

Car Emissions and EURO 5 Consumers View

Workshop

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The FIA represents 43 Million Consumers throughout the EU.

On behalf of this powerful organisation I want to answer 6 questions concerning car emission and Euro 5.

Fig. 2 Questions

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- 1 Is it necessary to tighten the vehicle emission limits to save the individual mobility?
- 2 Is it necessary to tighten the limits for trucks **and** passenger cars?
- 3 Is it necessary to tighten the limits for spark ignition cars?
- 4 Should the diesel limits be aligned to the spark ignition values?
- 5 Is it reasonable to introduce limits for fine particle emissions?
- 6 What are the demands for the future fuels?

Fig. 2 Questions

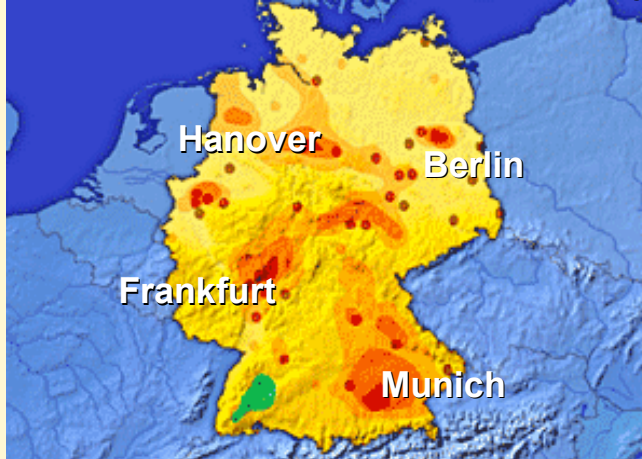
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Fig. 3 Actual PM10 Situation in Germany (Example for the European Situation)

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PM-10 Particulate concentrations in Germany



Council Directive 1999/30/EC (Stage 1; 1 January 2005):

- 24-hour limit value:
50 $\mu\text{g}/\text{m}^3$ PM10 not to
be exceeded more
than 35 times a
calendar year
(Stuttgart, Munich:
exceeded already in
03/2005)
- Annual limit value:
40 $\mu\text{g}/\text{m}^3$ PM10

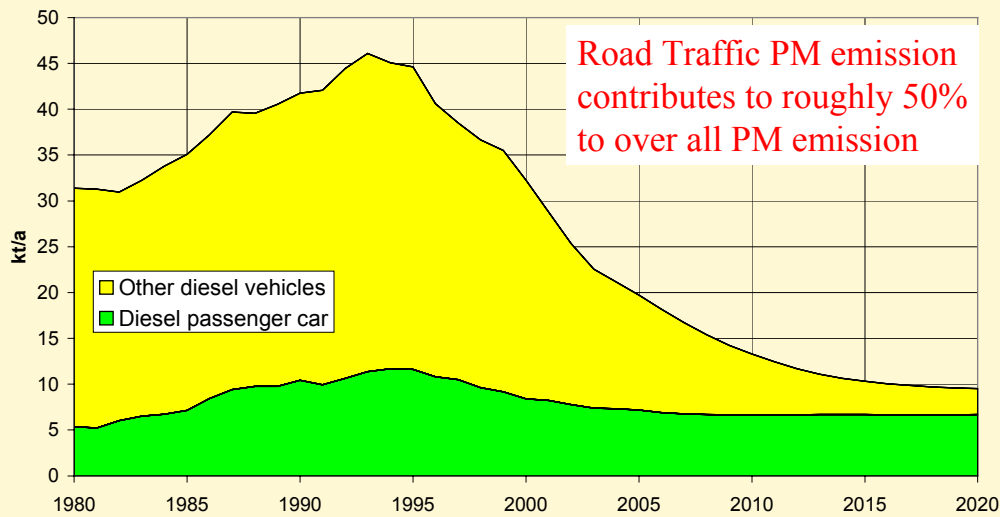
Figure 3 shows the actual PM 10 immission situation in Germany as an example for the European situation.

The council directive limits the PM 10 emission from 1 January 2005 on.

As expected from all experts we are happening to see a limit exceedances already in the first quarter of 2005.

The consequences could lead to mobility restrictions also in Germany, as we have it already in other European countries.

Fig. 7 Share of traffic based PM emissions of cars and trucks in Germany **ADAC**



Source: TREMOD 2002

The share of road traffic PM emission contributes to roughly 50 % to over all PM emission.

Due to the already decided EU regulations (Euro 4 for passenger cars and Euro 5 for trucks and busses) there will happen a decrease of over all traffic based emission over the years, Fig 7.

In spite of this situation the local PM emission due to immission regulation is present.

To solve this problem the following actions have to be carry out:

- decision on reduced PM emission limits for both diesel passenger cars and trucks and busses
- decision on financial incentives to encourage consumers to purchase this clean technologies (for both series and retrofit filters)
- Industry must change over from conventional to PM filter technology step by step, as soon as possible
- Industry must offer retrofit PM filters at leas for all popular diesel vehicles

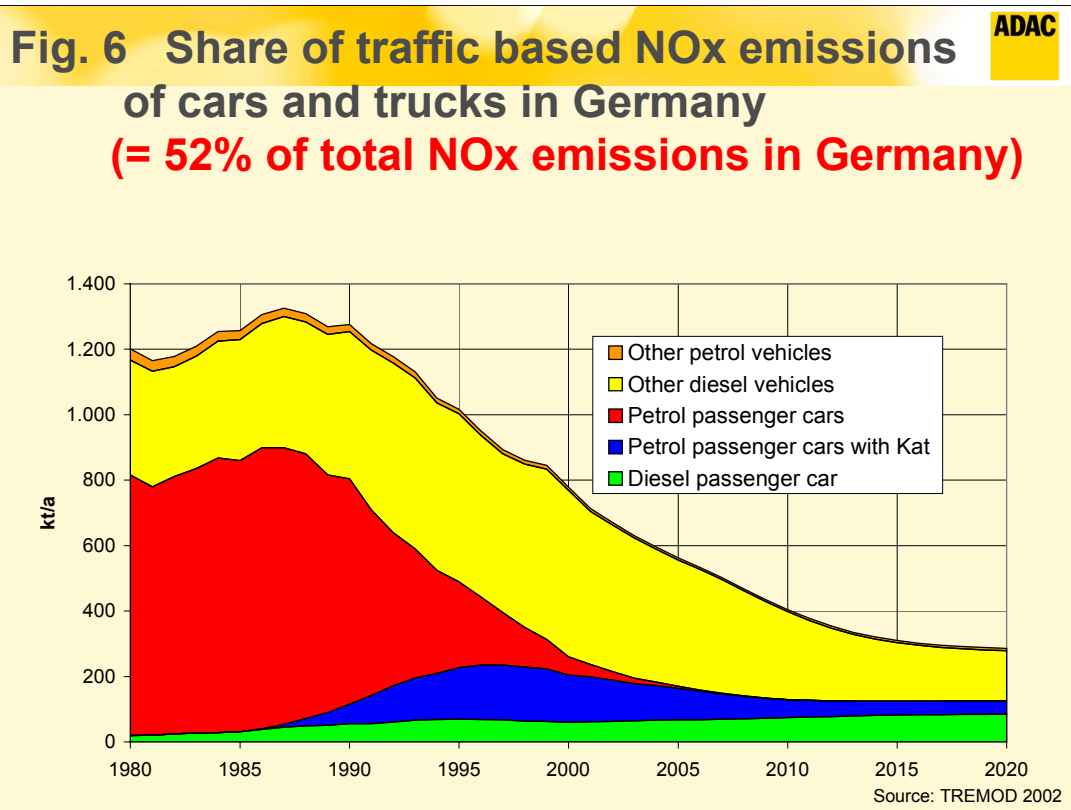
Figure 4: Consequences in Europe

- Italy, Rome: Ban on driving on Thursdays (50% of car fleet Euro 3 or older)
 - Northern Italy: Ban on driving in some Cities on Sundays
 - Great Britain, London: City toll
 - Germany: Discussion about consequences like ban on driving for cars without PM filter, city toll, traffic restrictions
- ⇒ Though emission levels significantly have decreased within the last decade, we still have immission problems caused by emissions

Fig. 5 Other future emission problems?

Council directive 1999/30/EC relating to limit values for SO₂, NO₂ and NO_x, PM and lead in ambient air.
For example:

- **SO₂**: Hourly limit value 350 µg/m³ not to be exceeded more than 24 times a calendar year;
Daily limit value 125 µg/m³ not to be exceeded more than 3 times a calendar year (1 January 2005)
- **NO₂**: Hourly limit value 200 µg/m³ not to be exceeded more than 18 times a calendar year;
Annual limit value 40 µg/m³ not (1 January 2010)



Road traffic NOx emission contributes to roughly 50 % to over all NOx emission.

Again due to existing regulations the traffic based emissions are decreasing over the years, Fig. 6.

But we would have an exceedances of the immission limits from 2010 on if no further reductions could be achieved.

According to UBA calculations we need a reduction of the Nox emission limits for the next EU directives.

Fig. 8 Is it necessary to tighten the PM and the NOx limits to save the individual mobility? For trucks, for passenger cars?

- To influence positive the ambient air in cities
- To save the individual mobility
- To prevent city toll, ban on driving or other restrictions to the individual mobility

The FIA sees high necessity to tighten the limits for both passenger cars and trucks to save the individual mobility and prevent mobility restrictions

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**Fig. 9 Actual Situation comparing Euro 4
Pass. Cars with Diesel and Petrol Engines
(measurements of EcoTest program NEDC)**

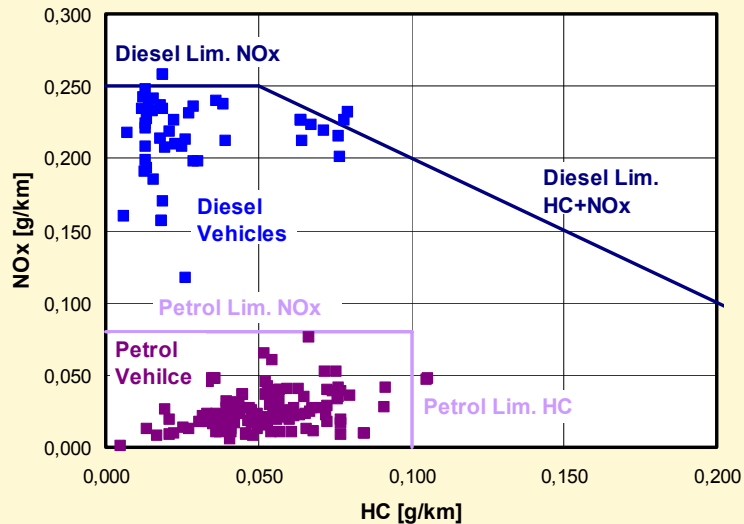


Fig. 9 shows the NOx and HC emission performance of Euro 4 passenger cars.

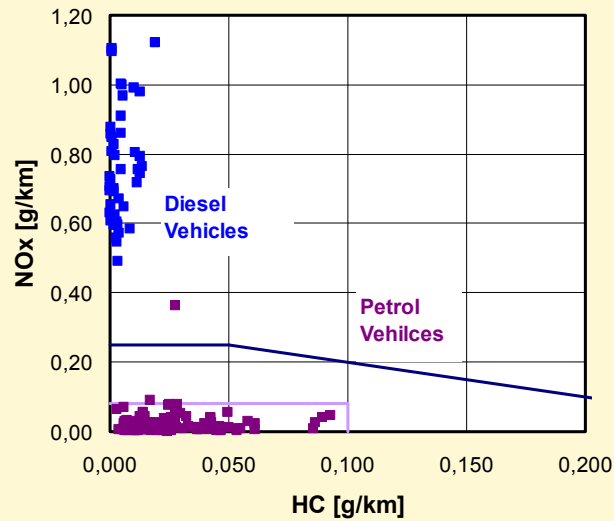
Blue dots = diesel cars

lilac dots = petrol cars

The measurements come from the FIA Foundation/ADAC EcoTest programme, NEDC driving cycle.

The diesel cars NOx emissions are much higher than the NOx emissions of petrol cars.

Fig. 9a Actual Situation comparing Euro 4-Cars with Diesel and Petrol Engines
(EcoTest program ADAC Highway cycle)



The NOx emission situation for diesel cars becomes even worse at highway driving conditions.

Fig. 10 Is it necessary to tighten the limits for spark ignition cars?

- Equal low level HC emissions for Euro 4 diesel and petrol cars
 - NO_x emissions of diesel vehicles in NEDC are 8-times higher than of petrol cars, in ADAC Highway cycle up to 20 times
- ⇒ In future NO_x emissions of passenger cars mainly caused by diesel engines

The FIA sees no need to tighten the Euro 4-limits for petrol cars

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**Fig. 11 Actual Situation of Euro 4-
Passenger Cars with Diesel Engines
(measurements of EcoTest program NEDC)**

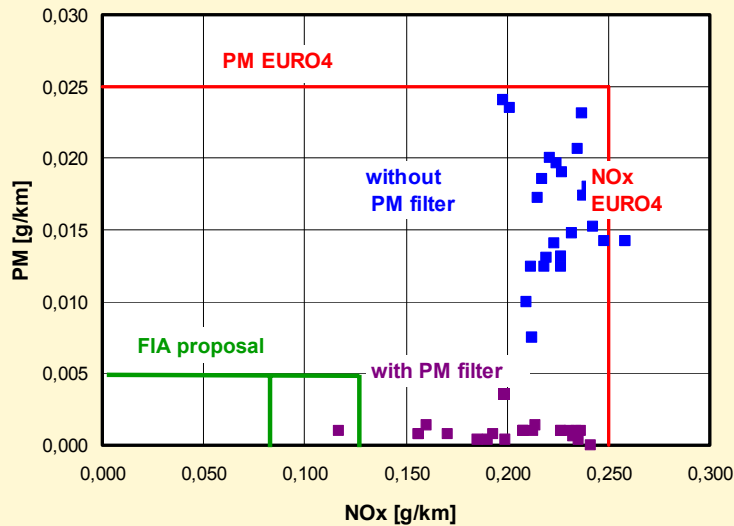


Fig. 11 shows the actual situation of Euro 4 diesel passenger cars, PM emission versus NOx emission.

blue dots = cars without PM filter

lilac dots = cars with PM filter

FIA wants to reduce the emission limits for diesel cars to the level of the petrol cars.

With the help of PM filters the FIA proposal of 5 mg/km easily could be achieved.

But only one car, the Toyota Avensis with NOx After Treatment System comes with 110 mg/km in the region of today's petrol car limits of 80 mg/km.

Fig. 12 Should the diesel limits be aligned to the spark ignition values?

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- Cars with PM filter achieve lower PM emissions but also significantly lower NO_x emissions
- Cars with PM filter and without NO_x after treatment systems already achieve about 150 mg/km or even less (Citroen C5: 126 mg/km)
- Toyota Avensis with NO_x after treatment system
DeNO_x-Kat: 110 mg/km

The FIA proposes Euro 5 limits for Diesel:
NO_x: 125 mg/km...80 mg/km
PM: 5 mg/km

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Fig. 13 Effect of PM Filter on Particle Size Distribution

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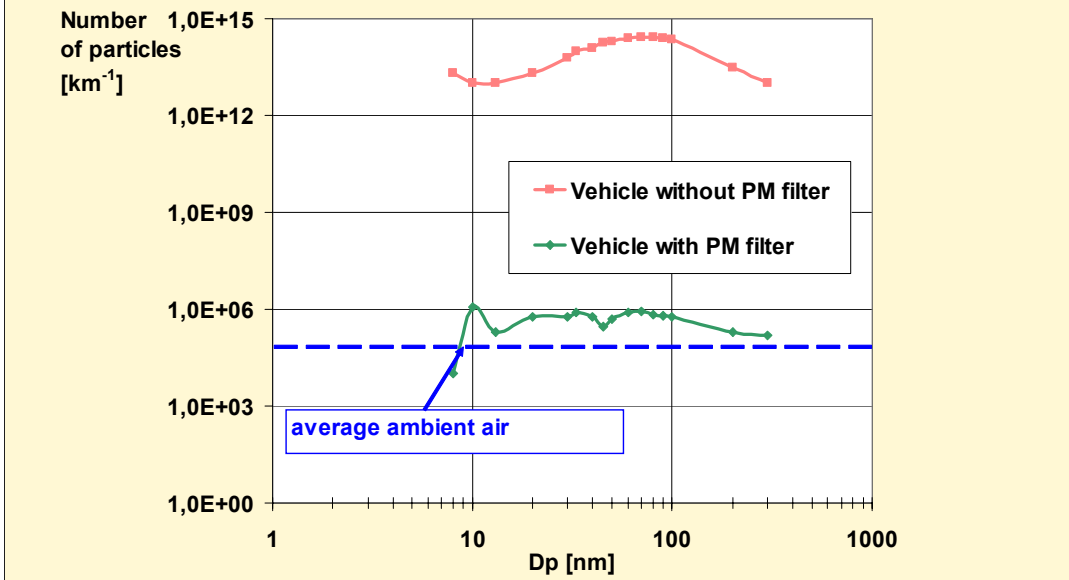


Fig. 13 shows the effect of PM filter on particle size distribution as a result of an ADAC test on one car with particle filter.

The particle filter achieves a big reduction of the number of particles, but no influence on the particle size distribution was observed.

Fig. 14 Is it reasonable to introduce limits for fine particle emissions?

- Almost linear reduction of all PM sizes by use of PM filters
- In case of fine particle limits danger of long lasting discussion on measurement procedure and thus delay of implementation of Euro 5

The FIA proposes no special limits for fine particles in Euro 5

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Fig. 15 Influence of Fuel Sulphur Content on Exhaust Emission according to ADAC test

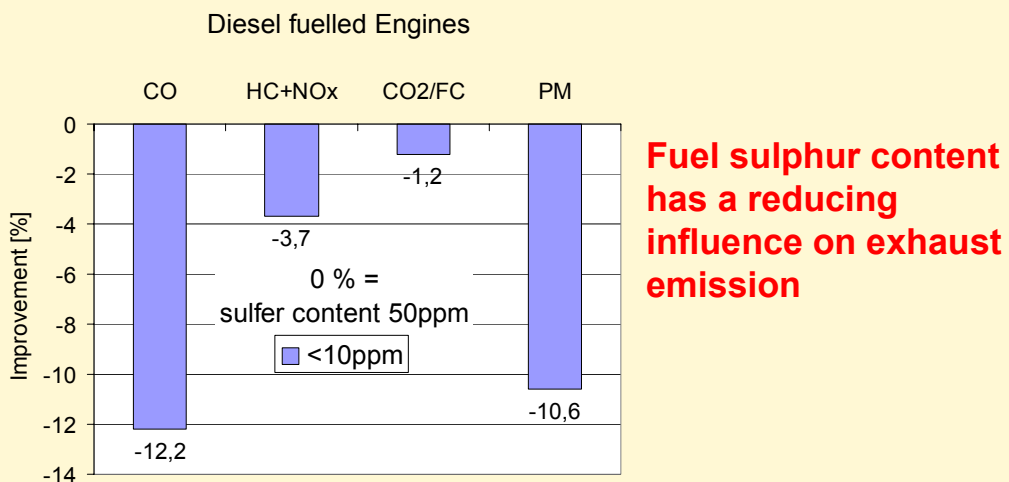
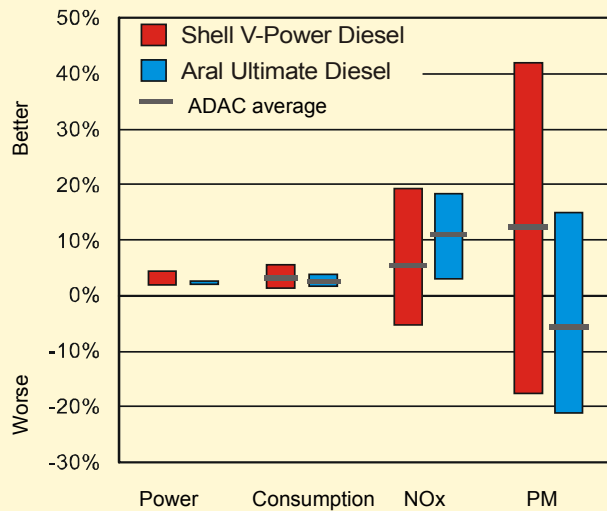


Fig. 15 shows the influence of fuel sulphur content on exhaust emission. Sulphur free diesel fuel brings a significant reduction on all pollutants compared to diesel fuel with 50 ppm. sulphur content.

Fig. 16 ADAC test of high quality diesel fuels



- Measurements with conventional diesel fuels compared to two types of high quality diesel fuels

- **Potential to improve diesel emissions is given**

An ADAC test of high quality diesel fuels such as Shell V Power Diesel or Aral Ultimate Diesel shows some potential for immission improvement.

Fig. 17 Conclusion

- It is necessary to further tighten limits for both commercial vehicles and diesel passenger cars
- But it is not necessary to tighten the limits for petrol vehicles
- FIA proposal for passenger car diesel limits:
NOx: 125 mg/km...80 mg/km
PM: 5 mg/km
- Tax incentives for preliminary introduction of technologies meeting the Euro5 limits to encourage consumers to buy clean diesel cars

Fig. 17 Conclusion

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- **FIA proposes no special limits for fine particles for Euro5**
- **Sulphur content in diesel fuel should be limited to less than 10 ppm Europe wide as soon as possible**
- **New fuel developments also have significant potential for further emission improvements**

**•Thank You for Your
Attention**