

Emission Levels of Diesel Cars EURO 1 – EURO 4

**Preliminary Results of measurements under
NEDC and CADC conditions**

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Project carried out under contract with BMLFUW, Austria



Question 1

How have specific emissions of diesel passenger cars evolved in the past?

The answer shall be given by measurements on

EURO 1	5 cars
EURO 2	34 cars
EURO 3	48 cars
EURO 4	7 cars

tested in 10 labs within ARTEMIS (5th Framework programme)

and national measurements (5 EURO 4 cars)

Test cycles:

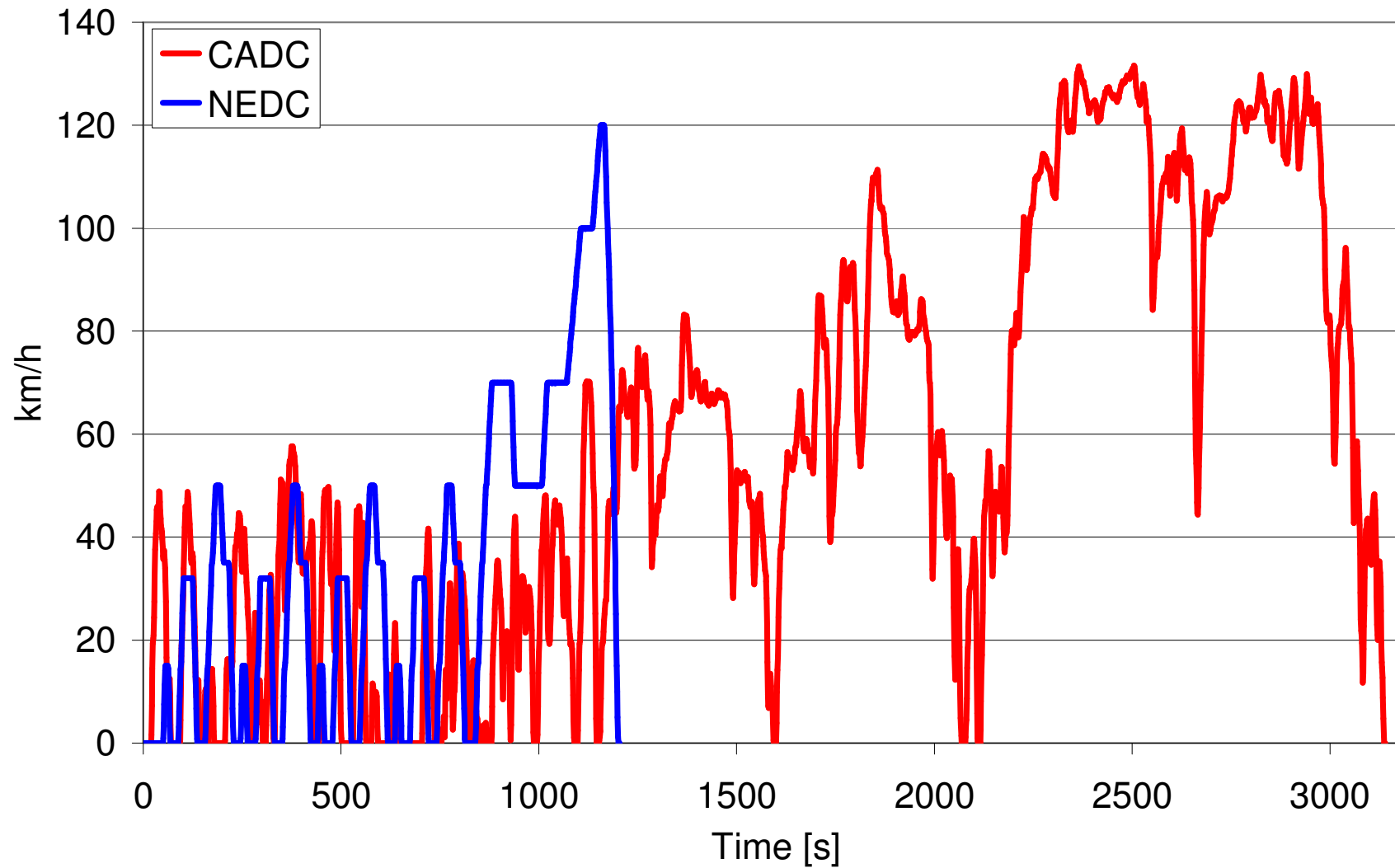
*NEDC type approval cycle

*CADC covering urban, road and motorway

based on ~110.000 km real world driving from >80 cars

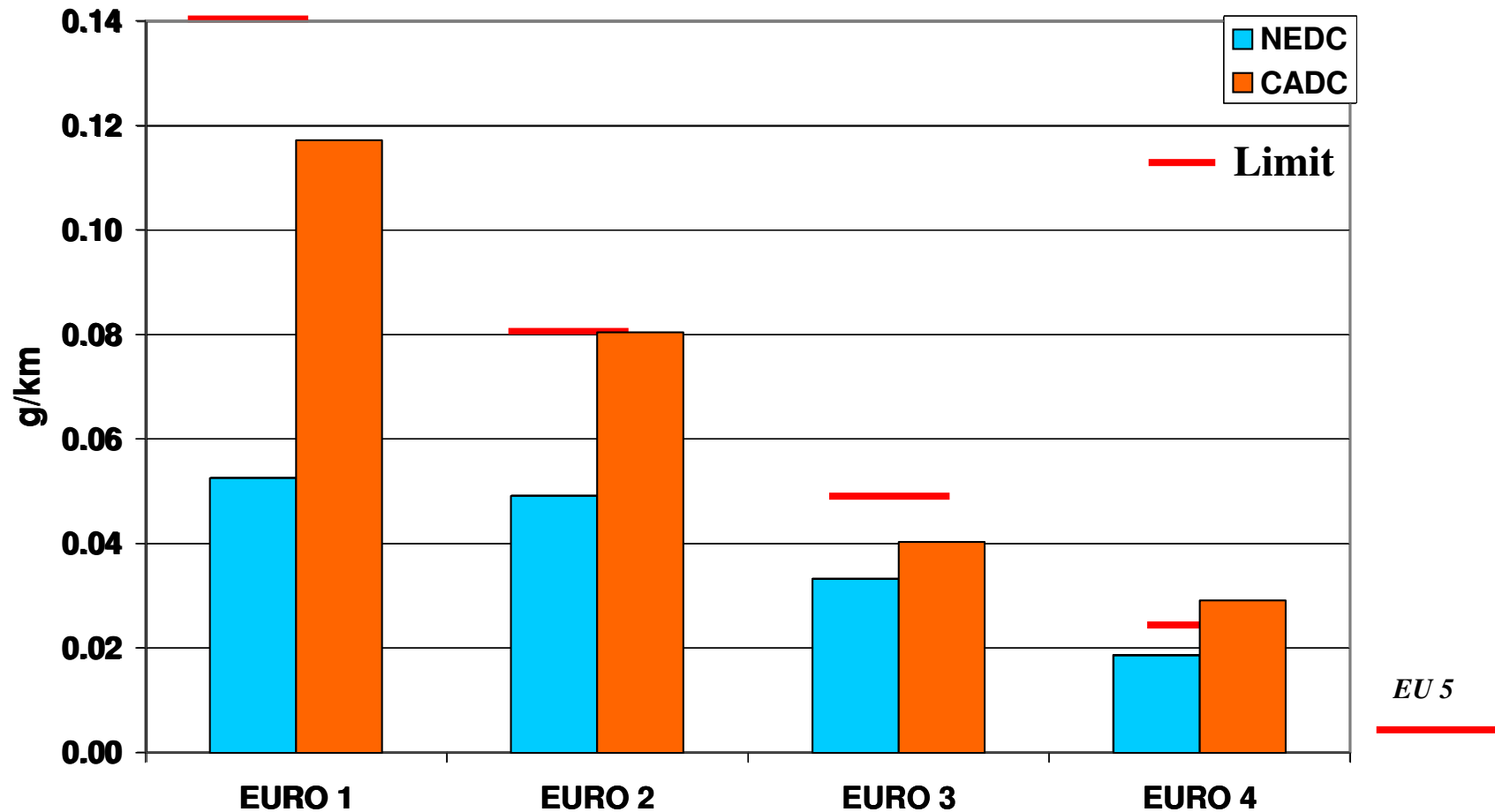


Test cycles



Question 1.1

How have specific PM emissions of diesel passenger cars evolved in the past?

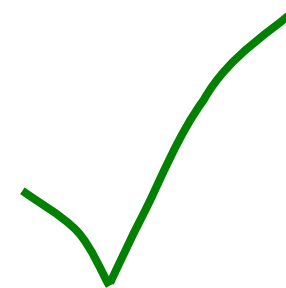


Question 1.1

How have specific PM emissions of diesel passenger cars evolved in the past?

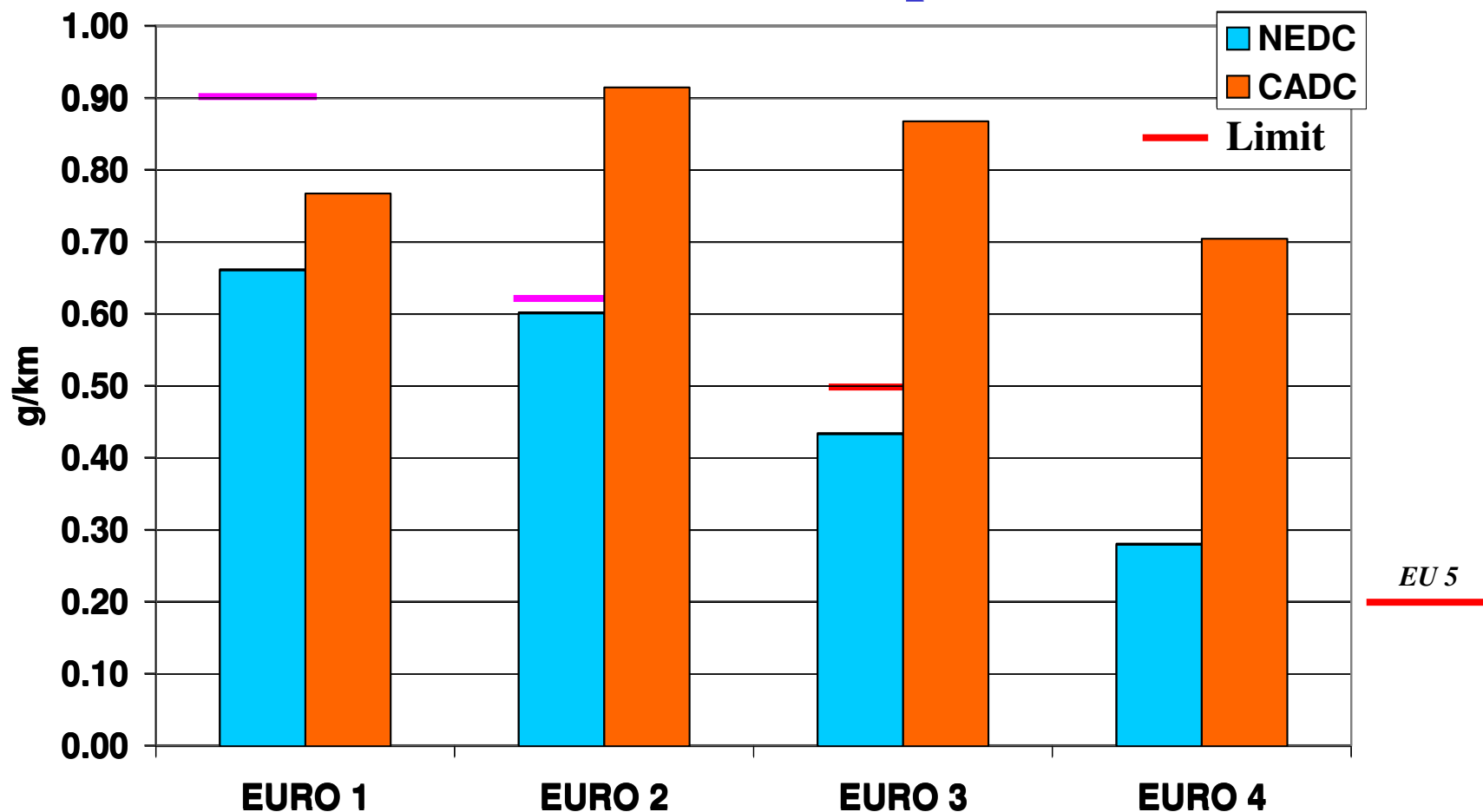
Particulate Matter reduction EURO 1 -> EURO 4:

Type approval limit	-82%
Measured in NEDC	-65%
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Measured CADC total	-75%
urban	-76%
road	-76%
motorway	-75%
EURO 4 with DPF	-97.5%



Question 1.2

How have specific NO_x emissions of diesel passenger cars evolved in the past?



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How have specific NO_x emissions of diesel passenger cars evolved in the past?

NO_x reduction EURO 1 -> EURO 4:

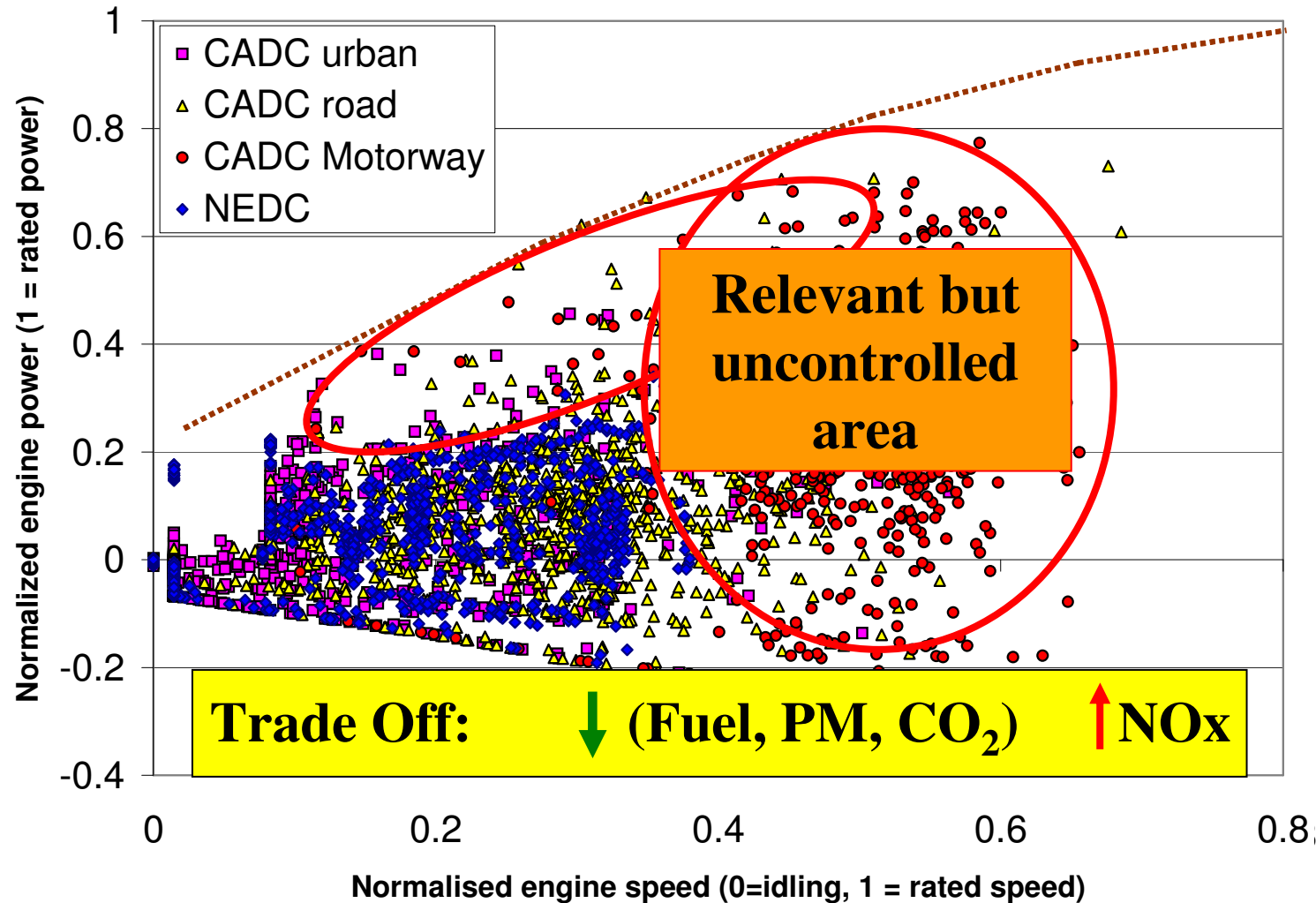
Type approval limit	~-70%
Measured in NEDC	-58%

Measured CADC	total	-8%
	urban	-25%
	road	-32%
	motorway	+6%

- Reduction rates achieved for NO_x in CADC are small
- Meeting NO₂ air quality limits might be difficult especially near motorways
(↑ no. of diesel cars and ↑ NO₂/NO_x)

Question 2

How to explain these facts?



Engine load
77kW
golf class car

Conclusions

- **PM, HC and CO from diesel cars show clear decreasing trends from EURO 1 to EURO 4 in all cycles tested**
- **PM, HC and CO emissions are already quite low, PM especially with EURO 4 + DPF**
- **NOx emissions showed much smaller decreases from EURO 1 to EURO 4 in the CADC than in the NEDC**
- **Reasons are**
 - * **the trade off between Fuel consumption and NOx emissions**
 - * **that the NEDC controls a much smaller area of the engine load conditions than driven in the CADC**
- **To achieve higher reduction rates for NOx in CADC like real world driving will need further efforts in the design of the type approval procedure and in R&D**

Thank you for your attention!



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