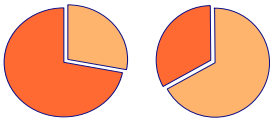
A 50% reduction in CO_2 emissions is possible

- Technology improvements can reduce CO_2 emissions for land based transport by 40% (2040 study)
  - taking into account growth in transport volumes!
- Intelligent Transport Systems can reduce CO_2 emissions by about 20% (ICT & energy efficiency study, other ITS studies)
- Another 5 to 10% reduction in CO_2 emissions expected by land use & transport measures
  - compact cities that encourage residents to use environmentally friendly modes of transport (cycling & walking, public transport) (e.g. discussed in EU Transport GHG 2050 study)

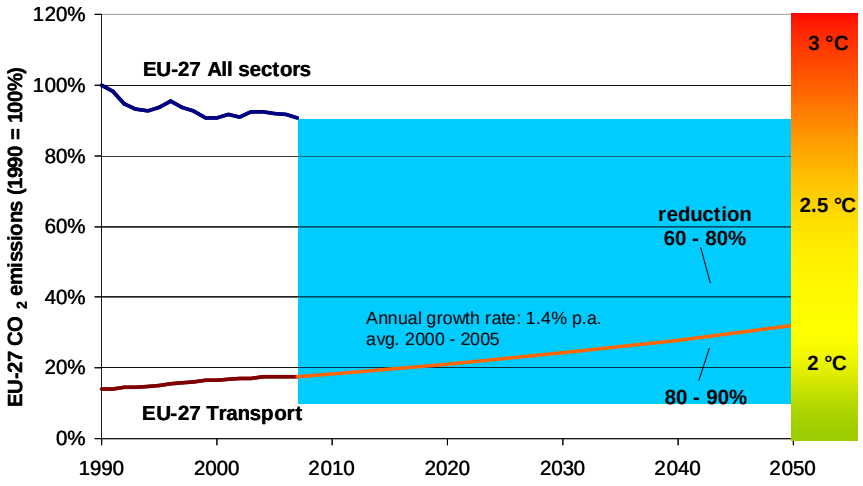
Transport and GHG emissions

- Transport in EU consumes two thirds of oil used and causes over a quarter of the CO_2 emissions
- Share in total CO_2 emissions is rising
- Transport sector faces a major challenge!
  - transport volumes still rising
- There is no single measure that can reduce CO_2 emissions from transport to the levels needed



50% reduction in transport CO_2 emissions necessary

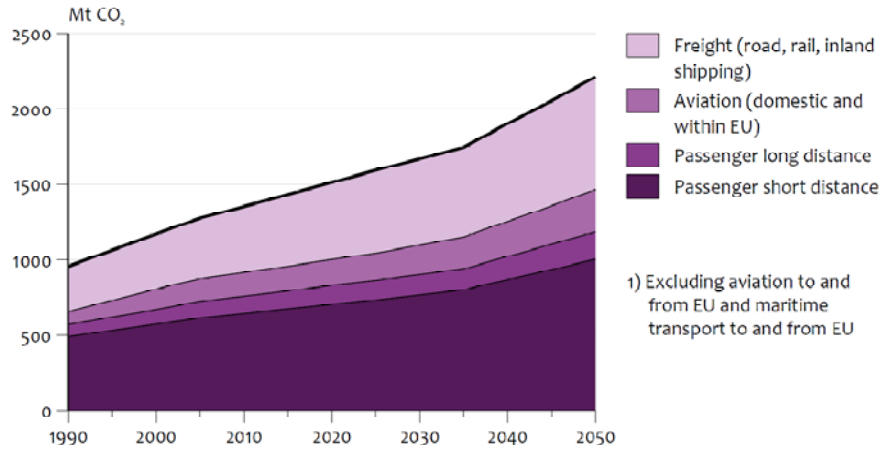
Source: adapted from EEA 2009



Emissions growing

"Getting into the right lane" (PBL, 2009)

CO_2 emission EU transport[1)]



Growing… within limits

- Growing transport volumes (especially road transport, aviation)
  → need to curb growth in km's travelled, favouring environmentally friendly modes and vehicles
  → need to drastically reduce emissions per km travelled
    - improved vehicle efficiency, decarbonisation of fuels, improved driving behaviour
- Studies show it can be done
- This needs a combination of short-, medium- and long-term measures, technological and other
- Needed:
  - transition to sustainable transport system
  - stringent transport policy
  - political support
  - change in mindset

Transport measures

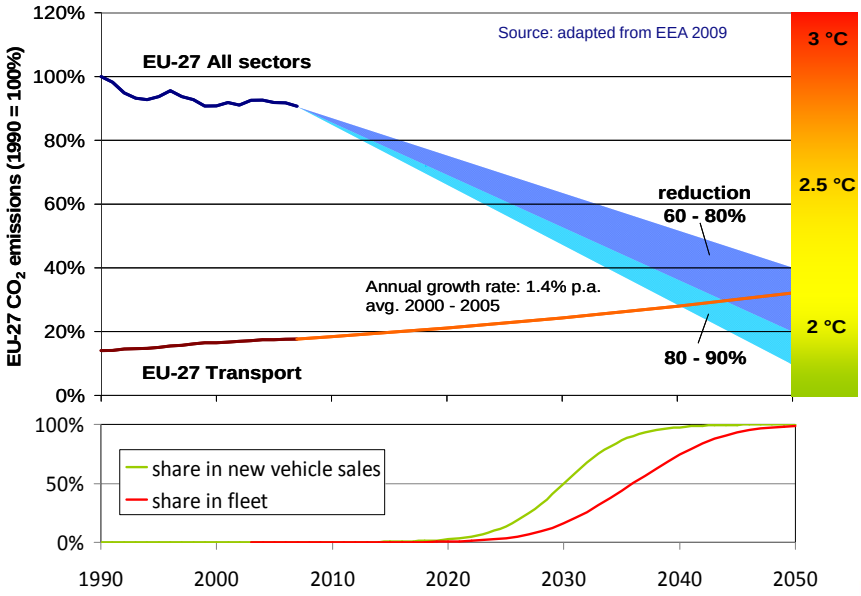
- Technological innovations (vehicles)
- Intelligent transport systems (ITS)
- Land use and transport planning
- Pricing

Technological changes

- Short term: technological improvements in current fleet
  - more efficient conventional vehicles
  - hybrid, plug-in hybrid
  - 2nd generation biofuels
- Mid to long term: introduction of decarbonised transport
  - electric vehicles, fuel cells, biofuels
- Clean vehicles more expensive but in the long run cost effective




Towards meeting the 2050 goal



Electrification / decarbonisation

- Co-evolution between vehicles and energy system needed
  - development of efficient vehicle technology
  - development of sustainable energy production chain
- How to avoid pitfalls:
  - sustainability criteria for energy chains
  - effective load management, smart grids
  - we need to hedge our bets:
    - more than one energy carrier is needed anyway
    - we cannot afford not to meet the target
    - we need to try out many different solutions to arrive at the winning option

Barriers to be removed

Biofuels	Electric vehicles / plug-in hybrids	Hydrogen / fuel cell vehicles
Barriers • High production costs • Impact on engine operation • Limited WTW GHG reduction potential of many 1st generation biofuels • Sustainability issues • Certification	**Barriers** • High battery costs • Limited range • Charging infrastructure	**Barriers** • High costs of fuel cells • On-board storage • Poor WTW chain efficiency • Hydrogen production and distribution infrastructure
Uncertainties • World-wide availability of biomass • Competition with food • Cost development of 2nd generation biofuels	**Uncertainties** • Battery lifetime • Safety issues • Impact of fast charging • Material availability	**Uncertainties** • Cost development of fuel cells • Development of efficient routes for production of hydrogen from renewable sources • Economic viability of large scale hydrogen distribution infrastructure • World-wide availability of platinum

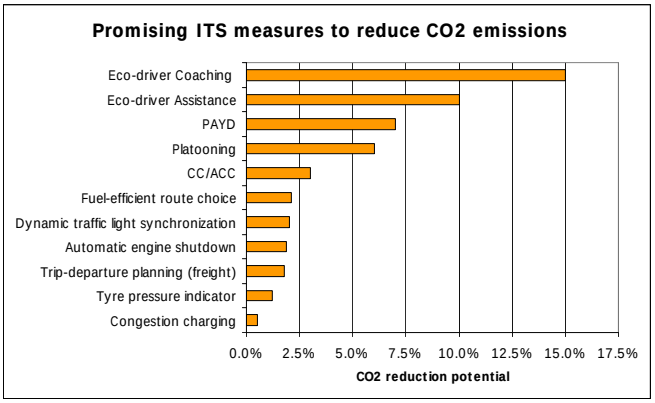
Intelligent transport systems (ITS)

- ITS: the use of information and communication technology in transport
- Driver assistance systems, travel information systems, traffic control systems
- Aim: to minimise inefficiencies in transport
  - emphasis is shifting from improving throughput & safety to environmental objectives






ITS can help reduce inefficiencies in transport substantially



- Next steps: more Field Operational Tests, EU R&D projects like eCoMove, business modelling for ITS

Land use and transport

- Strong relationship between density of urban areas and emissions
  - shorter distances to travel – less CO_2
- Better land use and transport planning can also improve the quality of life in cities
  - less congestion
  - better air quality
  - less noise annoyance
  - attractive looking cities




Land use and transport measures

- Higher densities (compact cities) = less emissions
- But effect of spatial planning policy is unclear

- Transport measures:
  - improved public transport (public transport accessibility in building energy performance certificate?)
  - facilities for cyclists and pedestrians
  - parking management
  - congestion charging

- Added health benefit:
  - through better air quality, less noise
  - through more exercise (walking & cycling)

Pricing

- Road pricing: instrument to influence travel demand and to support traffic management
  - expected to reduce number of km's travelled
  - can help downsize fleet

- Pricing useful to control rebound effects of other measures

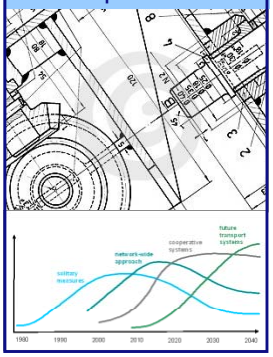
- Prices can be varied
  - in time and place (congestion expected? price goes up)
  - according to "carbon footprint vehicles"

Solid policy framework needed

- Stringent CO_2 standards and pricing policies to:
  - curb growth km's driven
  - downsize vehicle fleet
- Dilemma: standards vs. economical instruments
  - create level playing field, to allow options to compete on CO_2 benefits
- Change needed in the mindset of EU citizens, policy makers and politicians
  - use transition management techniques to address barriers
- Important: policy framework needs to be consistent over time

Transition towards sustainable mobility
Dilemma: bottom-up vs. top-down approach

top-down



generic policy aiming at goals:

standards & regulation, CO_2 tax, cap & trade, ???

bottom-up

blueprint – roadmap
"shaping society"

let a thousand flowers bloom
think green
people / planet / profit

Conclusions

- Halving GHG emissions from transport requires a combination of:
  - technological improvements and innovations
  - stringent policies, organisational changes, transition management
  - adequate pricing / taxation instruments
- Some courageous choices need to be made
  - by politicians & policy makers
  - by travellers
- Costs of cleaner transport are initially higher but acceptable

Thank you for your attention!

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