

## Technical note 2

# Emissions reduction challenges and Envirox<sup>TM</sup> fuel efficiency additive

 Saves fuel

 Reduces emissions

 Cleans engines

### **Introduction**

The European Commission has set legislated targets for the reduction in emissions from transport sources. These targets can only be met by improvements in fuel quality, engine technology and exhaust after-treatment and this note summarises development in these areas.

### **Diesel fuel standards**

Diesel fuel offered for sale in Europe must meet the EN 590 standard.

The present standard allows for the inclusion of 5% by volume of biodiesel and requires a maximum sulphur limit of 50 mg/kg. In addition, it is specified that sulphur-free fuel (max. 10 mg/kg) must be available on a balanced geographical basis. This reflects the influence of sulphur on emissions of sulphur dioxide and particulates and also on the performance and longevity of exhaust aftertreatment devices. Fuel standards have also reduced the aromatic content and increased cetane number, both of which are known to reduce vehicle emissions.

### **Heavy duty vehicle emission standards**

European vehicle emission directives are commonly referred to as Euro 1, 2, 3, etc. Since the first directive Euro 1, was introduced in 1992 there has been a progressive lowering of the allowable limits of Carbon Monoxide (CO), Hydrocarbons (HC), Oxides of Nitrogen (NOx), Particulates (PM) and smoke. All new heavy duty vehicle types sold in the European Union must meet current emissions limits when tested in laboratory conditions using standard test cycles.

The present standard, Euro IV, prescribes three emissions tests: the European Stationary Cycle (ESC), the European Transient Cycle (ETC) and the European Load Response (ELR) test. As from 2005,



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new vehicle model approvals (2006 for all model approvals) should demonstrate compliance with emission regulations for useful life periods of between 5 and 7 years (or 100,000 to 500,000 km) depending on the vehicle category.

### **Diesel engine technologies**

Engine design improvements have resulted in improved fuel efficiency and the ability to comply with increasingly stringent emission standards. These developments include improved combustion chamber and fuel injection system design, the use of turbo-charging, exhaust gas recirculation and electronic control of the diesel engine

The use of exhaust aftertreatment systems is increasingly required to meet emission standards and to improve the emissions performance of older fleets. Diesel oxidation catalysts, diesel particulate filters and selective catalytic reduction (SCR) are the most common emissions control devices on diesel powered vehicles.

### **The contribution of Envirox™ to emissions reduction**

Envirox™ fuel efficiency additive is a dispersion of solid, stable cerium oxide nanoparticles which delivers immediate emissions benefits – HC, CO and PM are all reduced. Field tested in different vehicle categories and in vehicles manufactured to meet a range of European emissions standards, Envirox™ is compatible with all standard exhaust aftertreatment devices encountered in diesel fuelled vehicle fleets.