

# GHG emissions of Transport

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# European Environment Agency

- 32 member countries
- Community budget and nations budgets
- Commission, Member States, Public
  
- 180 staff
- EIONET
- ETC and other consultancy
- Scientific Committee



# Overall GHG trends EU-27

5 142.8 Mt CO<sub>2</sub>-eq. 2006 (exc. int. bunk.)

10.4 t CO<sub>2</sub>-eq. per inhabitant

1990-2006: -7.7%

Projected emissions: -12% (1990-2020)

with additional measures

without EU '20-20 by 2020' package

# Overall GHG trends EU-15

4 151.1 Mt CO<sub>2</sub>-eq. 2006

10.7 t CO<sub>2</sub>-eq. per inhabitant

1990-2006: -2.7%

Projected emissions: -11% Kyoto (2008-12)

EU-15 target of -8% should be met

# Overall GHG trends

EEA Report | No 5/2008

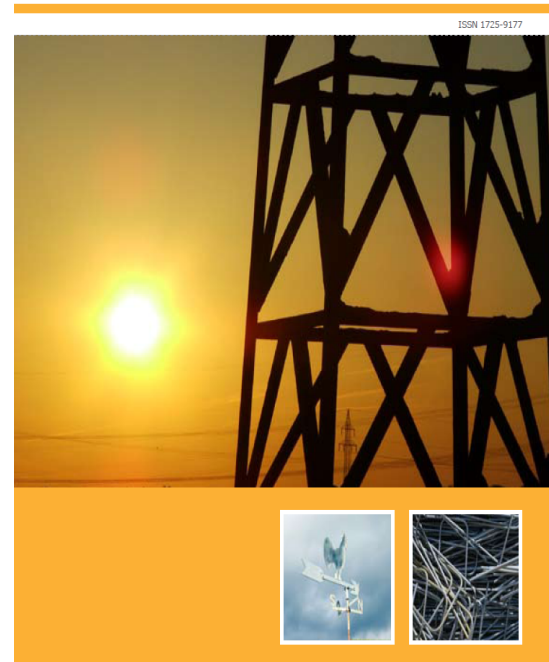
Greenhouse gas emission trends and  
projections in Europe 2008

Tracking progress towards Kyoto targets

Executive summary

ISSN 1725-9177

- EEA Report 2008
- GHG data viewer



European Environment Agency 

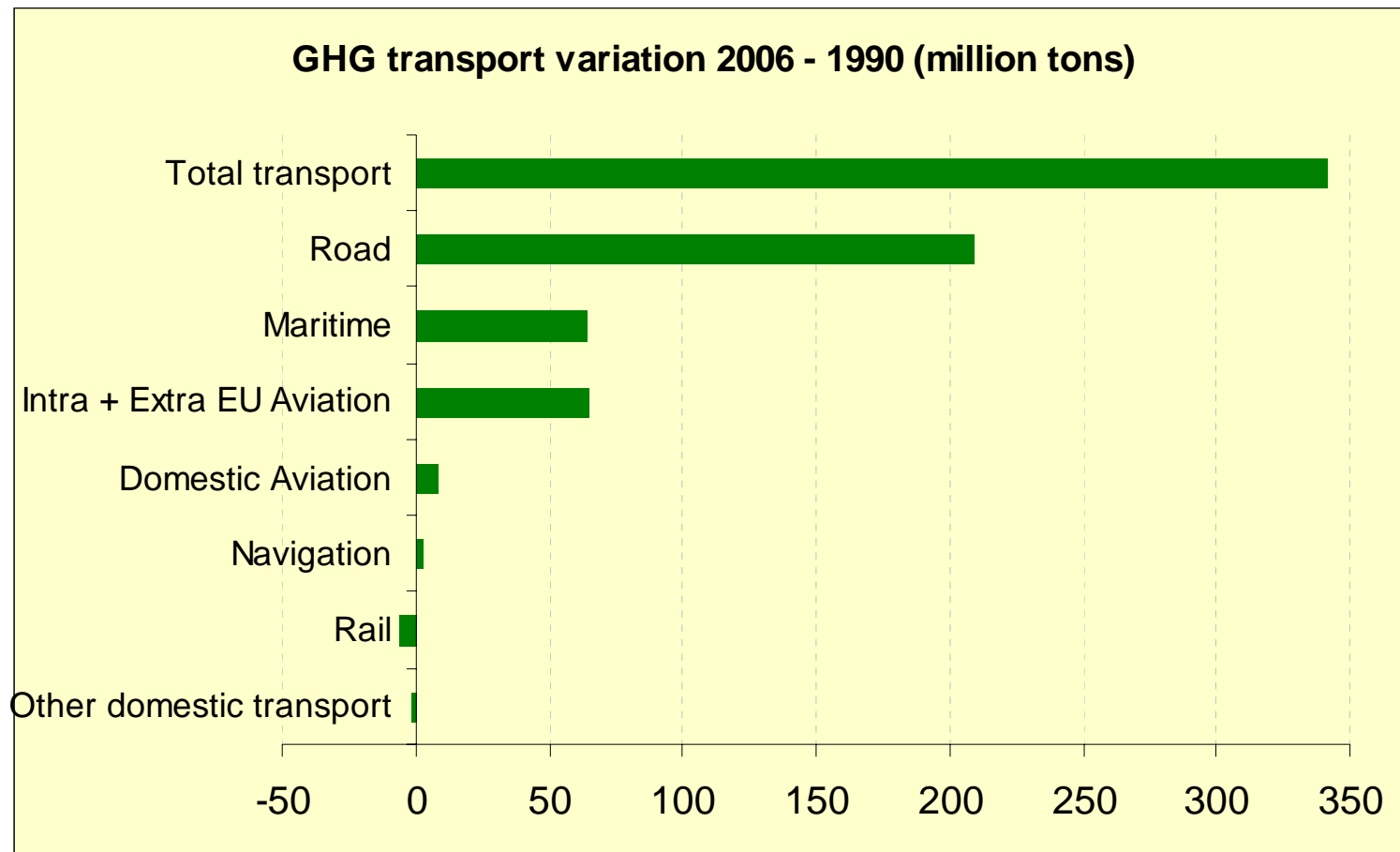
# Our works on transport

- Reliable environmental information
- Support in assessing policies
- TERM reports
- Thematic reports
- Indicators, factsheets



⇒ [www.europa.eea.eu/transport](http://www.europa.eea.eu/transport)

# Transport 1990 - 2006



# Overall Transport 1990-2006

Overall Transport (19%-24% of overall GHG)

+ 35.8%

+ 1.9% per year

+ 342 Mt CO<sub>2</sub>-eq.

*Non Transport (Kyoto)*

-13.4%

- 642 Mt CO<sub>2</sub>-eq.



# GHG Road Transport 1990-2006

71% of overall transport GHG 2006

93% of domestic transport GHG 2006

61% of transport GHG growth

+ 1.6% per year

+ 209 Mt CO<sub>2</sub>-eq.

# GHG Road Transport 1990-2006

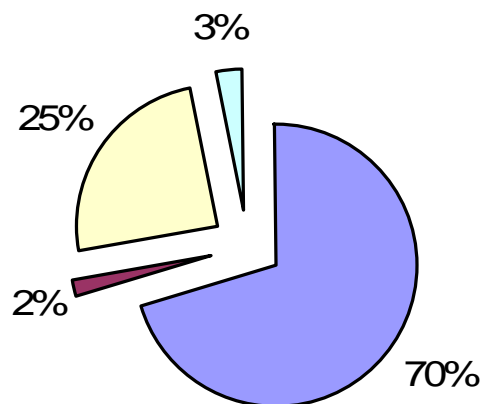
Still dominant source

Lion's share of growth

3<sup>rd</sup> fastest growth

# GHG Road Transport

GHG Road 2006



# GHG Road Transport (cars)

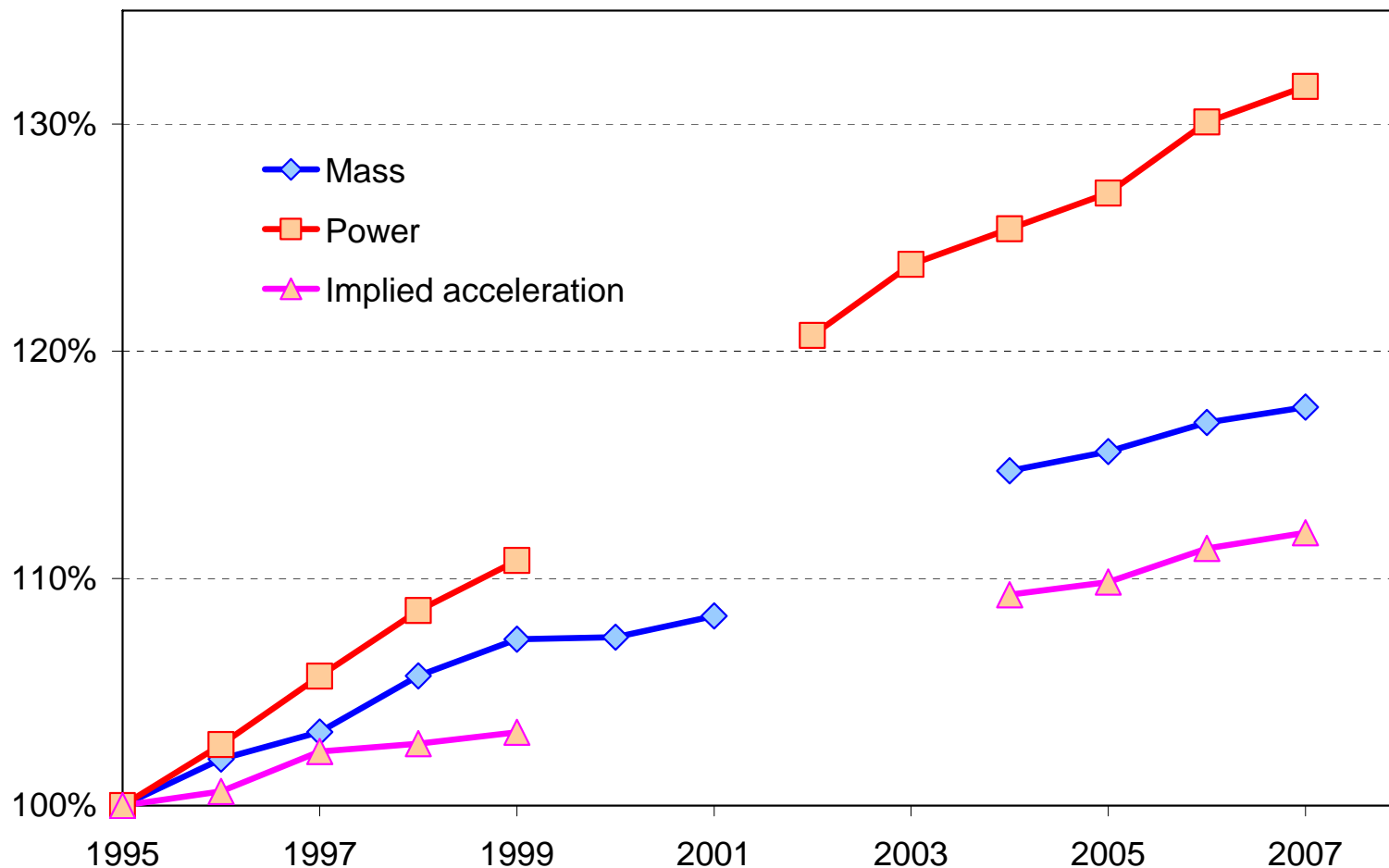
Average gCO<sub>2</sub>/km

1995 ⇒ 2007

Average car in traffic: 215 ⇒ 201

Average new car: 186 ⇒ 158 (⇒ 130 by 2015 ⇒  
95 by 2020)

# GHG Road Transport (cars)



# GHG Road Transport (cars)

Average mass of new cars ~ 1386 kg + 287 kg since 1995, to move 1.1 persons of 60 – 110 kg most of the time!

ADEME-IFP 2009 (UBA 2007)

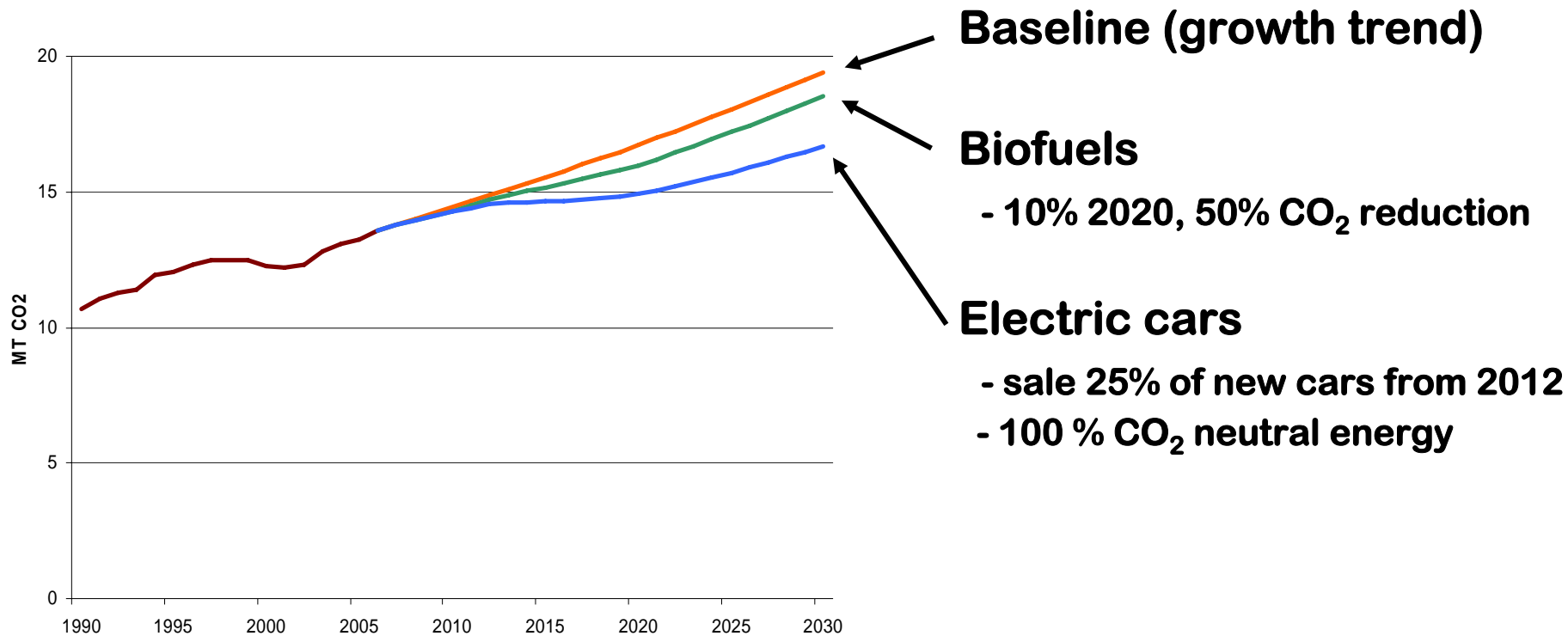
Mid-size car 1380 ⇒ 850 kg (600-1200 €)

120 ⇒ 90 gCO<sub>2</sub>/km

Size, mass, power (speed), tyre width, distance, pass. per car

Bonus/Malus France: - 9g CO<sub>2</sub>/km in 8 months 2008

# Example: biofuels and electric cars in DK



# GHG Aviation 1990-2006

12% of overall transport GHG

83.5% are international aviation

22% of overall growth

+ 4% per year

+ 74 Mt CO<sub>2</sub>-eq.

# GHG Maritime 1990-2006

13.4% of overall transport GHG

18.6% of overall growth

+ 2.9% per year

+ 64 Mt CO<sub>2</sub>-eq.

# Transport GHG in 2020?

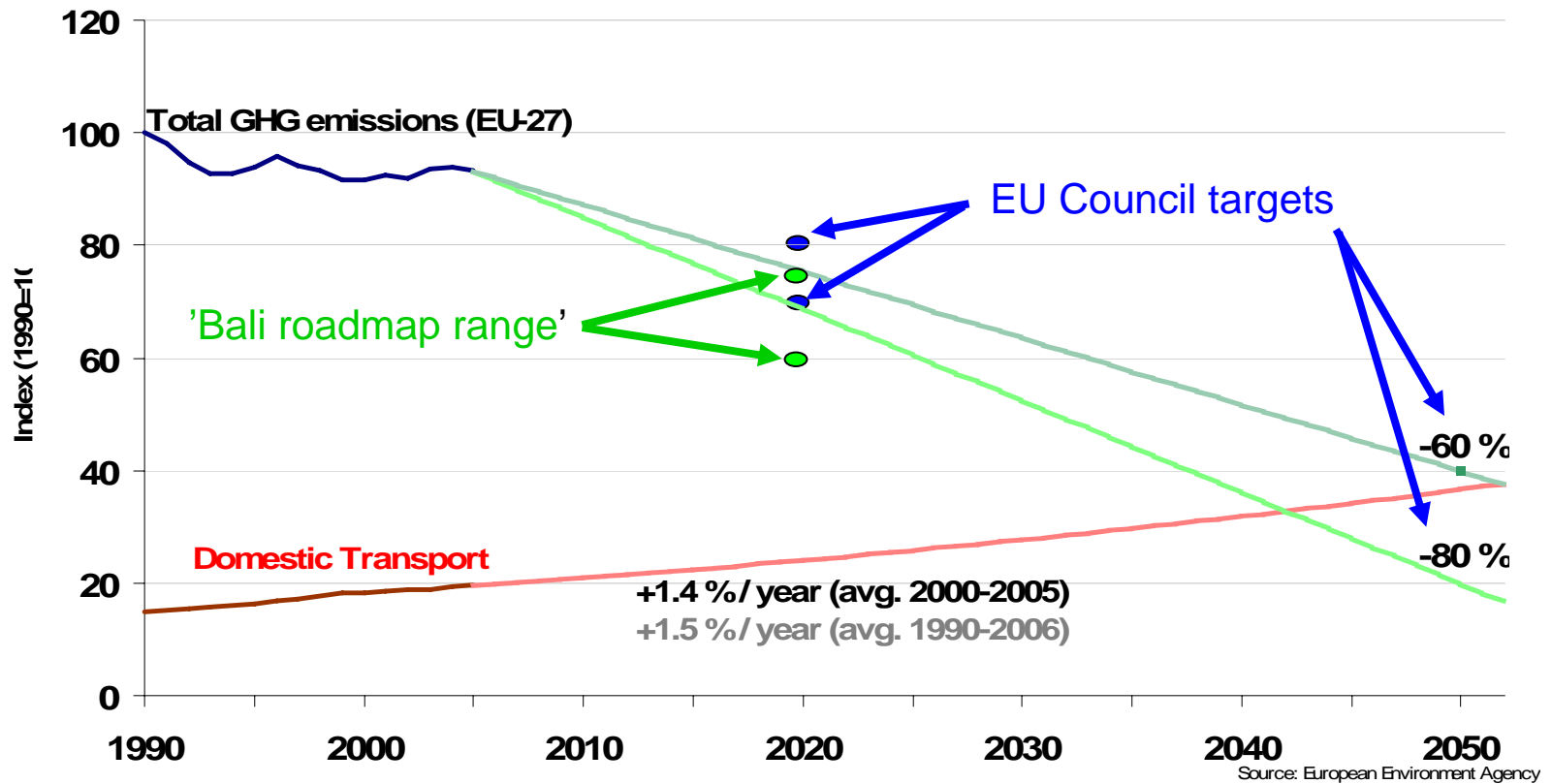
Assuming trends are prolonged over  
2005 – 2020

+7% domestic transport (though we  
need -10% at least?)

+21% international transport

+10% overall transport

# GHG emissions trajectories



# Freight transport efficiency

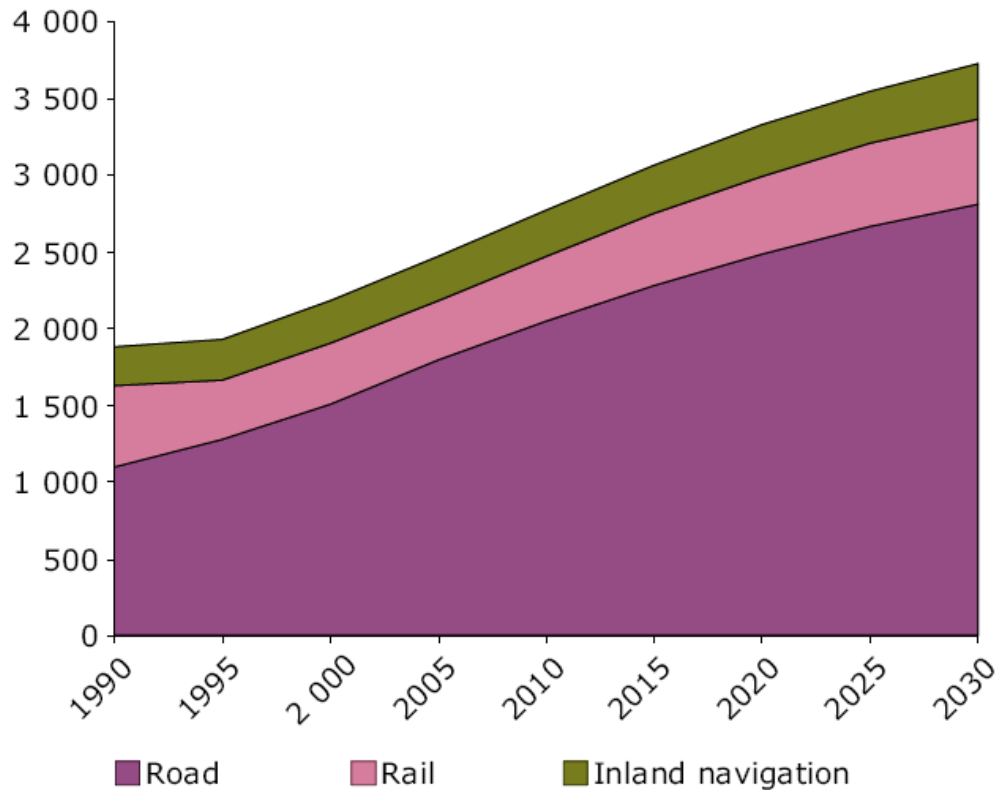
Average CO2 emission per tkm

- Sea transport 2 – 7 g/tkm
- Rail transport 18 – 35 g/tkm
- Inland waterways 30 – 49 g/tkm
- Road transport 62 – 110 g/tkm
- Air transport 665+ g/tkm

Source: EEA, TERM report, 2009

# Freight transport demand

Gtkm (freight transport activity)



Source: European Commission, 2007.

Demand is growing fastest for modes of transport that emit higher CO<sub>2</sub> levels

Modal shift and load factors



# Freight transport demand

- +35% t-km 1990-2006
- No decoupling from GDP
- Road first: 73% of domestic freight, 45% of overall freight
- Maritime second: 37% of overall freight
- Road: +3.8% per year
- Air: +3.5%
- Maritime: +2.7%

# Freight transport demand

- Importing fruits (ADEME, INRETS 2008)
  - Apples from Chile vs France: x 13 GHG per kg (road)
  - Melon from Spain vs France: x 3.5 GHG per kg (road)
  - Bananas from Columbia, air vs boat: x 50 GHG per kg
  - Peaches from Spain by road: GHG Retailer to home ~ x 1.7 GHG Producer to retailer
- Urban logistics (ADEME, Ministry Transport)
  - Round vs parallel deliveries: 3-4 times less GHG
  - Suburban hypermarkets vs. nearby shops: 15 to 60 times more GHG

# Freight transport demand

- Charging: Swiss model (2001 – 2005)
  - Distance based, EURO class differentiated, earmarking for rail
  - 900 M€ revenue in 2006
  - 6% decrease veh-km despite increase 16.4% t-km
  - 10% decrease Nox, 16% decrease PM
  - 4% decrease CO<sub>2</sub>
  - Quicker fleet renewal, increased load factors, shift to rail (64% in 2007)
- EU approach on charging still much too shy

# Passenger transport efficiency

Average CO2 emission per pkm

• Air (short haul)	77 – 240	g/pkm
• Air (long haul)	118 – 153	g/pkm
• Car (1.1 passenger)	95 – 480	g/pkm
• Bus or coach	45 – 80	g/pkm
• Rail (normal)	45 – 130	g/pkm
• Rail (high speed)	80 – 165	g/pkm

Modal shift and  
load factors

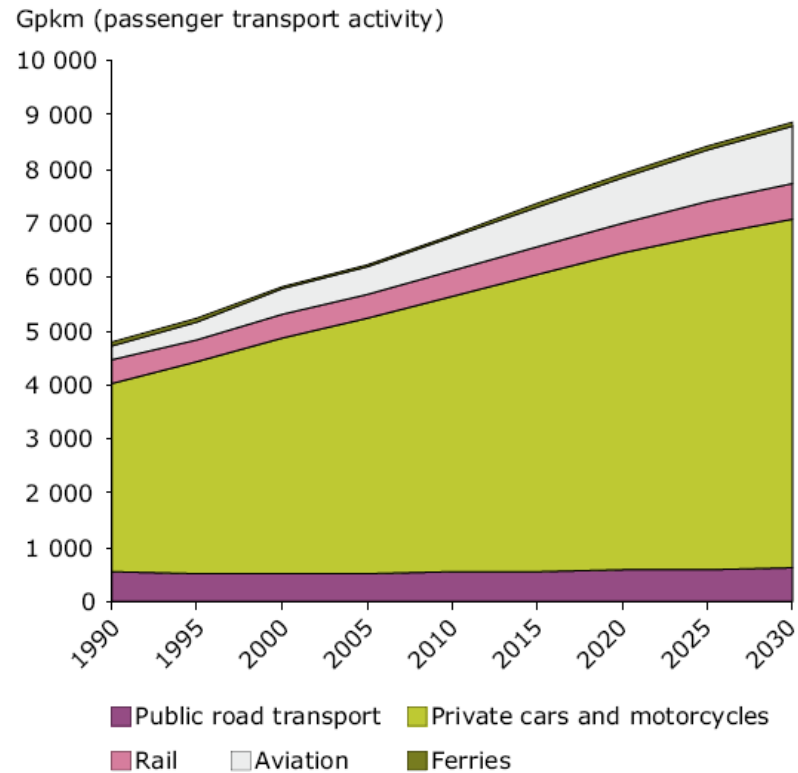
Source: EEA, TERM report, 2008



# The need for demand management

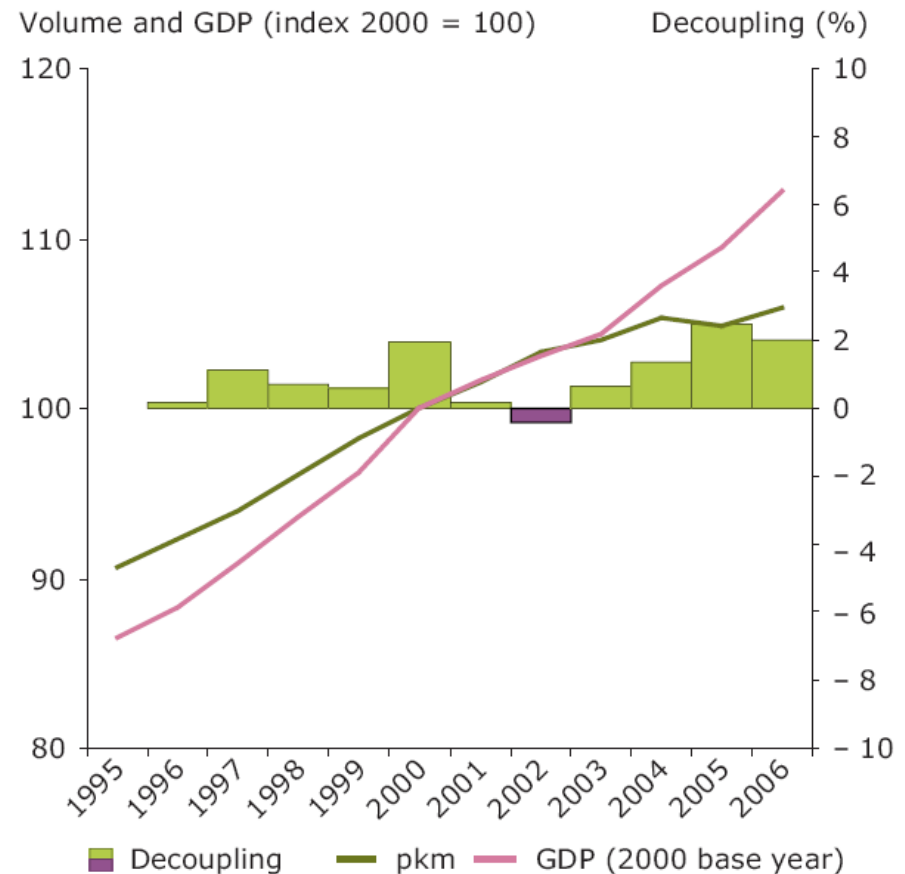
## Passenger transport

Modal shift and load factors



# Passenger Transport – continuous growth

- Growth has occurred for all modes with the exception of sea transport
- Growth has been slower on average than growth in the economy since the mid 1990s



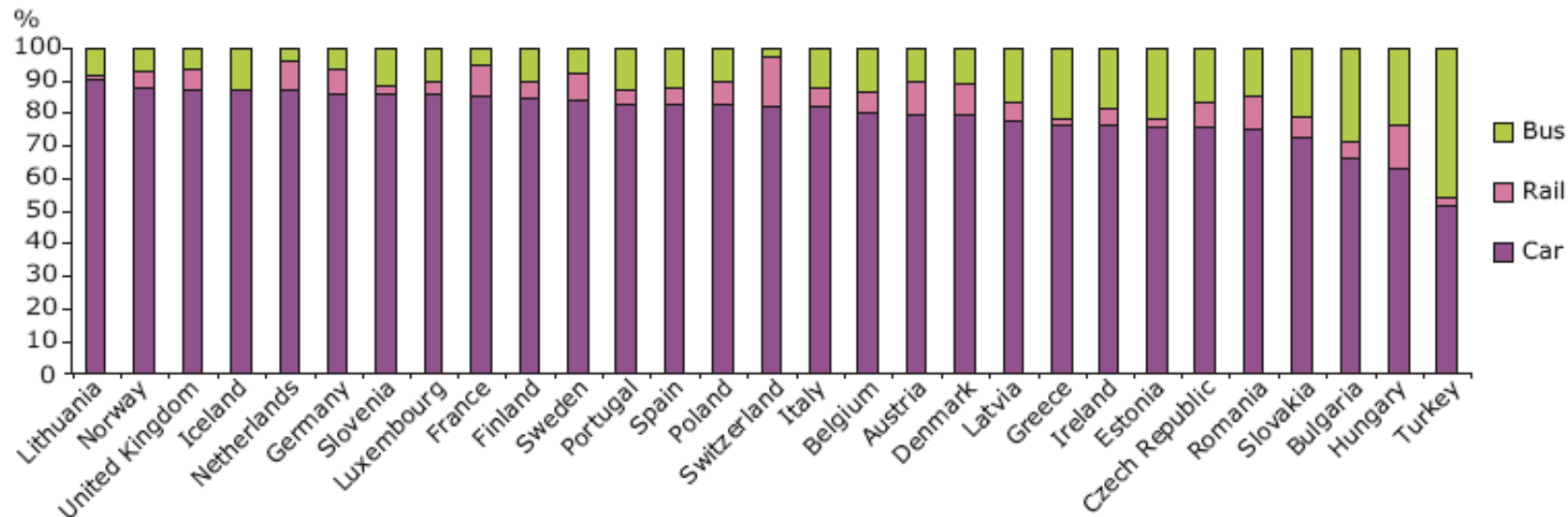
Demand  
management



# Passenger transport demand

- Car per inhabitant: +26% 1995 - 2006
- + 18% p-km 1996-2006 (flatening p-km 2004 – 2006)
- Domination of car: 73% of p-km
- Strong continued growth of Air: +76% 1995-2006
- Owning car model (512 per 1000 inhab EU15):
  - 220 million  $\Rightarrow$  270 million if EU27 = EU15

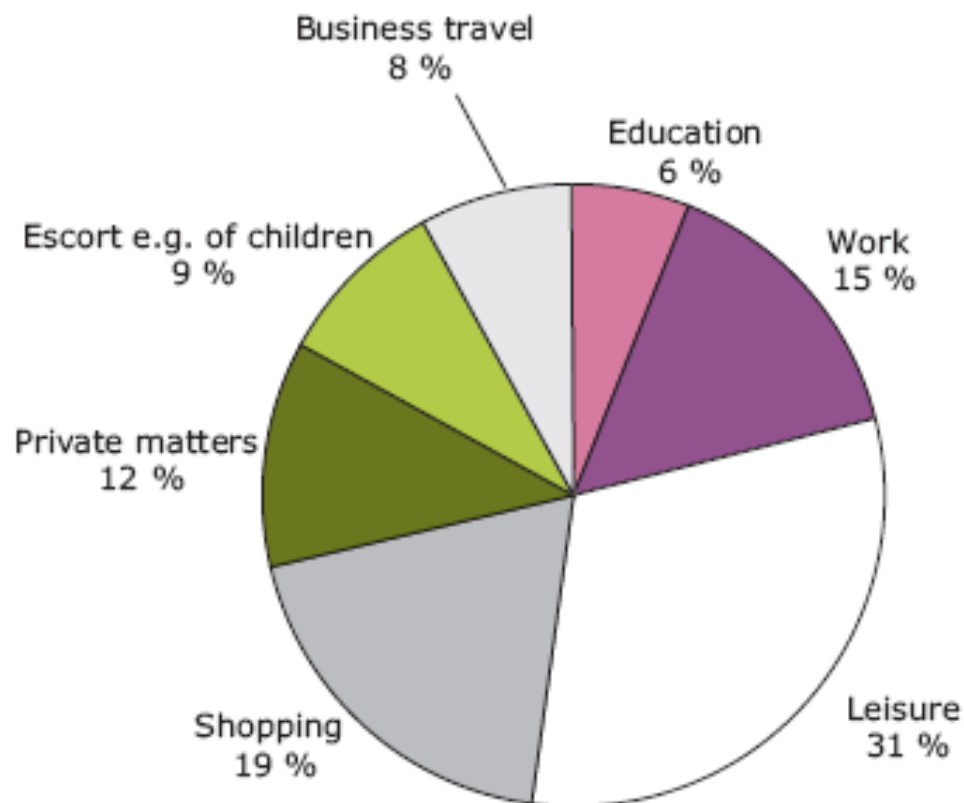
# Passenger transport demand



# Importance of urban mobility

- 55% EU pop live in LUZ > 100 000
- Ultra domination of car over short distances
  - e.g. Lyon, Lille metropolitan areas
  - 90% of car trips < 10 km representing 60-70% of distances travelled by car!
  - 100% of car trips < 30 km
- Suburban sprawl
  - urban expansion > demography
  - Uncoordinated land use and transport, offering no alternative to car
- Health impacts

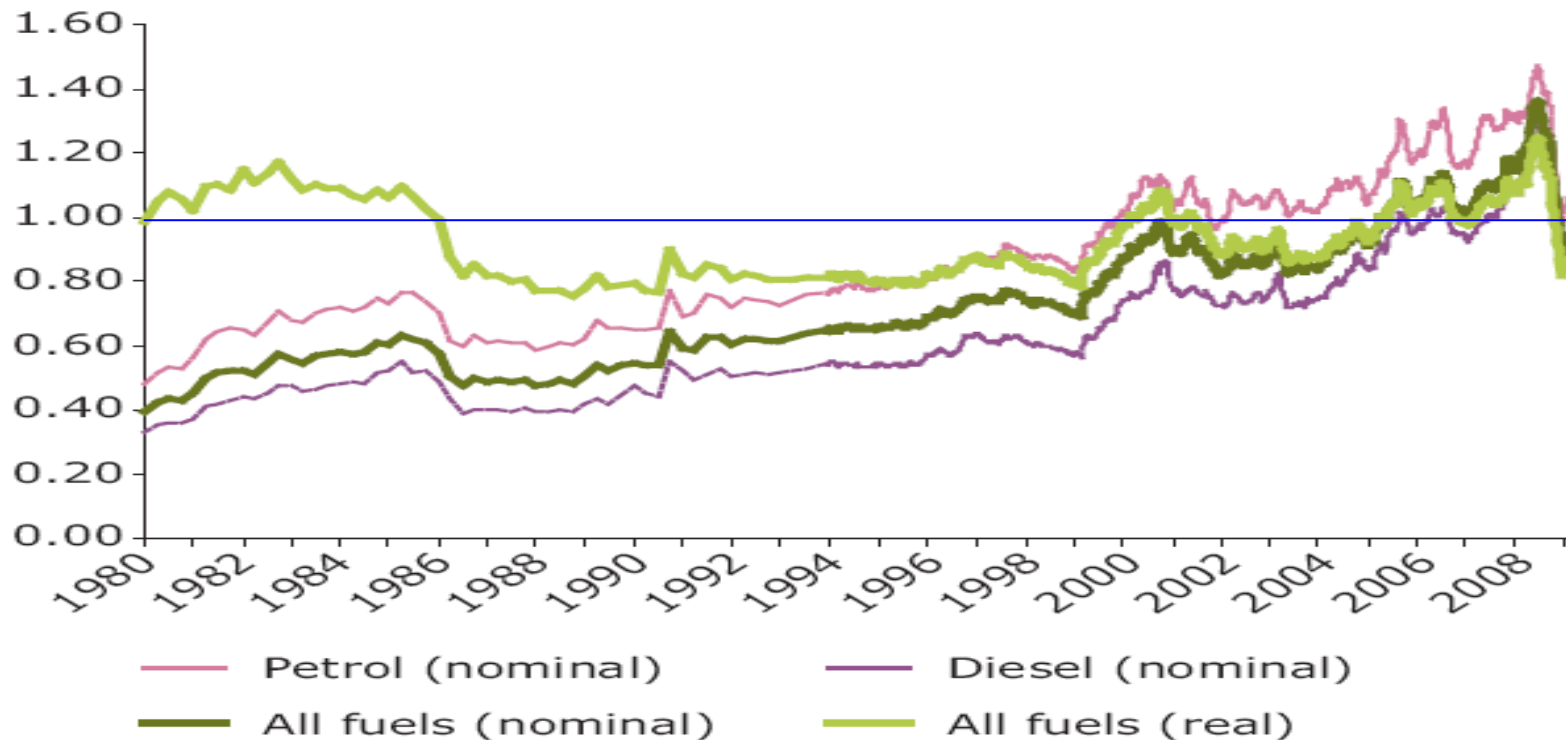
# Passenger Transport Demand



# Transport fuels

## Nominal and real fuel prices in the EU

EUR per litre petrol equivalent



Source: DG TREN, 2008.



# Conclusive points

- Transport GHG trends clearly unsustainable
- Constant, coherent, comprehensive, multilevel and determined strategies and actions needed as rapidly as possible
- GHG (CO<sub>2</sub>) reduction targets for transport
- Technology necessary, but no silver bullet (even EVs), avoid the wrong uses (e.g. ITS to increase capacity and speed of less efficient modes, waves of enthusiasm for biofuels and now EVs)

# Conclusive points

- Managing transport demand
  - Shift to most efficient modes and vehicles
  - Curbing distances and load factors related trends
  - Charging (distance, differentiation, externalities)
  - Land use (e.g. parking supply; accessibility to PT, walking, cycling; reallocation of road space)
  - Urban mobility strategies/plans (e.g. SUTP)
  - Consumption, logistics chains



# Conclusive points

- Managing transport demand
  - Car ownership vs. ultra low emission mobility services (e.g. car sharing, new ways of taxiing)
  - Travel plans (businesses, schools > smart choices)
  - Locking-in benefits brought by technology
  - Information (labeling, best in class) and incentives (e.g. bonus/malus)
  - Shifting investments into less carbon intensive modes
  - Targeting multi-benefits (health and GHG)