020

Incentives for  
low- and zero-  
emission cars

## Lorries, coaches, and buses

Proposal  
(2017) on CO<sub>2</sub>  
monitoring  
and reporting

Proposal for  
CO<sub>2</sub> standards

## Fuels

Promote low-  
emission  
alternative  
energy

Alternative  
fuel  
infrastructure

# Scope and objective

**CO<sub>2</sub> emissions from HDVs are not certified nor monitored and reported**



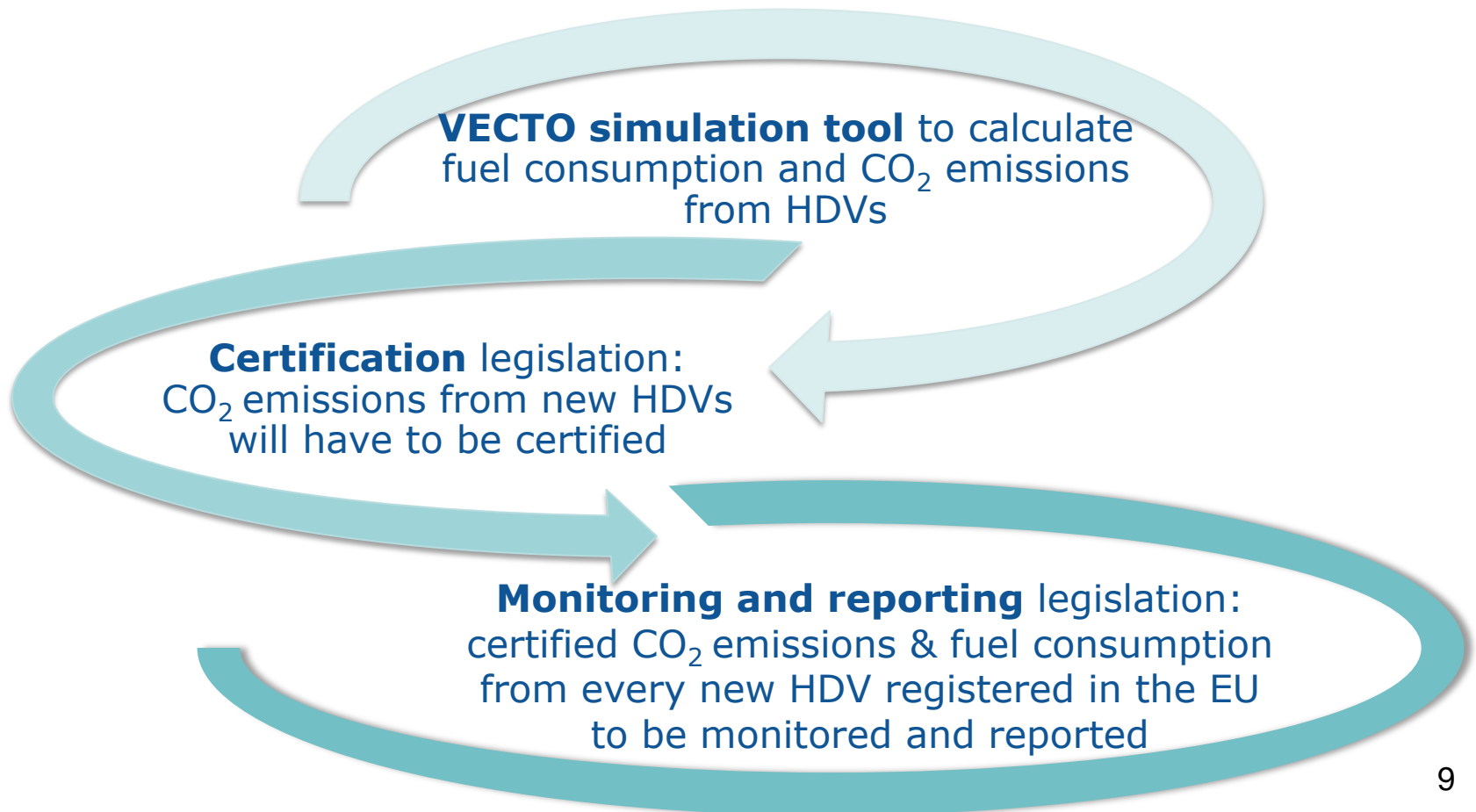
**Knowledge gap**



**Lack of transparency & → competitive pressure for uptake of most energy efficient technologies/vehicles**



# Three steps of monitoring & reporting



# Operational objectives

- ***Gather data needed for action to reduce GHG emissions from HDVs***
- ***Tackle market failure limiting the uptake of low emission technologies***
  - *Increased market transparency*
    - *Data publicly available, allowing comparison by operators*
  - *Increased vehicle efficiency*
    - *Operators better informed to choose most efficient truck*
  - *Improve competitiveness*



Simulation tool to calculate  
both, fuel consumption and  
CO<sub>2</sub> emissions from the **whole**  
vehicle

# VECTO modes

- **Declaration mode:** where all *generic data* and the *test cycle* are allocated automatically as soon as the ***vehicle class*** is defined
- **Engineering mode:** where the user can select and change all input data to allow recalculation of test data e.g. for model validation

# VECTO output

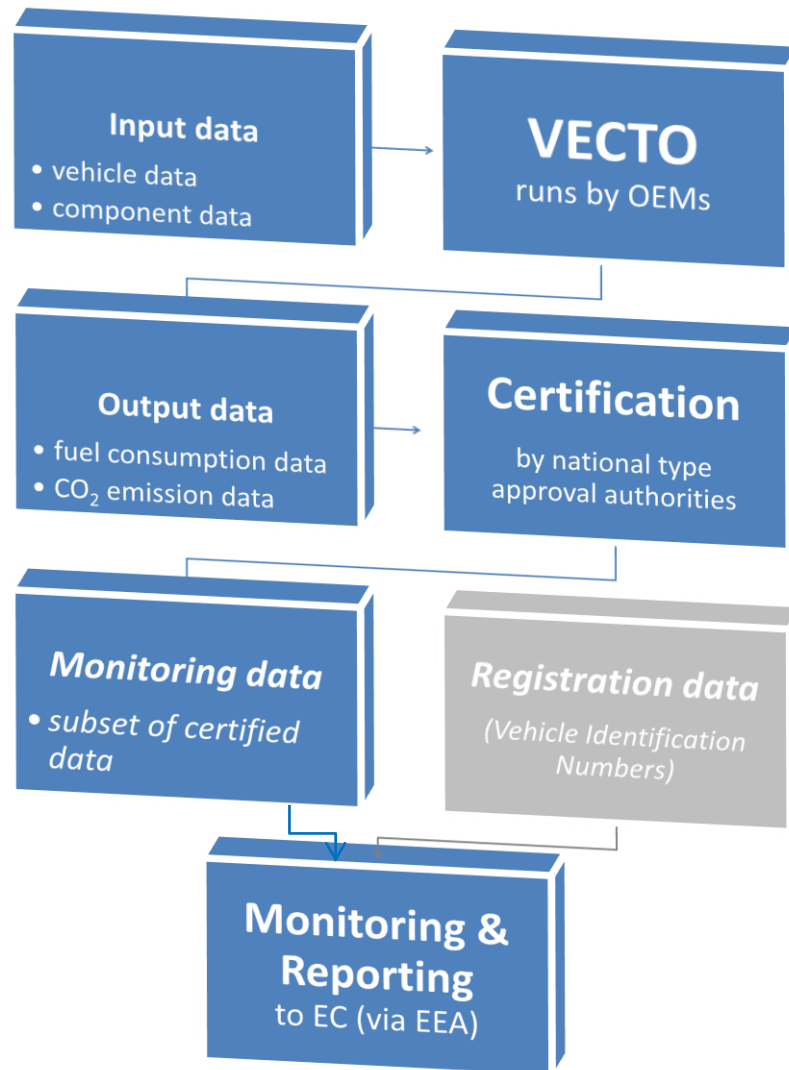
In the ***declaration mode:***

- FC and CO<sub>2</sub> emissions automatically calculated for all mission profiles allocated to the vehicle for average payload, full load and empty driving
- Results given in **g/km, g/(m<sup>3</sup> x km), g/(ton x km)**
- Accuracy compared to lab measurements: **+/- 3%**

# HDV CO<sub>2</sub> emission certification

- In the EU certification of motor vehicles takes place under type approval legislation as defined in the 2007/46/EC Framework Directive
- Upcoming new regulation on the certification of HDVs' CO<sub>2</sub> emissions and fuel consumption under the existing Regulation 595/2009 (EURO VI)

# Link VECTO-Certification-Monitoring

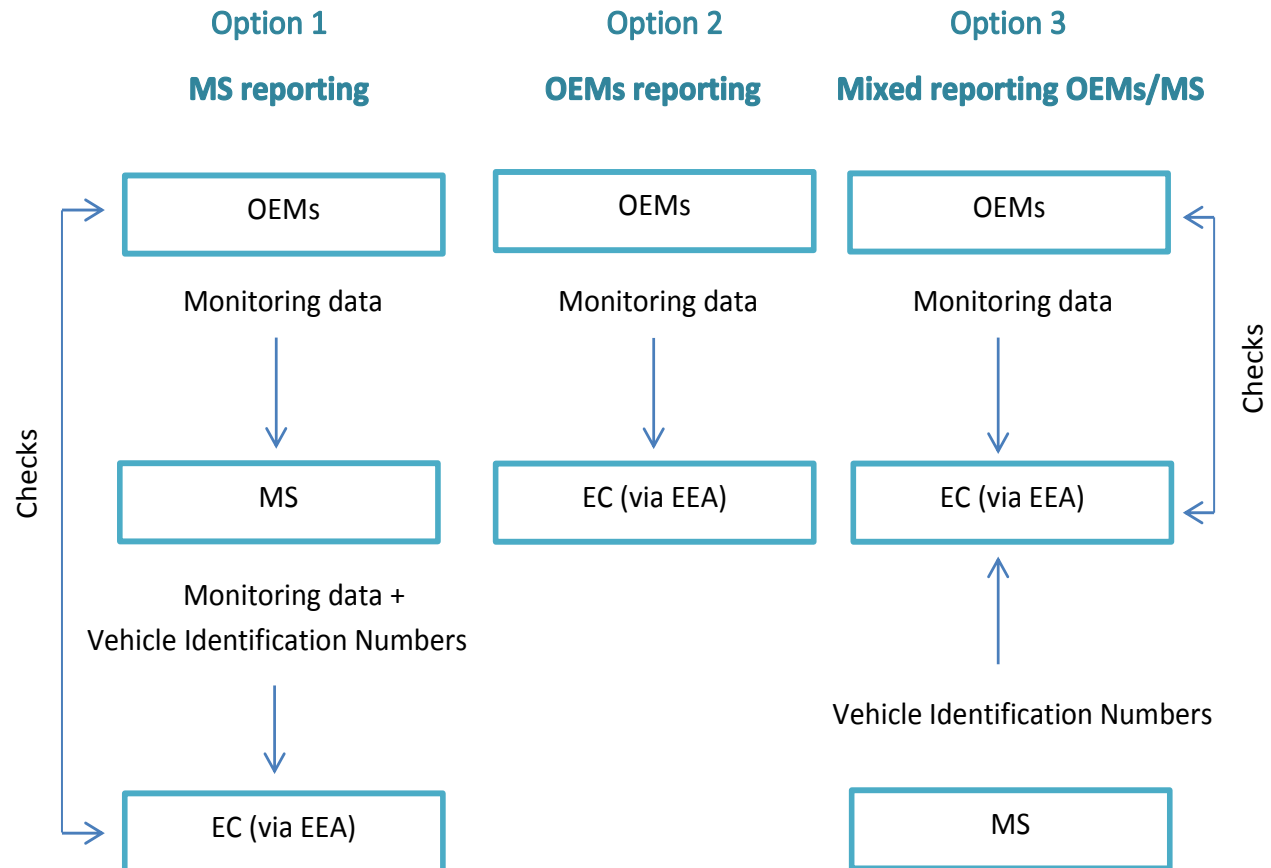


# Data to be monitored/reported

- List of parameters to be monitored and reported after certification, in particular:
  - **Fuel consumption**
    - for different mission profiles (driving cycles) and with different metrics (g/km or g/m<sup>3</sup>km or g/tkm)
  - **CO<sub>2</sub> emissions**
  - **Vehicle specifications and technologies used**
    - engine, gear box, axles, tires, start/stop system, etc.



# Options



# HDV CO<sub>2</sub> emission standards

- Proposal during this Commission's mandate
- Date of regulatory application still tbd
- More complex than CO<sub>2</sub> standards for LDV:  
17 vehicle classes, utility parameters,  
limited historical data,...

## Analysis:

- CO<sub>2</sub> emission baseline
- Technology improvements, cost & benefits

Identification of vehicle class			Vehicle class	Allocation of mission profile and vehicle configuration							Standard body allocation
Axle configuration	Chassis configuration	Maximum GVW		Long haul	Long haul (EMS)	Regional delivery	Regional delivery (EMS)	Urban delivery	Municipal utility	Construction	
4x2	Rigid	>3.5 – 7.5	(0)								
	Rigid (or tractor)*	7.5 - 10	1			R		R			B1
	Rigid (or tractor)*	>10 - 12	2	R+T1		R		R			B2
	Rigid (or tractor)*	>12 - 16	3			R		R			B3
	Rigid	>16	4	R+T2		R			R		B4
	Tractor	7.5 - 16	5	T+ST	T+ST+T2	T+ST	T+ST+T2				
4x4	Rigid	>16	(6)								
	Rigid	>16	(7)								
	Tractor	all weights	(8)								
6x2	Rigid	all weights	9	R+T2	R+D+ST	R	R+D+ST		R		B5
	Tractor	all weights	10	T+ST	T+ST+T2	T+ST	T+ST+T2				
6x4	Rigid	all weights	11	R+T2	R+D+ST	R	R+D+ST		R	R	B5
	Tractor	all weights	12	T+ST	T+ST+T2	T+ST	T+ST+T2			R	
6x6	Rigid	all weights	(13)								
	Tractor	all weights	(14)								
8x2	Rigid	all weights	(15)								
8x4	Rigid	all weights	16							R	
8x6 8x8	Rigid	all weights	(17)								

R = Rigid & standard body  
 T1, T2 = Standard trailers  
 ST = Standard semitrailer  
 D = Standard dolly

Initially: standard bodies & trailers, only vehicle standards

Final objective: consider real vehicle configuration, separate trailer standards

# HDV CO<sub>2</sub> emission standards: next steps

## Extension of scope:

- All truck classes
- Buses & coaches
- Trailers

## Technologies:

- A lot of things (waste heat recovery, AT,...)
- In particular: hybridisation

## Timeline:

- Gradual/stepwise increase of stringency

# Energy efficiency of trucks

Directive 96/53 as amended by Directive 2015/719 on weights & dimensions of road vehicles in international traffic:

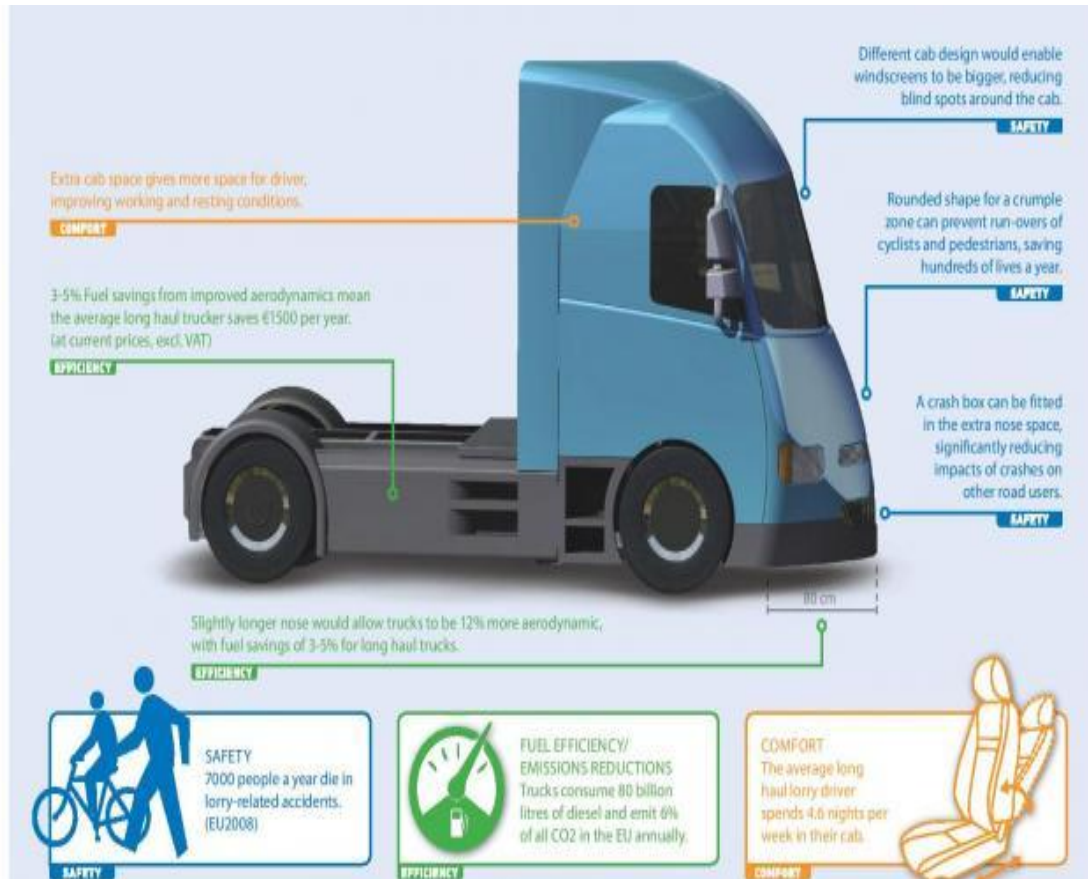
- Retractable or foldable aerodynamic devices to the rear
  - New (elongated) cab profiles
- are allowed, even if maximum length is exceeded

Certain type approval requirements:

- Safety assessment (pedestrians/cyclists, collisions)
- Improved aerodynamic performance

To be specified in TA Comitology under General Safety Regulation 661/2009 => vote in TCMV scheduled for end 2017

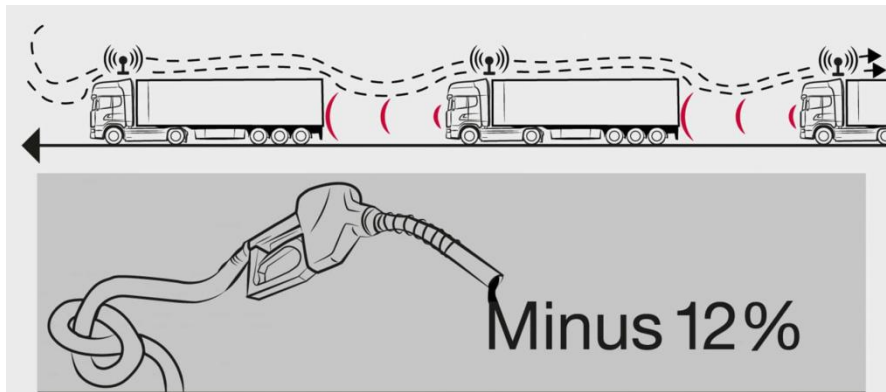
# Energy efficiency of trucks



"Typical" European truck of the future  
(Copyright T&E)



# New forms of road transport



Platooning & autonomous driving:  
only the first and last truck experience large air drag forces. Fuel savings up to 15% are discussed. Can improve safety and reduce traffic jams.

Mega & EMS trucks:  
length > 18,75 m or  
gross vehicle weight > 40 t.  
Significant fuel savings, but issues with safety, infrastructure logistics and wear. Currently national registration possible in some Member States, future cross-border traffic to be decided on EU level.



# Towards carbon-free transport

- Renewable fuels (bio & synthetic)
- Hydrogen / fuel cells
- Electrification
- Prefer transport by railway where possible, adapt infrastructure & logistics



# Towards carbon-free transport



Electrified roads: certain share of the road network to be equipped with overhead wiring (or inductive charging?), driving on the non-electrified parts with battery power or diesel/gas engines. Costs of 2 mio. €/km have been quoted.

Battery-electric trucks: currently electric range up to 200 km, probably only suitable for urban and regional delivery and the smaller truck segments.



# Thank you for your attention!

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