Development of the New Euro 7 Emission Legislation in Europe 欧7排放法规进展

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12th Symposium on Technology for Prevention and Control of Motor Vehicle and Vessel Pollution in Large Cities •



Association for Emissions Control by Catalyst (AECC AISBL)

AECC members : European Emissions Control companies 欧洲排放控制协会简介



Exhaust emissions control technologies for original equipment, retrofit and aftermarket for all new cars, commercial vehicles, motorcycles, and non-road mobile machinery

AECC is listed in EU Transparency Register (# 78711786419-61) and has consultative status with the UN Economic and Social Council (ECOSOC)



Euro 6/VI significantly reduced impact on air quality 欧六大幅度降低了机动车排放对大气质量的影响

- Evolution in emission control systems
 - ♦ LD diesel combination of deNOx technologies
 - LD gasoline introduction of particulate filter
 - HD diesel compact design of SCR and filter



ASSOCIATION FOR EMISSIONS CONTROL BY CATALYS

Several reports about improved air quality

 \triangleright Example of NO₂ in Brussels



Source: CurieuzenAir report air quality in Brussels, 2022

Further evolution expected towards Euro 7 预期欧盟进一步推动欧七法规

- The European Commission published the Euro 7 proposal on 10 November 2022
- Two parallel processes are now ongoing
 - The ordinary legislative process by European Parliament and Council to discuss and decided Euro 7



Development of implementing legislation by the European Commission with

European Commission

- AGVES expert working group
- CLOVE consortium
- Currently put on hold





L. LDV Vehicle Types	6. Replacement pollution control systems types and their parts 7. Brake system types and their replacement
2. HDV Vehicle Types	
3. HDV Engines	parts; 8. Tyre types in respect to tyre abrasion
4. OBM/OBD systems	9. CO_2 + range determination for LDV
5. Anti-tampering, security and cybersecurity systems	10. CO ₂ + range determination for HDV

Euro 7 proposal by the European Commission 欧盟委员会提出的欧七法规概述



	Cars and vans	Trucks and buses
Implementation timing	1/7/2025	1/7/2027
Normal driving conditions (RDE)	0 to 35 °C 0 to 700 m 	-7 to 35 °C 0 to 1600 m
Extended driving conditions (RDE)	-10 to 0 °C or 35 to 45 °C 700 to 1800 m 	-10 to -7 °C or 35 to 45 °C 1600 to 1800 m
Limits	Lowest Euro 6 level + NH ₃ Emission budget <10 km Extended area: emissions / 1.6 Additional lifetime: limit x 1.2	Moving Window 90 th and 100 th percentile Emission budget < 3x WHTC Extended driving divider: emissions / 2 Multiplier for additional lifetime tbd
Main lifetime	160k km or 8 years	300k km or 8 years (cat. 1) 700k km or 15 years (cat. 2)
Additional lifetime	200k km or 10 years	375k km (cat. 1) 875k km (cat. 2)



Euro 7 status in Council





Rotating EU Presidency leads the discussions







- Souncil agreement (General Approach) foreseen by 25 September 2023
- Indications of draft texts being considered in Council working group
 - Lead time for implementation
 - LDVs: 3 years
 - HDVs: 5 years
 - € LDV limits and test conditions in direction of maintaining Euro 6d Real-Driving Emissions procedure
 - ♦ HDV limits and test conditions
 - Modification to approach considered: averaging if emissions instead of Moving Window post-processing
 - Separate limits for laboratory and RDE tests
 - Euro VI test conditions



Euro 7 status in European Parliament 欧七在欧盟议会的进展



- Leading committee is ENVI, with rapporteur MEP Vondra (ECR, Czech)
 - Draft reports by opinion committees (ITRE, TRAN and IMCO) were voted in July 2023
 - ENVI report vote on 12 October 2023
 - EP Plenary vote foreseen on 9 November 2023
- Draft ENVI report published 26 May
 - Longer lead times after adopting all implementing acts (LD +3-4 years, HD +4-5 years)
 - Ochanges to light-duty test conditions in direction of Euro 6
 - Higher limits for vans and higher power-to-mass ratio threshold
 - Similar changes to HD limits and test conditions as in Council
 - \bigcirc Amendments to include type approval of vehicles running on CO₂-neutral fuels
- Discussion on compromise amendments in ENVI is now ongoing



Euro 7 needed to further improve air quality

Works together with other legislative efforts which reduce CO₂ emissions 为了进一步改善大气质量,欧七是必须的

- AECC calls for a swift adoption of Euro 7
- Finalise Euro 7 well before 2024 EU elections
- Key to realise a prompt implementation

Affordable emission control technologies are available today

- AECC data indicates proposed Euro 7 limits are technically feasible
 - Light-duty vehicles
 - Test conditions to represent real-world driving
 - Development in substrate and coating technologies are ongoing beyond what is demonstrated



- Heavy-duty vehicles
- Euro 7 proposal follows the outcome of the Impact Assessment
- The Moving Window methodology seems appropriate, without data exclusions



AECC fact sheet on Euro 7, September 2023 AECC在2023年9月发布的欧七情况介绍

https://www.aecc.eu/wp-content/uploads/2023/09/2023-08-31-AECC-Factsheet.pdf

Myths and truths about **Euro 7 pollutants limits** for new vehicles in the EU



Euro 7 is **unnecessary**

Euro 7 limits are pot feasible The necessary emission control technology

Euro 7 is

All EU citizens will benefit: an upgrade to Euro 7 reduces health risks caused by vehicle traffic. Each € invested in Euro 7 results in a reduction of 5€ on healthcare and environment costs.

Keeping Euro 6/VI is not sufficient.

20% of distance driven in Europe is outside current test boundaries. Wider Euro 7 test methods will better capture emissions resulting from driving in different conditions.

Euro 7 will bet make Europe competitive

China and the United States are moving ahead with more stringent standards than Euro 6/VL Europe cannot stay behind if it wants to remain competitive.

Investing in Euro 7 comes at incremental cost of 0.6-5.7 billion euro compared to the 59 billion euro each manufacturer is expected to invest in electrification, connectivity and automation by 2050.



www.aecc.eu www.ipa-news.com



as equipping them with new emission control technologies comes at a very small proportion of the cost of a new vehicle. Studies on the impact of Euro 7 estimate the

pot affordable

Cars and trucks will remain affordable

additional cost of new cars to be between 104-251€ compared to Euro 6d. Contrary to some claims, Euro 7 vehicles will not need to comply with all possible driving situations,

hence automatic gearboxes and hybridisation technologies should not be counted among the cost to adapt to the new standards.









64% from Euro 6d. Vehicle manufacturers are already developing new vehicles with more stringent limits than Euro 6/VI

Fitting the latest emission control technology can reduce truck NOx emissions by 75-96% compared to Euro VI-C and NOx from a gasoline car by 40-

in mind.

AECC demo data supports Euro 7 and CO₂ discussions AECC的技术示范项目为有关欧七及CO₂减排的讨论提供支持

- Demonstrators show ultra-low pollutant emissions with emission control technologies in an integrated approach
- Tests show compatibility with drop-in sustainable renewable fuels, with substantial reduction in Well-to-Wheel CO₂ emissions



















LD gasoline demonstrator concept AECC汽油车示范项目

- Base vehicle description 车辆描述
 - C-segment vehicle
 - 1.5l engine with 4 cylinders
 - ♦ Variable valve train and cylinder deactivation
 - 48V mild-hybrid
 - Euro 6d type-approval baseline: cc cGPF + uf TWC
- AECC emission control system AECC的后处理系统。
 - Phase 1: cc TWC, uf cGPF+TWC+ASC
 - ♦ Phase 2: cc EHC|TWC, uf cGPF+TWC+ASC
 - Sench aged components targeting 160k km





J. Demuynck, et al.; "<u>Ultra-low Emissions of a 48V Mild-Hybrid Gasoline Vehicle with Advanced Emission Control Technologies</u>", 15th International Conference on Engines and Vehicles, 2021 J. Demuynck, et al.; "<u>Zero-Impact Emissions from a Gasoline Car with Advanced Emission Controls and E-Fuels</u>" 43rd International Vienna Motor Symposium, 2022







Gaseous emissions are mainly from initial cold-start 汽油车的气体污染物排放主要来自最初的冷启动

- > The highest cold-start NOx peak measured is below the proposed Euro 7 emission budget limit
- Near-zero emissions under warm operation
- Further potential is possible for initial cold-start NOx due to demonstrator constraints





Note: RDE aggressive test results, 1.6 divider applied to data at -10 °C





Particulate emissions are mainly from initial cold-start 汽油车的颗粒物排放主要来自最初的冷启动

- Most data is measured with aged GPF
 - ♦ Ash and soot accumulation supports filtration efficiency
 - Test with ccEHC at -10 °C repeated with fresh GPF
- ♦ All PN10 data remains below the proposed Euro 7 limit





Note: RDE aggressive test results, 1.6 divider applied to data at -10 °C; the fresh GPF test is not a valid test according to the Euro 7 proposal



LD gasoline demonstrator with sustainable renewable fuels Sustainable renewable fuels tested ∑ Sustainable renewable fuels tested

- Sustainable renewable fuels tested
 BOSCH
 BOSCH
 - Blue Gasoline
 - ♦ 2x samples of e-gasoline aramco
- Ultra-low pollutant emissions confirmed

E10 ref.



Engine out



Tailpipe

2500

-2000 -1500 -1000 -500



Note: RDE aggressive test results at -10 °C after 10 km (1.6 divider not applied), 2 test repeats on E10 reference fuel and e-gasoline

J. Demuynck, et al.; "Zero-Impact Emissions from a Gasoline Car with Advanced Emission Controls and E-Fuels" 43rd International Vienna Motor Symposium, 2022 J. Demuynck, et al.; "Advanced Emission Controls and E-fuels on a Gasoline Car for Zero-Impact Emissions", SAE paper 2022-01-1014, 2022





LD gasoline demonstrator with sustainable renewable fuels ♦ Well-to-Wheel CO, analysis

 \bigcirc Blue Gasoline already offers significant reduction of -17% WtW CO₂ emissions

 \odot E-gasoline has the potential to nearly eliminate WtW CO₂ emissions



J. Demuynck, et al.; "Zero-Impact Emissions from a Gasoline Car with Advanced Emission Controls and E-Fuels" 43rd International Vienna Motor Symposium, 2022 J. Demuynck, et al.; "Advanced Emission Controls and E-fuels on a Gasoline Car for Zero-Impact Emissions", SAE paper 2022-01-1014, 2022





HD diesel demonstrator concept 重型柴油车示范项目

- Base vehicle description 车辆描述
 - MB Actros 1845 LS 4x2
 - Engine OM 471
 - Euro VI C certified
 - 12.8 litres, 6 cylinder in-line
 - High Pressure EGR + DOC + DPF + SCR
- AECC emissions control system AECC的后处理系统
 - Phase 1: ccDOC, ccSCR/ASC+ ufDOC+cDPF+ SCR/ASC, twin AdBlue dosing and HC doser
 - ♦ Phase 2: additional EHC as part of the ccDOC
 - Components are hydrothermally aged targeting 500k km





P. Mendoza Villafuerte, et al.; "Demonstration of Extremely Low NOx Emissions with Partly Close-Coupled Emission Control on a Heavy-duty Truck Application", 42nd Vienna Motor Symposium 2021 P. Mendoza Villafuerte, et al.; "Future-proof heavy-duty truck achieving ultra-low pollutant emissions", Transportation Engineering, Volume 9, September 2022, 100125, 2022









THANK YOU!



