

**講演2**

**Euro7  
- New proposal for vehicle emissions type  
approval in Europe -**

**Scientific Project Officer European Commission Joint Research Centre**

**Dr. Ricardo Suarez-Bertoa**

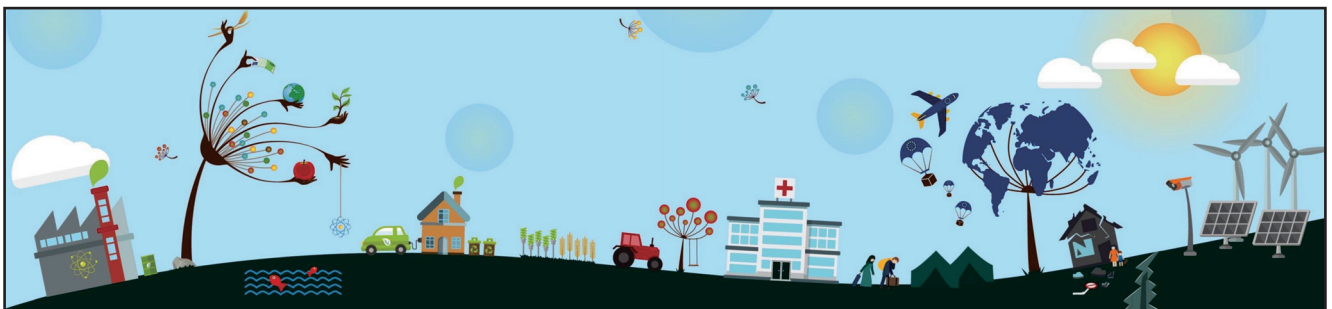


# Euro 7

New proposal for vehicle emissions type approval in Europe

R. Suarez-Bertoa

*Way forward for realization of automobiles as options for carbon-neutral society*



## JRC Mission

As the science and knowledge service of the Commission our mission is to support EU policies with independent evidence throughout the whole policy cycle.

## JRC sites

Headquarters in **Brussels**  
and research facilities located  
in **5 Member States**:

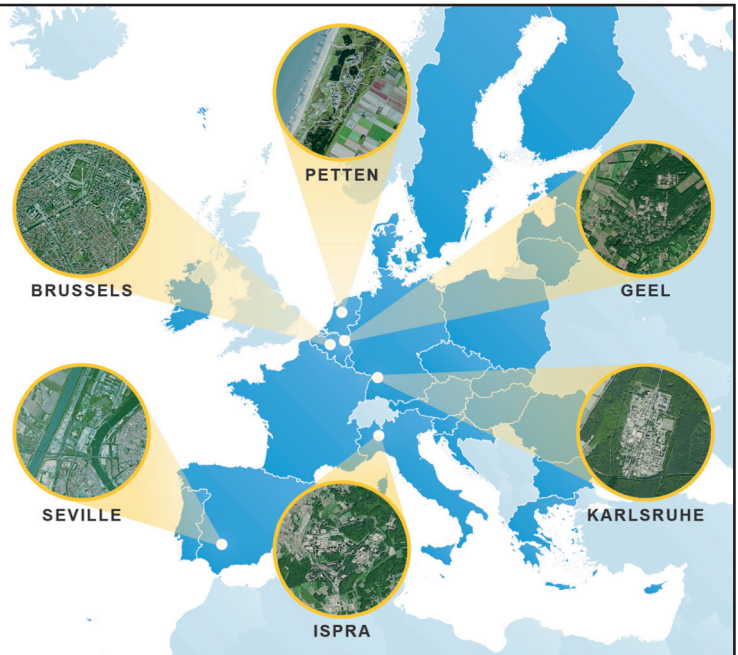
Belgium (Geel)

Germany (Karlsruhe)

Italy (Ispra)

The Netherlands (Petten)

Spain (Seville)



## Euro 7

New proposal for vehicle emissions type approval in Europe



## Wider context of Air Pollutant Emissions

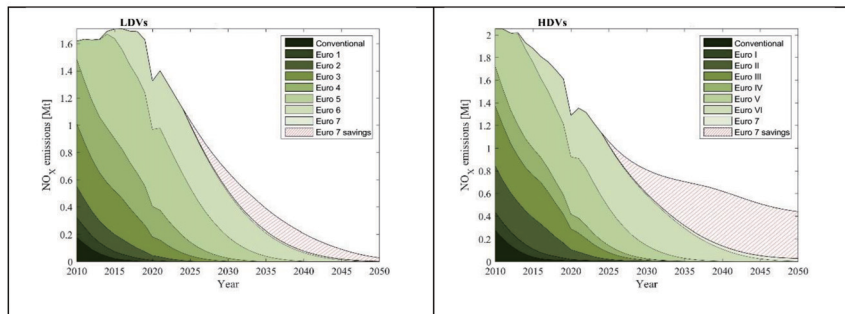


## The need to act

- **Important health and environmental concerns:** ~70.000 premature deaths due to road transport emissions in Europe each year
- **New Ambient Air Quality limits**
- **Selective Internal Combustion Engine (ICE) bans** from MS/cities and risk for single market
- **Developments in key world markets**
- **Conventional vehicles will stay in circulation** and brakes/tyres also emit

6

## Tapping the remaining potential for combustion engines



- Previous Euro emissions legislation has significant benefits
- All passenger cars sold in Europe after 1 September 2019 are Real-Driving-Emissions (RDE) compliant
- But potential remains to improve it further through Euro 7, in particular for heavy-duty vehicles

7



## Euro 7 Objectives

- Improve **air quality**
  - Limit pollutants at the source → **make a difference where it matters most**
  - Take account of new developments (electrification, digitalisation, batteries, brakes and tyres) → **future proof legislation**
- Ensure proper **functioning of internal market**
  - Avoid obstacles (incl. market imbalance across the EU) → **affordability, access restrictions...**
  - Reduce complexity and compliance costs → **look for synergies where they exist**
  - Ensure compliance throughout more representative lifetime → **second-hand markets**

8



EURO 6 for cars, vans

EURO VI for buses, lorries

ICE vehicles



Electric and H2 vehicles

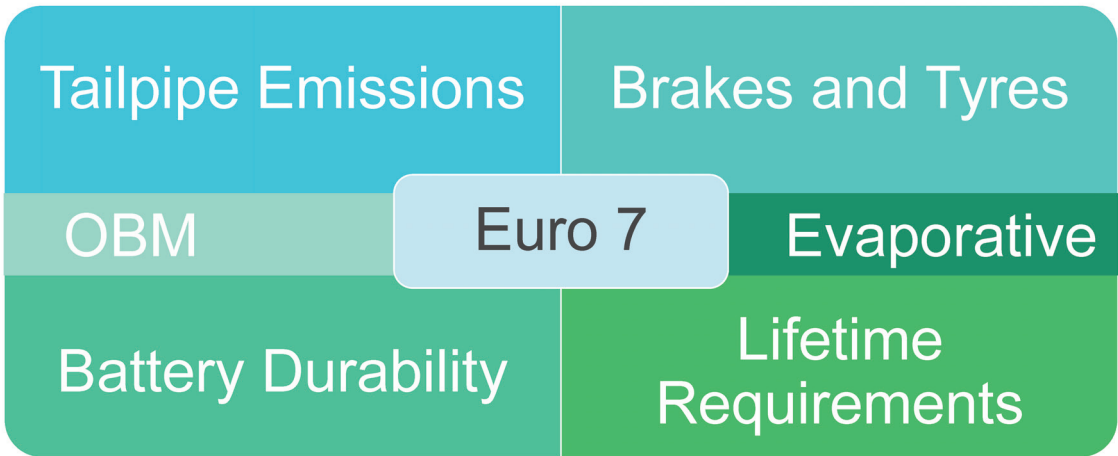


**Euro 7**  
for cars, vans, buses, lorries

Significant simplification of legislation and testing  
Longer lifetime coverage  
Digital monitoring of compliance  
Brake particles *and* Microplastics from tyres

Fuel- and technology-neutral emission limits:  
NOx, particles, hydrocarbons, CO, ammonia, ...  
More representative on-road tests under wider driving conditions

In-vehicle battery durability (*complementing Battery Regulation*)



## Estimated impact of Euro 7 in 2035 (compared with Euro 6/VI)

### Reduction of NOx emissions

➤ **35%** from cars and vans

➤ **56%** from buses and lorries

### Reduction of particles from the tailpipe

➤ **13%** from cars and vans

➤ **39%** from buses and lorries

### Reduction of particles from the brakes

➤ **27%** from the brakes of a car and vans

### Low impact on consumers

These emission reductions are expected to be achieved with existing technologies. A moderate impact on the costs of cars - between €90 and €150 - and on the cost of buses and lorries - around €2600 - is expected.

### Big benefit for health and environment

For each euro spent on technologies for Euro 7, more than 5 euros are saved on health and environment.



## Euro 7 – Light Duty vehicles (LDV)





## Pollutants & emission limits – LDV

Table 1: Euro 7 exhaust emission limits for M<sub>1</sub>, N<sub>1</sub> vehicles with internal combustion engine

Pollutant emissions	M <sub>1</sub> , N <sub>1</sub> vehicles	Only for N <sub>1</sub> vehicles with power to mass ratio <sup>1</sup> less than 35 kW/t	Emission budget for all trips less than 10 km for M <sub>1</sub> , N <sub>1</sub> vehicles	Emission budget for all trips less than 10 km only for N <sub>1</sub> vehicles with power to mass ratio less than 35 kW/t
	<i>per km</i>	<i>per km</i>	<i>per trip</i>	<i>per trip</i>
NO <sub>x</sub> in mg	60	75	600	750
PM in mg	4.5	4.5	45	45
PN <sub>10</sub> in #	6×10 <sup>11</sup>	6×10 <sup>11</sup>	6×10 <sup>12</sup>	6×10 <sup>12</sup>
CO in mg	500	630	5000	6300
THC in mg	100	130	1000	1300
NMHC in mg	68	90	680	900
NH <sub>3</sub> in mg	20	20	200	200



## RDE testing conditions – LDV

Table 1: Conditions for testing compliance of M<sub>1</sub>, N<sub>1</sub> vehicles with exhaust emission limits with any market fuel and lubricant within the specifications issued by the manufacturer of the vehicle

Parameter	Normal driving conditions	Extended driving conditions*
Extended driving divider	-	1.6 (applies to measured emissions only during the time when one of the conditions set out in this column applies)
Ambient temperature	0°C to 35°C	-10°C to 0°C or 35°C to 45°C
Maximum altitude	700 m	More than 700 m and below 1 800 m
Maximum speed	Up to 145 km/h	Between 145 and 160 km/h
Towing/aerodynamic modifications	Not allowed	Allowed according to manufacturer specifications and up to the regulated speed.
Auxiliaries	Possible as per normal use	-
Maximum average wheel power during first 2 km after cold start	Lower than 20% of maximum wheel power	Higher than 20% of maximum wheel power
Trip composition	Any	-
Minimum mileage	10 000 km	Between 3 000 and 10 000 km

\* The same emission strategy shall be used when a vehicle is run outside those conditions, unless there is a technical reason approved by the type approval authority.



## New elements

Table 1: Euro 7 Minimum performance requirements (MPR) for battery durability for M<sub>1</sub> vehicles

Table 3: Euro 7 evaporative emission limits for petrol fuelled M<sub>1</sub>, N<sub>1</sub> vehicles

Table 4: Euro 7 brake particle emission limits in standard driving cycle applying until 31/12/2034

Emission limits in mg/km per vehicle	M <sub>1</sub> , N <sub>1</sub> vehicles	M <sub>2</sub> , M <sub>3</sub> vehicles	N <sub>2</sub> , N <sub>3</sub> vehicles
Brake particle emissions (PM <sub>10</sub> )	7		
Brake particle emissions (PN)			

15



## Euro 7 – Heavy Duty vehicles (HDV)



## Pollutants & emission limits – HDV

Table 2: Euro 7 exhaust emission limits for M<sub>2</sub>, M<sub>3</sub>, N<sub>2</sub> and N<sub>3</sub> vehicles with internal combustion engine and internal combustion engines used in those vehicles

Pollutant emissions	Cold emissions <sup>2</sup>	Hot emissions <sup>3</sup>	Emission budget for all trips less than 3*WHTC long	Optional idle emission limits <sup>4</sup>
	<i>per kWh</i>	<i>per kWh</i>	<i>per kWh</i>	<i>per hour</i>
NO <sub>x</sub> in mg	350	90	150	5000
PM in mg	12	8	10	
PN <sub>10</sub> in #	5x10 <sup>11</sup>	2x10 <sup>11</sup>	3x10 <sup>11</sup>	
CO in mg	3500	200	2700	
NMOG in mg	200	50	75	
NH <sub>3</sub> in mg	65	65	70	
CH <sub>4</sub> in mg	500	350	500	
N <sub>2</sub> O in mg	160	100	140	
HCHO in mg	30	30	30	

<sup>2</sup> Cold emissions refers to the 100<sup>th</sup> percentile of moving windows (MW) of 1 WHTC for vehicles, or WHTC<sub>cold</sub> for engines

<sup>3</sup> Hot emission refers to the 90<sup>th</sup> percentile of moving windows (MW) of 1 WHTC for vehicles or WHTC<sub>hot</sub> for engines

<sup>4</sup> Applicable only if a system is not present that automatically shuts down the engine after 300 seconds of continuous idling operation (once the vehicle is stopped and brakes applied)



## RDE testing conditions – HDV

Parameter	Normal driving conditions	Extended driving conditions*
Extended Driving Divider	-	2 (applies to measured emissions only during the time when one of the conditions set out in this column applies)
Ambient temperature	-7°C to 35°C	-10°C to -7°C or 35°C to 45°C
Vehicle Payload	Higher or equal than 10%	Less than 10%
Auxiliaries	Possible as per normal use	-
Internal Combustion Engine Loading at cold start	Any	-
Trip composition	As per usual use	-
Minimum mileage	5 000 km for <16t TPMLM 10 000 km for > 16t TPMLM	Between 3 000 km and 5 000 km for <16t TPMLM Between 3 000 km and 10 000 km for > 16t TPMLM



## Ongoing work - HDV

- Durability multiplier for additional lifetime
- Brake particle emissions test
- Tyre abrasion test
- Battery durability requirements
- OBM

19



## Timing

- Quick adoption is needed in order to have a good return on investment
- Quick adoption is consistently requested by industry (OEMs and suppliers), civil society and NGOs (POLIS, EUROCITIES, T&E, ICCT, ...), Member States and several MPs

20



## Conclusions

- The proposal is based on whole-vehicle testing on the road on typical use, including short trips, larger boundaries and larger durability resulting in significant emission savings
- The finally selected option is a balanced proposal which has **significant net benefits for the EU: €145,4 billion between 2025-2050**
- It requires minimal changes to cars and vans (mostly calibration of the engine, OBM for ICE and cleaner brakes for all)
- It requires technologies already used for buses and lorries (i.e. double SCR, slightly better particle filter, OBM for ICE)

21



# Thank you

22



\*Based on EU Mix fit-for-55 Scenario 2021 reflecting the impact of the agreed CO<sub>2</sub> standards for cars and vans

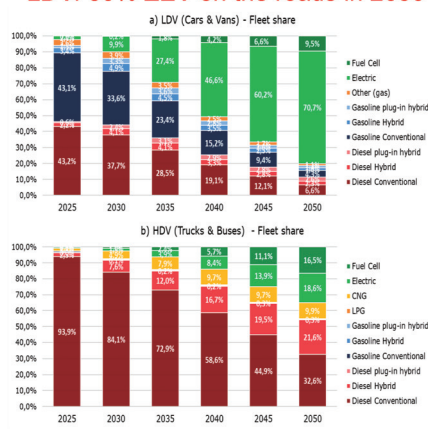
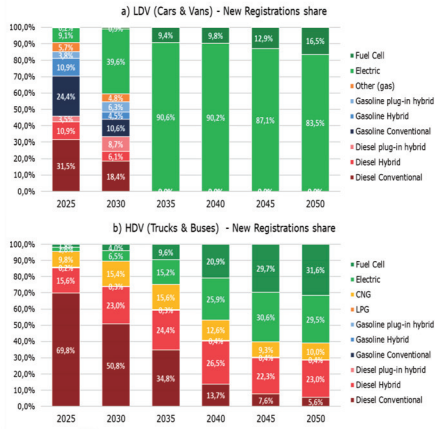
# A changing environment for the automotive industry

Sales of new vehicles:

Vehicles on the roads:

**LDV: 100% ZEV sold from 2035 on**

**LDV: 80% ZEV on the roads in 2050**



**HDV: only 61% ZEV sold in 2050**

**HDV: 35% ZEV on the roads in 2050**

