



## OUR CONTRIBUTION TO ENVIRONMENTAL PROTECTION

*At DEUTZ, environmental protection is not an ambitious aspiration but the philosophy by which we live. Using the latest technology, DEUTZ engines reduce pollutant emissions to a significant degree throughout the entire world. At the same time, carefully targeted environmental management ensures efficient processes along the entire value chain.*

- ▶ *The particulate mass has been reduced by a factor of **13**<sup>1)</sup>*
- ▶ *Carbon monoxide emissions has been reduced by a factor of **666**<sup>1)</sup>*

**C**ombustion engines produce emissions. Soot particles, nitrogen oxides and other toxic gases harm people and pollute the environment. It is the duty of politicians and industrial concerns to constantly advance the development of low-emission technologies; the framework which underpins this obligation is ever more stringent emission limits.

North America, Europe and Japan have introduced the strictest emissions standards and have largely harmonised them in the industrial engine sector – DEUTZ's core business sector. The BRIC countries (Brazil, Russia, India, and China), of equally huge importance when measured by global sales, are aligning themselves to these standards and will catch up in the medium term.

<sup>1)</sup> TD 2.9 L4 Tier 4 as against a comparable Tier 3 engine.



To meet the current EU Stage IV and US Tier 4 in the 56 to 560 kW power output range, the nitrogen oxide limit is now set at 0.4 g/kWh and the maximum for particulate emissions at 0.025 g/kWh.

This means that nitrogen oxide limits have been reduced by 95.7 per cent between 1999 and 2014 in North America, Europe and Japan and by 96.5 per cent for particulate mass (essentially soot particles). DEUTZ engines equipped with particulate filters to meet the most recent emissions standard already reduce particulate mass by more than 99 per cent. Consequently, the exhaust from the latest DEUTZ engines which meet the most stringent emissions standard contain no more nitrogen oxides or particulate mass than the ambient air in many of the world's greatest cities. To this extent, our highest emissions standard sets us on the way towards zero emissions.

#### ***In the technological lead***

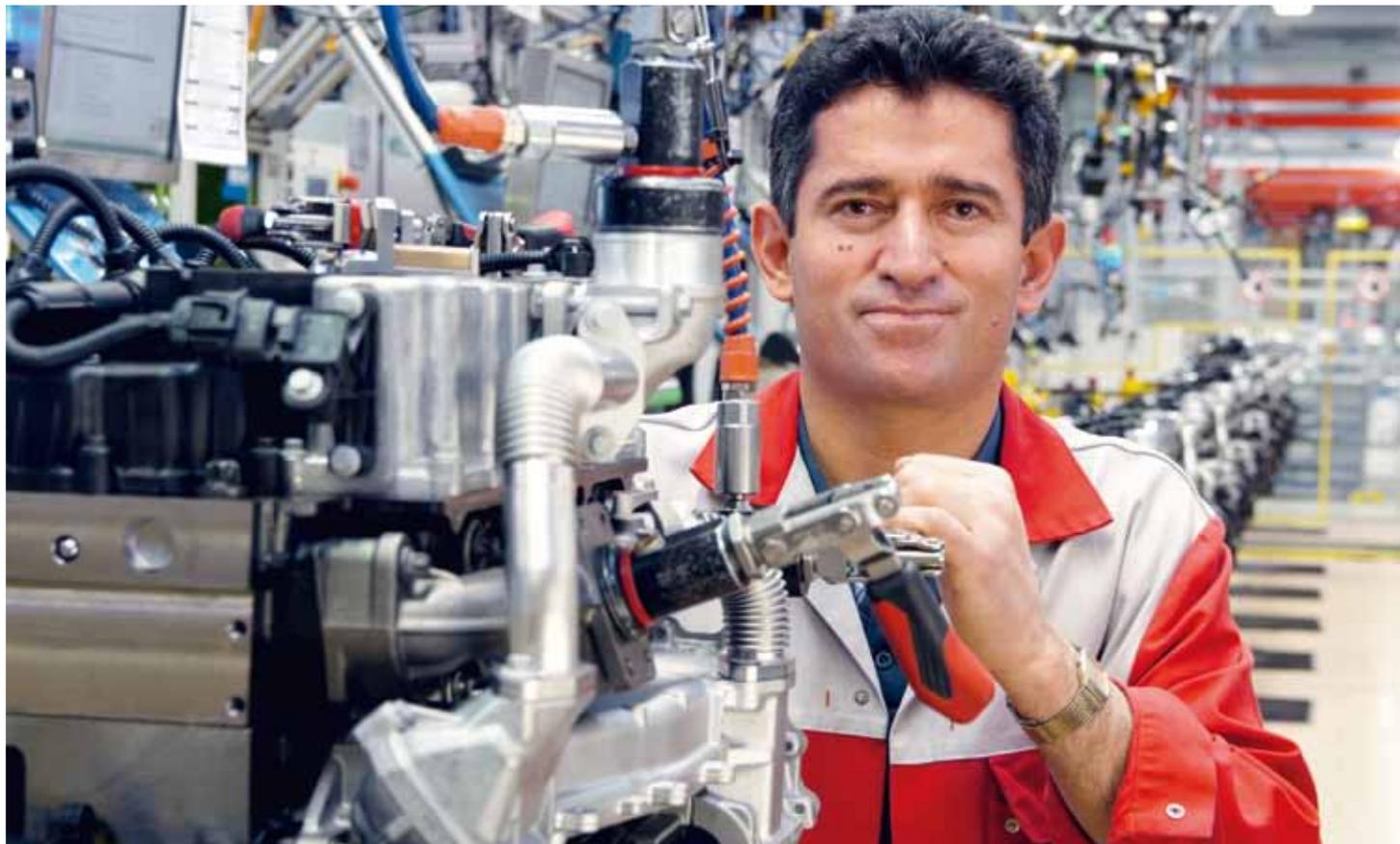
DEUTZ has always assumed a leading technological role. The Company has built up great expertise in the field of emissions reduction and exhaust aftertreatment and has gained a competitive lead through its substantial investment in R&D. Our diesel-particulate-filter-equipped TCD engines in the 2.9 to 7.8 litre cubic capacity range, designed for the EU Stage IV/US EPA Tier 4 emissions standard, already meet the limits of the next EU emissions standard, envisaged for 2019. This tightening of the standard is expected to lower the permitted particulate mass limit still further from 0.025 to 0.015 g/kWh. In addition, it will limit the number of particles as the debate about fine dust continues. This will considerably reduce fine dust pollution, particularly in urban areas.



Chemical fuel analysis is part of DEUTZ's internal quality assurance procedures.

- ▶ *Fuel consumption has been reduced by up to **10 per cent**<sup>1)</sup>*
- ▶ *Our agricultural customer, Fendt, boasts the **lowest consumption** for its class – with DEUTZ engines*

<sup>1)</sup> TCD 3.6 industrial engine Tier 4 compared with competitors' engines in the 4.5 litre range.



*We are constantly working hard to reduce both the resources we consume and the emissions produced by our own commercial operations.*

DEUTZ places great importance on low fuel consumption by its engines and is an active supporter of the trend towards downsizing. It is in the lower power output range, in particular, that we have completely re-developed our engine models. These engines exhibit the best power density in their class and can compete with engines with a greater cubic capacity produced by our competitors. DEUTZ engines, with high injection pressures and turbocharged, offer high performance from small cubic capacities, reducing fuel consumption at the same time. Our customers and the environment both benefit from this as less CO<sub>2</sub>, the main contributor to global warming, is released into the atmosphere.

***Environmental protection and resource conservation during production***

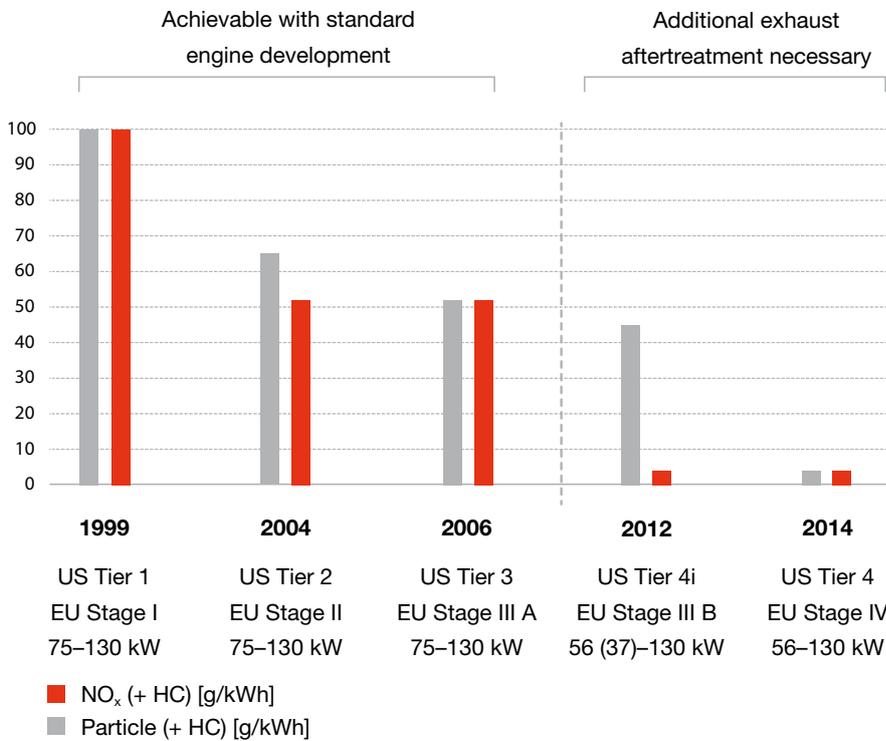
However, DEUTZ does not contribute to environmental protection solely through its advanced products. We are also constantly working hard to reduce both the resources we consume and the emissions produced by our own commercial operations. We are, for example, consistently expanding both our energy and our environmental management systems. The three management systems - quality, environment and energy - have also once again met the requirements for ISO certification. Additional potential has been exploited by implementing an extremely varied range

of technical and organisational measures. For example, the time spent on post-production engine testing has been reduced in order to reduce emissions and save resources. The test stands in the development division are increasingly being fitted with generators in order to feed the energy recovered back into the power grid. Also, as part of our waste management policy, we are continuing to replace disposable packaging with returnable packaging used in a closed-loop system. More details of these arrangements are given in the 'Environment' section on page 43 et seq.

A decision was taken during 2014 on optimising our production sites. In addition to improving economic efficiency, there will also be environmental benefits. For example, the planned construction of a new shaft centre at the Cologne-Porz site using the latest building engineering techniques will allow considerably more efficient operation, consume less energy and produce fewer emissions. At the same time, as part of a scheme to greatly improve land use in an inner city location, we are vacating an area of some 160,000 square metres at the Cologne-Deutz site. The area can in future be used for residential apartments, commercial activity and open green spaces.



**Changes over time to emissions standards (%)**



From 1999 till 2014 NO<sub>x</sub> was reduced by 95.7% and particle emissions by 96.5%