

# World Trends in Road Freight Transport

## Breakfast Technical Session

of the

ROAD ENGINEERING ASSOCIATION OF ASIA AND AUSTRALASIA

and

ENGINEERS AUSTRALIA TRANSPORT PANEL

on

18 Nov. 2008 at Main Roads Western Australia in Perth

**Jørgen Christensen, M.Sc. MS**

Chair, JTRC Working Group on Heavy Goods Vehicles

# The topics

- The OECD/ITF JTRC working group on heavy vehicles
- Traffic growth in recent years
- Expected continued growth
- Congestion
- Fuel consumption
- Greenhouse gas
- Pollution
- Safety
- Performance and productivity
- Regulatory trends

# OECD

## Analyses of Heavy Vehicle issues

- Impacts of Heavy Freight Vehicles [1983]
- Dynamic Loading of Pavements [1992]
- Dynamic Interaction between Vehicles and Infrastructure Experiment (DIVINE), Technical Report, [1998]
- Dynamic Interaction between Vehicles and Infrastructure Experiment (DIVINE), Policy Implications, [1999]
- Performance-based Standards for the Road Sector [2005]

## Why this project?

- Increasing road freight transport on capacity-limited infrastructure
- DIVINE project showed potential for heavier loads on “road-friendly” HGVs
- Need international benchmarking of HGV safety effects
- Implications of technological development for HGV productivity and safety
- How can HGV compliance with rules and regulations be enhanced ?
- What conditions must apply to ascertain societal added value from larger road freight vehicles ?

# Major Tasks

- Benchmarking (safety, productivity)
- Operations
- Effects of Regulatory Measures
- Potential Changes
- Possible Regulatory, Technological and Operational Improvements

# Membership

- Australia (4)
- Belgium(1)
- Canada (2)
- Czech Rep. (1)
- Denmark (2)
- EU-Commission (1)
- France (2)
- Germany (1)
- Hungary (1)
- Latvia (1)
- Mexico (1)
- Netherlands (3)
- Norway (1)
- Poland (2)
- Russia (1)
- Republic of South Africa(1)
- Spain (1)
- Switzerland (1)
- Sweden (1)
- Ukraine (1)
- UK (1)
- USA (2)

# The "Perth-Melbourne party"

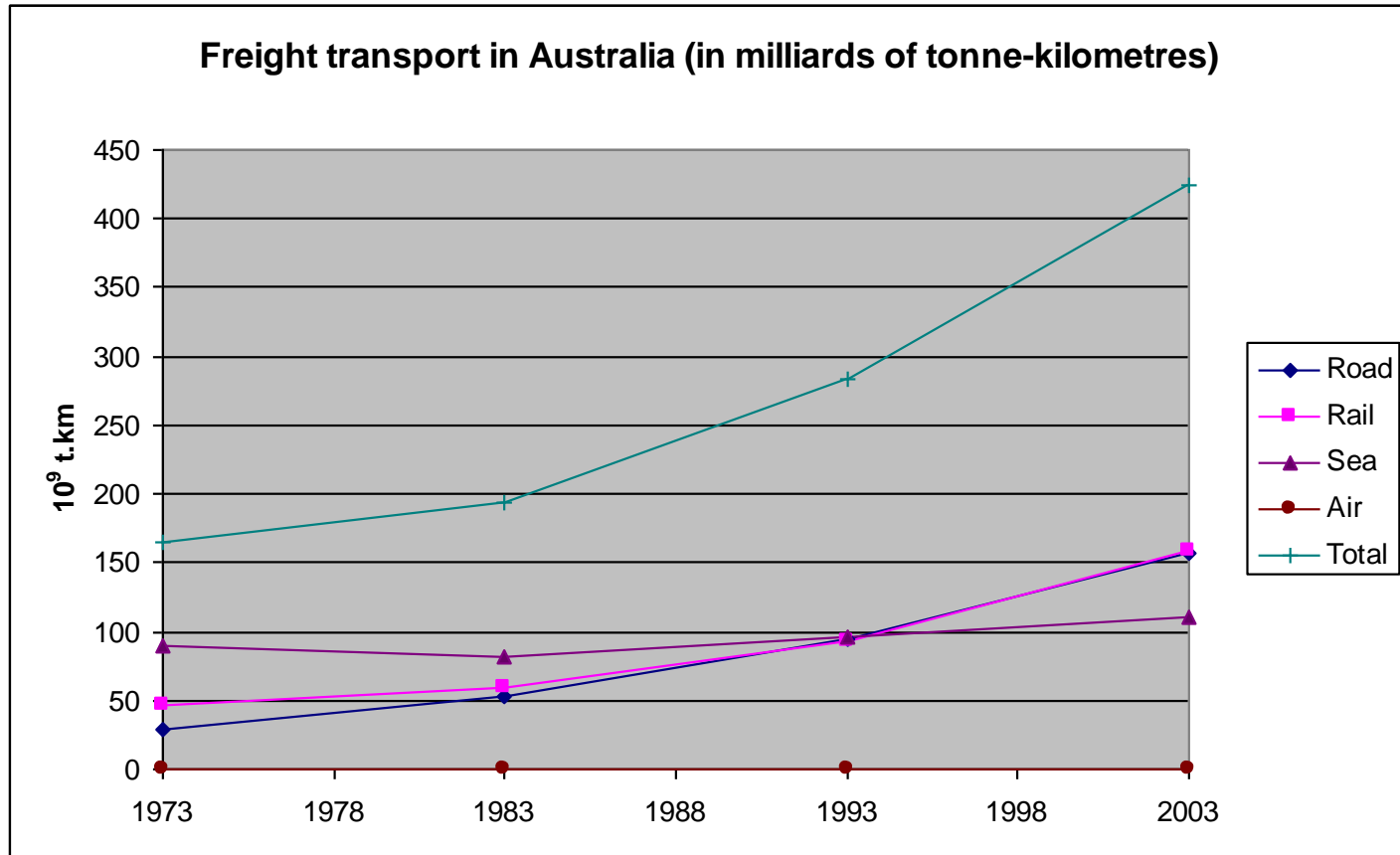
- Loes Aarts, RWS/DVS, The Netherlands
- Matthieu Beréni, SETRA, France
- Jorgen Christensen, RTR Facilitation, Denmark
- Véronique Feypell-de-la-Beaumelle, OECD/ITF JTTC
- Klaus-Peter Gläser, BASt, Germany
- Bernard Jacob, LCPC, France
- Barry Moore, OneMooreConsultancy, Australia
- Paul Nordengen, CSIR, South Africa
- Jeff Potter, NTC, Australia
- Andrew Spoerri, Transport Canada
- Andrzej Urbanik, IBDiM, Poland
- John Woodrooffe, UMTRI, United States

## Time schedule

- SEP 2007: Open workshop on experiences with heavy freight vehicles (Paris)
- SEP 2007: 1st plenary meeting (Paris)
- JAN 2008: Task leaders meeting (TRB)
- MAY 2008: 2nd plenary meeting (Paris)
- MAY 2008: 1st dialogue meeting with stakeholders
- AUG 2008: 2nd dialogue meeting with stakeholders
- NOV 2008: 3rd plenary meeting (Australia)
- JAN 2009: 1st editorial group meeting (TRB)
- APR 2009: 2nd editorial group meeting (Paris)
- SEP 2009: Publication of report



# The increase in freight transport



## The increase in freight transport

Inland surface freight excl. pipelines (mill. tonne kms)

Australia

Year	1990	2005	Growth
Total	178	339	<b>90 %</b>
Rail	88	170	<b>93 %</b>
Road	90	169	<b>88 %</b>

## The increase in freight transport

Inland surface freight excl. pipelines (mill. tonne kms)

Japan

Year	1990	2006	Growth
Total	301	366	<b>22 %</b>
Rail	27	23	<b>-15 %</b>
Road	274	343	<b>25 %</b>

## The increase in freight transport

Inland surface freight excl. pipelines (mill. tonne kms)

Russia

Year	<b>2000</b>	2006	Growth
Total	1597	2236	<b>40 %</b>
Rail	1373	1858	<b>35 %</b>
Road	153	194	<b>27 %</b>

## The increase in freight transport

Inland surface freight excl. pipelines (mill. tonne kms)

United States

Year	1990	2005	Growth
Total	3219	4819	<b>50 %</b>
Rail	1554	2531	<b>63 %</b>
Road	1239	1741	<b>41 %</b>

## The increase in freight transport

Inland surface freight excl. pipelines (mill. tonne kms)

European Union (24)

Year	1990	2006	Growth
Total	1513	2122	<b>40 %</b>
Rail	459	402	<b>-12 %</b>
Road	941	1587	<b>69 %</b>

## Continued growth in freight transport

Inland surface freight excl. pipelines (mill. tonne kms)

European Union (24)

Year	2000	2020	Growth
Total	1799	2700	<b>50%</b>
Rail	370	420	<b>14 %</b>
Road	1297	2010	<b>55%</b>

# Continued growth in freight transport

Inland surface freight excl. pipelines (bill. tonne kms)

Australia

Year	2000	2020	Growth
Total	270	525	<b>94 %</b>
Rail	134	239	<b>78 %</b>
Road	136	286	<b>105 %</b>



## The congestion issue

Europe: (*Keep Europe Moving, EU, June 2006*)

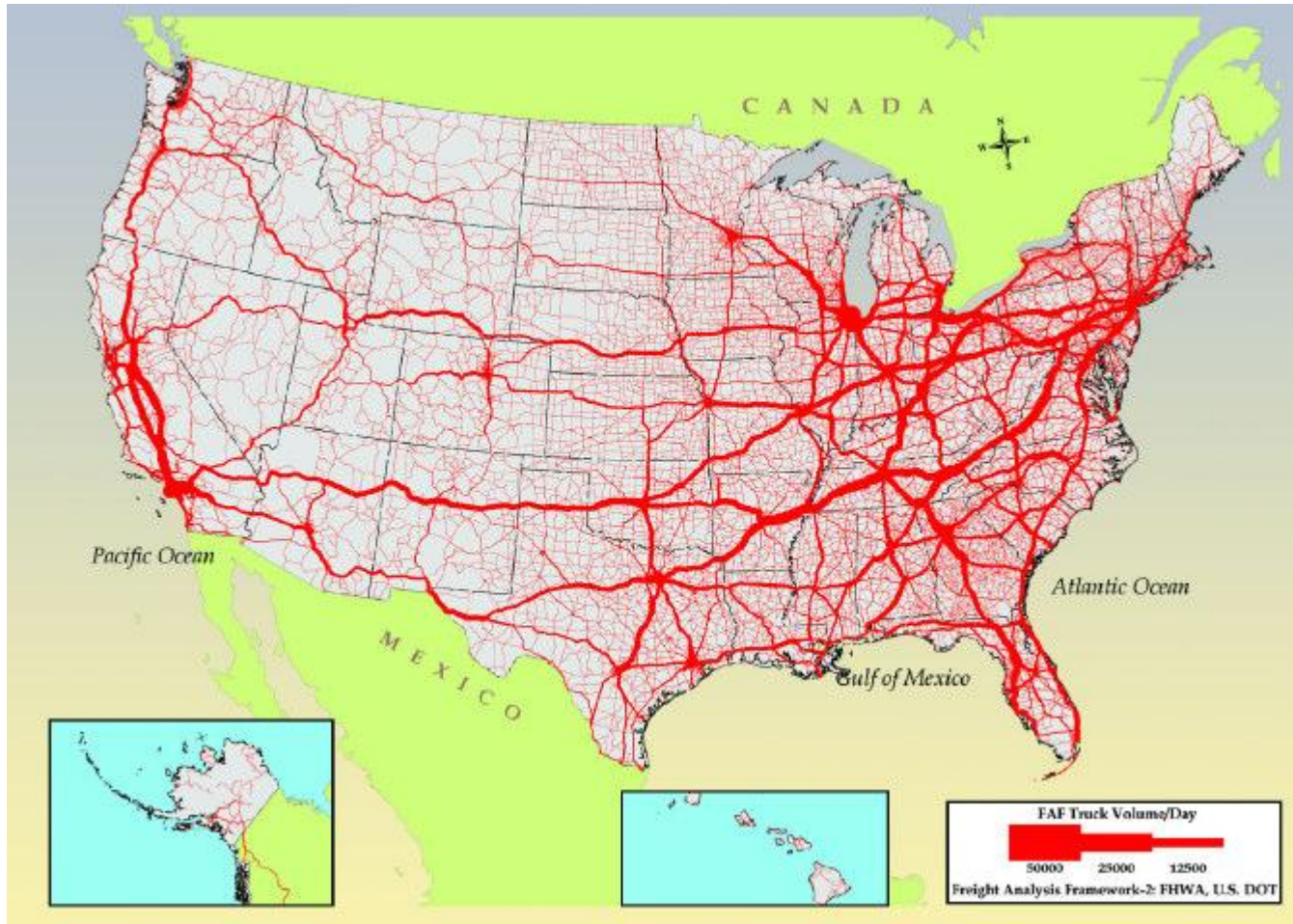
- hindrance for optimal infrastructure exploitation
- yearly loss of 70 billion Euro (2006). ( 0.6 % GDP)
- may reach 200 billion Euros annually in 10 years
- road freight vehicles seen as major cause for inter-urban congestion

Australia: (*Twice The Task, NTC, November 2005*)

- urban congestion greatest concern
- exponentially increasing problems to all road users
- delay cost from \$12.8 b (1995) to \$29.7b (2015)

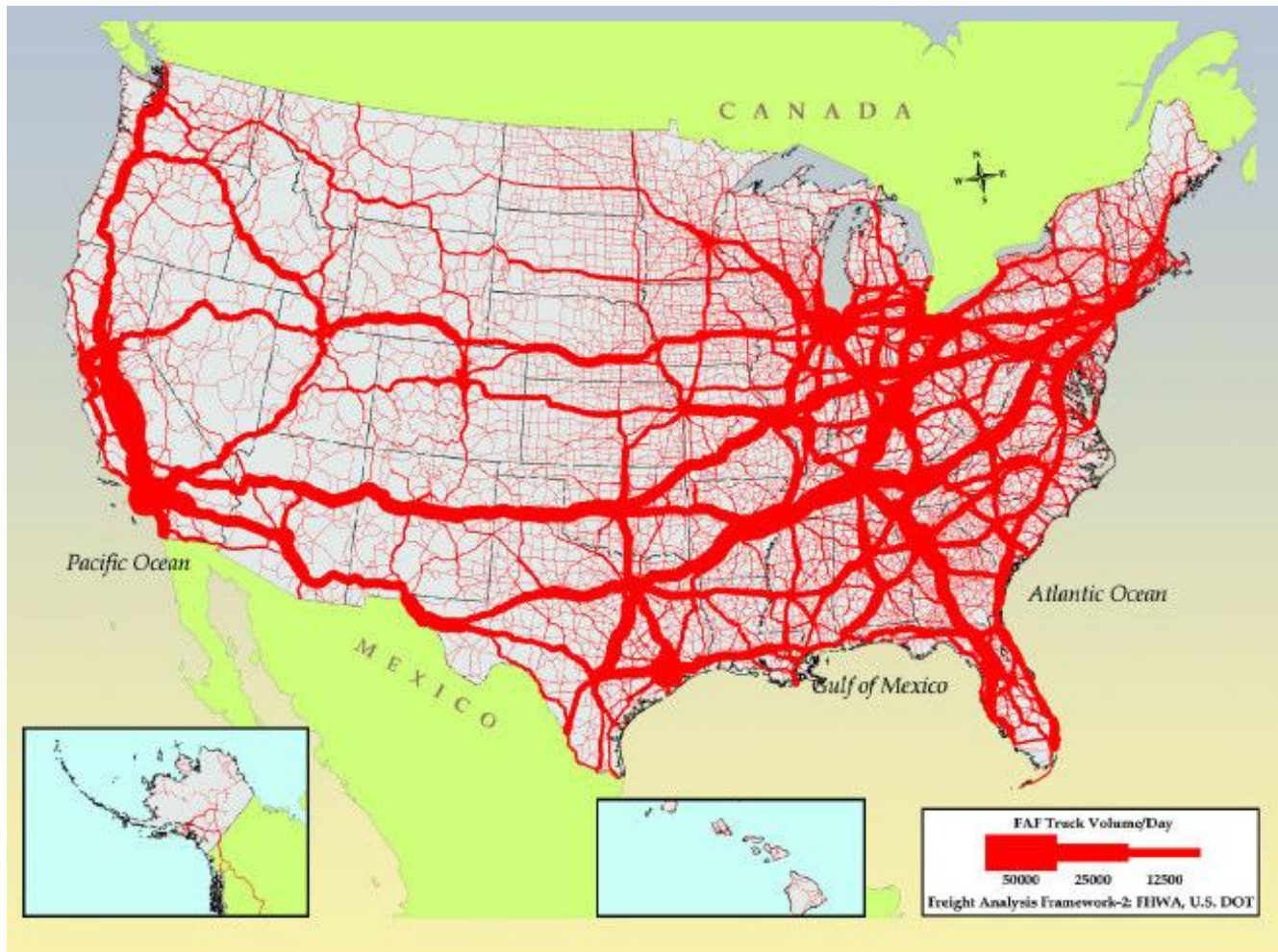
# The congestion issue

Daily long-haul truck traffic on the US highway system 2002



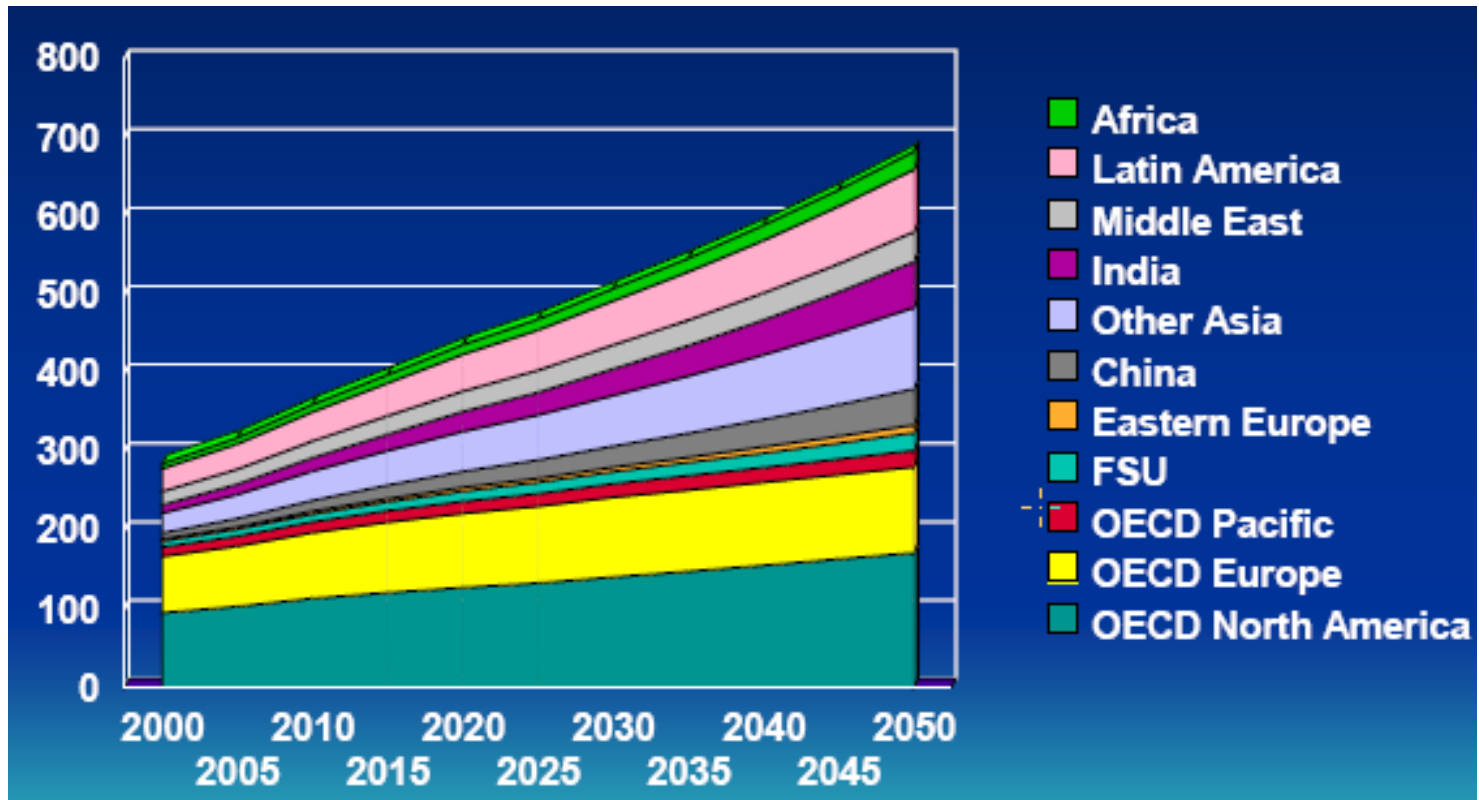
# The congestion issue

Daily long-haul truck traffic on the US highway system 2035



# The fuel consumption issue

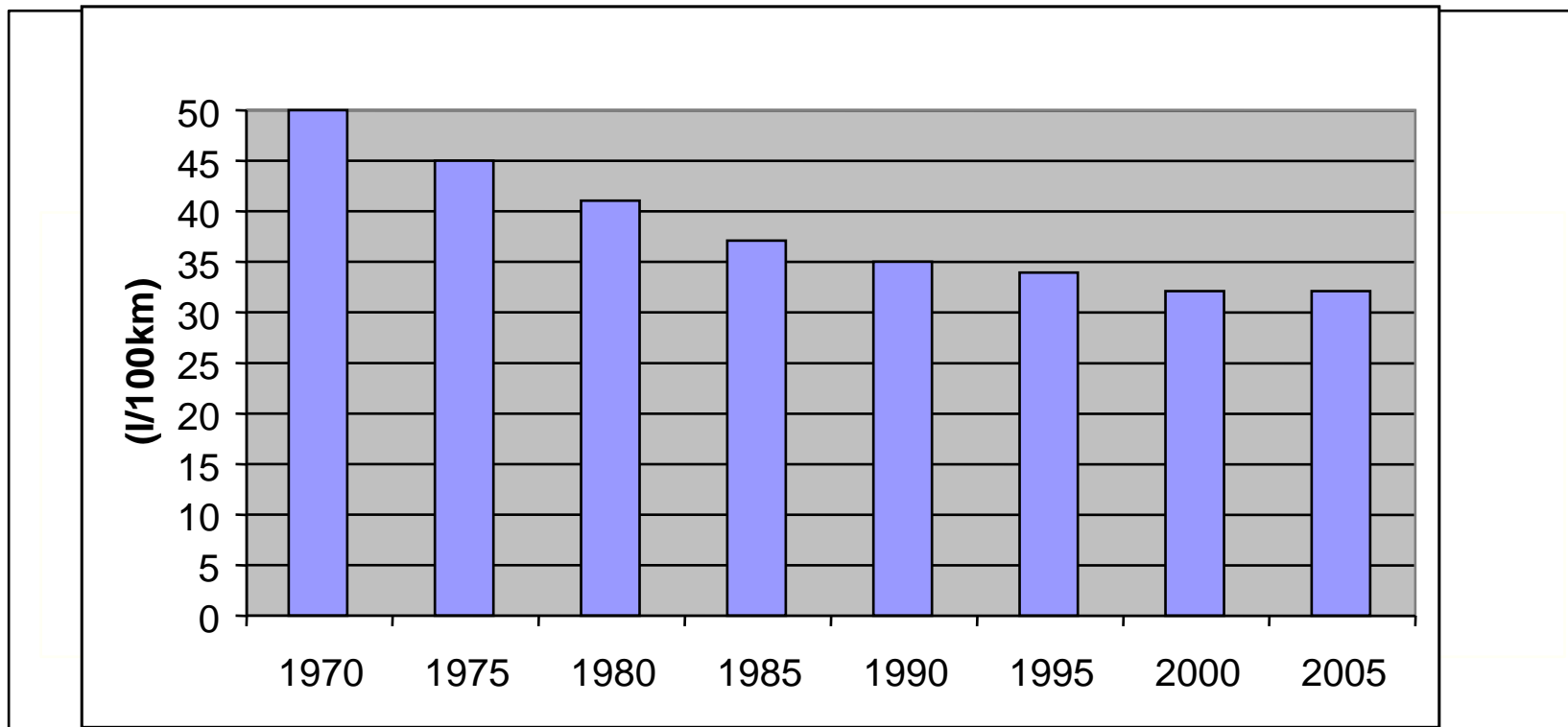
Evolution of lorry energy consumption in millions of toe.



Source: WBCSD

# The fuel consumption issue

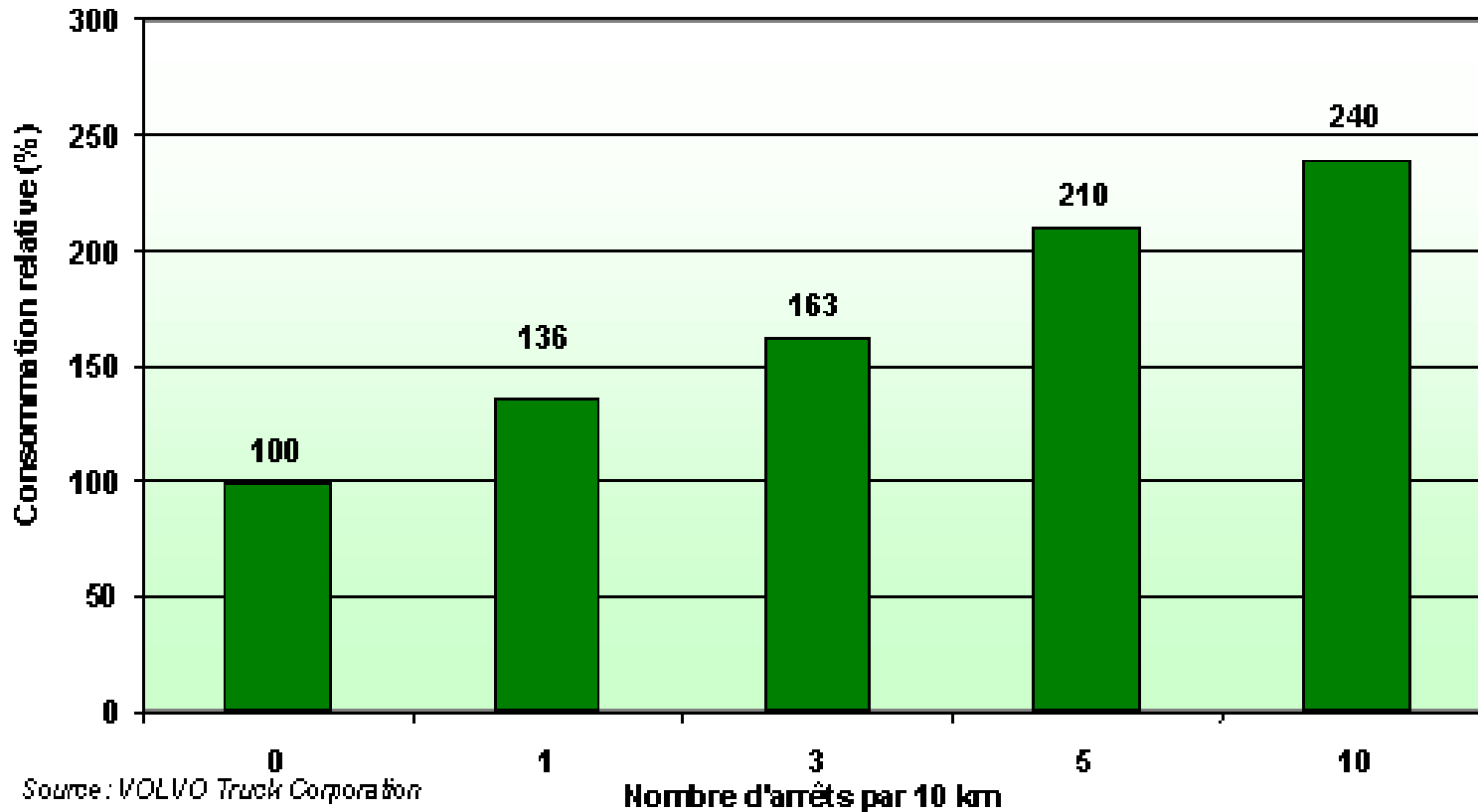
Average fuel consumption of a 40-tonne lorry per 100 km



Source: Verband der Automobilindustrie (VDA) 2006.

# The fuel consumption issue

Number of stops per 10 km influence on fuel consumption of 40 tonne truck-semitrailer



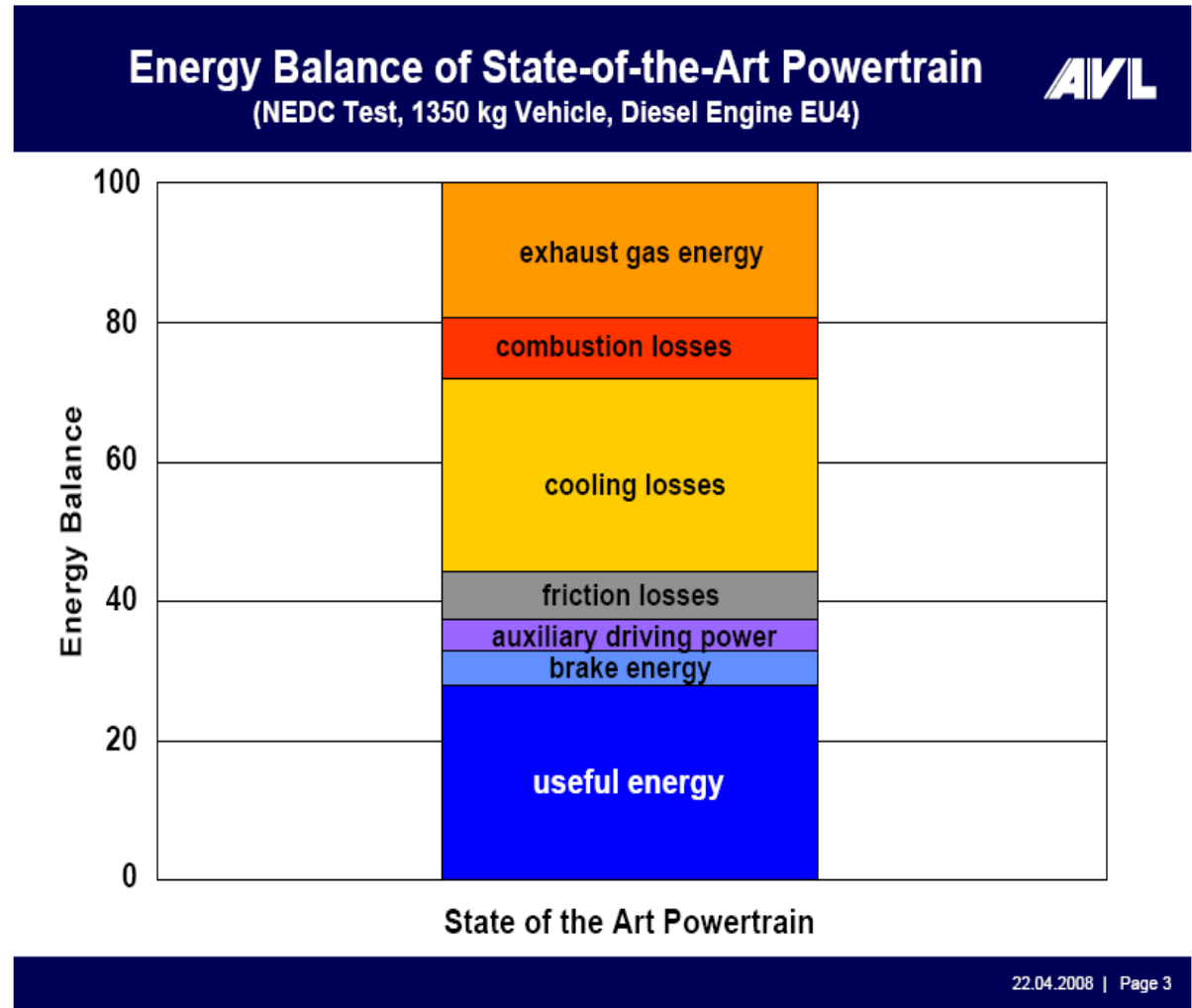
# The fuel consumption issue

IEA estimates another 20-30 % savings in fuel by diesel engines reducing total consumption to appr. 20 l/100 km

*“15-20 % CO<sub>2</sub> reduction potential in the medium term.*

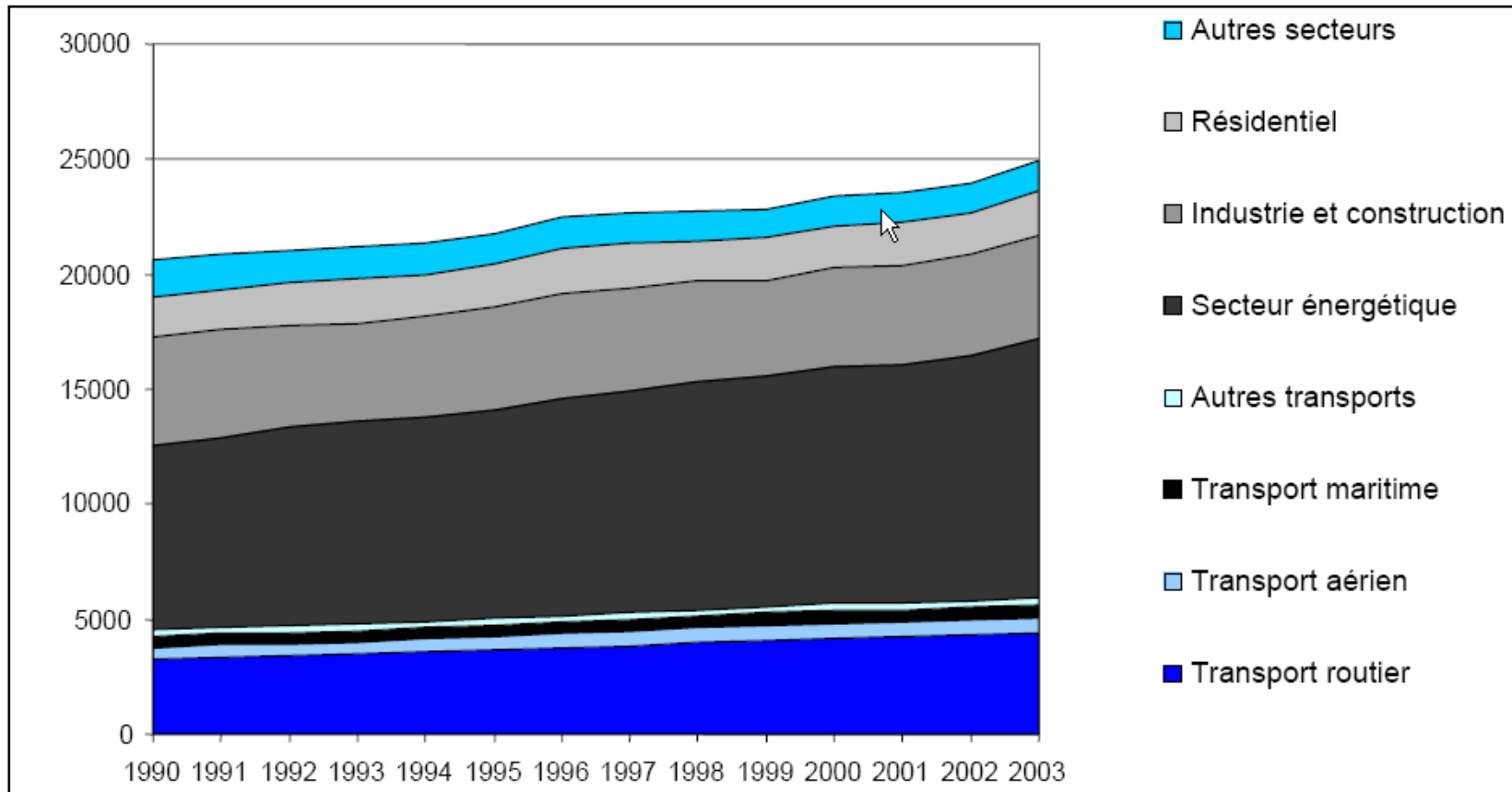
*Considerably more in the longer term”.*

Prof. Helmuth List, CEO of AVL, speaking to TRA 2008 in Ljubljana, Slovenia, April 2008. (figure to the right used in speech)



# The greenhouse gas issue

## Preparing for the successor to the Kyoto Protocol



Share of energy consuming sectors in global CO<sub>2</sub> emission 1990 - 2003

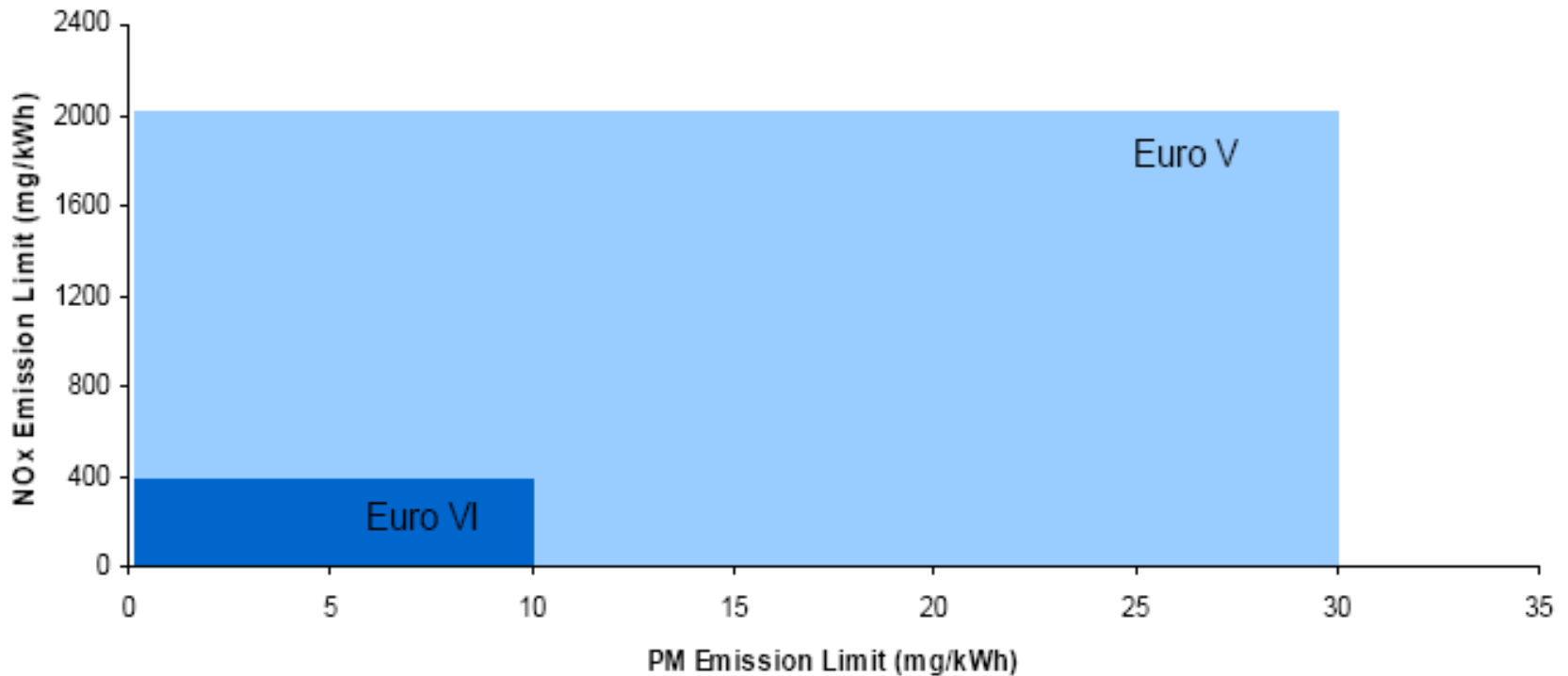


# The greenhouse gas issue

- Japan, 2006:  
HGV CO<sub>2</sub> emissions down 12.2 % from 415 g/km to 370 g/km by 2015 (base 2002).
- EU, proposal for Directive, 2008:  
Target **2020**  
Total CO<sub>2</sub> emission down **20** % (base 1990).  
**20** % of energy supply from renewable sources.

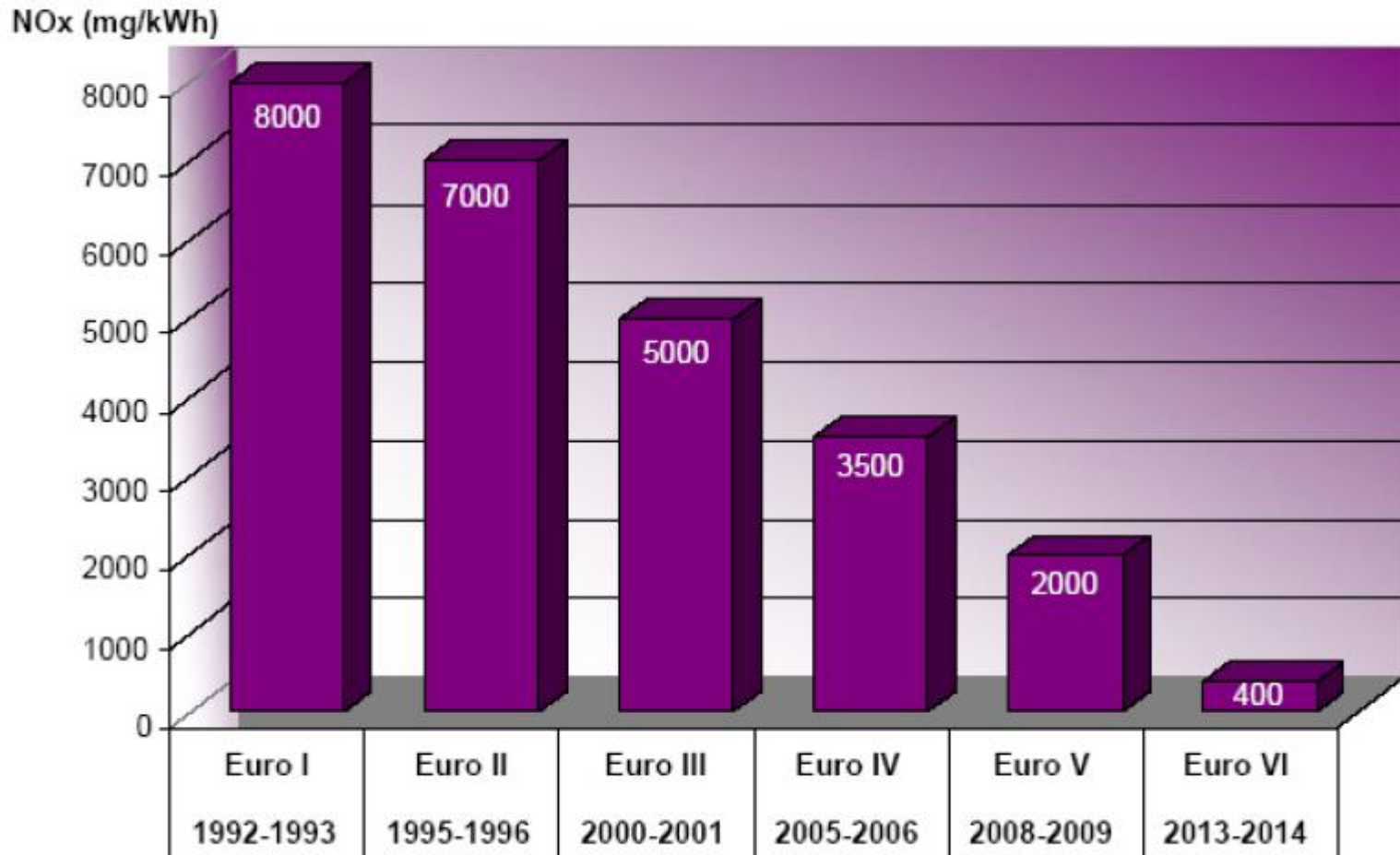
# The pollution issue

Euro VI versus Euro V Emission Limits  
(ETC Test Cycle)



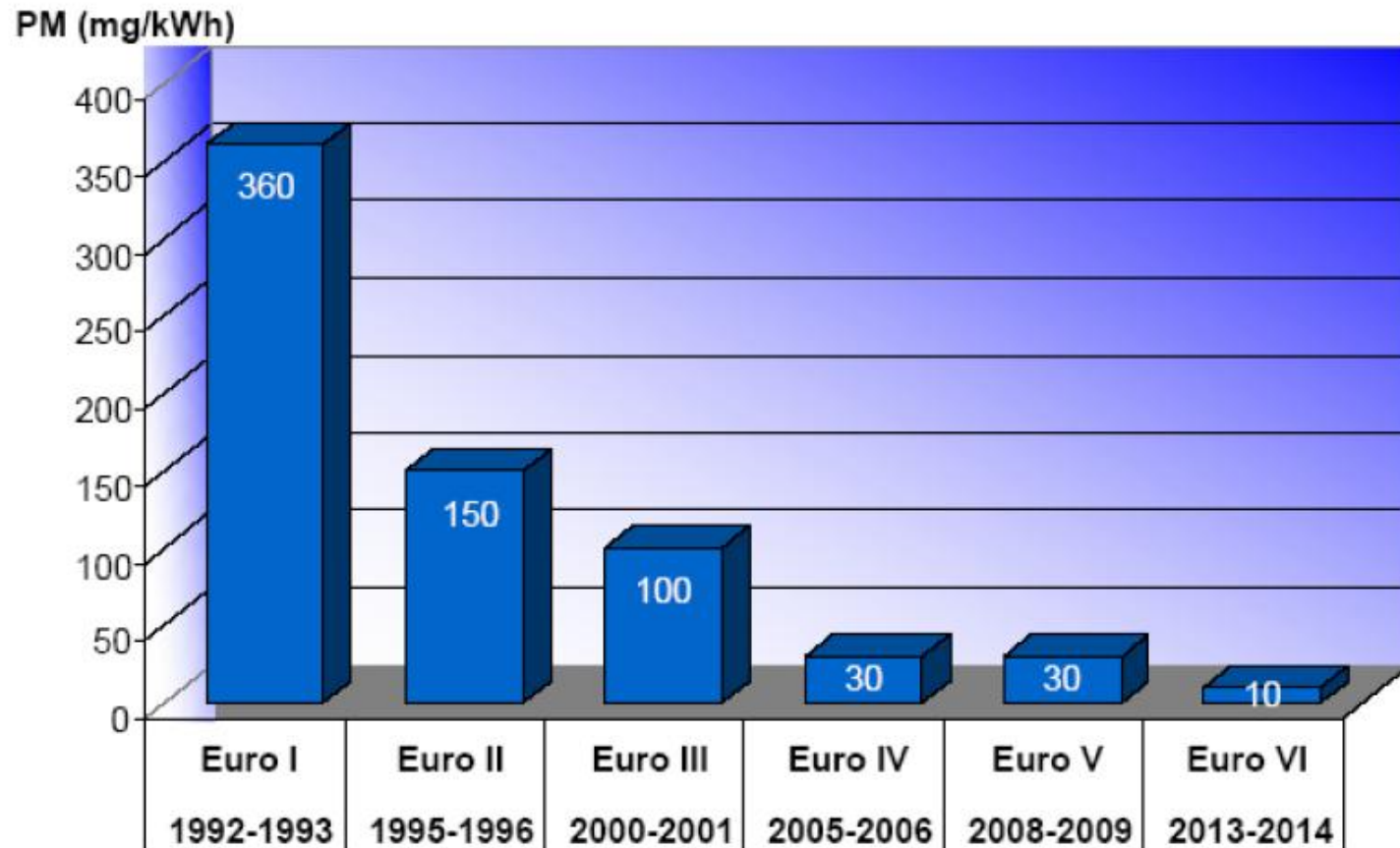
# The pollution issue

## Evolution of Nitrogen Oxides limit



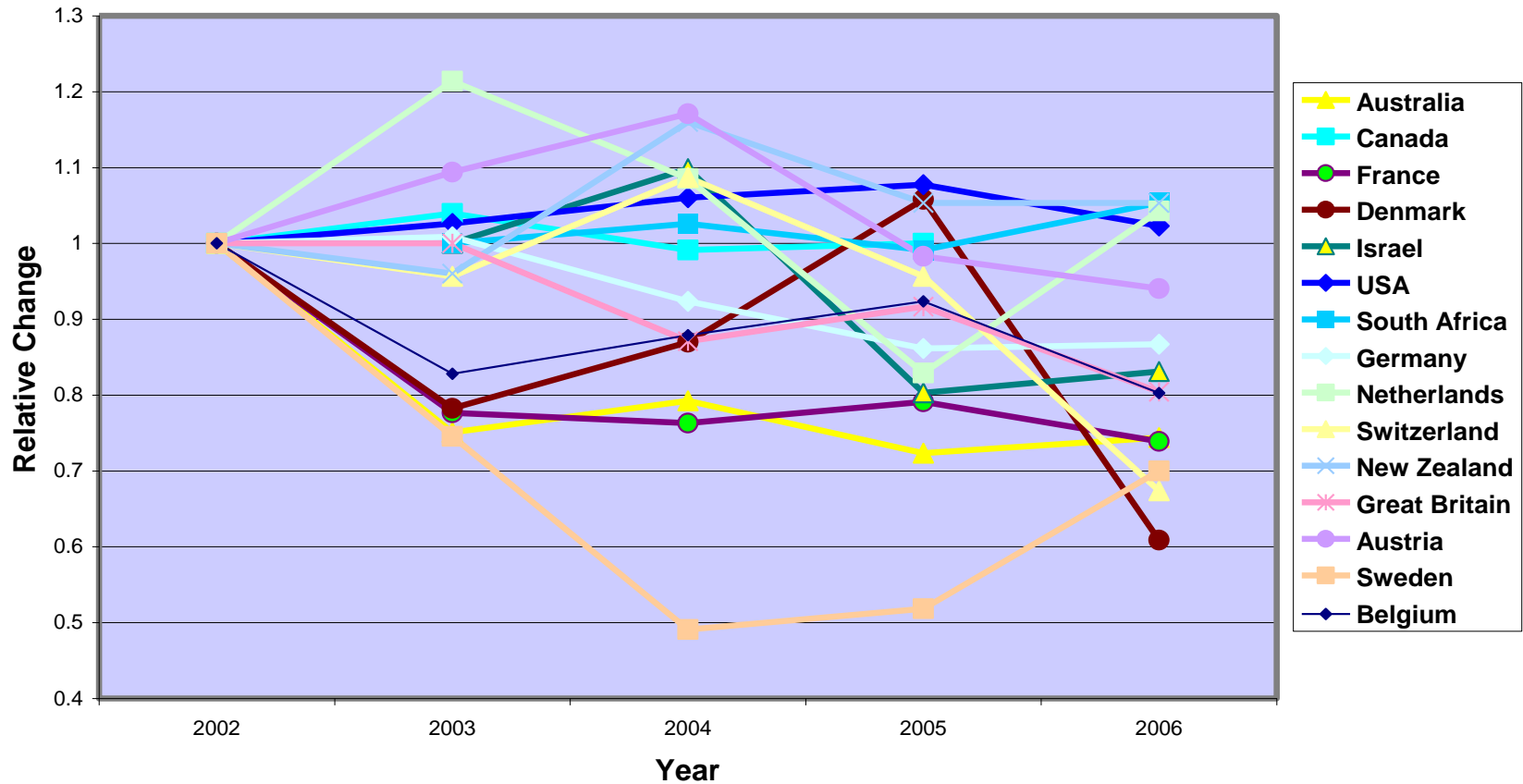
# The pollution issue

Evolution of Particulate Matter limit



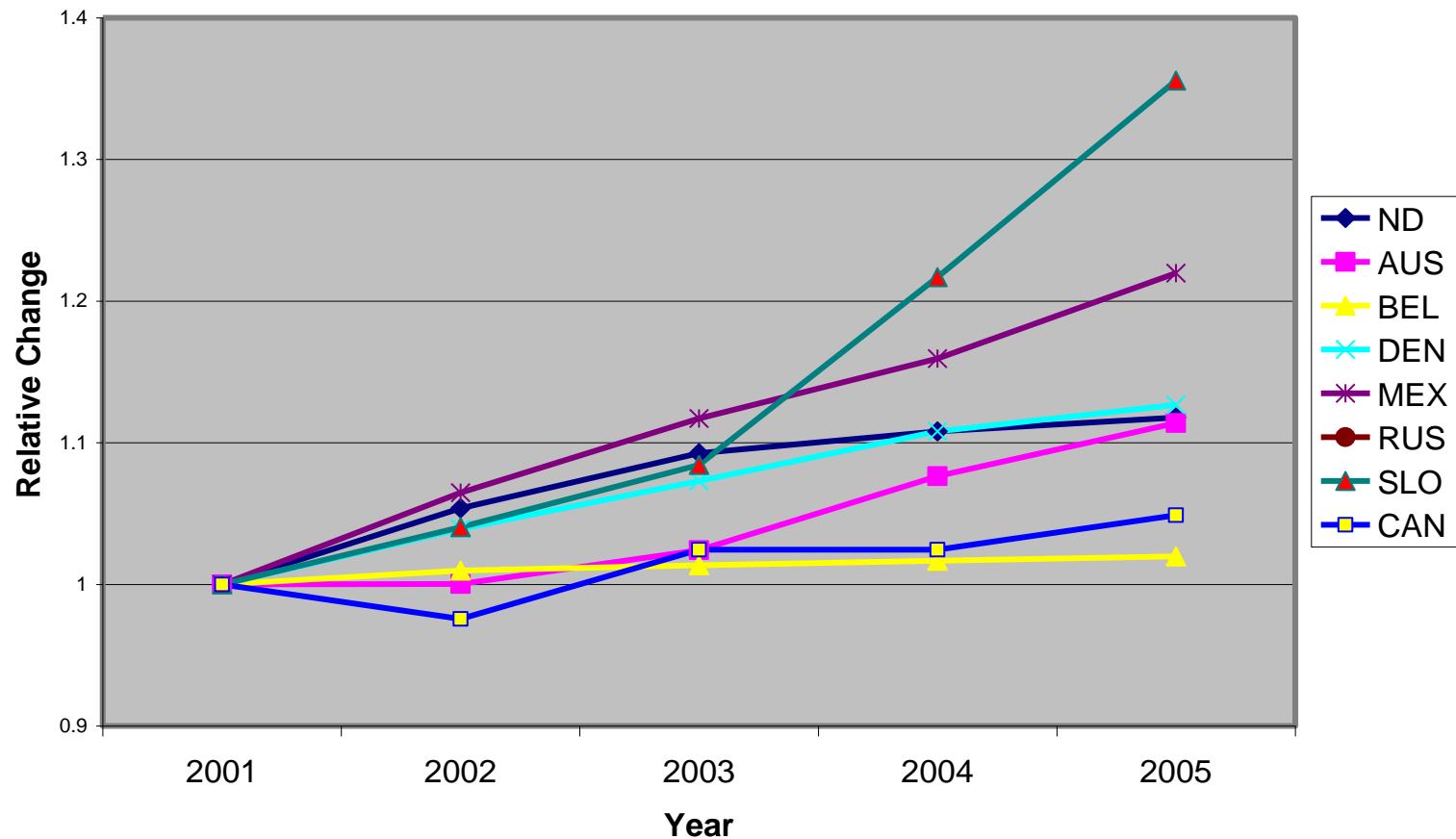
# HGV safety benchmarking

Relative trends in fatal crashes



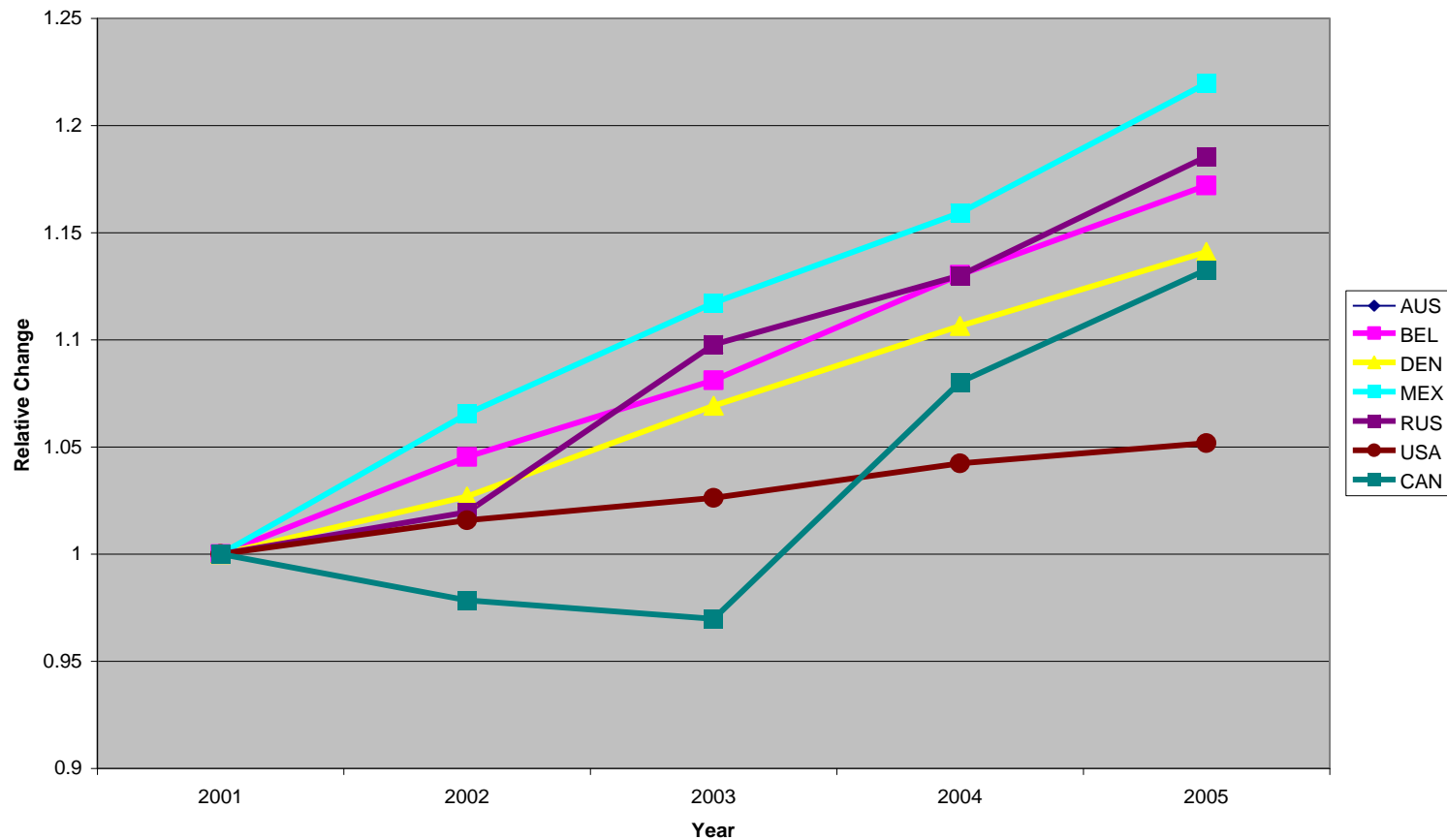
# HGV safety benchmarking

## Relative Growth in Articulated Heavy Vehicle Registrations



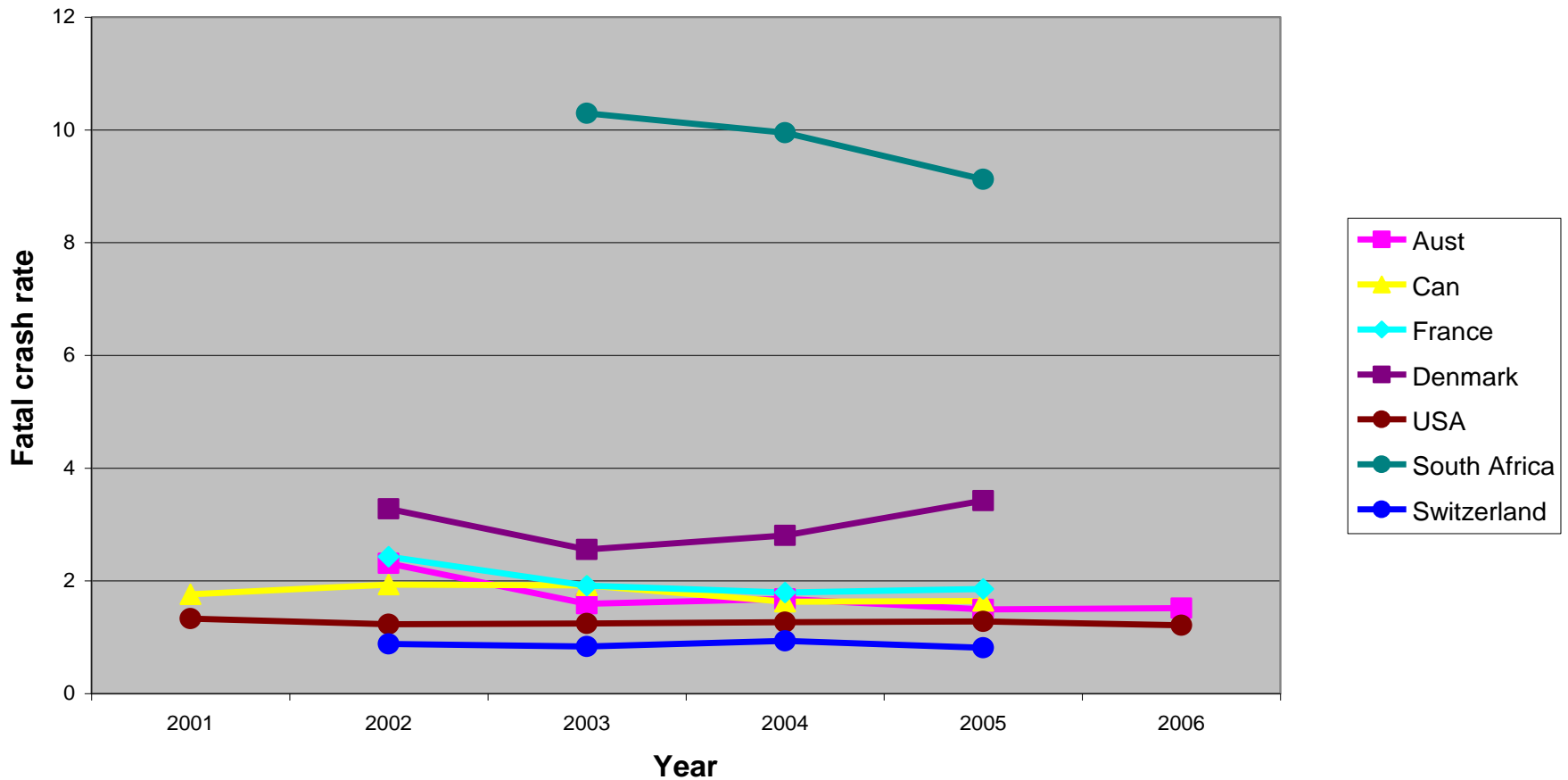
# HGV safety benchmarking

## Relative Growth in Articulated HGV Kilometres Travelled



# HGV safety benchmarking

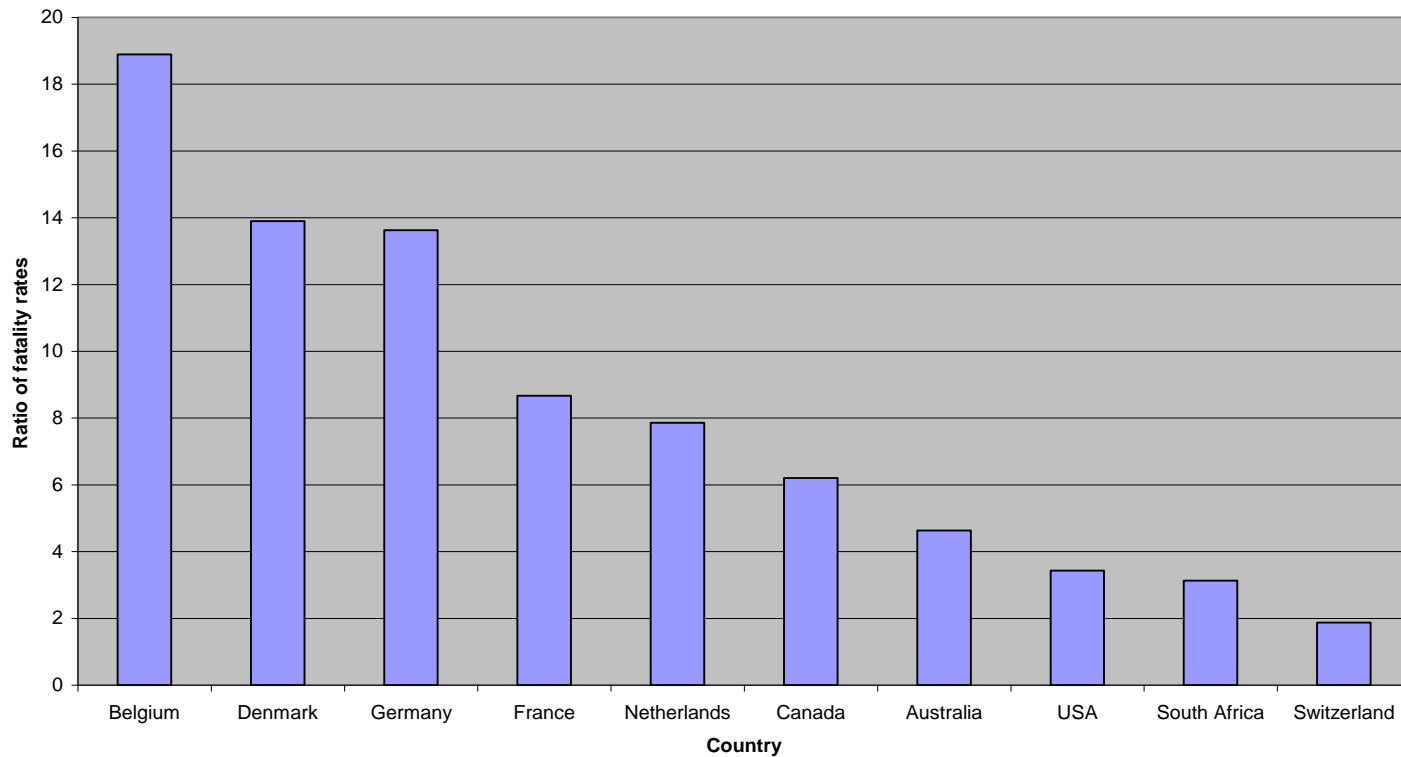
## Fatal truck crash per 100 million vehicle kms travelled





# HGV safety benchmarking

Ratio of Fatality Rates per 10,000 registered vehicles for trucks and all vehicles



## HGV safety benchmarking

Truck Occupant Fatalities per 10<sup>8</sup> kilometres travelled  
(travel data from 2005)

AUS	CH	FR	DK	CAN	USA	RSA
0,50	0,04	0,26	0,01?	0,32	0,24	3.13

## Performance and productivity

### Benchmarking 37 HGVs from WG nations:

- Vehicle Dynamic Simulation of typical workhorse and high capacity vehicles (by ARRB)
- Vehicle cargo volumetric and mass efficiency calculations of same vehicles, including productivity measures with reference to fuel use and CO<sub>2</sub>

# Performance and productivity

## Performance measure

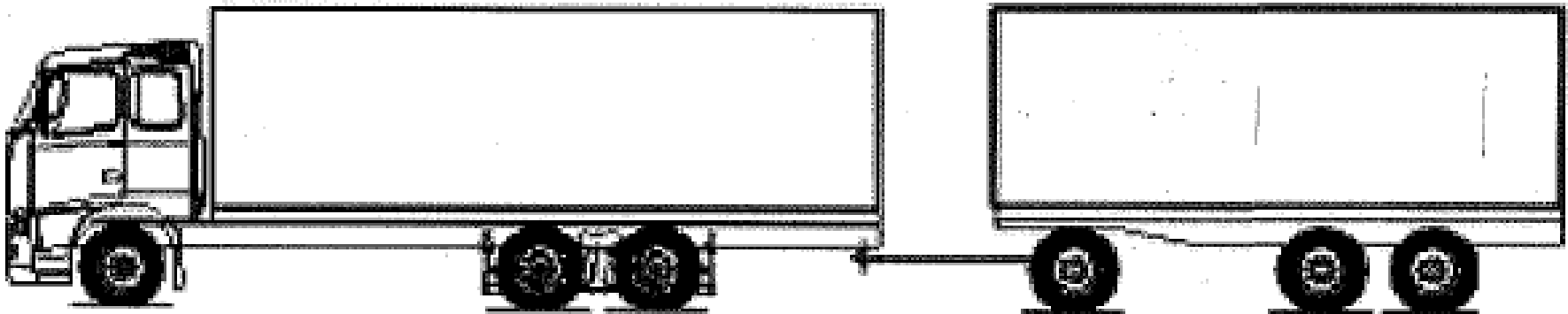
- » Static rollover threshold
- » Dynamic load transfer ratio
- » Friction demand in a tight turn
- » Braking efficiency
- » Low-speed offtracking
- » High-speed offtracking
- » Transient high-speed offtracking

## Performance and productivity

- Efficiency measures must adequately cover
  - Infrastructure consumption
  - Energy and emission impact
  - Lane footprint
- Take into account the important distinction between cargo mass and volume productivity

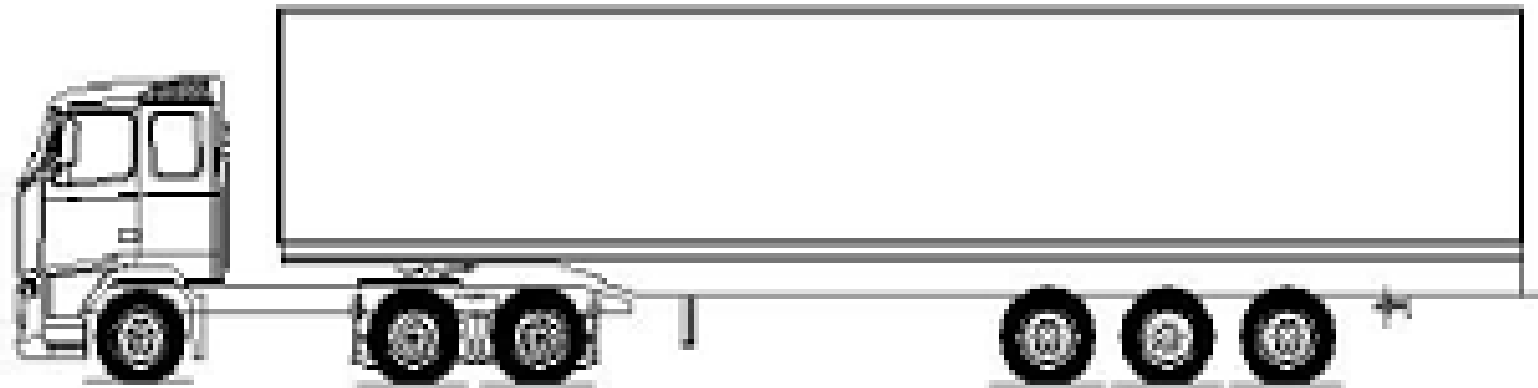
## Performance and productivity

- European truck – trailer, max 18,75 m 40 tonne



## Performance and productivity

- European tractor-semitrailer, 16.50 m, 40 tonne



## Performance and productivity

Conflicting views in the EU on higher-productivity HGVs

Good or bad for societal economy ?

Two LHVs can replace three conventional HGVs (figure to the right)





## Performance and productivity

Recent evaluation of LHV for the EU showed :

- LHVs may be introduced without harming European society, but
- Rail and inland water transport will grow less than expected with risk of local rail lines being endangered
- Safety of the individual LHV may be worse than of smaller truck and
- Infrastructure investments need to be paid.

## Performance and productivity

Recent evaluation of LHV for the UK DfT showed :

- Significant risk of higher CO<sub>2</sub> emissions and other environmental impacts due to modal shift from rail to road
- Serious road management implications due to incompatibility with many roads and junctions.
- Substantial investments for road, bridge and parking improvements
- Uncertain efficiency in sourcing loads for sustainable return trips
- Introduction of new safety risks
- Tougher standards to overcome problems not possible because of European trade rules
- Worthwhile benefits from permitting modest increase in length of current articulated vehicles.

## Regulatory trends

- Technical standards  
A global foundation through UNECE Inland Transport Committee
- Operator licensing and/or accreditation  
A tool for supported compliance
- Digital tachographs  
Society's co-driver to enable benefits and prevent transgressions
- Road pricing (for all?)  
Collecting all societal costs of transport at the level of the user

## Regulatory trends

- Chain of responsibility

Legal responsibility to those in a position of control within a logistics chain.

Legislation in Belgium, Germany, Italy, Finland and Australia .

Pressure on the EU Commission to adopt it as European legislation (Directive)

- Supported compliance

Resources for controlling operators is under pressure while road transport keeps increasing.

Offering the advantages of relaxation of limitations.

Requires selfcontrol or third party supervision.

Electronic proof of compliant behaviour (e.g. tachograph)

## Regulatory trends

- The key to effective utilisation of heavy vehicles is to demonstrate to the community and their political leaders that these vehicles comply with route restrictions, and deliver high safety and environmental outcomes and recover all costs associated with their use of the network.
- The tools to deliver these requirements are available.
- The challenge for the relevant agencies is to implement an integrated and effective approach to the regulation of heavy vehicles.

**Thank you for attention**