



Future Fuels for Commercial Vehicles

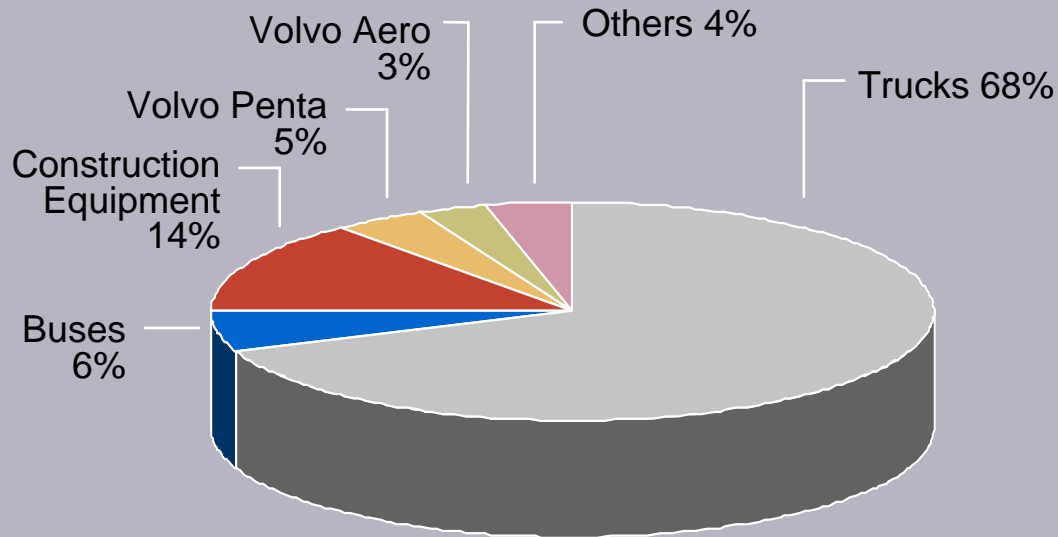
Rolf Willkrans
Director Environmental Affairs
Volvo Group Headquarters
Göteborg, Sweden

Business Areas

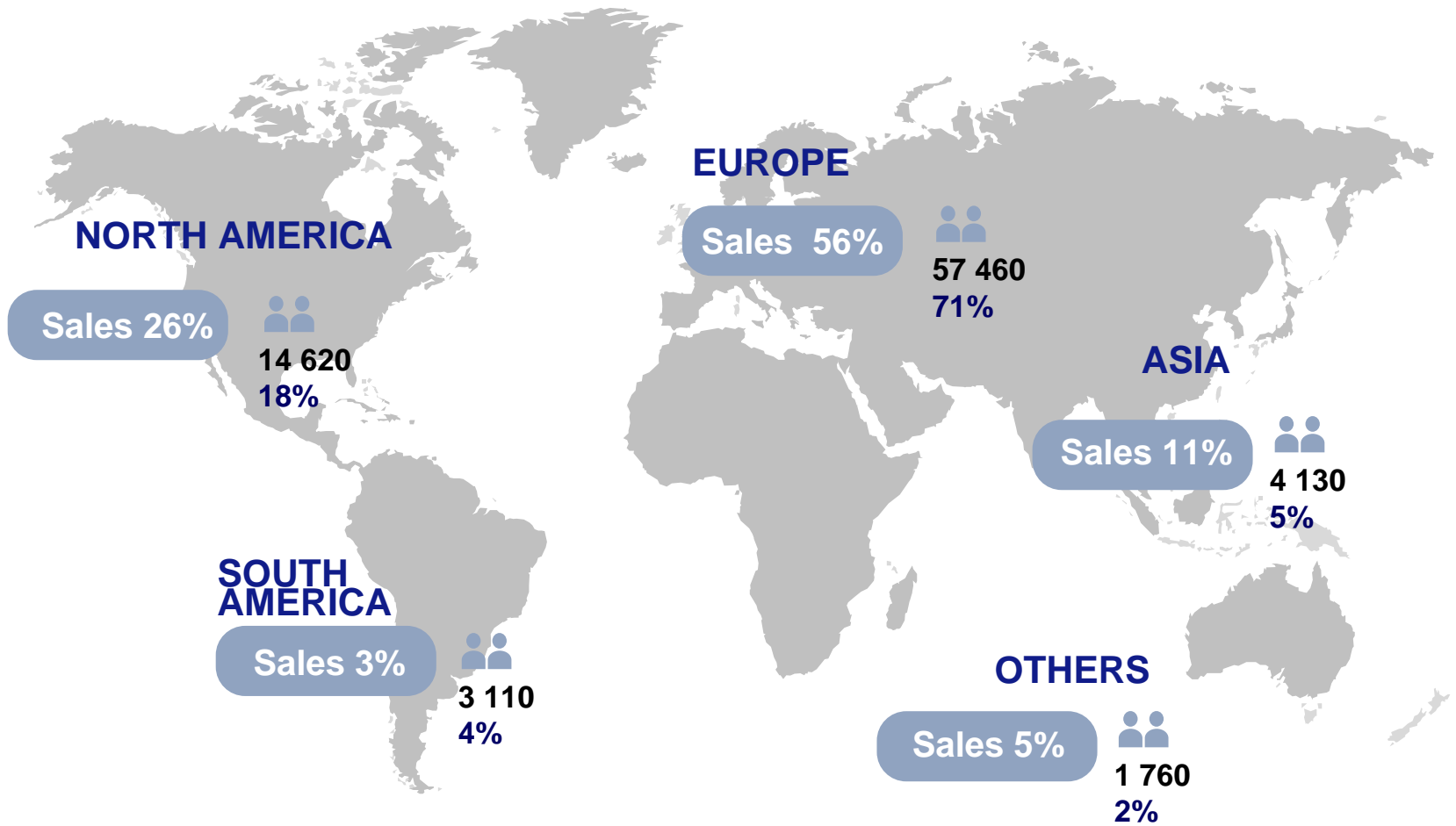


Business Areas, 2004

Total Sales: EUR 22,0 bn



Sales and Employees Worldwide 2004



Volvo Corporate Values

Quality



Safety



Environment

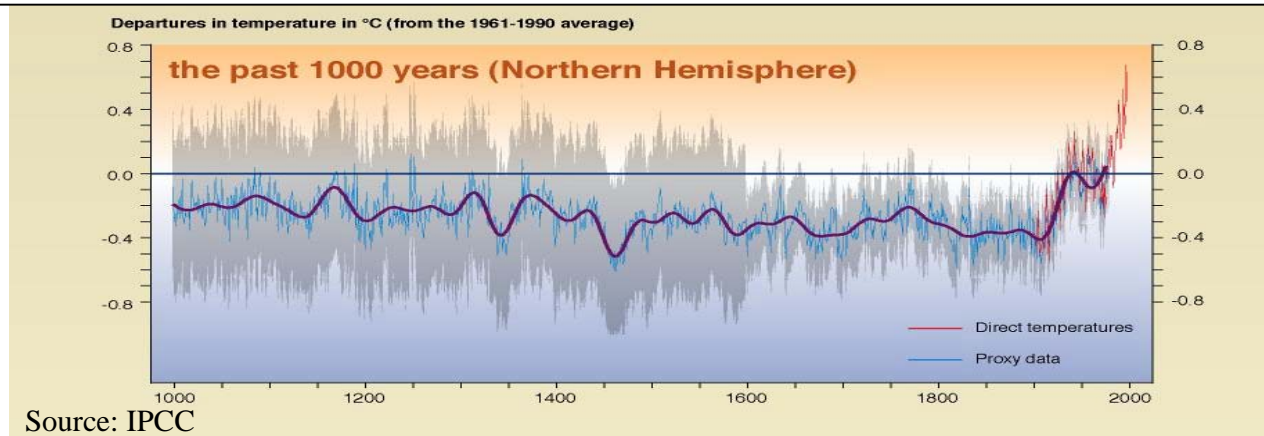


Drivers

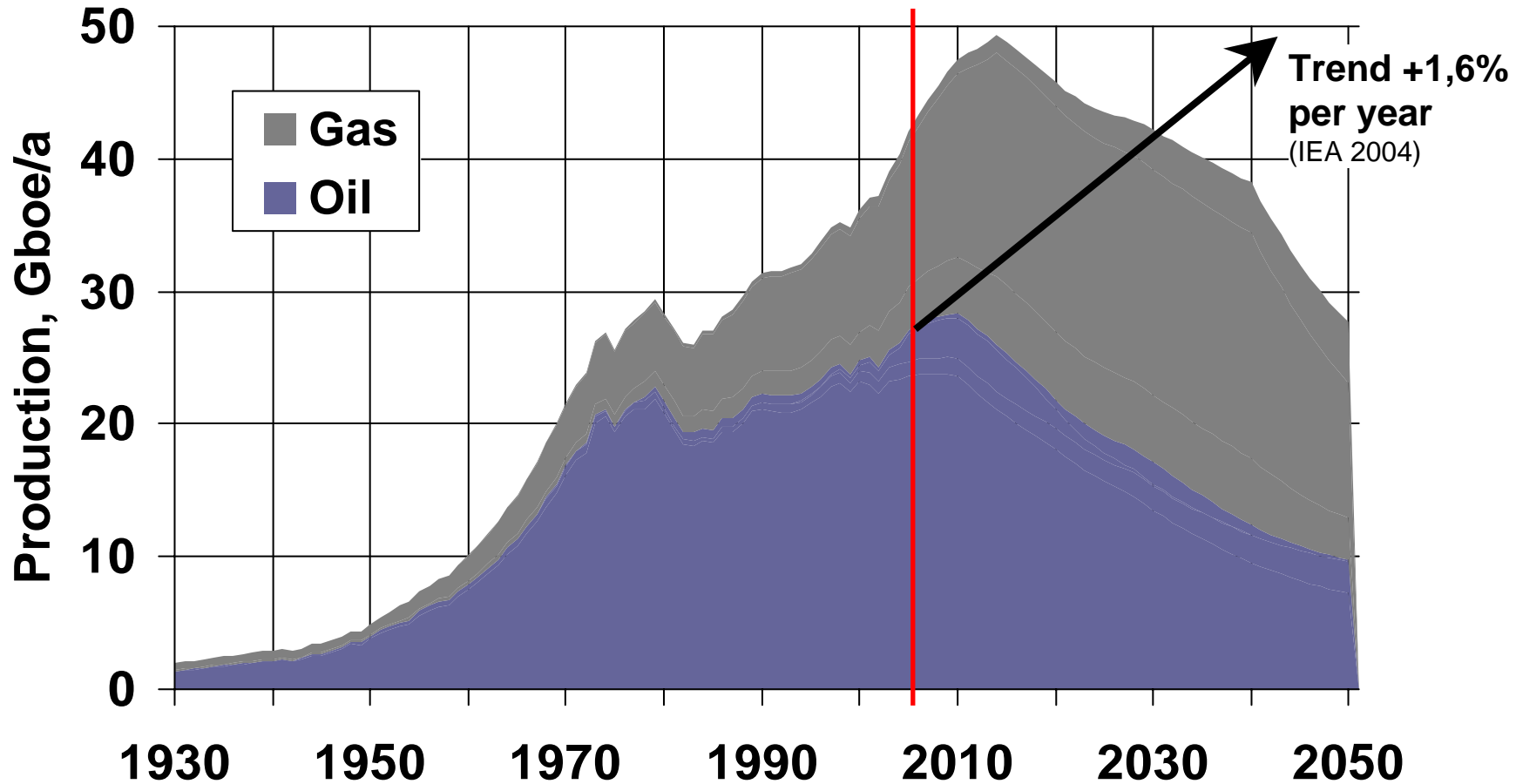
- Climate change - fossil greenhouse gas emissions
- Availability of energy resources and projected increasing demand
 - ✓ Crude oil is a finite resource. Global crude oil production will peak within a decade
 - ✓ 97% of the energy used for transport comes from crude oil
- Security of supply
 - ✓ The majority of known crude oil reserves are located in the Middle East
- Emissions, regulated and unregulated

Climate change – fossil greenhouse gas emissions

- “Climate issues will present the automotive industry with its greatest challenge in the future”
 - ✓ Leif Johansson, CEO and President of AB Volvo.
- Reduction of fossil greenhouse gas emissions is addressed in national and international strategies and programmes.
 - ✓ The transport sector is a focused area.
- Will be a strong driver for low or neutral CO₂ fuels and vehicles.



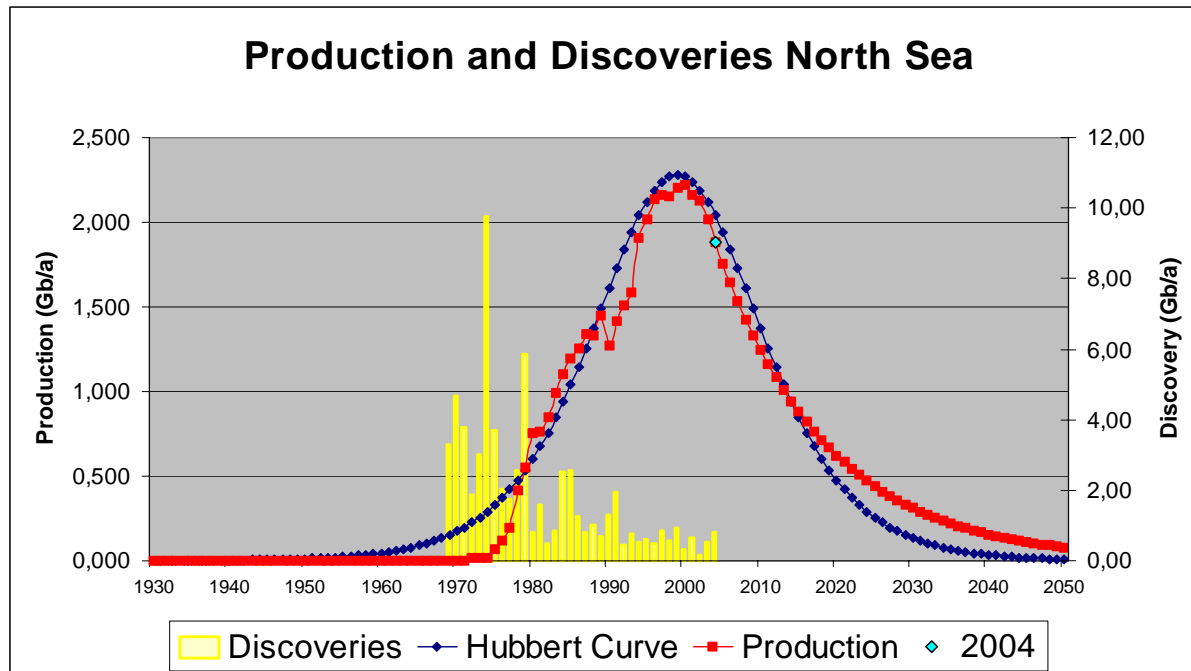
Production of Oil and Gas



Source: CJ Campbell, 2004

North Sea

- The North Sea peaked in 2001
- Production decreased by 7% during 2004 compared to 2003
- The production will be approximately 40% of the 2000 level in 2015



Source: CJ Campbell, 2005

Emissions, regulated and unregulated

- Truck and bus diesel emission standards 2010
 - ✓ NOx and PM levels will be 100 times lower than for uncontrolled engines.
 - ✓ Regulated emissions from diesel vehicles will approach sustainable levels.
- Exhaust emissions will not be a main driver for changes to alternative fuels
 - ✓ But, urban areas will require even lower emissions.
- Fuels which can reach desired emission levels with low driveline cost will be favoured.

Scenario conclusions

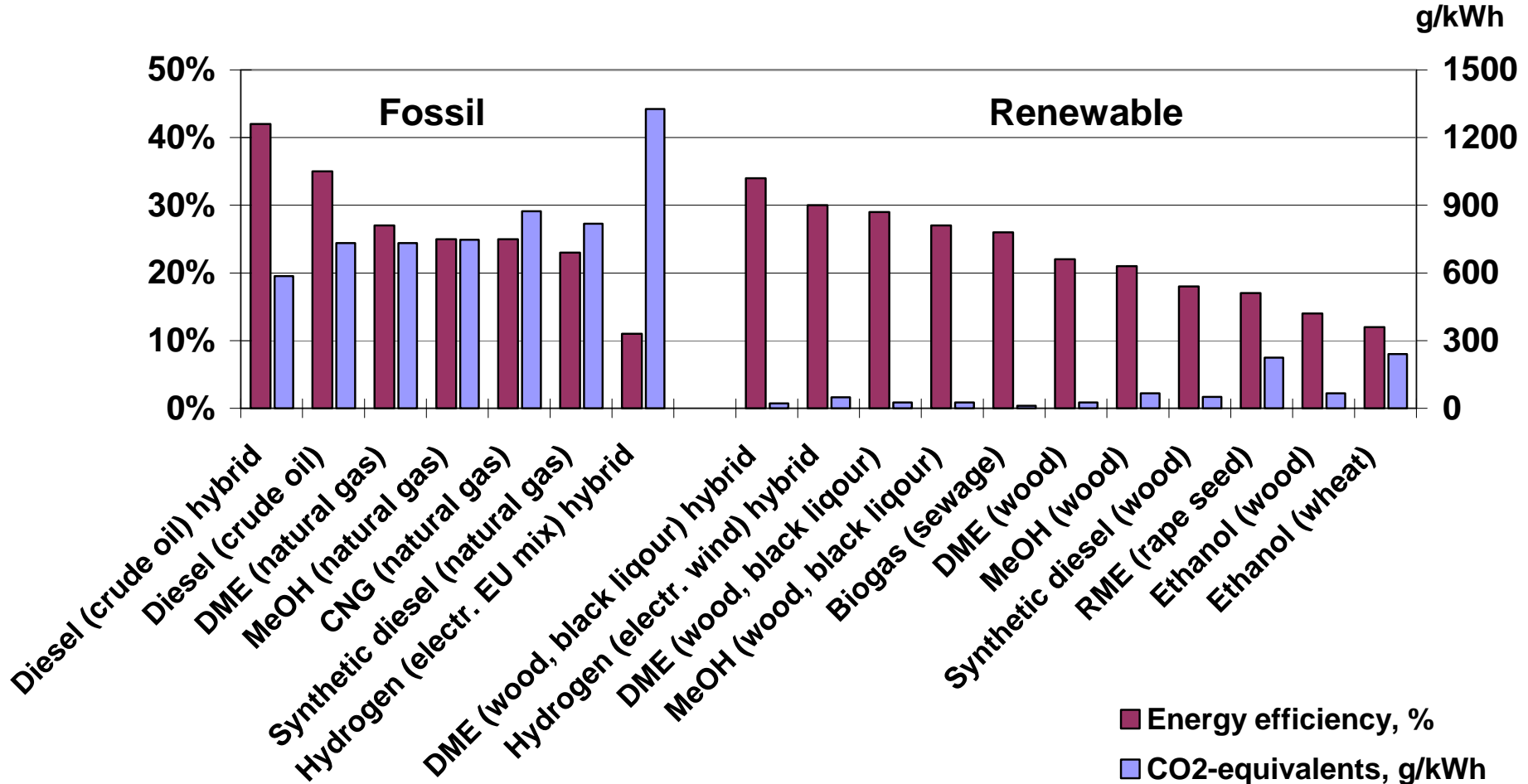
- Climate change must be addressed
 - ✓ Well-to-wheel CO2 emissions
- Current use of oil is not sustainable in the long run
 - ✓ Availability
 - ✓ Security
 - ✓ Oil price
- Energy efficiency must be focused, regardless if the energy is finite or renewable
 - ✓ Well-to-wheel energy efficiency

Gross list of energy carriers of interest

- Ethanol, (EtOH)
- Methanol, (MeOH)
- Diesel (crude oil and synthetic = Fischer-Tropsch)
- Rape seed Methyl Ester (RME)
- Dimethylether (DME)
- Methane, Natural Gas and Biogas
- Hydrogen

Well to wheel analysis

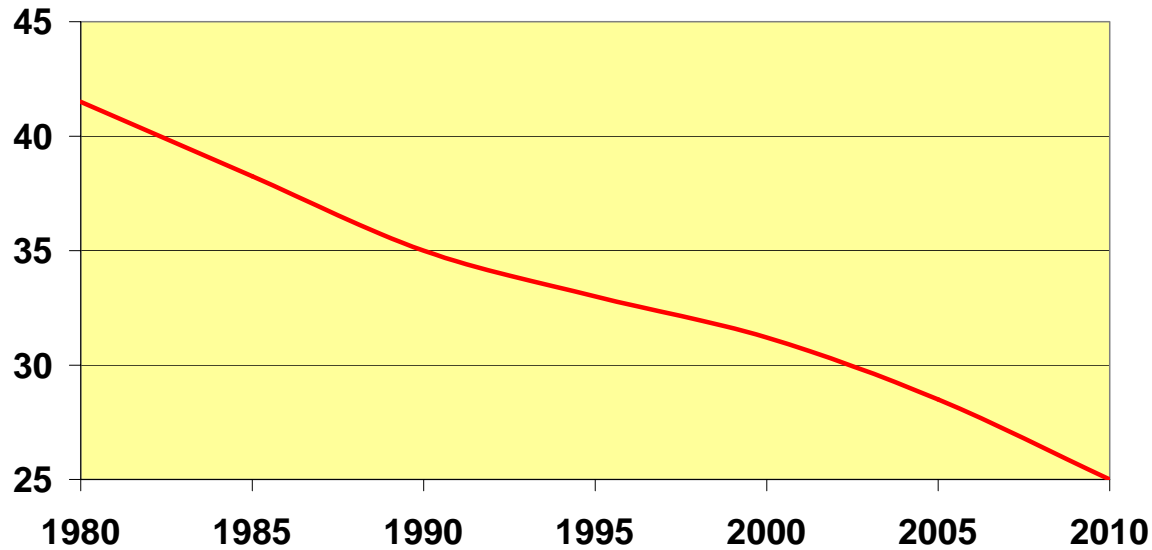
Volvo study



Fuel consumption development

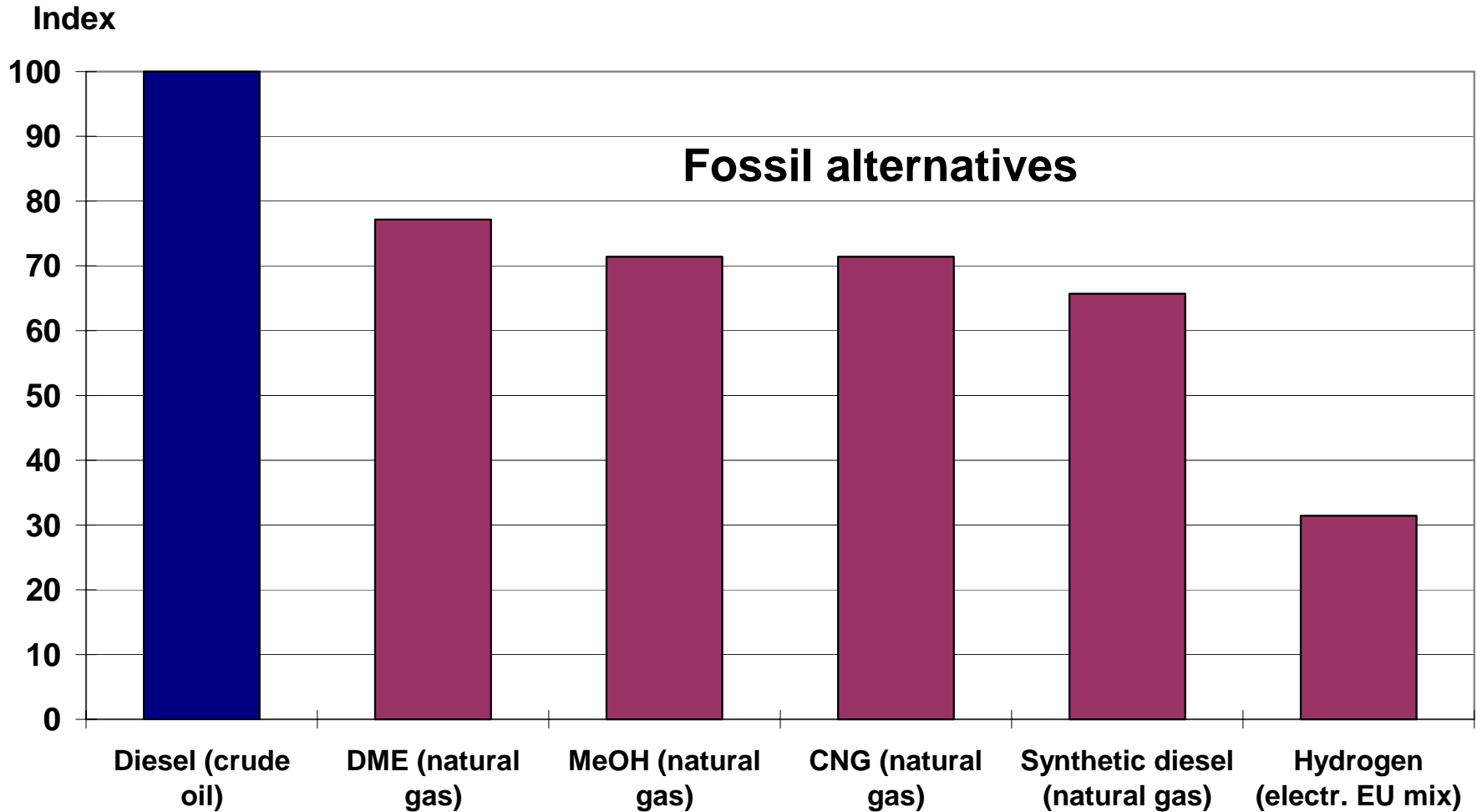
Volvo FH12, 40 tonnes, long-haul traffic situation

litre/100km



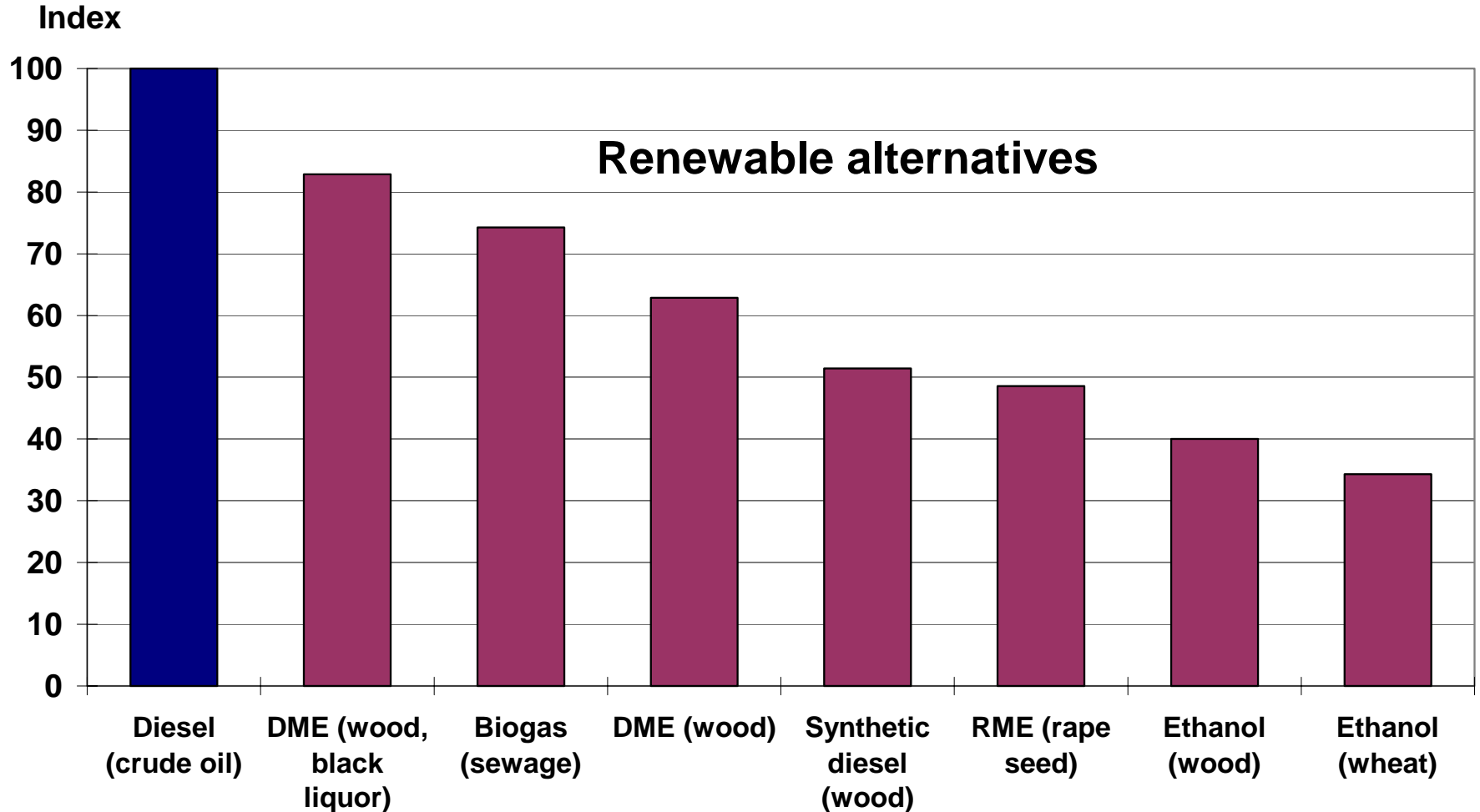
Energy efficiency

Well-to-wheel



Energy efficiency

Well-to-wheel



Why DME

- Best “well to wheel” energy efficiency from bio source and from non crude oil fossil source
- Multi source and multi purpose features
 - ✓ produced through gasification of an organic source
 - ✓ can be used for diesel engines; fuel cells; power gas turbines
 - ✓ as domestic fuel and as chemical feedstock
- Energy dense and liquid at low pressure – handles like LPG
- Non-toxic, biodegradable and harmless to the atmosphere
- A genuine compression ignition fuel, with potential for ultra low exhaust emissions

Volvo's Position on Future Fuels

- Conventional diesel fuel will remain the dominant fuel for at least two decades.
- Natural gas and biogas will be used regionally.
- DME is a strong candidate for a more long-term future fuel:
 - ✓ Best well-to-wheel energy efficiency from bio source.
 - ✓ Close to CO₂ neutral if produced from biomass.

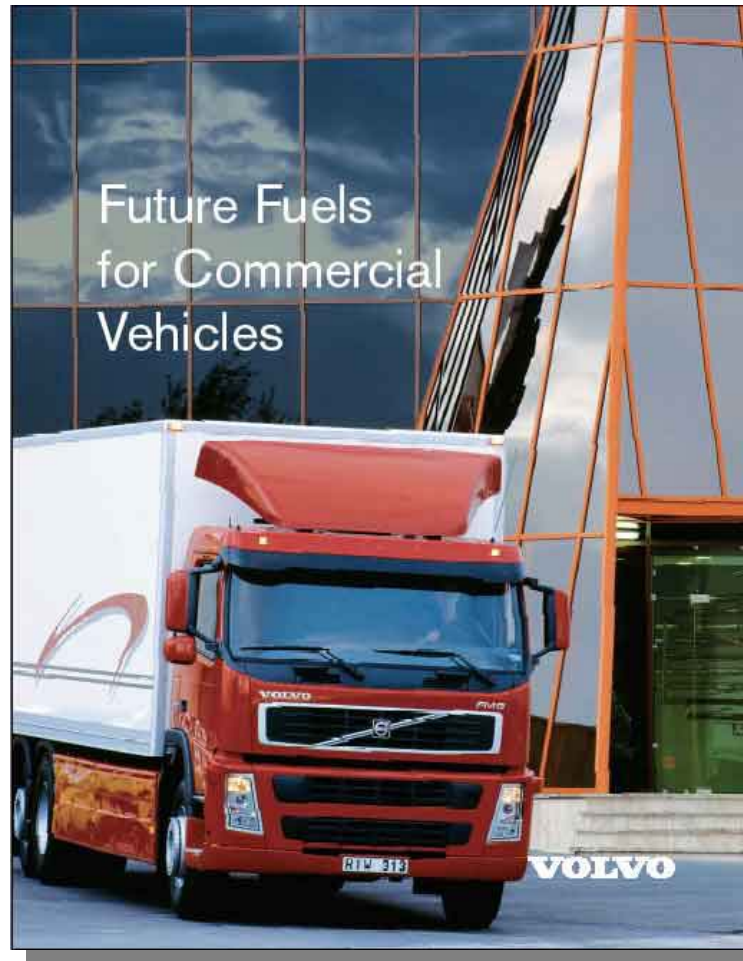


Recent DME activities at Volvo

- DME truck developed in the EU funded project AFFORHD.
 - ✓ Presented May 18 in Stockholm.
- 9-litre diesel engine adapted to DME.
- Exhaust emissions below Euro V level.



Printed material



Available on www.volvo.com