

Talanoa and International Conference on Renewable Energy and Climate Change 14 - 18 July 2014

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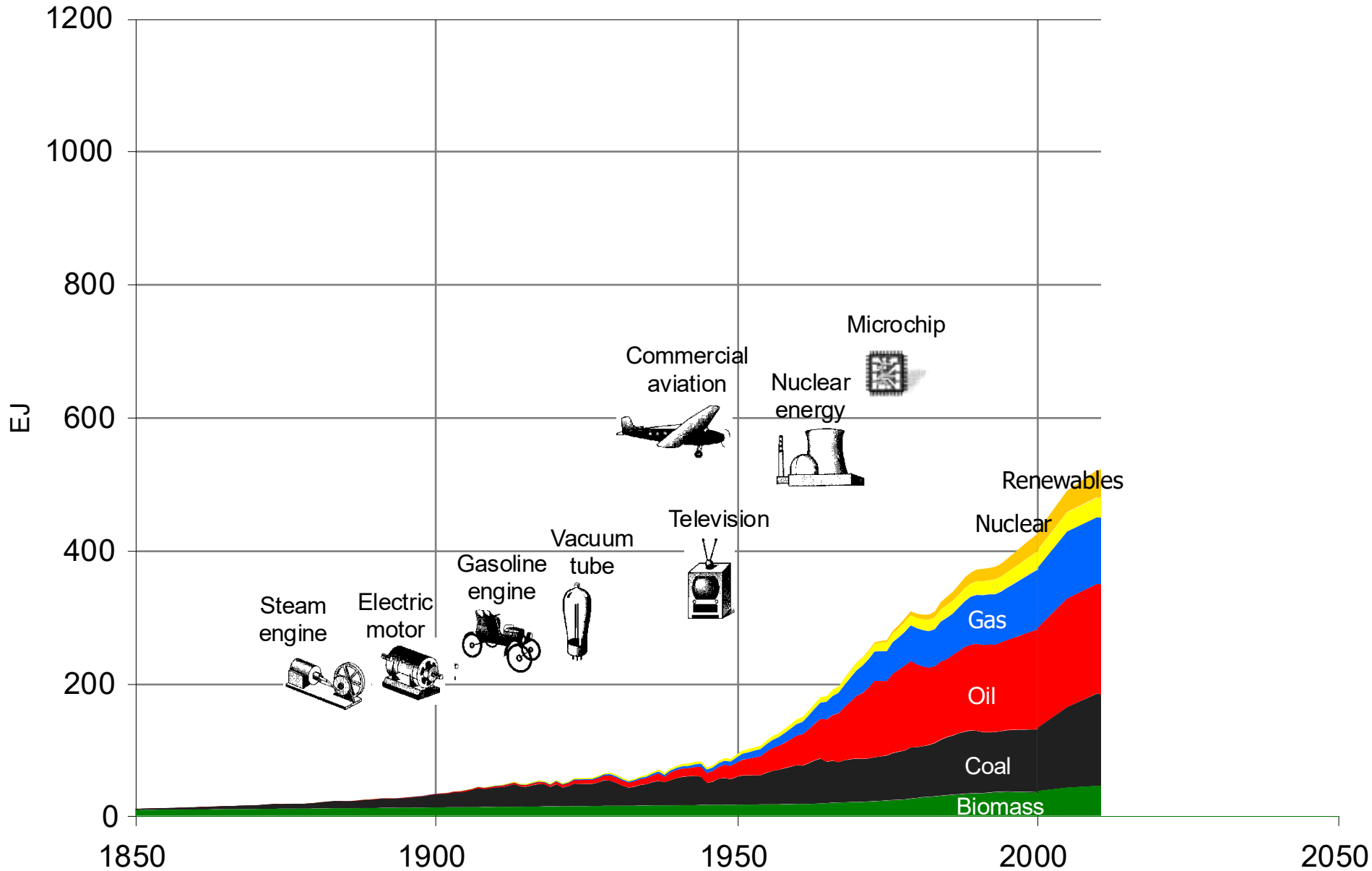
IPCC CLIMATE CHANGE 2014 Mitigation and Transport

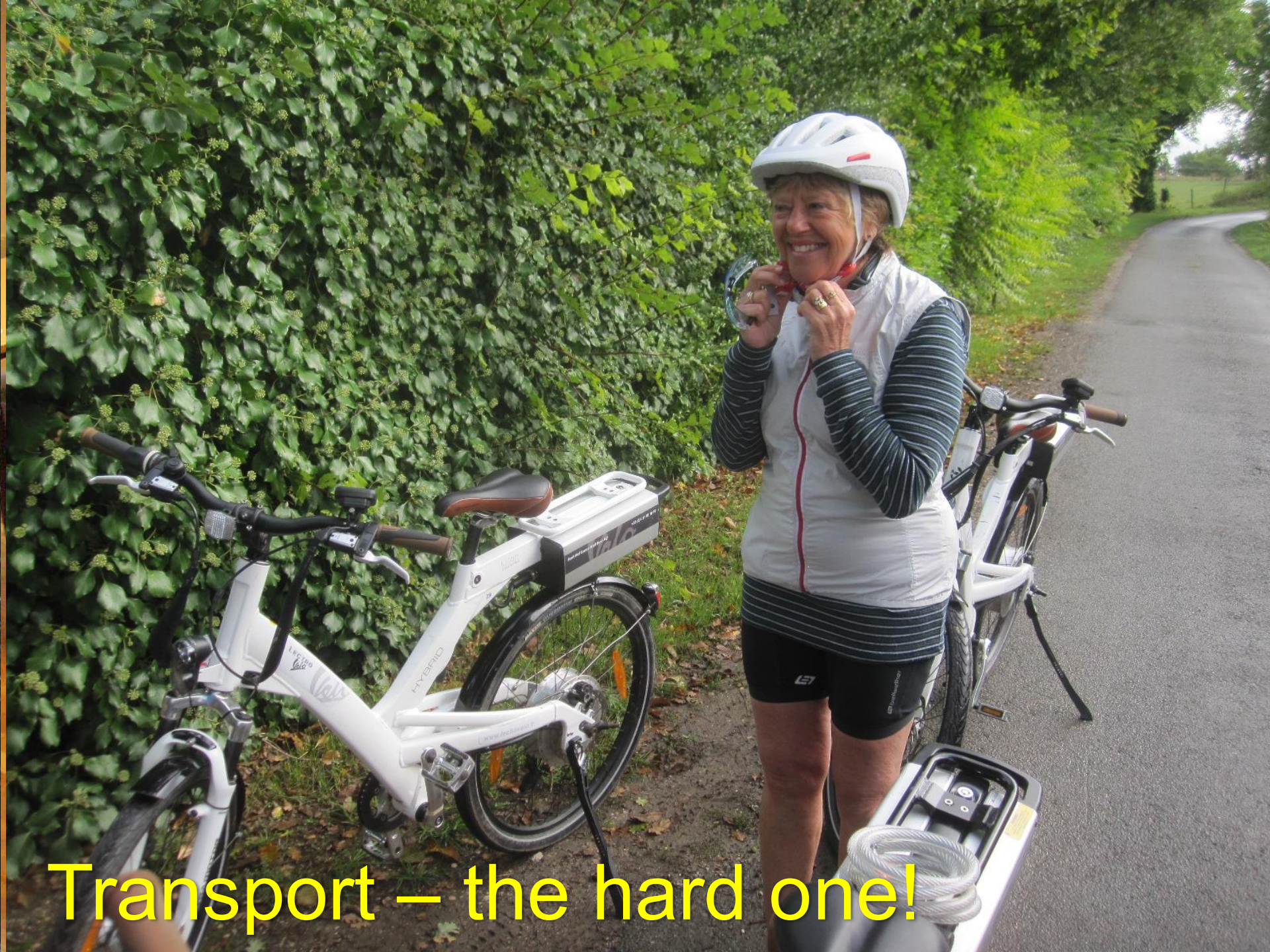
What are the GHG emission trends?

Despite mitigation efforts, global anthropogenic GHG emissions grew more rapidly from 2000 to 2010 than in any of the previous three decades.



Global primary energy demand growth





Transport – the hard one!

TOTAL GHG emissions



Fuel carbon intensity
(gCO_{2-eq}/MJ)

Energy intensity
(MJ / km)
(MJ / t km)

Journey
(km / yr)
(t km / yr)

System - infrastructure modal choice

- Diesel
- Gasoline
- Biofuels
- Electricity
- Hydrogen

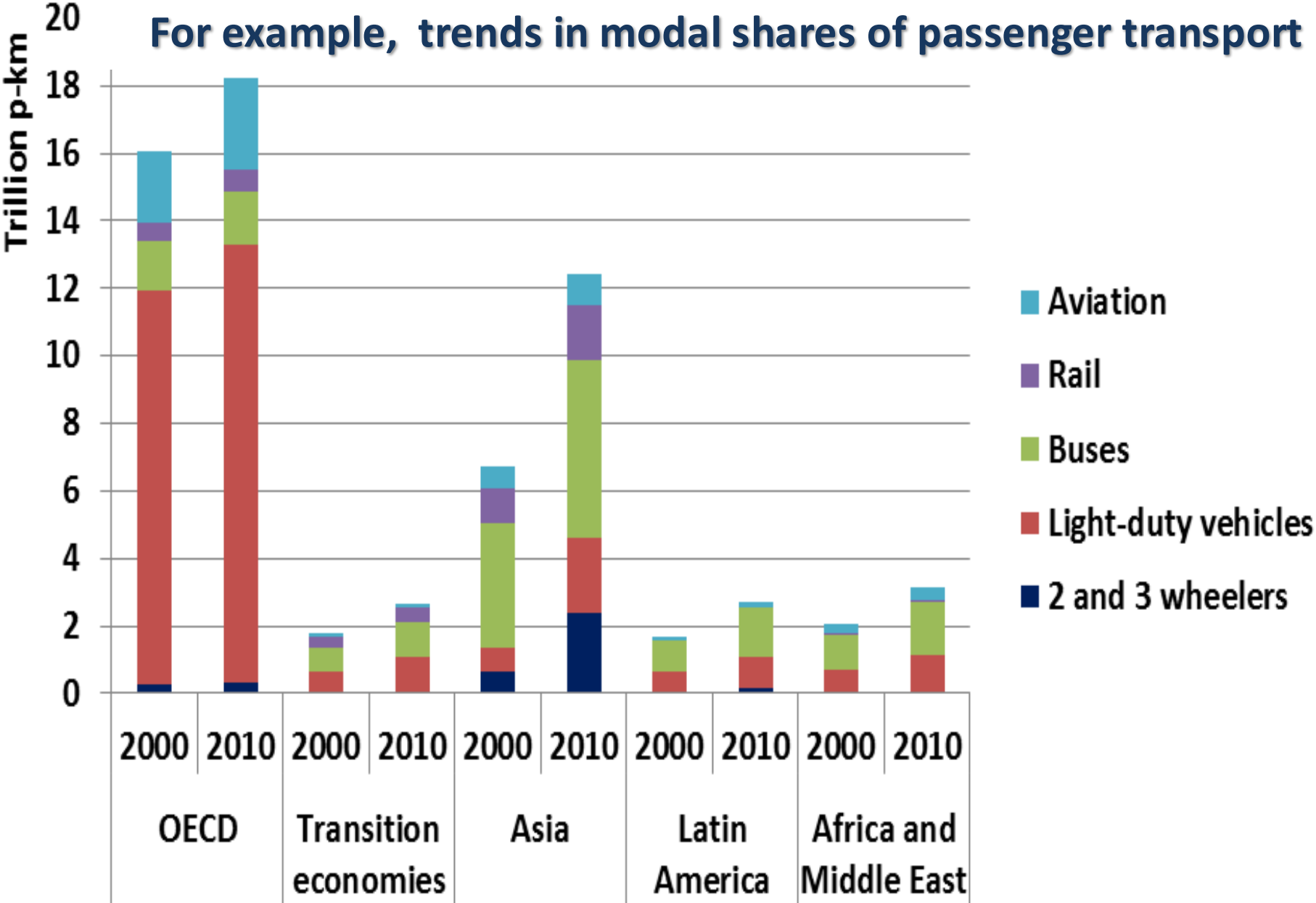
- LDV / HDV / Bikes
- Rail
- Marine
- Aviation
- Mass transit
- Cycling / walking

- Distance to travel
- Combine trip objectives
- Avoidance
- Internet shopping

- Urban planning
- Roading / airports / railways / ports
- Choice between speed / comfort / cost / convenience

Major regional differences have been highlighted

For example, trends in modal shares of passenger transport

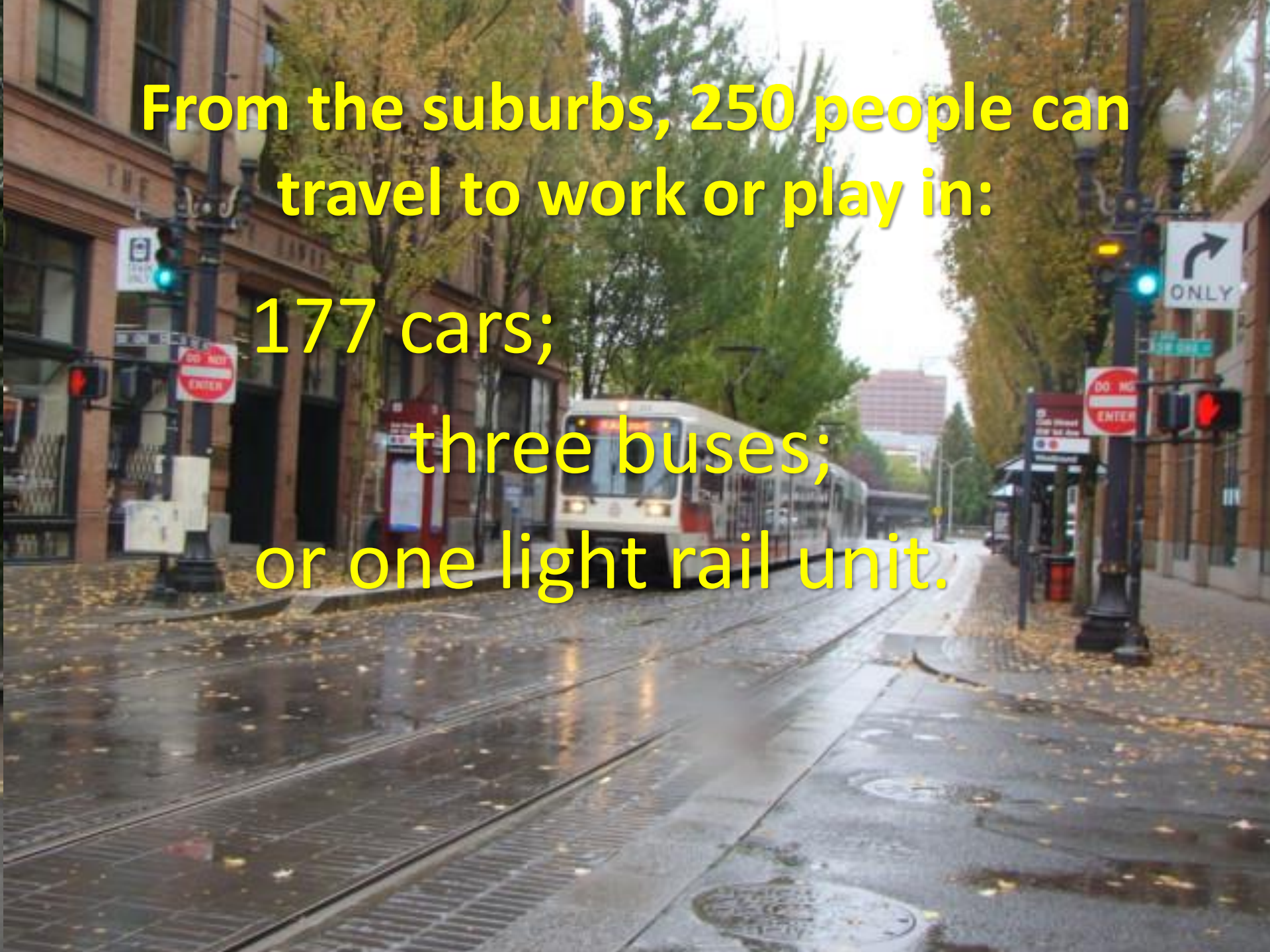


From the suburbs, 250 people can
travel to work or play in:

177 cars;

three buses;

or one light rail unit.



Moving around the CBD



Behavioural change highlighted

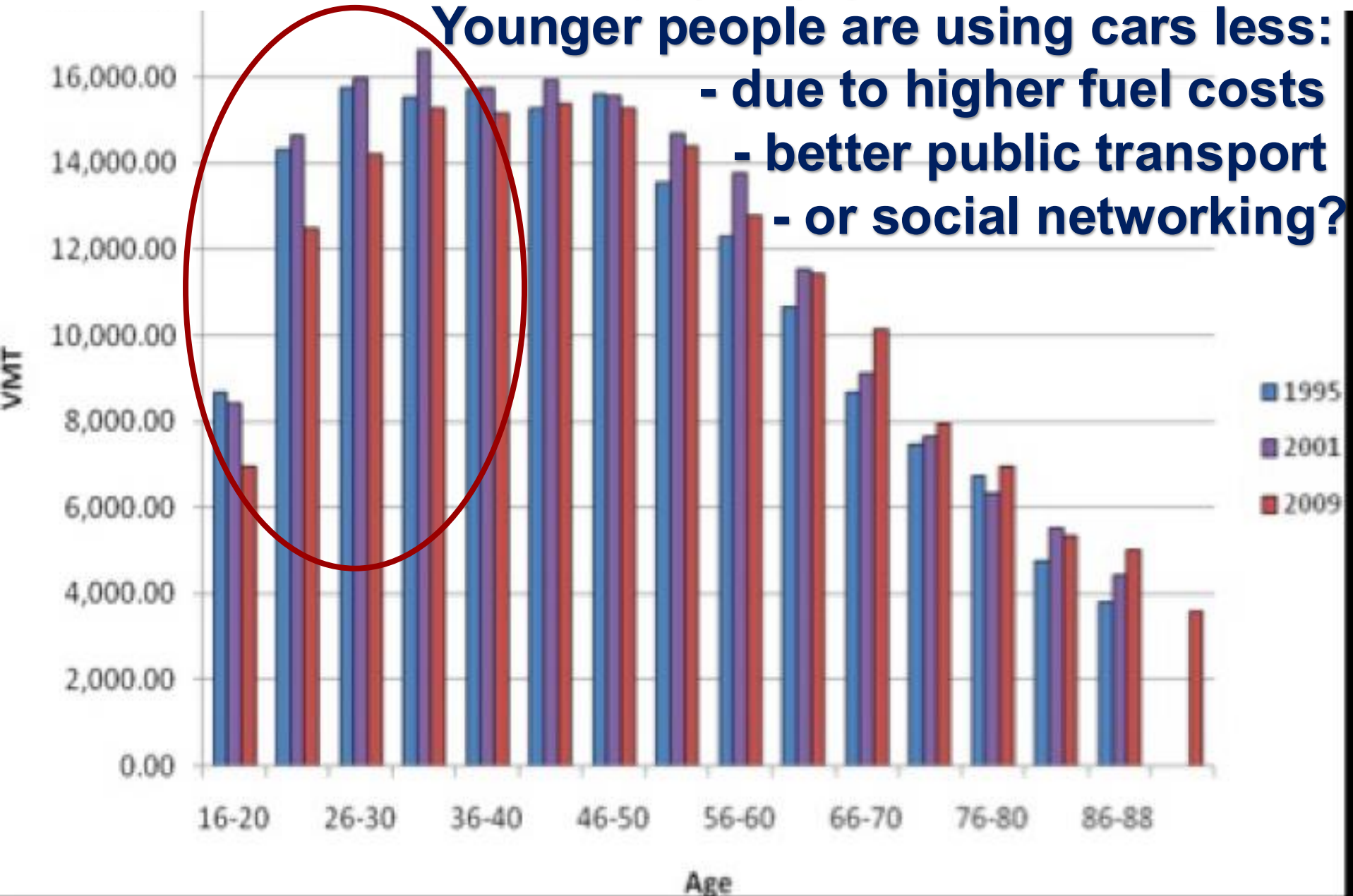
Vehicle miles travelled per year by age class in USA

Younger people are using cars less:

- due to higher fuel costs

- better public transport

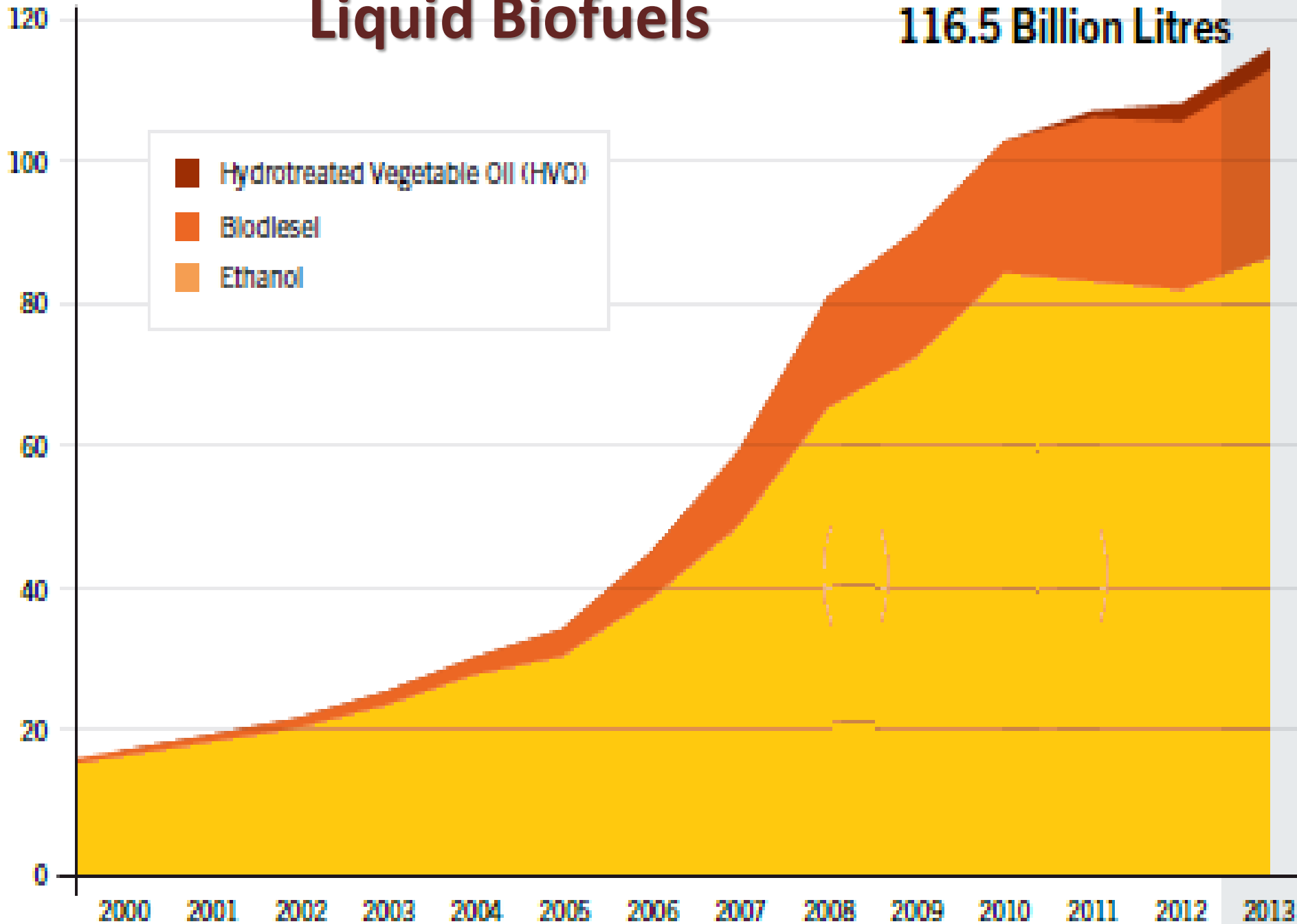
- or social networking?

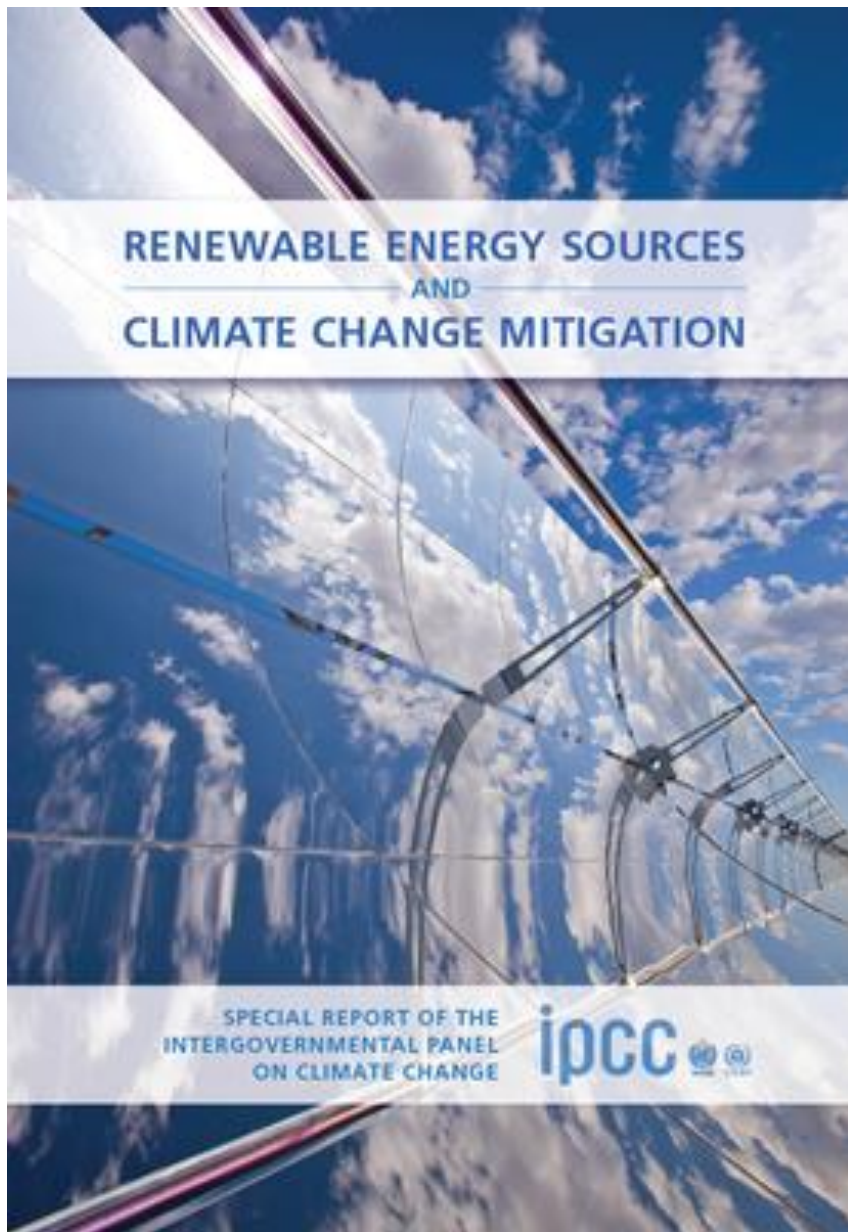


Billion Litres

Liquid Biofuels

World Total
116.5 Billion Litres





IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation (SRREN)

July, 2011.

<http://srren.ipcc-wg3.de>

Can atmospheric GHG concentrations be stabilized?

There are multiple pathways to any stabilization level including ones consistent with the 2°C target, but requirements and risks vary substantially.

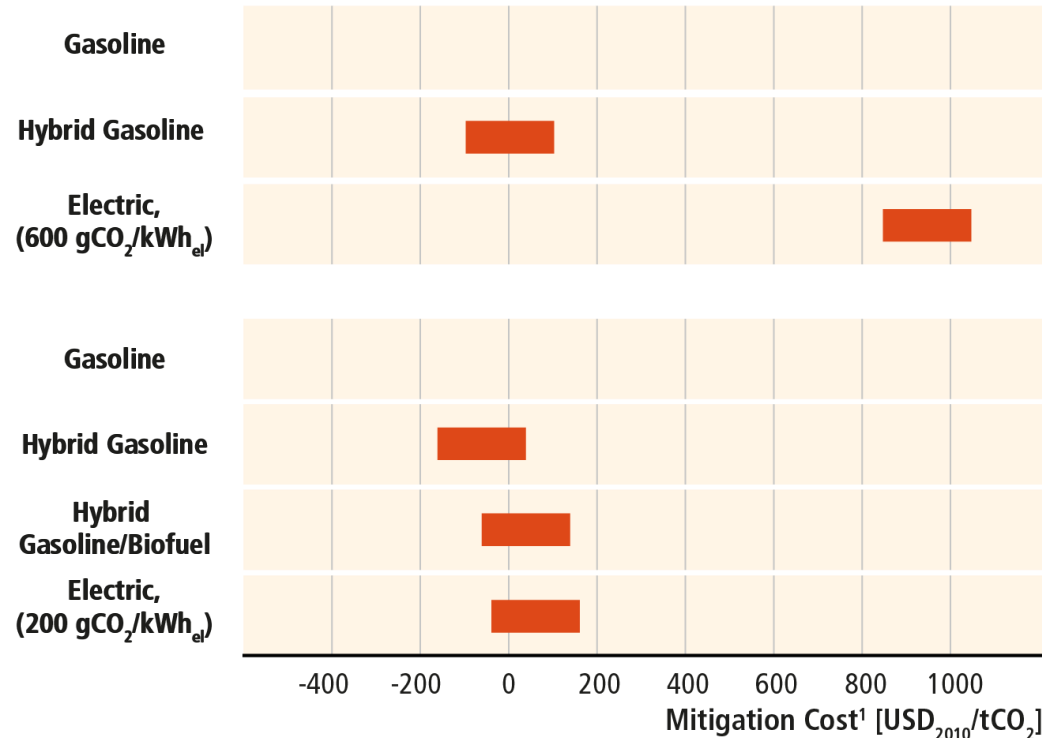
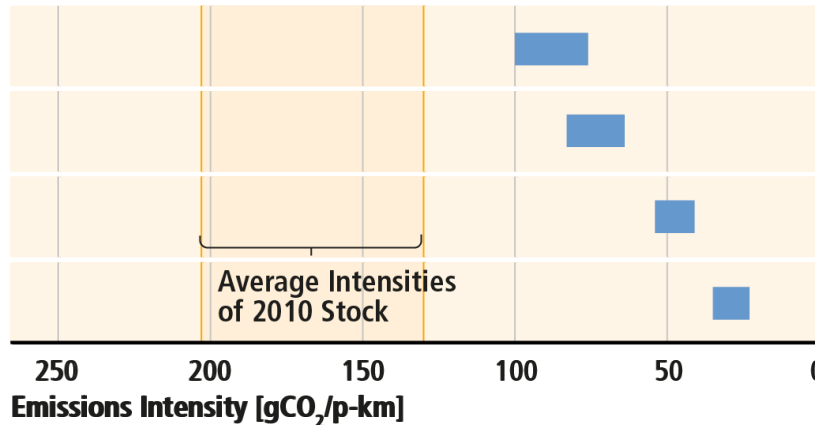
Several strategies exist to reduce emissions from transport

Some Mitigation Technologies for Light Duty Vehicles

Options in 2010



Options in 2030



¹ Levelized cost of conserved carbon; calculated against 2010 new gasoline (2030 optimized gasoline) for 2010 (2030) options. Mitigation cost are based on point estimates ±100 USD₂₀₁₀/tCO₂ and are highly sensitive to assumptions.

Private costs of reducing emissions in transport vary widely.

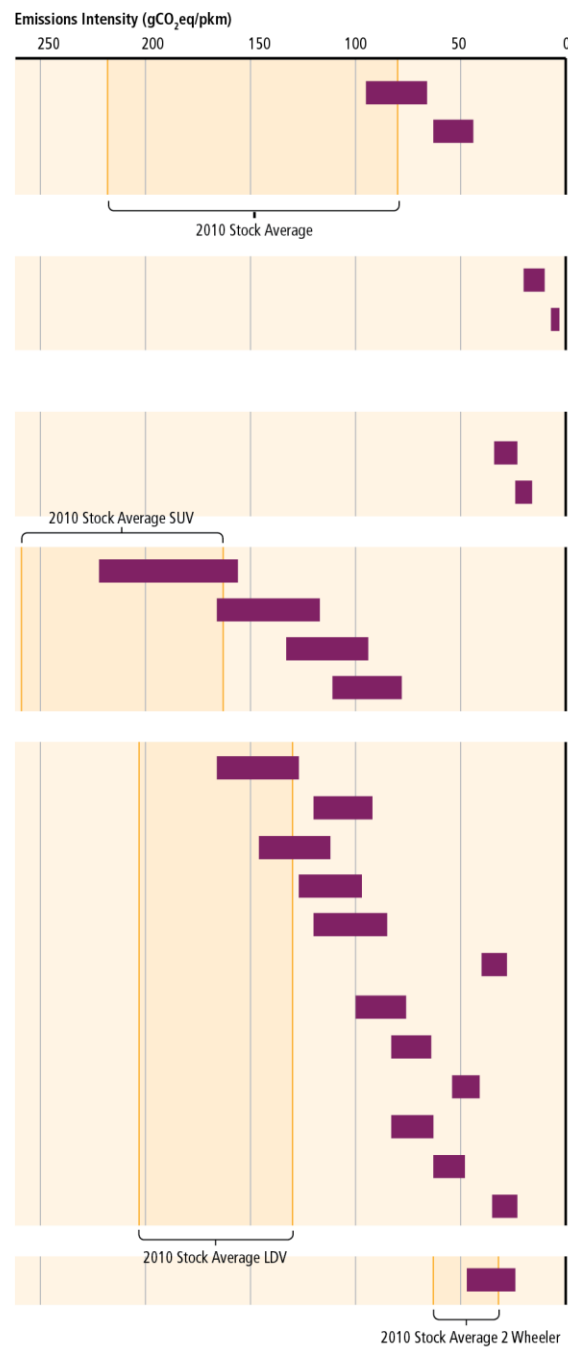
Potential emission reductions

(g CO₂ / km) and mitigation costs (\$/tCO₂)

for various modes of transport.

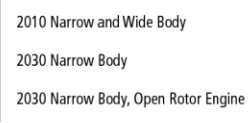
Stock average vehicle fleet compared with:
2010 new vehicles;
projected 2030 new vehicles and fuels.

Passenger transport

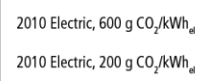


Aviation

(Commercial, Medium to Long Haul)

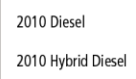


Rail (Light Rail Car)

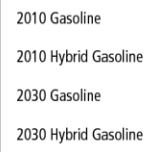


Road

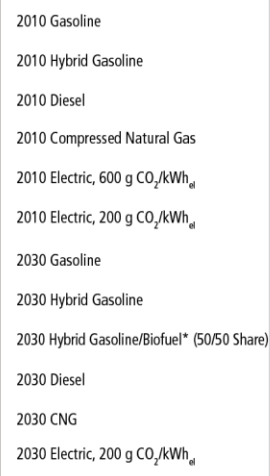
New Buses, Large Size



New Sport Utility Vehicles (SUV), Mid-Size



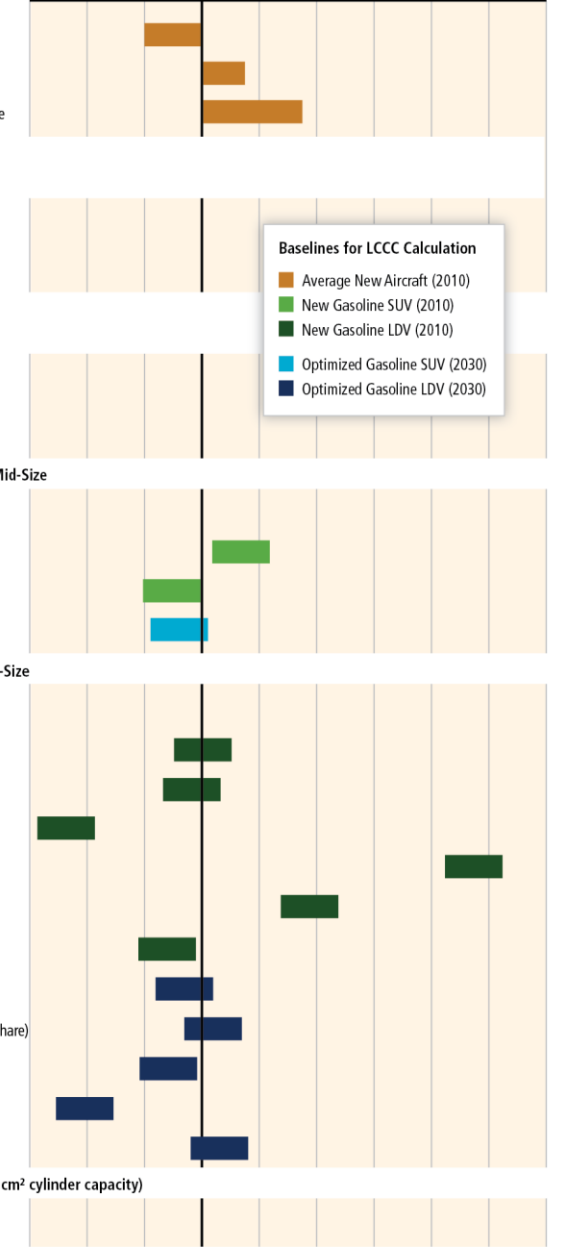
New Light Duty Vehicles (LDV), Mid-Size



New 2 Wheelers (Scooter up to 200 cm² cylinder capacity)

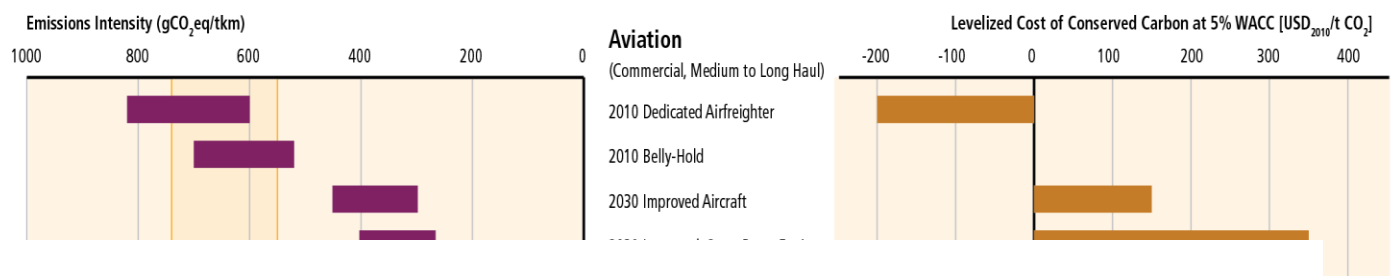


Levelized Cost of Conserved Carbon at 5% WACC [USD₂₀₁₀/t CO₂]



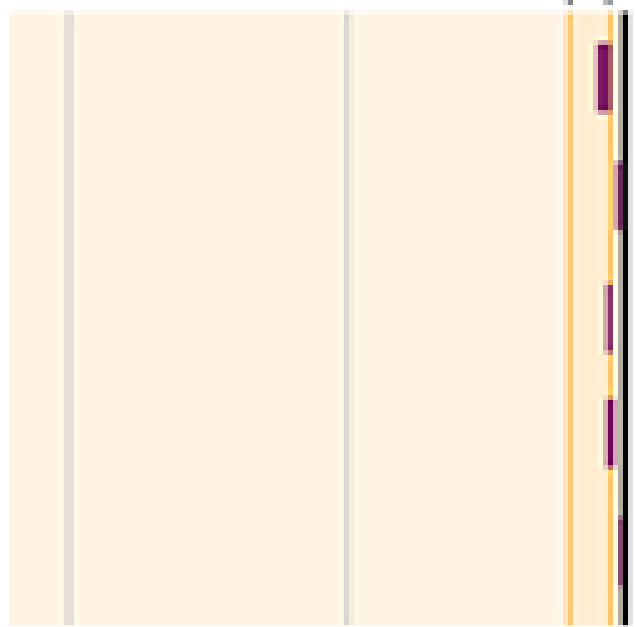
* Assuming 70% less CO₂/MJ of Biofuel than per MJ of Gasoline

Potential emission reductions (g CO₂ / km) and mitigation costs



Current Average International Shipping

Waterborne



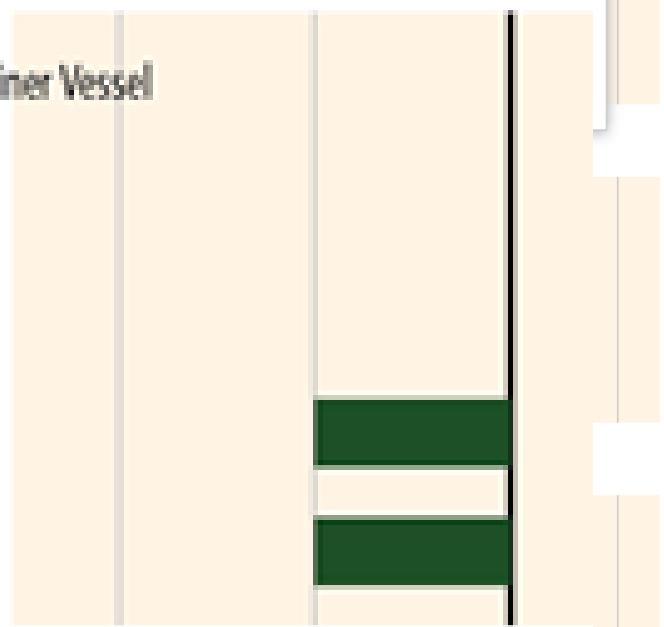
2010 New Large International Container Vessel

2010 Large Bulk Carrier/Tanker

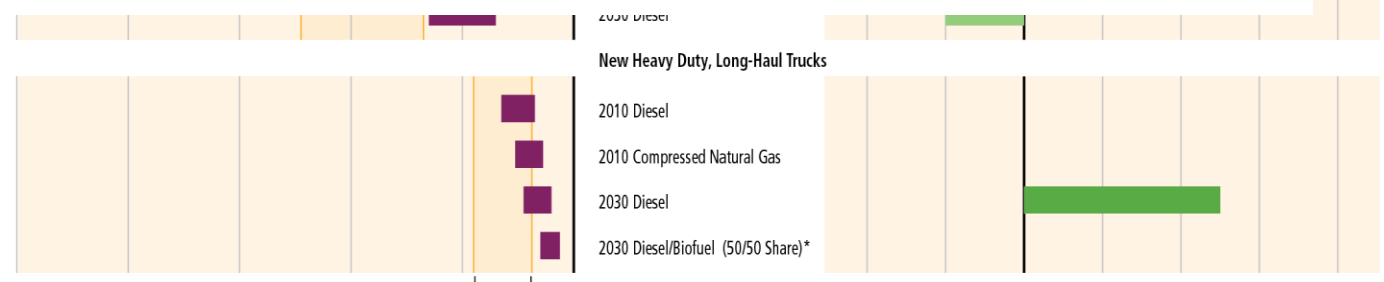
2010 LNG Bulk Carrier

2030 Optimized Container Vessel

2030 Optimized Bulk Carrier

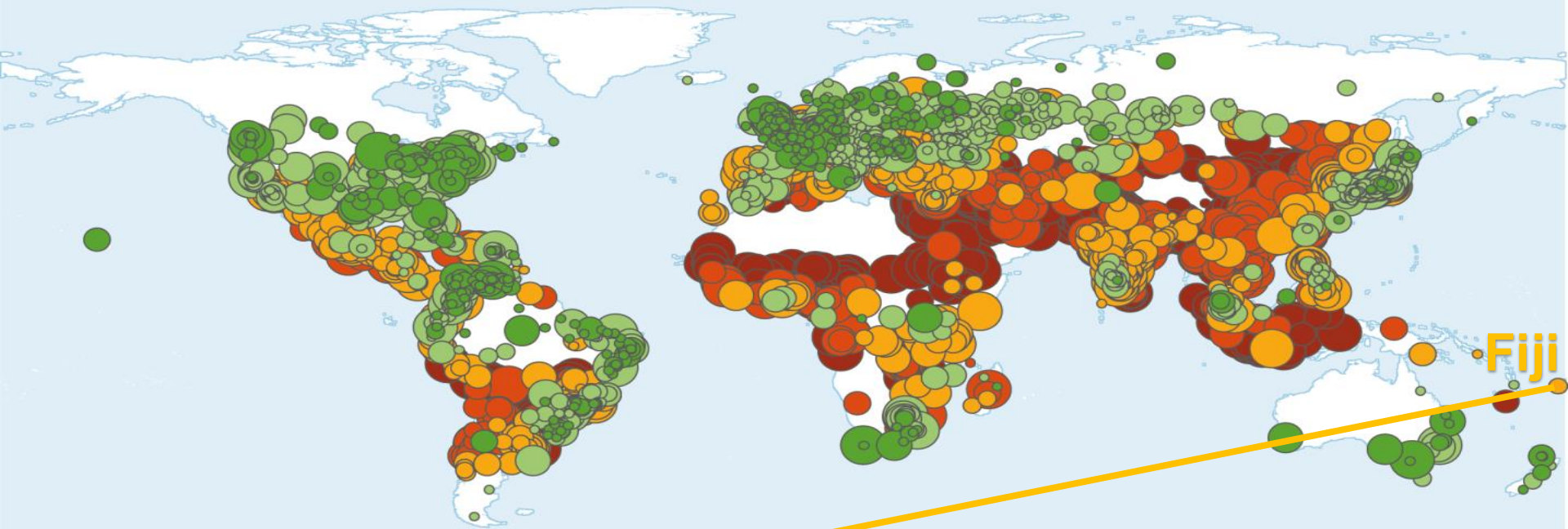


vehicles and fuels.



2010 Stock Average Duty Long-Haul Truck

*Assuming 70% Less CO₂/MJ Biofuel than /MJ Diesel



PM₁₀ Concentrations [$\mu\text{g}/\text{m}^3$]

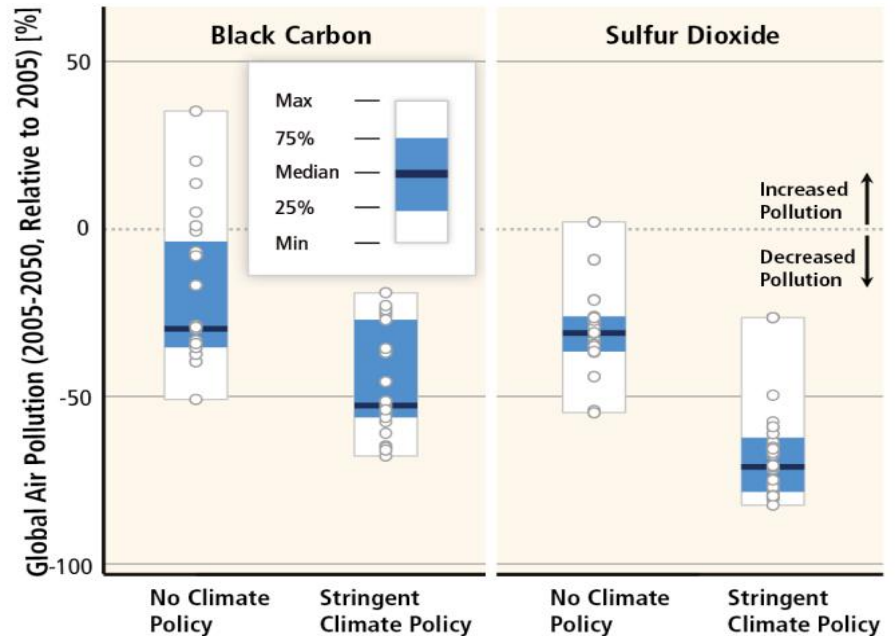
- <20 (WHO Air Quality Guideline)
- 20-30 (Target 3)
- 30-50 (Target 2)
- 50-70 (Target 1)
- >70 (Above Target 1)

Exposure Quintiles [$\text{Capita} \times \mu\text{g}/\text{m}^3$]

- 0 - 33,741 - 4,050,173
- 4,050,173 - 7,939,338
- 7,939,338 - 15,898,968
- 15,898,968 - 38,746,313
- 38,746,313 - 2,538,095,144

Mitigation can result in large co-benefits such as human health.

Co-Benefits of Mitigation for Air Quality





Mitigation options in the transport sector

Reduce energy demand through lower activity (eg journey avoidance);

Switch to low-C energy carriers (fuels);

Improve energy intensities of road vehicles, planes and boats;

Encourage behavioural change through infrastructure development;

Identify and promote all co-benefits.



Meet the game-changers



New low-carbon technologies are essential, but so is social acceptance to produce behavioural change.

What options are available for policymakers?

- Sector-specific policies have historically been more widely used than economy-wide policies but there is an increased focus on policies designed to integrate multiple objectives, increase co-benefits and reduce side-effects.**
- Regulatory approaches, technology support, and information measures are widely used and often effective.**
- In some countries, tax-based policies specifically aimed at reducing GHG emissions have helped to weaken the link between emissions and GDP growth.**
- The reduction of fossil fuel subsidies in various sectors can achieve GHG-related activity and emission reductions, depending on the social and economic context.**

Overall.....

- **Policy-making for climate change raises issues of risk and uncertainty, of ethics, of social and economic goals, and of continued sustainable growth.**
- **Analytic methods and behavioural research are available to inform policy-makers when managing such issues.**
- **Deep cuts in GHG emissions to limit warming to 2°C relative to pre-industrial levels remain possible.**
- **This goal will entail challenging technological, economic, institutional, and behavioural changes.**
- **Less ambitious mitigation measures taken over a longer period of time, will also have to face similar challenges as well as possibly higher costs.**