

At operational level, this involved implementing the resulting measures as well as planning and implementing the energy concepts in new buildings. The energy teams' hard work enabled us to achieve annual savings of 715 MWh from a total of 20 projects.

As well as maintaining the continuous improvement process, our focus for 2017 is to raise awareness among employees in areas of production where energy consumption is high. We will also concentrate on carrying out an efficient closure of the plant in Cologne-Deutz and completing the energy concept in the new shaft centre.

#### DEUTZ Group: Energy consumption in our plants<sup>1)</sup>

MWh	2016	2015
Electricity	79,837	80,283
Natural gas	35,795	34,243
District heating	23,017	23,857
Heating oil	4,440	3,863
Diesel fuel <sup>2)</sup>	20,144	21,335
LPG <sup>3)</sup>	310	–

<sup>1)</sup> Plants in the DEUTZ Group, excluding joint ventures.

<sup>2)</sup> At 9.85 kWh/litre (mean).

<sup>3)</sup> At 12.8 kWh/kg (mean).

## ENVIRONMENTAL MANAGEMENT SYSTEM

One of the ways in which the effectiveness of DEUTZ AG's environmental management system can be seen is that key aspects, such as sustainability, are taken into consideration when workstations are being planned. The system has had its compliance with DIN EN ISO 14001 reconfirmed by the certification body DNV GL 2016.

For example, when shaft production was relocated from the Cologne-Deutz site to Cologne-Porz, the supply of coolant was centralised at the same time. This has a number of advantages in the machining of shafts. Centralised control of the system means it is no longer necessary to monitor a large number of individual machines. The useful life of the cutting fluid can now be used optimally, thereby conserving resources and reducing hazardous waste. Permanent, centralised monitoring of key parameters of the cutting fluid also ensures a high level of manufacturing quality. This is directly beneficial from both a financial and an environmental perspective. We anticipate that fluid consumption will decrease by between 5 and 10 per cent this year.

Internal environmental and energy audits, which are conducted by a team of specialists according to a defined schedule, help to ensure that the processes being audited comply with statutory requirements and that departmental targets are met. Our environmental management system also helps in this regard and its rule set is continuously updated and analysed to ascertain at an early stage whether any process changes are needed.

In 2016, DEUTZ AG began to implement the new requirements arising from the risk- and opportunity-based approach of the ISO 14001:2015 standard for environmental management. The first results, particularly the assessment of opportunities, will be examined by the external auditors in spring 2017.

**Focus on reducing emissions** The assessment of environmentally relevant processes has shown that the emissions from operating the engine test bays during development and production have a strong impact on our environmental footprint. To be able to better evaluate the overall impact, DEUTZ analyses total annual emissions of the greenhouse gas CO<sub>2</sub> as well as of the pollutants dust, nitrogen oxide and benzene.

#### DEUTZ Group: Annual CO<sub>2</sub> emissions in our plants<sup>1)</sup>

Tonnes	2016	2015
CO <sub>2</sub> emissions (Scope 1)	13,433	13,251
CO <sub>2</sub> emissions (Scope 2)	51,315	51,070
CO <sub>2</sub> emissions (Scope 3)	1,224	532
Total CO <sub>2</sub> emissions	65,972	64,853

Scope 1: CO<sub>2</sub> emissions caused by combustion in our own facilities.

Scope 2: CO<sub>2</sub> emissions relating to purchased energy (e.g. electricity, district heating).

Scope 3: CO<sub>2</sub> emissions from flying and the use of hire cars.

<sup>1)</sup> Plants in the DEUTZ Group, excluding joint ventures.

Another analysis shows total CO<sub>2</sub> emissions resulting from the direct or indirect consumption of energy per engine produced during the reporting period:

**DEUTZ Group: Emissions per engine in our plants<sup>1)</sup>**

Emissions per engine		
	2016	2015
Carbon dioxide (kg)	470	460
Nitrogen oxide (kg)	0.22	0.128
Dust (g)	2.7	2.6
Benzene (mg) <sup>2)</sup>	<85.0	44.8

<sup>1)</sup> CO<sub>2</sub> in plants in the DEUTZ Group, excluding joint ventures. The other data relates to German plants.

<sup>2)</sup> Measurement uncertainty is three times higher than the measured value.

There was a small year-on-year increase in carbon dioxide emissions per engine, which rose by 2.2 per cent. This means that the target of reducing carbon dioxide emissions by 2.0 per cent per engine produced was not achieved. The reason for this is that around two-thirds of the test bay emissions are attributable to research and development activities, whereas production testing only accounts for about a third. More endurance testing aimed at refining engines with large cubic capacities and improving product quality led to the increase. Ultimately, however, these tests play a part in ensuring that our future engines put fewer emissions and less CO<sub>2</sub> into the environment when they later go into operation. The per-engine level of other emissions (dust, nitrogen oxide and benzene) also increased in 2016 for the same reason, even though the revision rate in engine production has been successfully lowered and testing programmes have been significantly streamlined and further standardised.

The state-of-the-art, high-performance exhaust gas aftertreatment system used in the production test bays at the German sites ensures that DEUTZ remains comfortably within permitted limits and, in some cases, is very significantly below them.

**FOCUS ON WATER POLLUTION CONTROL**

The relocation of shaft production provided an opportunity to check that the production machines were not causing water pollution. This thorough inspection of the machines was carried out in order to pinpoint and completely eliminate any leaks from what are normally inaccessible places.

Moreover, the collection trays were designed with generous dimensions on-site by a specialist company. We invested €450 thousand in the installation of the collection trays, which play a key role in water pollution control.

All equipment that can contain or collect water pollutants and that is subject to mandatory inspection requirements is inspected at defined regular intervals by experts in order to comply with water pollution control requirements and increase technical uptime.

The risk of contaminating water courses and soil as a result of operating this equipment has been significantly reduced because we invested in renewing our machinery as part of the relocation of shaft production from Cologne-Deutz to Cologne-Porz.

**SAFETY MANAGEMENT**

Over the past few years, ongoing measures in the area of occupational health and safety have led to a reduction in the frequency of accidents.

However, the latest environmental KPIs show that the frequency of accidents<sup>1)</sup> and the number of notifiable accidents per thousand employees has increased despite safer workplaces being designed and improvements made to our health and safety organisation. Accident frequency, which is the number of notifiable workplace accidents in relation to the number of hours worked, stood at 20.9 in 2016 (2015: 12.9) and was thus significantly higher than in the previous year. Similarly, the number of notifiable accidents per thousand employees increased to 27.9 (2015: 17.7). The investigations carried out after the accidents did not reveal any clear systemic reasons for the accidents so, after reviewing the risk assessments, the necessary instructions were provided to the individuals affected in most cases.

One of the ways in which the DEUTZ AG safety organisation has been improved is the provision of cross-departmental training for fire wardens. This training, which consists of both theoretical and practical parts, was run by the works fire brigade.

<sup>1)</sup> Accident frequency: number of accidents per million hours worked (as defined by the employers' liability insurance association).