



European Commission

AECC Technical Seminar on Heavy Duty Engine Emissions

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Future Euro VI emissions legislation and World Harmonization

José P. LAGUNA-GOMEZ

Unit F.1 (Automotive Industry)

Directorate-General for Enterprise and Industry



Agenda

- **Framework and background of the EU legislation**
- **Key issues for Euro IV and V**
- **Euro VI**
- **Conclusions**



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Framework of the EU legislation

- **Type-Approval system**
- **Procedure whereby an EU Member State certifies that a type of vehicle satisfies the relevant administrative provisions and technical requirements relating to:**
 - ❖ **Active and Passive Safety**
 - ❖ **Protection of the Environment**
 - ❖ **Performances and other issues**

Framework of the EU legislation

- **Objectives:**
 - ❖ **to enable vehicles to be placed on the market**
 - ❖ **Environmental standards for vehicles harmonised at the EU level to ensure a single market for new vehicles**
- **The concept is also applicable to technical units (e.g. engine type / engine family) and components**

Background

- **AutoOil 1 and AutoOil 2 integrated programmes were important milestones in policy development**
- **Euro VI is developed in the context of the Clean Air For Europe (CAFE) Programme, that:**
 - **Aims to develop a long-term, strategic and integrated policy to protect against the effects of air pollution on health & the environment.**
 - **Seeks to provide a cross-sectoral view of alternative measures to reduce air pollution.**

Background

- **Road transport remains an important cause of air pollution in Europe**
 - ❖ **It is the largest contributor to NO_x emissions and the second largest for PM₁₀**
 - ❖ **By 2020, emissions of NO_x and PM are forecast to go down even without further vehicle measures**
 - ❖ **To meet the ambition level of the Thematic Strategy on Air Pollution (CAFÉ Programme), further reductions on both pollutants are needed .**

Background

- **The health impacts of air pollution remains a problem**
 - ❖ **No safe level for human exposure to particulate matter. Smaller particles may be more damaging**
 - ❖ **Average life expectancy is currently shortened by about 9 months in the EU, by 2020 forecast to be shortened by about 5 months**

Recommendations from CARS 21

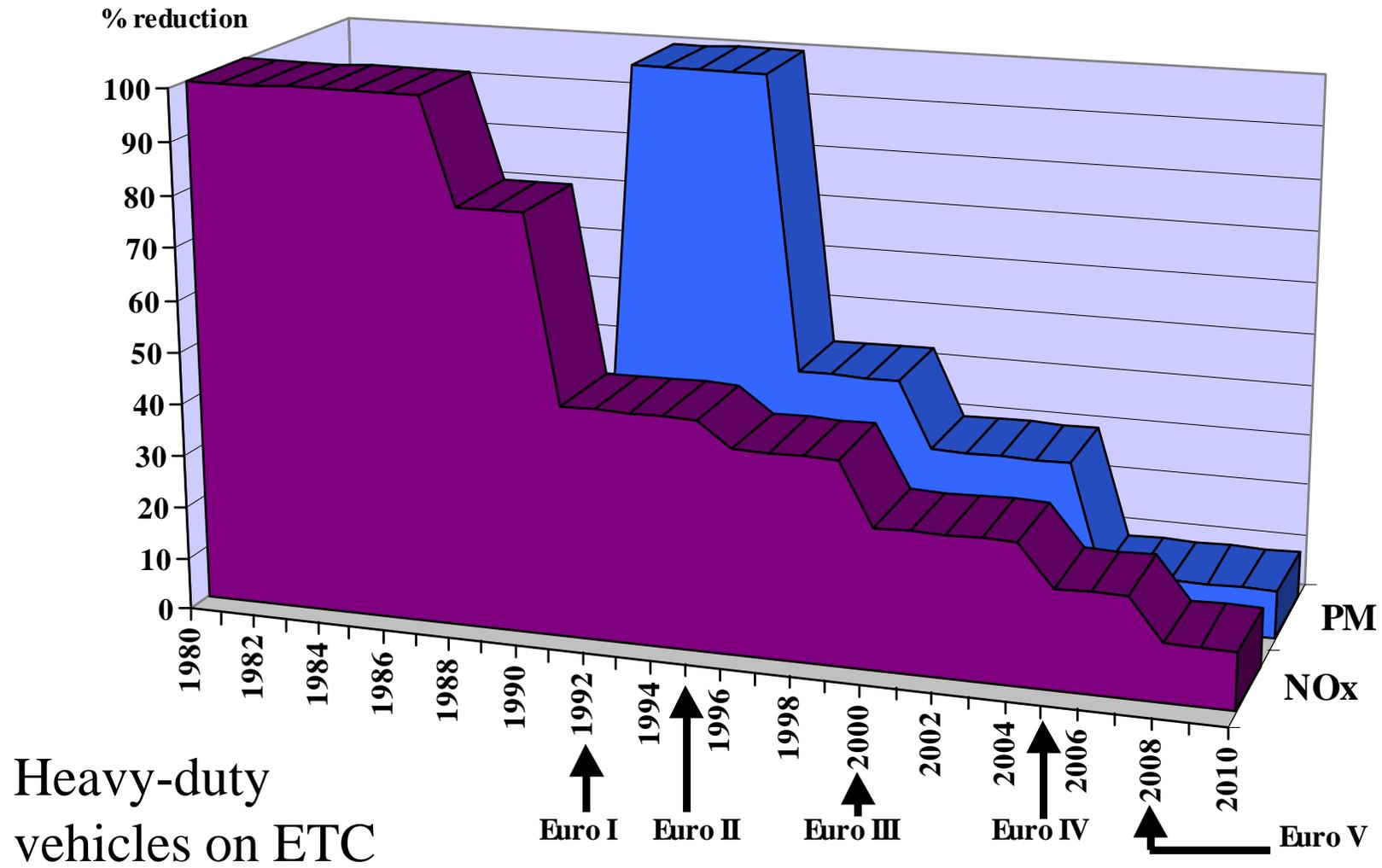
- **CARS 21: A Competitive Automotive Regulatory System for the 21st century**
- **Simplification - Replacing EC Directives by UNECE Regulations**
- **Application of the principle of Better Regulation – Impact Assessment**
- **Support of international harmonisation**



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Emission standards have brought big reductions in emissions



Scope of Euro IV and V

- **The scope has changed according to Regulation (EC) 715/2007 (Euro 5&6):**
 - **In general, applicable to all engines intended to be placed in vehicles of categories M1, M2, M3, N1, N2 and N3 with a reference mass higher than 2610 kg**
 - **Exception for engines intended to be placed in vehicles of categories M1, M2, N1 and N2 with a reference mass lower than 2840 kg, if approved according to Regulation (EC) 715/2007**

Euro IV emission limits

- Euro IV introduces reductions of 30% in NO_x and 80% in particulates relative to Euro III:

ESC and ELR cycles

g/kWh	CO	HC	NO _x	Particulates	Smoke (m ⁻¹)
Euro 4	1.5	0.46	3.5	0.02	0.5

ETC cycle

g/kWh	CO	NMHC	NO _x	CH ₄	Particulates
Euro 4	4.0	0.55	3.5	1.1	0.03

Euro V emission limits

From 1 October 2008:

- **the NO_x limit on both the ESC and the ETC cycles will be 2.0 g/kWh.**
- **This implies a further 43% reduction on NO_x emissions**

Additional requirements

The current directives include requirements relating to:

In-service conformity.

- The manufacturer will have to demonstrate to the Type-Approval Authority that its vehicles fulfil the established requirements during the whole useful life.

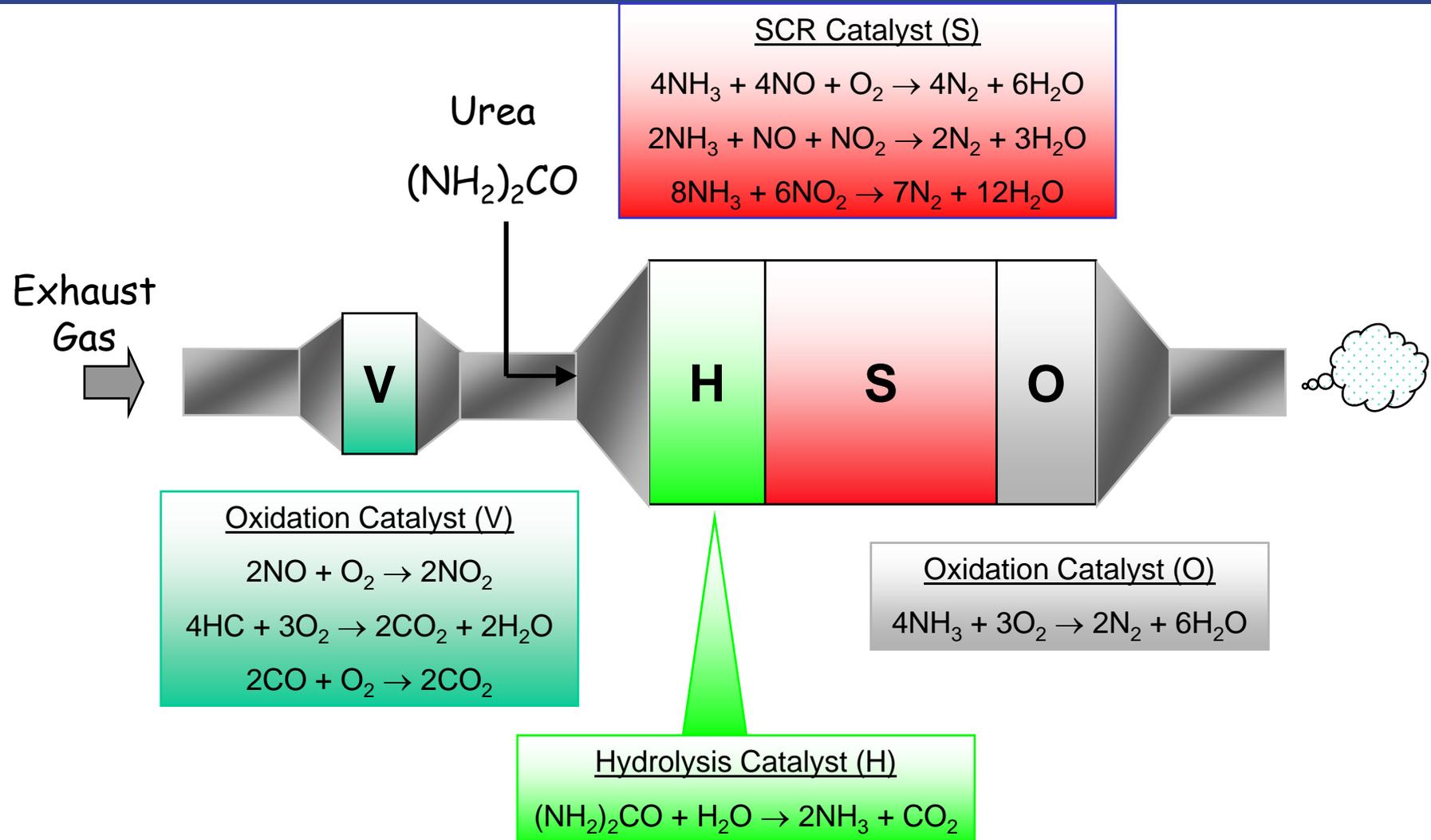
Durability of the after-treatment system.

- To fulfil the limit values at Type Approval, the manufacturer will take into account the deterioration of the after-treatment system during the useful life of the vehicle.

On Board Diagnostics (OBD).

- The OBD system will monitor the components that have an influence on emissions to inform the driver about their failure so that correction measures would be taken.

Urea SCR is used in the EU



SCR systems to achieve Euro IV and V limits

- **SCR systems rely on the dosing of a urea based reagent**
- **SCR equipped vehicles already introduced on EU market in 2006;**
- **Without reagent, NO_x emissions of a Euro V vehicle could be as poor as a Euro II vehicle – completely unacceptable !**



Concerns regarding SCR

- **Refilling of urea tank;**
- **Use of urea being a standard quality;**
- **Availability of urea;**
- **Urea storage tanks large enough;**
- **Tampering to save money;**
- **Reliability and availability of sensors.**

Anti-tampering measures

- Measures are introduced to prevent the tampering of the NO_x emissions control (failure of the EGR system, lack of reagent, bad quality of the reagent or incorrect dosing).
- The anti-tampering system includes a “torque limiter” to reduce the performance of the engine if any of the cases mentioned above occurs.
- Correct operation of the emission control monitoring system will be demonstrated during the type approval process.

UNECE – Global Technical Regulations

- **New GTRs provide a pathway for harmonising requirements at a technical level;**
- **Heavy duty regulations on WHDC and OBD already adopted (November 2006) and transposed into ECE R.49;**
- **OCE due to be finalised soon;**
- **To be implemented with Euro VI.**

UNECE – Global Technical Regulations

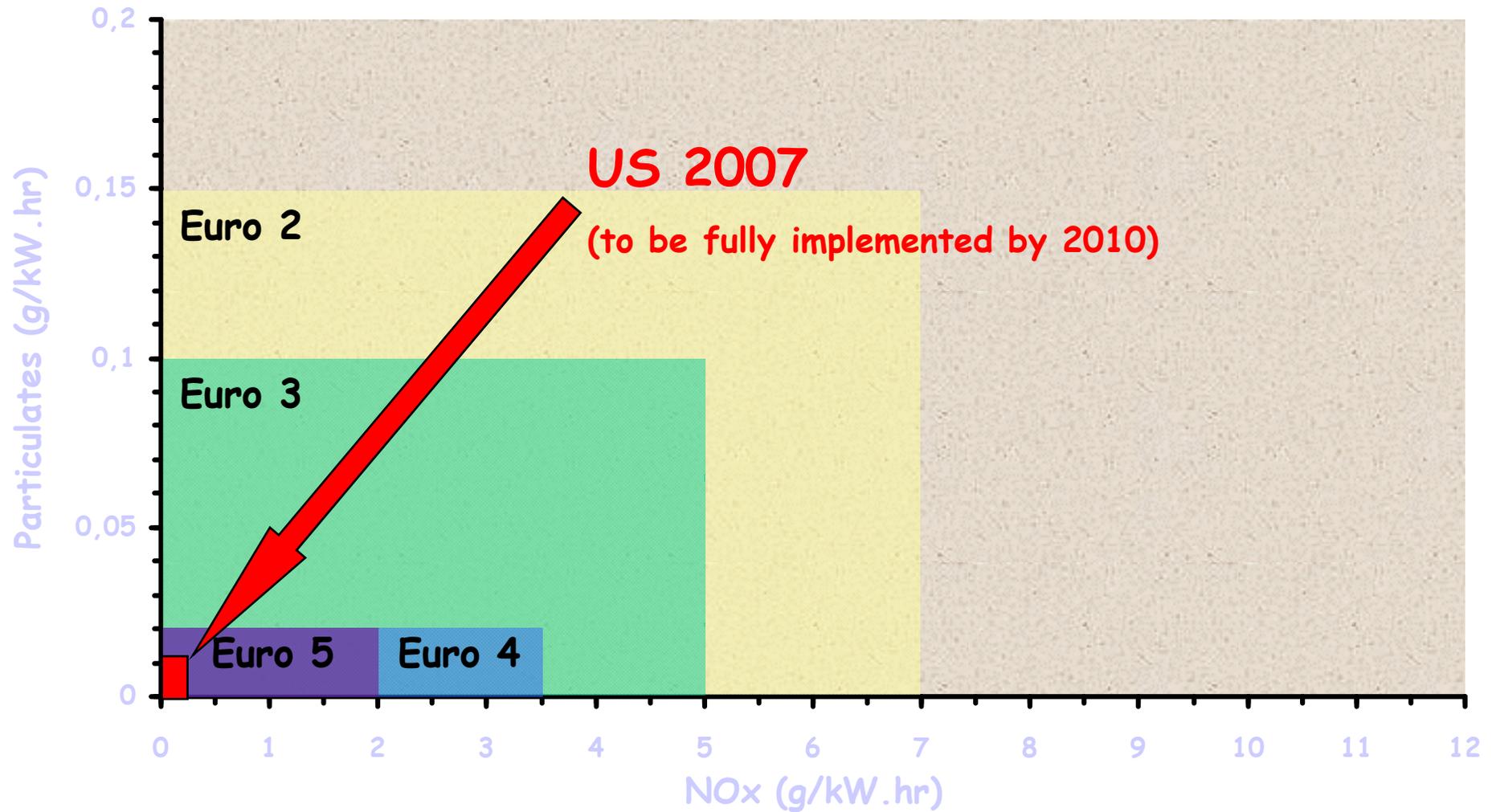
- **Options on WHDC:**
 - **Soak period**
 - **Weighting factors**
 - **Filter material and size**
 - **Reference fuel**
- **To be removed as soon as possible**



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How far should Euro VI go?



Euro VI stage

- **It will adopt the form of a Regulation developed using the "split level approach", which means that:**
 - ❖ **The political part of the Regulation (scope, limit values, timing, etc) is adopted by co-decision (European Parliament and Council).**
 - ❖ **The technical part of the Regulation is adopted by the Commission through comitology (Committee for Adaptation to Technical Progress - CATP).**

Euro VI stage

- **Being considered for 2013 – 2014**
- **Public consultation on limit values between 10 July and 5 September 2007**
- http://ec.europa.eu/enterprise/automotive/page_sbackground/pollutant_emission/heavy_duty/public_consultation/contributions.htm
- **4 scenarios are developed**
 - **NO_x: 50 – 90% reduction from Euro V**
 - **PM: 33 – 66% reduction from Euro V**

Euro VI emission scenarios

g/kWh	A		B		C		D	
Engine	CI ²⁾	PI ³⁾						
PM	0.01	0.01	0.02	0.02	0.015	0.02	0.015	0.01
NOx	0.4	0.4	0.2	2.0	1.0	2.0	0.5	1.0
THC	0.16	0.66	0.55	1.05	0.55	1.05	0.55	1.05
CO	4.0	4.0	4.0	3.0	4.0	3.0	4.0	3.0
NH ₃ ⁴⁾	10 ppm							
Increased CO ₂ ⁴⁾	2-3 %	-	5-6%	-	Neutral	-	Neutral	-

1) To be applicable to vehicles using SCR (Selective Catalytic Reduction) after-treatment technology

2) Engines fuelled with diesel and ethanol

3) Engines fuelled with natural gas (NG) and liquefied petroleum gas (LPG)

4) Anticipated additional CO₂ emissions resulting from the various scenarios

Euro VI emission limits

- **NO_x (0.4 g/kWh) and PM (0.010-0.015) standards are similar to those in US**
- **Differences (EU/US) in the legislative framework to be taken into account (ABT issue)**
- **Expected technologies to be used**
 - PM traps
 - SCR + EGR
 - DOC and Ammonia catalyst
- **Economic and environmental impacts to be considered**

Results of public consultation

- 55 replies received
- Vast majority support a **single step** with limit values close to US 2010 (A or D)
- Majority supports **scenario A**
- **CO₂ impacts** not considered as issue - fuel penalty associated will be reduced by technical improvements by date of applicability
- **Global harmonisation** of testing procedures supported
- **Additional requirements on OBD, OCE and in-service conformity** desirable
- Some request introduction of **particle number limit value (PMP)**



Roadmap

- **Proposal to be adopted by the Commission by December 2007**
- **Proposal to be sent to the European Parliament and to the Council at the beginning of 2008**



Further considerations

- **Harmonisation of standards will improve industry competitiveness and reduce testing cost;**
- **Correlation factors WHDC versus ETC are under development;**
- **Introduction of WWH-OBD requirements;**
- **Introduction of OCE requirements.**

Further considerations

- **Particulate number measurement with continued particulate mass measurement;**
- **Monitoring of CO₂ emissions;**
- **Inclusion of portable emission measurement systems (PEMS) if not introduced for Euro V.**



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Conclusion

- **Continued air quality issues require further action on vehicle emissions**
- **Euro VI due shortly**
- **Removing the options on WHDC will make international harmonisation possible for Euro VI**



Thank you

- **Thank you for your attention**

- http://ec.europa.eu/enterprise/automotive/index_en.htm