

# The environmental challenge



**VOLVO**



One of the greatest challenges for the truck and transport industry is to reduce the environmental impact of the transport sector to a sustainable level in the longer term.

The Volvo Group has many years' experience of working on environmental issues and environmental care is one of our core values. The Volvo Group is to be ranked as a leader in terms of environmental care among the world's top producers of transports, equipment and systems. Our environmental programs shall be characterized by a holistic view, continual improvement, technical development and resource efficiency.

The environmental objectives are part of the annual strategic challenge from the CEO to the Volvo Group companies. All necessary actions are to be implemented in the companies' business plan.

In this brochure, we give you an easy-to-understand description on how we look up on the environmental impact from our powertrains and how we are working to reduce the impact as much as possible.

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**Foreword** For the Volvo Group, environmental care is one of the most important drivers. We spend a lot of our time and resources on environmental improvements in order to fulfil and also exceed our customers' very high expectations on our products' environmental performance. The powertrains (the engines and transmissions) play a key role when it comes to further develop the Volvo Group's environmental image and performance.

Since the Volvo Group is a truly global company with operations and customers all around the world, we strive to help environmental authorities and regulators to find globally harmonized standards and procedures regarding exhaust emissions and fuels. Global harmonization is a key pre-requisite for faster implementation of new and efficient technology with excellent environmental performance.

Other main challenges are of course to reduce emissions of greenhouse gases and to find the fuels for the future. Regardless of which fuel we use, our products must have very good fuel efficiency. That is, and will be, one of our main objectives.

The diesel engines will most likely play an important role in the future powertrains, also in combination with fuels derived from renewable sources.



Lars-Göran Moberg  
President of Volvo Powertrain

## Facts about Volvo's powertrain

The Volvo Group is one of the world's largest manufacturers of heavy diesel engines for commercial use and also a major producer of transmissions for heavy vehicles in the world. We have production, research and development of powertrains on three continents and our products and services are offered on more than 200 markets around the world. Our production plant for powertrains in Skövde, Sweden, is the second largest in the world regarding to the number of engines produced for heavy vehicles.

Volvo's powertrains are designed to be adaptable to function within a very broad spectrum of application areas for use in most of our products. Our diesel engines are used in trucks, busses, construction equipment products and boats. Volvo also develops and manufactures engines for industrial use.

The strongest driving force for the development of powertrains is the needs and wishes of our customers. Reliability, durability, drivability and fuel economy help them increase their profitability and productivity. Our goal is to exceed their expectations – at a lower cost than our competitors. To accomplish that we have to be one step ahead of our competitors in both product and business development.

During 2003 we produced more than 180,000 engines from 2 to 16 litres. We offer engines with power output in the range of 75 to 775 hp. The largest amount of produced units from one product is the D12 engines, which also is in a superior manner the strongest heavy-duty engine in the world.

During 2003 Volvo Group produced more than 62,000 transmissions, 166,000 axles and 37,000 marine drives.



# Considering the entire life cycle



The Volvo Group's environmental programme is characterised by a holistic approach which takes account of every phase in the life cycle of products – from the cradle to the grave. Our environmental programmes are based on scientific data. As a result, we have conducted a number of LCAs, Life Cycle Assessments, for our products.

Volvo Group focuses on energy efficiency and low emissions in all aspects of our business.

## **Fuel efficiency is the most important issue**

However, what has the greatest impact on the environment? The results reveal that fuel consumption (diesel) for our products is the one component that has the largest individual environmental impact. The main reasons for this are that diesel fuel is not a renewable product and that it causes emissions of the greenhouse gas, carbon dioxide (CO<sub>2</sub>). Overall the use phase of a vehicle accounts for about 90 per cent of the total environmental impact.

For many years the Volvo Group has had a list of chemical substances that must not be used due to environmental aspects. When a vehicle is scrapped, virtually all the metal is recycled and used to make new products. This reduces the need to extract new

metal, which in turn reduces the total environmental load. About one-third of a new vehicle is made from recycled metals.

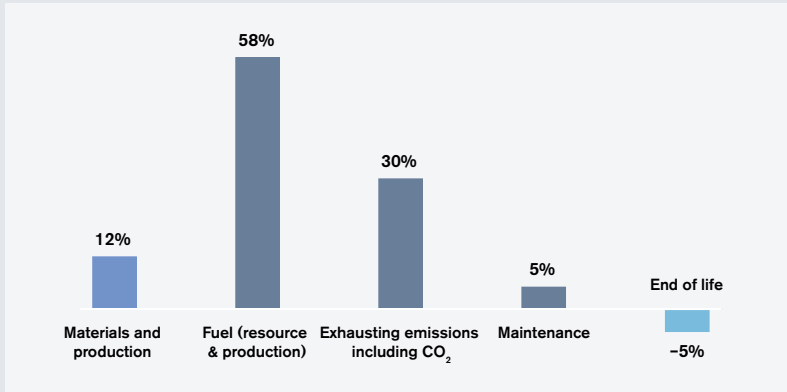
## **Local impact of plants**

At the local level, the environmental impact of the plants is important, even if they only account for a small percentage of the total environmental impact of a truck. For this reason, we are running an active environmental programme at every Volvo plant world wide.

Every powertrain plant has, for example, a certified environmental management system in accordance with ISO 14001. These plants also comply with Volvo's internal environmental standards for production facilities. We devote a great deal of time and effort to saving energy and reducing emissions.

# Life Cycle Facts

## Environmental impact assessment of a truck in long-haul operation



What has the greatest environmental impact? This diagram shows how the environmental impact is distributed for a truck according to the EPS (Environmental Priority Strategies, a tool in product design) evaluation system.

### Good examples

At the various Volvo production facilities, there are large and small examples of projects designed to benefit the environment.

Volvo's foundry in Skövde, Sweden, is the largest in Northern Europe. Production here focuses on cylinder blocks and cylinder heads, drum brakes/discs and flywheels. This foundry has been presented with the WFO Environmental Award for its new casting process, a method with major environmental benefits. The consumption of both moulding sand and energy is reduced by between 50 and 70 per cent. At the same time, the castings are stronger, thereby improving the environmental performance of the engines.

The foundry has also been presented with the Volvo Group Environmental Award for a new painting process for engine blocks. The water-borne paint is dried with dry air instead of hot air. This means that the energy consumed by painting and drying is reduced by no less than 90 per cent. All the paint that does not end up on the engine blocks is recovered and used as new paint. As a result, waste paint has been virtually eliminated.

# Fuel efficiency



Transport is essential for both welfare and growth. Our products are used to transport food to urban and rural destinations, to take people to and from work or to move building materials to produce homes and roads.

Our target is to create transport solutions with the lowest possible fuel consumption for the entire job.

There are three principal reasons for prioritising a reduction in fuel consumption.

1. Diesel fuel from fossil oil is a finite resource on which we must economise.
2. Emissions of CO<sub>2</sub> are directly linked to the amount of fuel consumed.
3. Reduced fuel consumption results in lower costs for our customers.

This means that the entire system has to be optimised for low fuel consumption – from the engine combustion chamber and total vehicle impact to the planning and logistics of vehicle systems.

## **Highest fuel efficiency combination**

When the entire chain is analysed – from the production of fuel to the usable output at the driven wheels (well-to-wheel efficiency) – the combination of diesel fuel and Volvo's diesel

engines produces extremely high energy efficiency. No other combination of fuel and engine is currently able to offer the same high level of fuel efficiency at a competitive cost level.

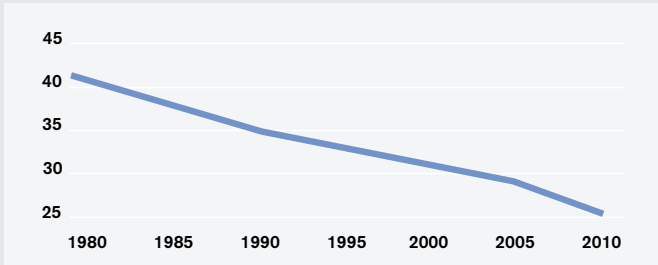
## **Future fuels**

When it comes to heavy-duty vehicles, diesel fuel from crude oil will continue to be the principle fuel for many years. In the longer term, however, we shall have to change to energy sources other than fossil oil. The main reason is declining availability and reduction of CO<sub>2</sub> emissions.

Well-to-wheel efficiency and emission of greenhouse gases throughout the life cycle are important parameters when assessing different fuels. There are large differences between the various alternatives.

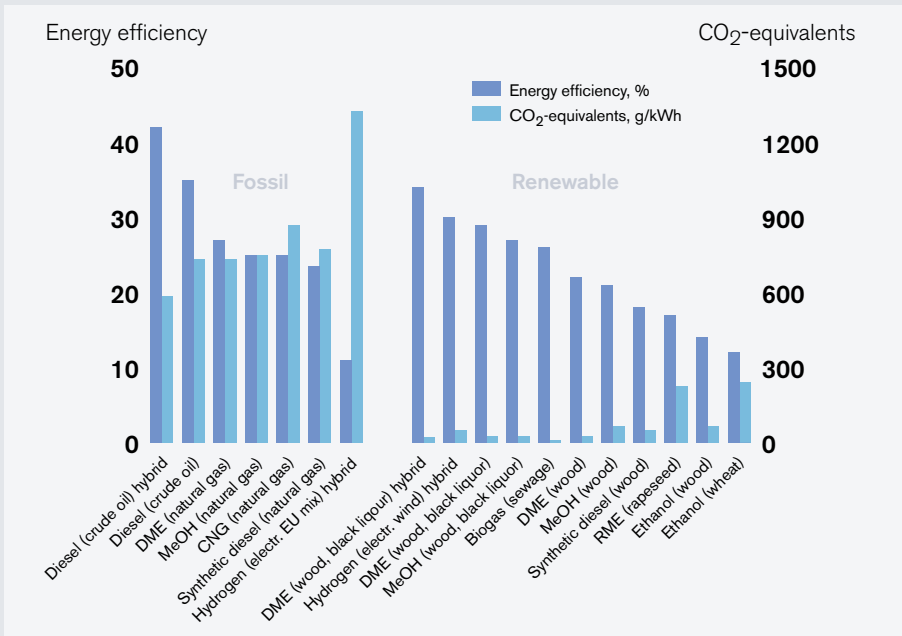
# Fuel Efficiency Facts

## Trends for fuel consumption for a Volvo truck



Fuel consumption for Volvo's trucks has been reduced by no less than 30 per cent since 1980. This is a trend that is going to continue.

## Assessment of the energy efficiency of different fuels



This bar chart shows an assessment of the energy efficiency of different fuels and the emission of greenhouse gases throughout the life cycle, well-to-wheel. Natural gas or biogas (methane) are the alternative fuels that are primarily being used at the present time. The Volvo Group is Europe's largest supplier of engines adapted for natural gas/biogas for buses. Looking ahead, dimethylether (DME), based on the gasification of black liquor from timber raw materials, for example, is the renewable alternative which theoretically has the best energy efficiency.

# Cleaner emissions



In order to reduce air pollution, emission standards are going to become increasingly rigorous. Volvo welcomes the trend towards clearly defined and globally harmonised emission standards.

As one of the largest engine suppliers, we have real potential to comply with the increasingly rigorous requirements. We are also working to promote global harmonisation of regulation procedures and emission standards.

Another important factor when it comes to improving the environment is access to fuel of high quality with, for example, low sulphur content.

## **Thirty per cent reduction**

When it comes to emissions, important improvements have been made in the last ten years. For example, within the EU, the emissions of nitrogen oxide by road traffic have been reduced by more than 30 per cent, while transport has increased by 20 per cent.

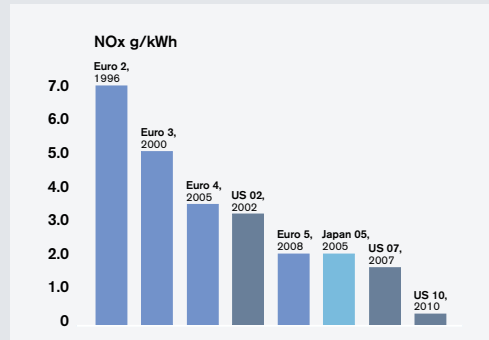
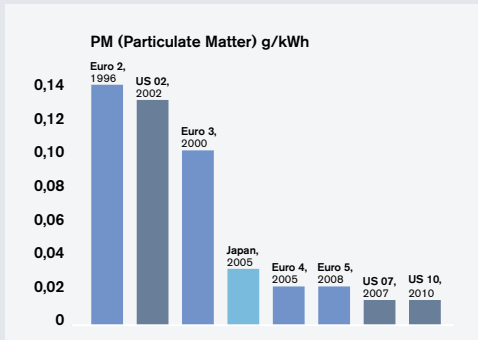
The increase in population migration to the cities will, however, necessitate additional improvements in the future. Reducing the noise produced by traffic will also be part of future environmental programmes.

## **An innovative filter**

Using the Volvo Exhaust Filter, we can offer engines with even lower emission levels. This is especially important for vehicles that are used in traffic-intensive areas. This exhaust filter reduces the content of carbon monoxide, hydrocarbons and particulate matter by as much as 90 per cent. It cleans the emissions in two stages – firstly using a catalytic converter and then using a ceramic filter which burns carbon black particles.

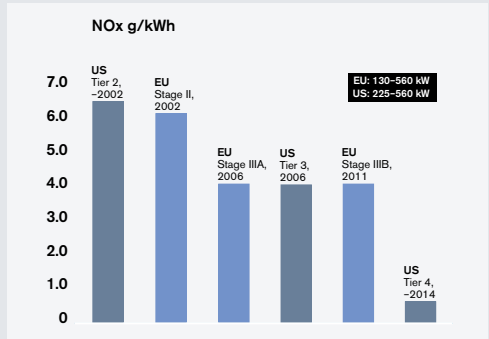
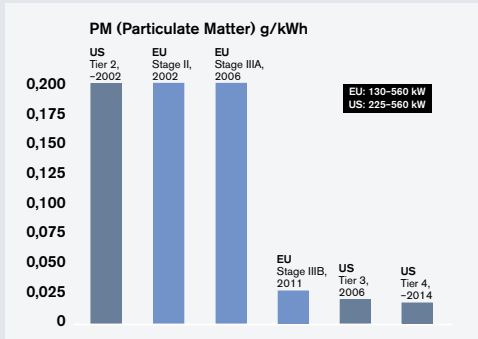
# Cleaner Emission Facts

## Emission standards for truck and bus diesel engines



The emission regulations for trucks have been significantly tightened over the past ten years and these emissions will be reduced by a further 60-90 per cent.

## Emission standards for off-road diesel engines



The emission regulations for construction machinery have been and will continue to be significantly tightened.

This folder focuses on Volvo Group's environmental challenge from our powertrains. At the present time, one of the most important challenges for the transportation industries is to reduce the environmental impact of the transport sector to a sustainable level in the long term. At [www.volvo.com/group/environment](http://www.volvo.com/group/environment), you can find more information on Volvo Group's environmental challenge.

**VOLVO**

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