

FUTURE FUELS FOR COMMERCIAL VEHICLES

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AT A VITAL CROSSROADS

The consumption of energy is increasing all over the world. At the same time, the available resources are declining. There will eventually be a shortage of some of the types of energy we use. At the same time, these energy sources are making a significant contribution to the increase in global warming. Joint intervention and activity on the part of everyone involved is needed to solve these problems.

Most stakeholders – vehicle manufacturers, fuel producers, politicians and researchers – agree about the problems. Our current use of fossil energy types is not sustainable in the longer term. In overall terms, almost three billion tonnes of crude oil are consumed every year and 60% of it is used by the transport sector. Most people also agree that time is a critical factor. The measures that are being suggested differ, however.

The time has therefore come for us to join forces and produce a picture and a vision of the possible routes and the action we should take. Transforming an energy system comprising vehicles, fuel and infrastructures takes a long time and requires extensive resources from everyone involved – from producers to consumers.

There is no question that the need to transport food, people and goods is going to increase. For many years now, Volvo has been working to find the best solutions for the future. Our starting point is that every decision and action should be based on scientific data and have a holistic perspective that includes all energy-using sectors. This provides a platform for sustainable long-term decisions.

POWERFUL DRIVING FORCES

There are three principal factors that drive the need for alternative fuels.

- The increase in global warming to which the

burning of oil is a contributory factor.

- Our enormous dependence on fossil fuels. Some 97% of all the energy that is used for transport comes from crude oil.
- Crude oil is a finite resource and its availability is steadily declining.

The global need for energy is increasing by more than two per cent a year. This represents almost a doubling of energy consumption over a period of 30 years. Of the total volume of energy, around 80 per cent comes from fossil energy, such as coal, oil and natural gas.

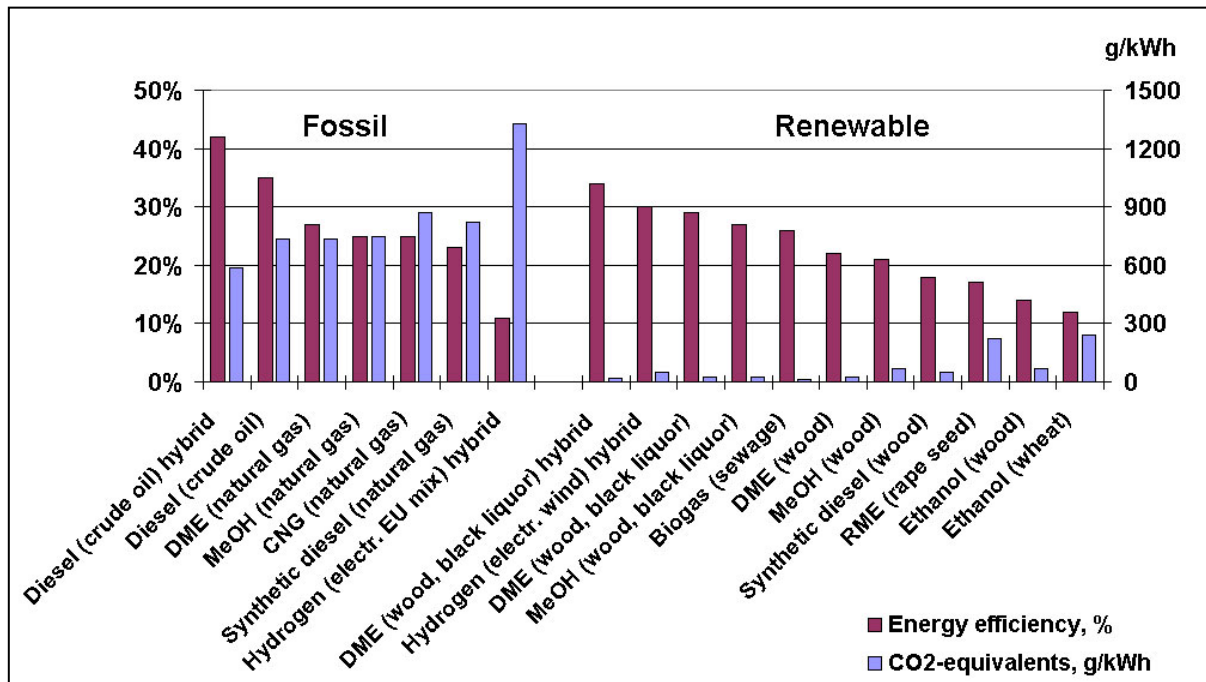
Most researchers generally agree that human activities have increased global warming. An increase of a few degrees in the worldwide mean temperature threatens water resources, raises the level of the sea, affects vegetation and precipitation, increases the spread of tropical diseases and changes the conditions for agriculture.

The main reasons for the increase in global warming include the burning of coal, oil and natural gas, which are used for transport, heating and industry.

Low regulated emissions, first and foremost nitrogen oxide and particulate matter, have often been put forward as an argument for introducing alternative fuels for vehicles. This is no longer such a powerful argument. Current and future engines are far cleaner than before and will soon reach emissions levels that will be acceptable in the long term.

WHAT DETERMINES THE CHOICE OF FUTURE FUEL?

The alternative we choose depends, among other things, on availability, environmental impact and fuel efficiency. Cost and customer acceptance are also important parameters.



1. Diagram showing the well-to-wheel performance of each fuel regarding energy efficiency and emission of greenhouse gases

One good way of comparing and assessing different fuel alternatives is to analyse the total energy efficiency and the emission of greenhouse gases, measured over the entire life cycle, from the production of the fuel to the usable effect on the driven wheels, a well-to-wheel analysis. The analysis should include all relevant activities, including the complete production of the fuel, transport of the fuel to customers and the vehicle's powertrain efficiency.

WHAT ARE THE ALTERNATIVES?

The following fuels are included in the alternatives we at Volvo have been studying in greater detail:

- Ethanol (EtOH)
- Methanol (MeOH)
- Diesel (conventional and synthetic)
- Rapeseed methyl ester (RME)
- Dimethylether (DME)
- Methane (natural gas and biogas)
- Hydrogen

VOLVO'S POSITION

Volvo's position when it comes to future fuels for commercial vehicles is based primarily on an analysis that has known and established scientific data as its starting point. Volvo applies an holistic approach, in which greenhouse gases, energy efficiency, energy availability and cost are prioritised. Volvo's position is as follows:

- In spite of CO₂ emissions, increasing costs and declining reserves, conventional diesel fuel – gradually improved, including possibly synthetic fuel components – will probably remain the dominant fuel for commercial vehicles for at least two decades.
- Fuel efficiency for the complete vehicle operation will be an area of focus, regardless of the choice of fuel.
- The cross-sector optimisation of energy and fuels should be used to ensure the effective use of available energy, the highest potential for CO₂ reduction and the lowest cost.
- Methane (natural gas and biogas, compressed or converted) will be used as a fuel for vehicles, due to increasing regional availability and expanding pipeline grids. Biogas is close to being CO₂ neutral.
- DME is a strong candidate for a longer term future fuel:
 - Best well-to-wheel energy efficiency from bio source.
 - Close to CO₂ neutral if produced from biomass.
 - Highest efficiency, lowest GWP and cost of the gas to liquid (GTL) fuels.
 - Very low exhaust emissions.
 - Energy dense and liquid at low pressure.
 - Non-toxic, biodegradable and harmless to the atmosphere.