

# ROOM TO BREATHE

**AHEAD OF NEXT YEAR'S EUROPEAN REVIEW OF AIR-QUALITY DIRECTIVES GOVERNING OFF-HIGHWAY MACHINERY, DEVELOPMENT OF A ROADMAP TACKLING FURTHER MEASURES SHOULD PROVIDE PLANNING CERTAINTY FOR THE INDUSTRY**

▷ “Industry is at the heart of Europe and indispensable for finding solutions to the challenges of our society, today and in the future,” said European Commission vice president Antonio Tajani in late 2010 on the occasion of the launch of the Integrated Industrial Policy for the Globalisation Era. “A competitive industry is key if Europe is to remain a global economic leader.”

The economic crisis had refocused attention on the importance of supporting a diverse and competitive manufacturing base. This is hardly surprising when we consider that, in Europe, manufacturing employs a quarter of people in the private sector, while another 25% work in industry-related services.

In January 2011, Janez Potočnik, his Commission colleague responsible for the environment, stated that: “Air quality is an important public health and environmental issue. Air pollution continues to cause damage to people and environment: premature deaths, shorter life expectancy, as well as substantial

damage to ecosystems, crops and buildings. The Commission will without further delay take measures which will help Member States comply with established EU air quality standards. These include, for example, measures on the sulphur content of bunker fuels and on reducing emissions from vehicles and machinery.”

The framework of EU air-quality directives 2008/50/EC (ambient air quality and cleaner air for Europe) and 201/81/EC (national emission ceilings for certain atmospheric pollutants) makes abundantly clear that Member States shall ensure that the concentration in ambient air of certain pollutants, including the mass concentration of very small particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>), does not exceed established emission limit values (ELVs).

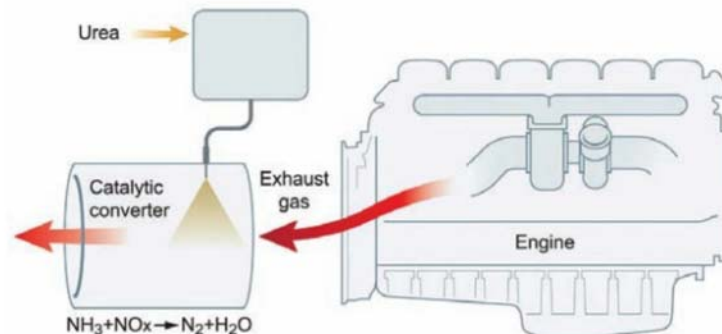
The directives additionally set a ‘national exposure reduction target’ to reduce ambient concentrations further by 2020. To substantiate the debate, a new study report on the impact of selected policy measures

on Europe’s air quality over the period 1990-2005 was published by the European Environment Agency (EEA) under the challenging title: *Has Policy Improved Air Quality?*

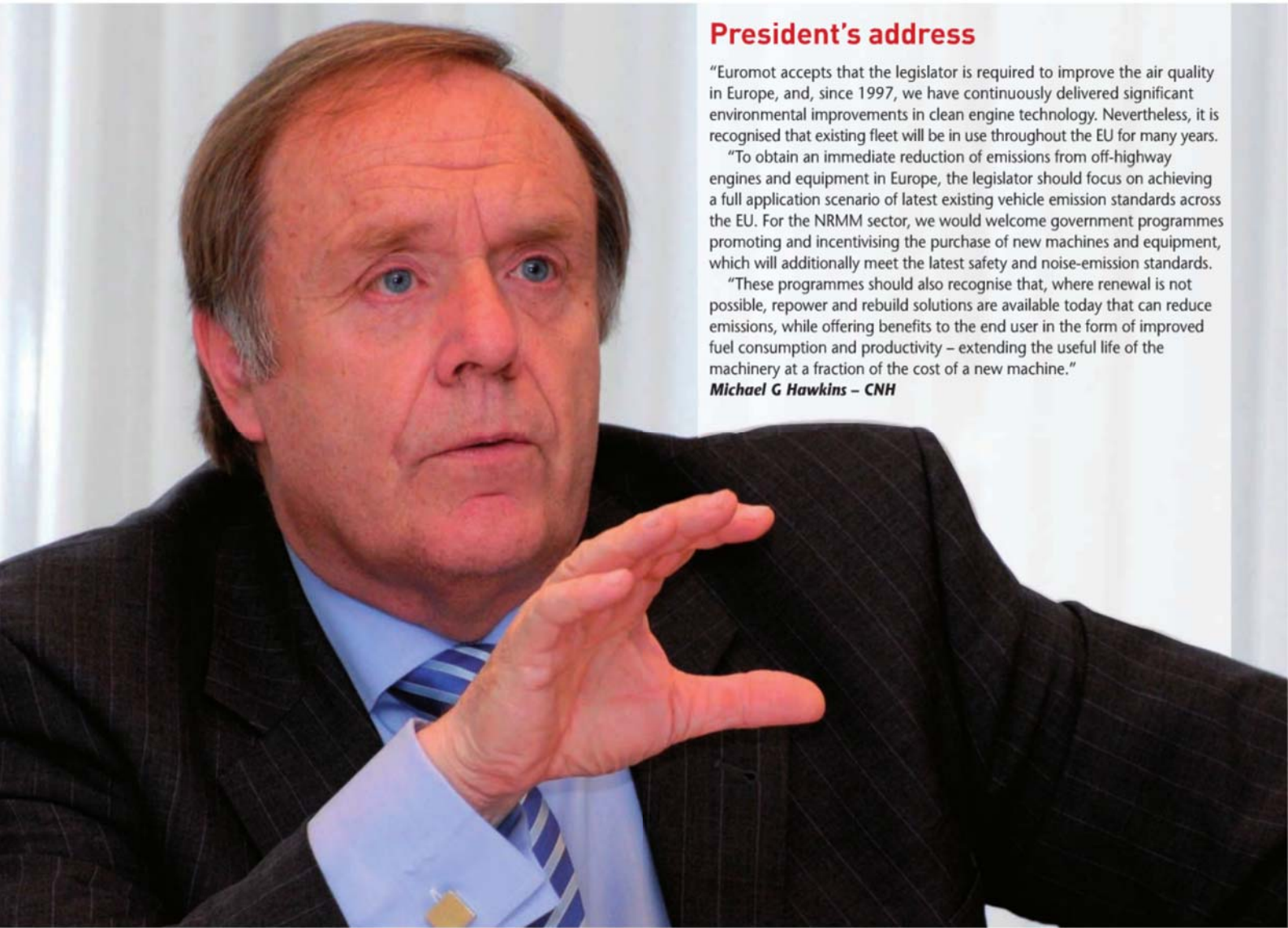
The selected policy measures were the Euro emission standards for road vehicles and the EU directives on industrial emissions (Integrated Pollution Prevention and Control (IPPC) and Large Combustion Plant (LCP)). And the answer is definitely ‘yes’ – despite increased (+26%) fuel use between 1990 and 2005, notable reductions in emissions had been achieved due to the introduction of the Euro standards in the road transport sector. By 2005, emissions of CO were 80% below the levels projected in a no-policy scenario, emissions of nitrogen oxides (NOx) were 40% below and fine particulate matter (PM<sub>2.5</sub>) was 60% lower, with the decrease commencing in the mid-1990s.

However, further improvement to Europe’s air quality would have occurred had all countries achieved their intended emission reduction commitments between 1990 and 2010 (full application scenario) – that is, had all European countries implemented the latest existing emission standards.

In March 2011, Günther Oettinger, the commissioner responsible for energy, joined in, claiming that “despite progress, our estimates show that we need a further decisive and co-ordinated action on energy efficiency, without which the EU will not meet its objective of 20% energy savings by 2020. It paves the



Typical setup for an SCR system (Picture: Scania)



**President's address**

"Euromot accepts that the legislator is required to improve the air quality in Europe, and, since 1997, we have continuously delivered significant environmental improvements in clean engine technology. Nevertheless, it is recognised that existing fleet will be in use throughout the EU for many years.

"To obtain an immediate reduction of emissions from off-highway engines and equipment in Europe, the legislator should focus on achieving a full application scenario of latest existing vehicle emission standards across the EU. For the NRMM sector, we would welcome government programmes promoting and incentivising the purchase of new machines and equipment, which will additionally meet the latest safety and noise-emission standards.

"These programmes should also recognise that, where renewal is not possible, repower and rebuild solutions are available today that can reduce emissions, while offering benefits to the end user in the form of improved fuel consumption and productivity – extending the useful life of the machinery at a fraction of the cost of a new machine."

**Michael G Hawkins – CNH**

way for the longer-term policies needed to achieve a decarbonised and resource-efficient economy by 2050 and to place the EU at the forefront of innovation."

The same month, Commission vice president Siim Kallas promoted his 2050 strategy for a competitive transport system, guaranteeing that it "will increase mobility, remove major barriers in key areas and fuel growth and employment. At the same time, the proposals will dramatically reduce Europe's dependence on imported oil and cut carbon emissions in transport by 60% by 2050."

In a matter of months, the European Commission has therefore been setting the scene for industrial research on next-generation clean vehicle technologies to reduce NOx,

SOx, PM and CO<sub>2</sub> emissions – with off-highway engines becoming more and more centre stage.

**Current regulatory requirements**

Emissions from new off-highway equipment aimed at construction, agriculture and industrial activities within the EU have been progressively reduced since the publication of the first off-highway engine emission limits in 1997. The manufacturers of this non-road mobile machinery (NRMM) and their engines have been committed to continue with this major environmental improvement.

Commencing 1 January 2011, a further, very aggressive, reduction in the overall mass emissions of PM is being progressively provided by the phased introduction of new EU

ABOVE: **Michael Hawkins, Euromot president:** "We would welcome government programmes promoting and incentivising the purchase of machines and equipment"

NRMM Stage IIIB machines. This new equipment will reduce these emissions by around 90% compared with 2010 (EU NRMM Stage IIIA) limit values, in addition to reducing NOx emissions by as much as 50%.

Engine manufacturers are getting ready for a new near-zero emission era in diesel engine design as Europe prepares for some of the toughest emission standards in the world: Euro 6 for heavy-duty on-highway engines from 2013 and EU NRMM Stage IV/US EPA Tier 4 Final for off-highway in 2014.

EU NRMM Stage IV will further reduce the NOx emissions by 80-90%. EU NRMM Stage IV/US EPA Tier 4 Final-compliant engines are about to be introduced to the market and have already been presented at

major trade exhibitions worldwide. Electronically controlled compression ignition (CI) engines fuelled with low-sulphur diesel will considerably lower emissions, enhance engine monitoring and control and improve performance to meet the forthcoming level of emission standards.

There were several engineering tasks of prime importance, such as achieving optimal performance, fuel economy and flexibility, as well as high reliability and durability to reduce maintenance costs.

Exhaust aftertreatment systems had to be developed and combined to reduce emissions and meet the integration challenges of

aftertreatment systems and their impact on engine technology (such as the integration of cooling systems, radiators and charge-air packages, etc). Aftertreatment systems cannot be simply transferred from on-highway to non-road engines, but require substantial development work and specially developed components and systems of their own.

Proper use of the emission reduction systems in operation and monitoring of real-world emissions throughout the service life (in-service

conformity) had to be assured, while intelligent retrofitting technologies had to be developed to adapt the existing fleet to the latest emission standards where replacement with new engines is not possible.

### Meeting the challenges

All of these challenges are going to be met. Euromot – the European Association of Internal Combustion Engine Manufacturers – is fully committed to delivering robust, cost-effective and resource-efficient measures to improve the air quality in Europe.

Euromot is currently focused – with the European Commission's Enterprise and Industry Directorate – on finalising a package of amendment proposals to the EU NRMM Directive 1997/68/EC. Some of these are required for the full implementation of Stage IV; some will address new emission limit requirements for categories not yet fully covered.

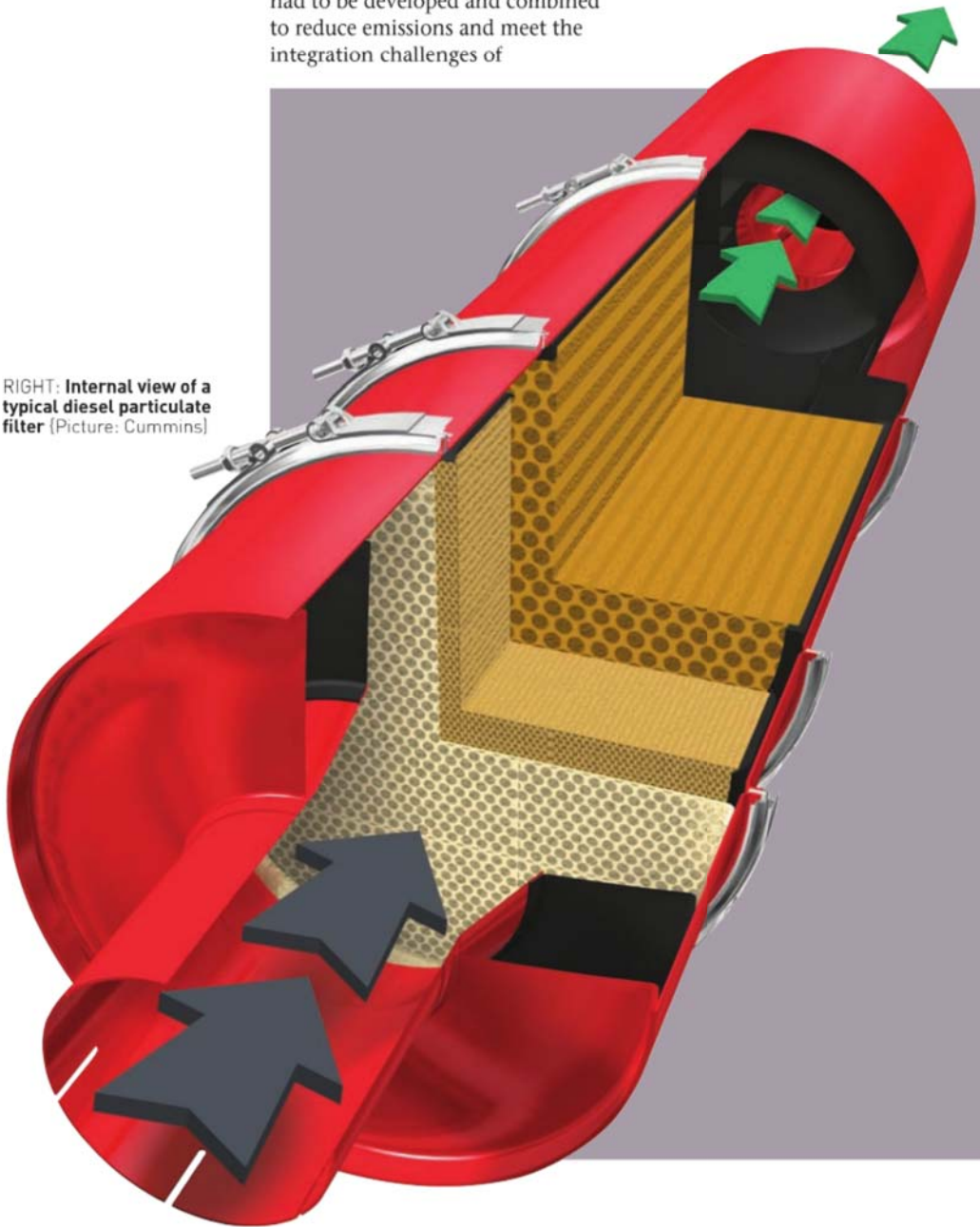
In addition, the association is contributing towards development of a harmonised NRMM retrofit certification scheme that forms the framework of the UNECE World Forum for Harmonization of Vehicle Regulations (Working Party on Pollution and Energy GRPE – Informal Working Group on Retrofit Emission Control (REC) Devices).

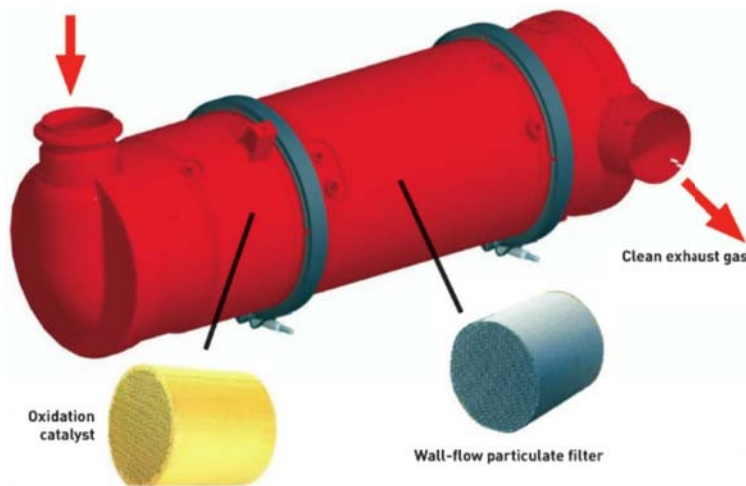
EU Stage IV requires off-highway engines to comply with emission limits that are equal (NOx) or only marginally different (PM) to the Euro 6 limits for heavy-duty engines. However, Euromot's manufacturers need to achieve these challenging limits with a fuel quality that – apart from the sulphur content – has been left completely undefined by the corresponding EU regulations. The availability of high-quality diesel fuel for off-highway applications will have to play a central role in all future debates on policy measures to reduce emissions from this sector.

### The next stage?

As mentioned previously, NRMM has now been identified by the Environment Directorate of the European Commission, Parliament and several Member States as a 'significant' source of PM and NOx in Europe. All future air-quality

RIGHT: Internal view of a typical diesel particulate filter (Picture: Cummins)





LEFT: Particulate filter for Tier 4 (Picture: Cummins)

regulations will look carefully at the contribution of this source to the identified air quality-related environmental and health problems.

In 2012, the European legislator will therefore launch an impact assessment study to establish a next stage of emission requirements for NRMM that could move even closer to heavy-duty Euro 6 by investigating options for establishing new metrics for the reduction of PM, specifically considering a particulate number (PN) limit. The assessment of PM-reducing devices requiring at least 90% particle removal efficiency and a particle number criterion is therefore under consideration.

This request from the legislator calls for the need to scientifically evaluate the contribution from the NRMM sector to air pollution in Europe and, as a consequence, the potential establishment of new requirements where appropriate. From the engine manufacturers' point of view, key prerequisites for any new measures include:

- New requirements to be applicable only to the most common engine categories; any potential new measures need to first address land-based variable-speed CI engines of 130-560kW, followed by 56-130kW;
- Timing: (a) a four- to five-year stability period in between two successive stages; (b) a minimum lead time of three years from publication of the new standard to the placing on the market of the engines that are requested to comply with the new requirements;
- Several policy options to be investigated (including 'do nothing')

with respect to the actual limit values of new metrics;

- A full impact assessment to be conducted, to investigate the environmental benefits, technical feasibility and economic benefits of each of the proposed options.

**Progressive implementation**

Furthermore, Euromot believes that the progressive implementation of EU Stages IIIB (2011-13) and IV (2014 onwards) will result in a considerable reduction of air pollutants emitted by NRMM, whereas the progress from EU Stage IV to a further stage of emission limits is anticipated to provide a much lower reduction potential than moving from Stage IIIA to IIIB/IV.

However, Euromot notes that the EU Member States are severely challenged to comply with air quality targets as required by the previously mentioned framework directives. As a result, having tackled the major contributors to air pollution, industry sectors with a minor share are now moving into the focus of regulators. A comprehensive review of both air-quality directives and related policy measures has been initiated this summer by the EC's Environment Directorate. Euromot has been given the opportunity to contribute to this process.

In this context, and with a view to the industry's need for planning certainty, Euromot fully supports the development of a roadmap outlining potential further measures for the emissions of NRMM in the EU. Specifically, the following issues need to be addressed:

- The proposed impact assessment study supporting the establishment of further provisions should consider the aspects of global alignment of any further stage;
- The internal combustion engine and equipment industries are not only challenged by new air-quality requirements to improve public health, but also by various energy efficiency and low-carbon policy initiatives managed by the Climate Action, Energy and Transport Directorates.

These aspects should be fed into a holistic approach on decarbonised next-generation clean engine and vehicle technologies in Europe and eventually be managed by one focal point in the European Commission, such as EC DG Enterprise and Industry and the Commission's Joint Research Centre (JRC);

- The proposed impact assessment study should consider other measures for reducing emissions and pollutants rather than setting new emission limit values. Accelerated emission reduction, for example, could be achieved by the incentivised renewal of the engines and machines in the field.

**The need for stability**

To meet upcoming requirements with intelligent and competitive solutions, the off-highway industry needs stability and sufficient lead time between the two stages. The increasingly stringent emission standards are challenging engine manufacturers to an unprecedented degree because off-highway engines need an extremely flexible engine architecture to be suitable for a widely varied range of applications in terms of design, duty cycles and operational conditions.

In addition, the industry will need policy support to maintain its strong, diversified and competitive industrial base in Europe. For a policy to be sustainable, it has to ensure a high level of resource efficiency, environmental protection and, last but not least, affordability.

The benefits to society will ultimately be low, however, if there is no cost incentive to stimulate the procurement behaviour of the end user who must pay the final bill. **IVT**