

Trends in European Automotive Fuels Quality and Emissions

CONCAWE started its activities on fuels qualities and related automotive emissions in the late 70's. These last 25 years have seen momentous changes in the levels of vehicle emissions, with a substantial contribution from improvements in the quality of fuels.

In the early years work focussed on issues such as reduction of lead content of gasoline and definition of the optimum octane for unleaded gasoline. The introduction of the latter in the late 80's enabled the first generation of catalyst cars to enter the market.

In the 90's the emphasis shifted towards the interrelationships between vehicle technologies, fuels and emissions. The European Programme on Engines, Fuels, and Emissions (EPEFE) ushered in an era of cooperation between the auto industry, the fuels industry and the regulator, and paved the way for the Auto-Oil programmes in which CONCAWE played a leading role on behalf of the oil industry. With the introduction of 10 ppm sulphur fuels during this decade, the sulphur content of European road fuels will have been reduced by two orders of magnitude in less than 15 years, enabling a number of innovative vehicle technologies to further reduce emissions and improve fuel efficiency. CONCAWE has made regular contributions to the understanding of the interactions between vehicles and fuels by conducting a series of test programmes.

As the focus shifts towards greenhouse gas emissions, the quest for lower pollutant emissions remains an essential objective. Discussions on the definition of Euro-5 (light duty) and Euro-6 (heavy duty) vehicle emission standards have already started and so has the review of the 2000 Fuels Directive. New technologies are holding much promise to meet the ambitious goals of virtually eliminating pollutants emissions while increasing vehicle efficiency. Fuel improvements can play a role in this when they enable new technologies that allow a step change in performance.

Figure 1 Progress towards elimination of lead from gasoline by year 2000

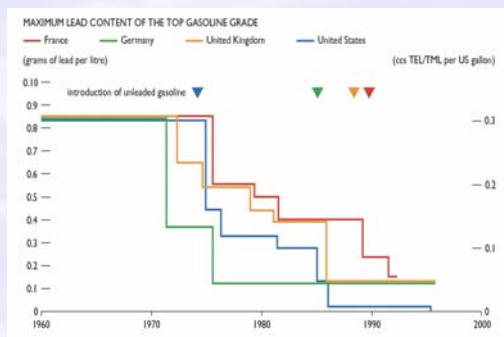


Figure 2 RUFIT study supported 95 RON as optimum octane level

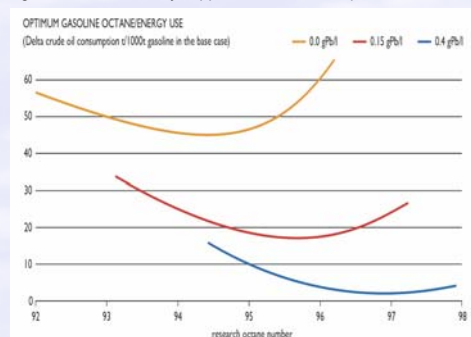


Figure 3 Impressive reductions in regulated emissions limits achieved

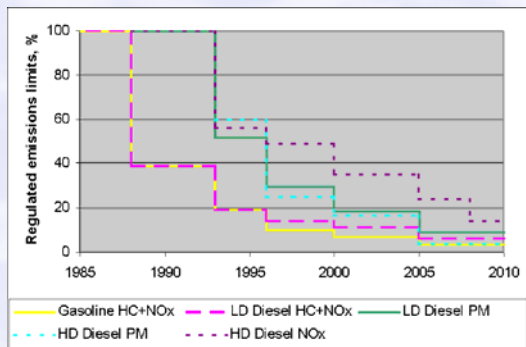


Figure 4 Summary of European gasoline and diesel fuel specification developments

Year		1993	1995	1996	2000	2005	2009
Gasoline Unleaded 95/95		EN228					
Sulphur	ppm m/m max	1000	500		150	50/10	10
Benzene	% v/v max	5			1		
Aromatics	% v/v max				42	35	
Olefins	% v/v max				18		
Oxygen	% m/m max	2.5 ⁽¹⁾			2.7		
RVP (summer)	kPa max				up to 80	60 ⁽²⁾	
E100	% v/v min	40(s)/43(w)			46		
FBP	°C max	215			210		
Year		1993	1995	1996	2000	2005	2009
Diesel (standard grade)		EN590					
CI	min	46			51		
CN	min	49			51		
Sulphur	ppm m/m max	2000		500	350	50/10	10 ⁽³⁾
Density	kg/m ³ min	820					
	max	860			845		
T95	deg C	370			360		
PAH	% m/m max				11		
Lubricity	µm @ 60°C max			460			

⁽¹⁾ Up to 3.7% at Member State discretion. Individual limits apply to specific compounds
⁽²⁾ 70 kPa max allowed in Member States with arctic or severe winter conditions
⁽³⁾ End date for full introduction of 10 mg/kg S max diesel remains subject to further review

Figure 5 Particulate filter are much more effective than fuel changes in reducing PM emissions

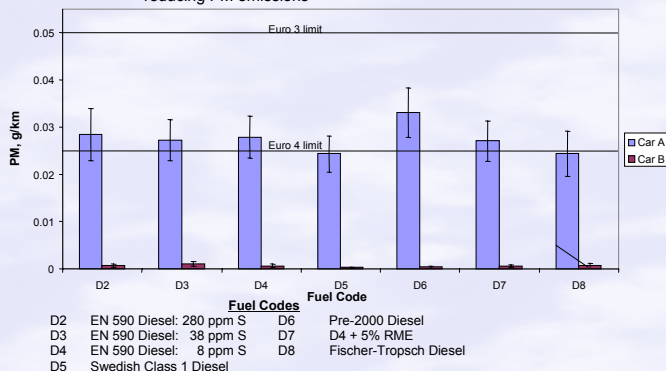


Figure 6 Current challenge is to reduce GHG emissions while also achieving very low regulated emissions

