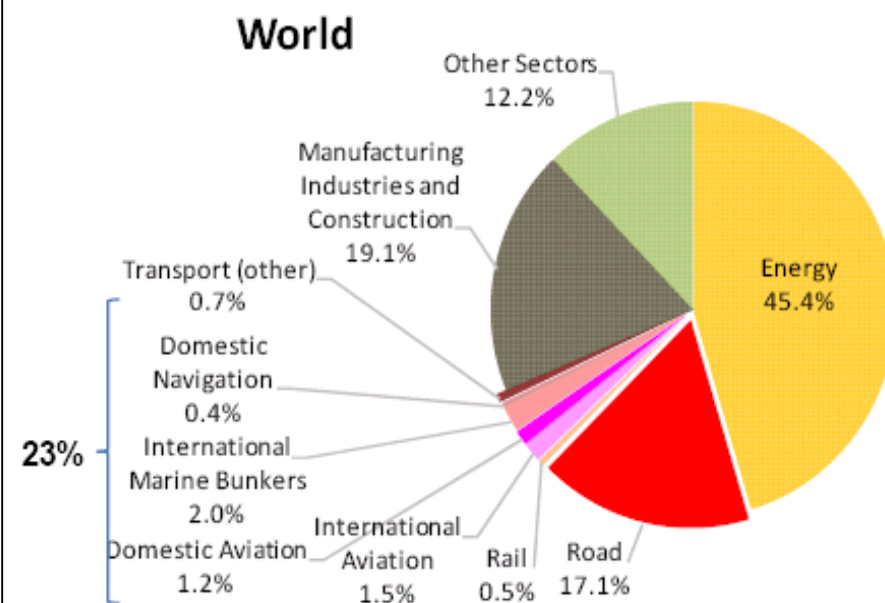




# Climate Change & Transport

**CO<sub>2</sub> Emissions from Fuel Combustion  
2005**



Source: OECD

- CO<sub>2</sub> emissions from transport accounted for 23% of global total in 2006

- Transport share expected to rise to one-third by 2050

- Transport is the fastest growing sector in terms of emissions

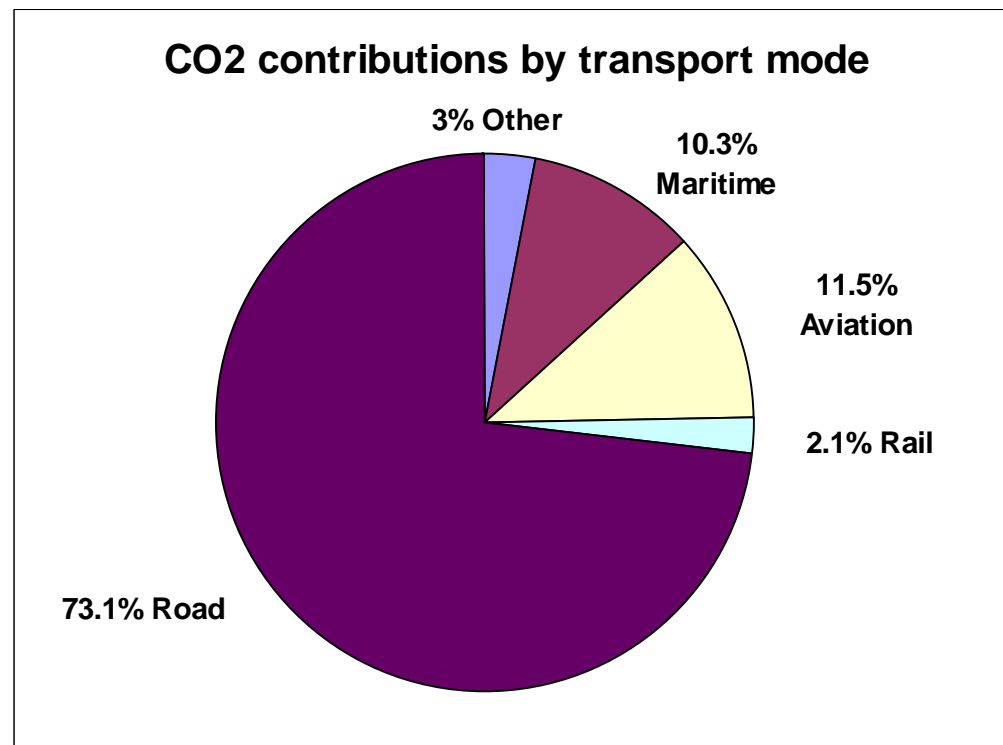
- Transport relies primarily on oil

- Transport growth strongly linked to income growth





# Contributions by mode

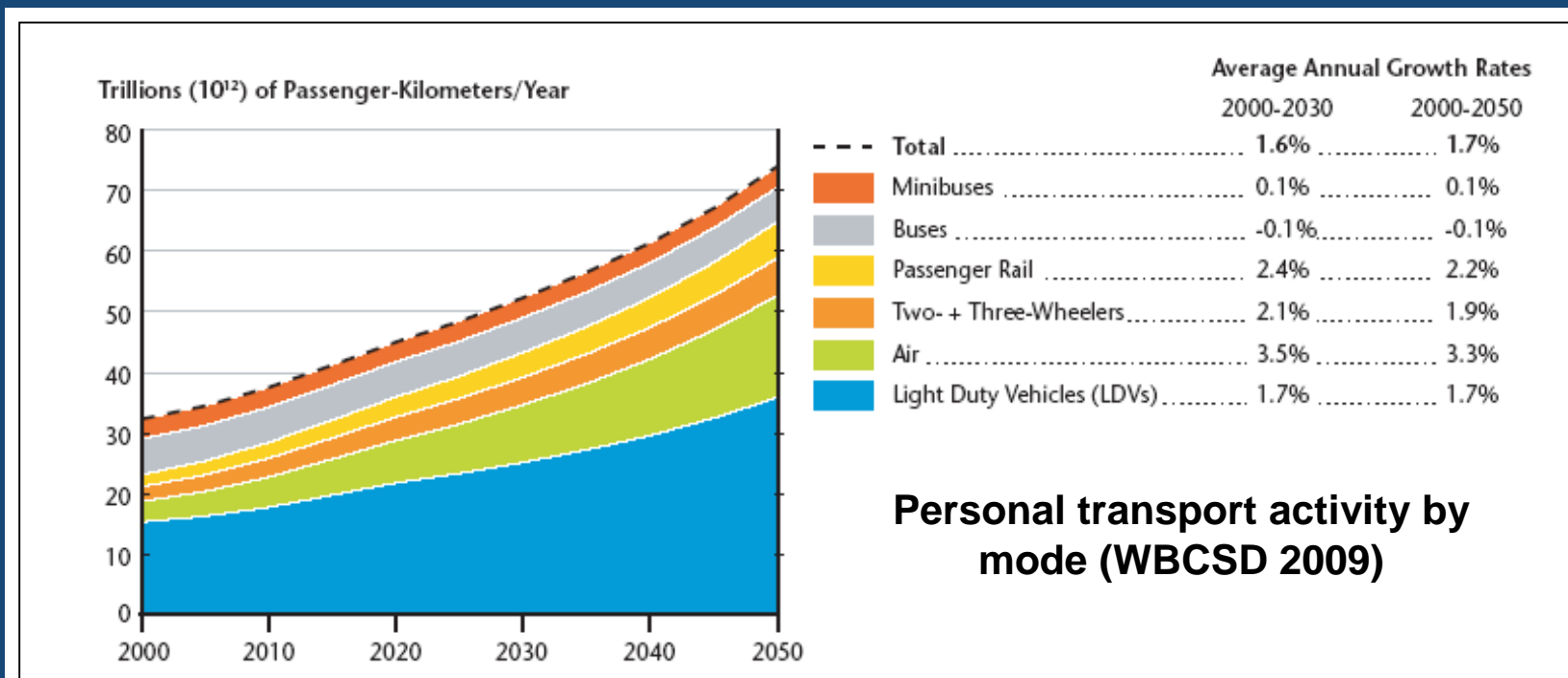


- Road transport – both passenger and freight – accounts for the vast majority of CO2 emissions in the transport sector at 73%
- Aviation and maritime together account for around 22%
- Rail has the lowest contribution of CO2 emissions among motorized transport at 2%





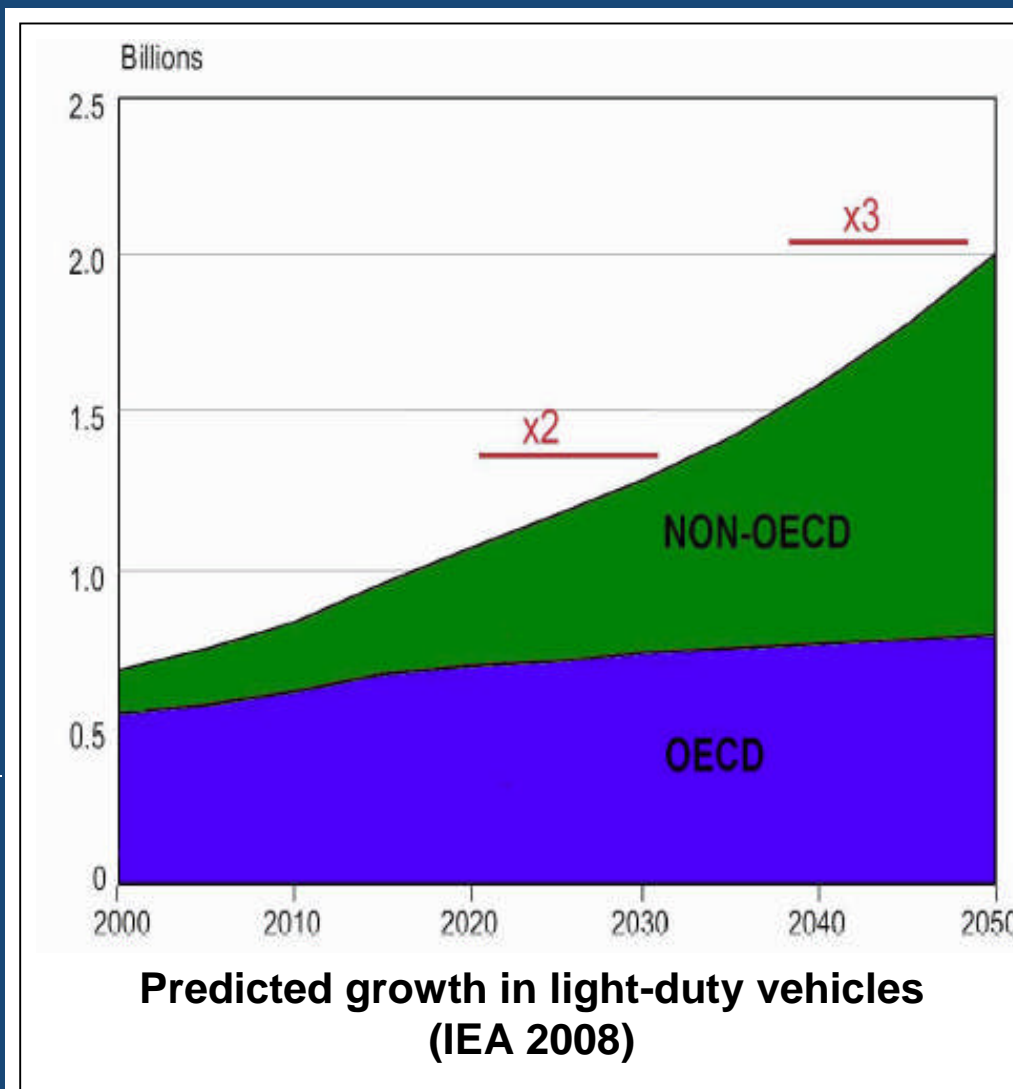
# Key trends



- IEA scenarios predict world transport energy use and emissions to increase by more than 50 percent by 2030 and more than double by 2050
- Fastest growth is expected to come from air travel, road freight and light-duty vehicles, with road transport accounting for the bulk of growth



# Growth sector 1: Private light duty vehicles



- World's light duty vehicle fleet is set to triple by 2050
- By 2050, two-thirds of the global fleet will be found in non-OECD countries
- Road transport remains the leader in terms of current and future growth and emissions

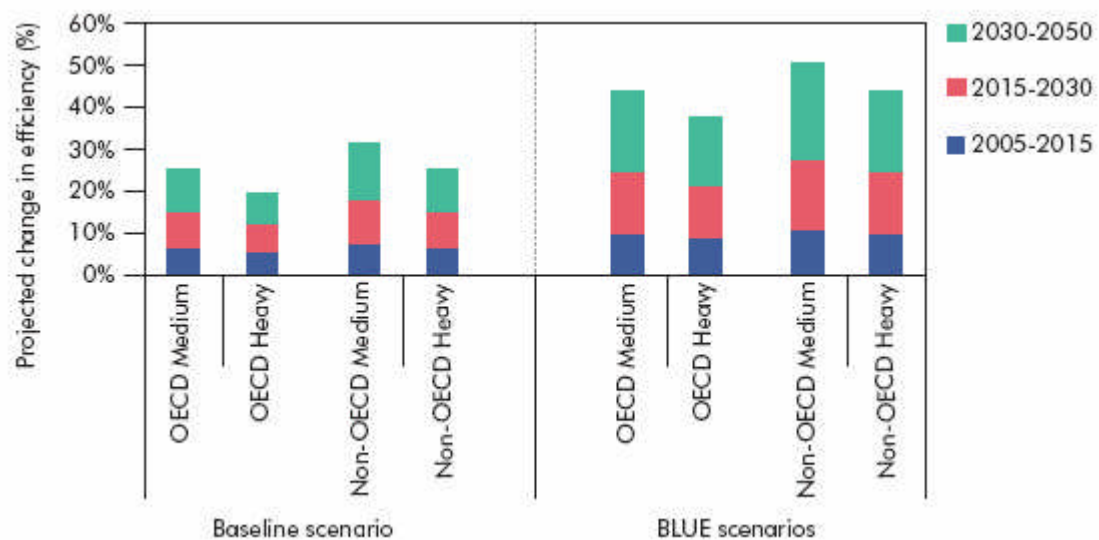


## Growth sector 2: Truck and rail freight transport

- Trucking energy use projected to increase by 50% by 2050, with volume nearly double and energy efficiency improvements by 20%
- Rail freight volumes expected to increase by 50%, with 20% improvement in efficiency
- Freight volumes closely linked to economic growth; strong growth in India and China – greatest improvement potential in non-OECD countries

**Projected change in truck efficiency (per cent change in energy use per kilometer)**

Source: IEA 2007



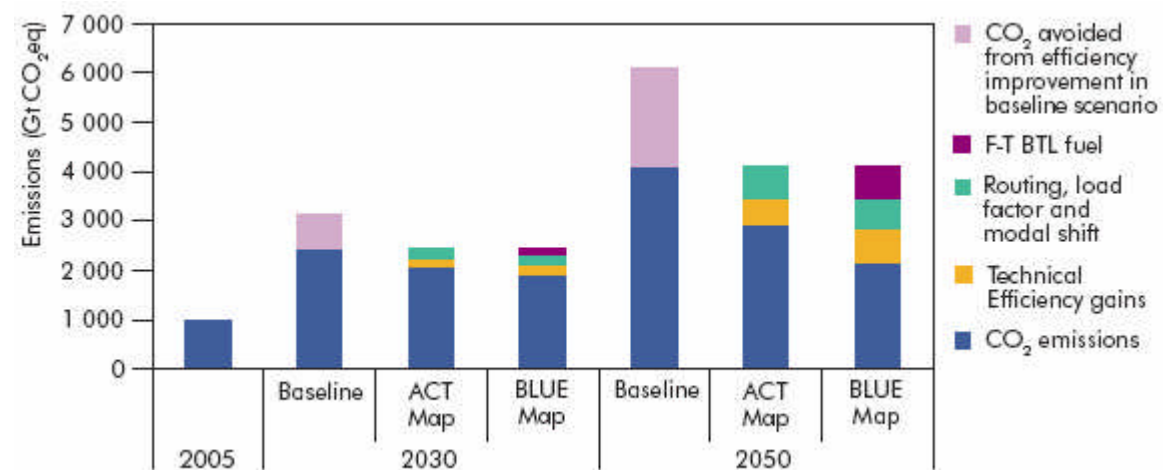


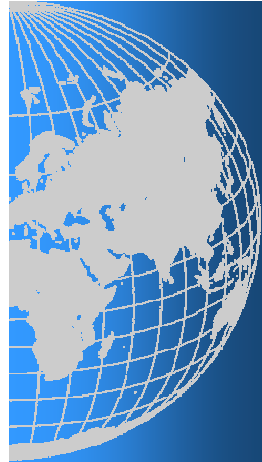
## Growth sector 3: Aviation

- CO<sub>2</sub> emissions projected to triple to about 750 Mtoe by 2050, when aviation will account for 19% of all energy used
- Passenger volumes expected to grow four-fold between 2005 and 2050; average energy intensity to decrease 28%, but still not enough to decouple fuel demand growth from activity growth
- Greatest reductions through shifting air to rail where possible and through second generation biofuels

**Aircraft CO<sub>2</sub> emissions projections by scenario**

Source: IEA 2007





## Cleaning Up Transport – Interventions to promote no and low carbon transport

In general, interventions can be grouped into three main groups:

### **AVOID**

To avoid transport

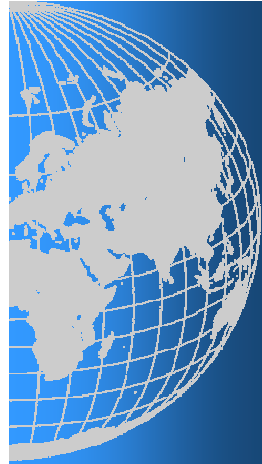
### **SHIFT**

To shift from high to low carbon modes

### **CLEAN**

To clean up transport modes





## AVOID

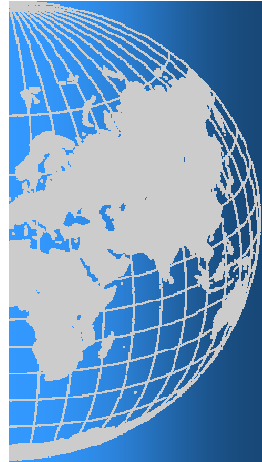
Long term solutions will have to come from radically redesigning our societies to reduce the need for transport

For example through better urban planning (living closer to work and home), e-services (like working from home, electronic transfer in stead of mail or videoconferencing rather than travelling for meetings)



However, many of these solutions are long term and require major changes





# SHIFT

From a sustainability point of view there is an urgent need to shift towards more efficient modes of transport – public transport

Many countries lack clean and efficient forms of public transport. Often this means not only investing in the transport mode itself (bus, train) but also in the infrastructure (BRT system, rail)

For example shift from private car to bus or bicycle or from plane to train

It is not always clear what is the cleanest mode: is a bus that is only half occupied and is using dirty diesel fuel better than ten hybrid cars?





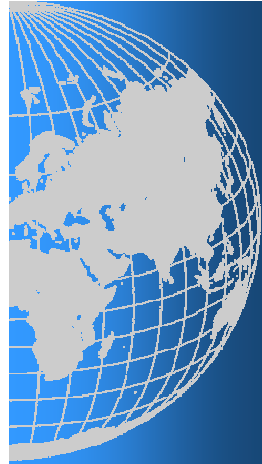
## CLEAN

Significant gains can be made in improving the efficiency, esp. of cars and busses

For example introduction of cleaner cars (hybrid and electric) and cleaner fuels (biofuels, electricity)

This is not only high tech solutions like electric vehicles – already major efficiency gains can be made with existing technologies and policies





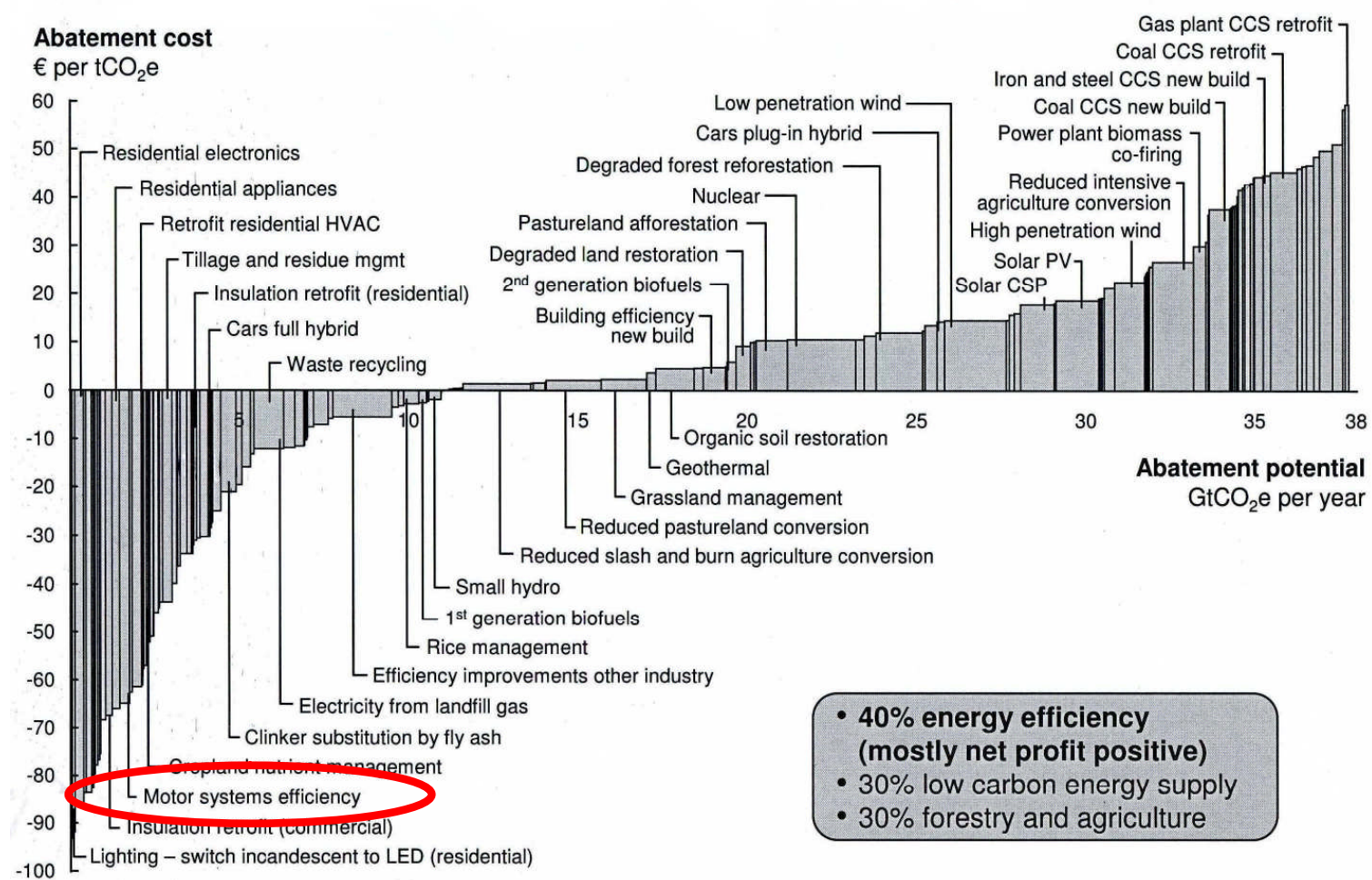
## Combining AVOID–SHIFT-CLEAN

- A future strategy should focus on all three AVOID – SHIFT and CLEAN
- Many interventions combine elements of the three (like BRT with cleaner busses)
- At the moment the most potential and the efficient are CLEAN measures
- However, for other reasons – congestion, economy, accessibility, poverty reduction etc. AVOID and especially SHIFT need as much attention





# Vehicle efficiency among the most efficient GHG strategies (McKinsey 2009)

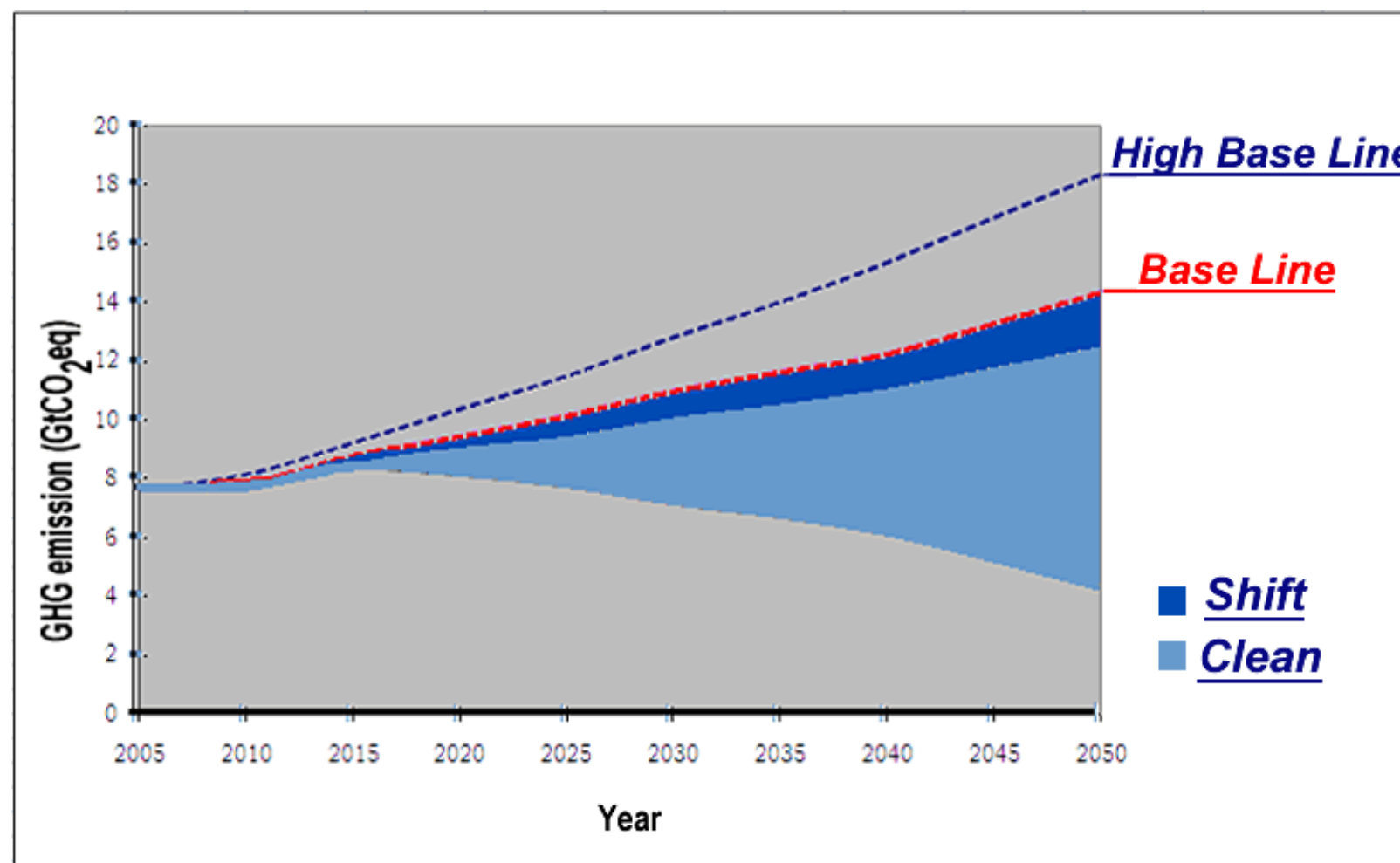


- 40% energy efficiency (mostly net profit positive)
- 30% low carbon energy supply
- 30% forestry and agriculture

Note: The curve presents an estimate of the maximum potential of all technical GHG abatement measures below €60 per tCO<sub>2</sub>e if each lever was pursued aggressively. It is not a forecast of what role different abatement measures and technologies will play.  
Source: Global GHG Abatement Cost Curve v2.0



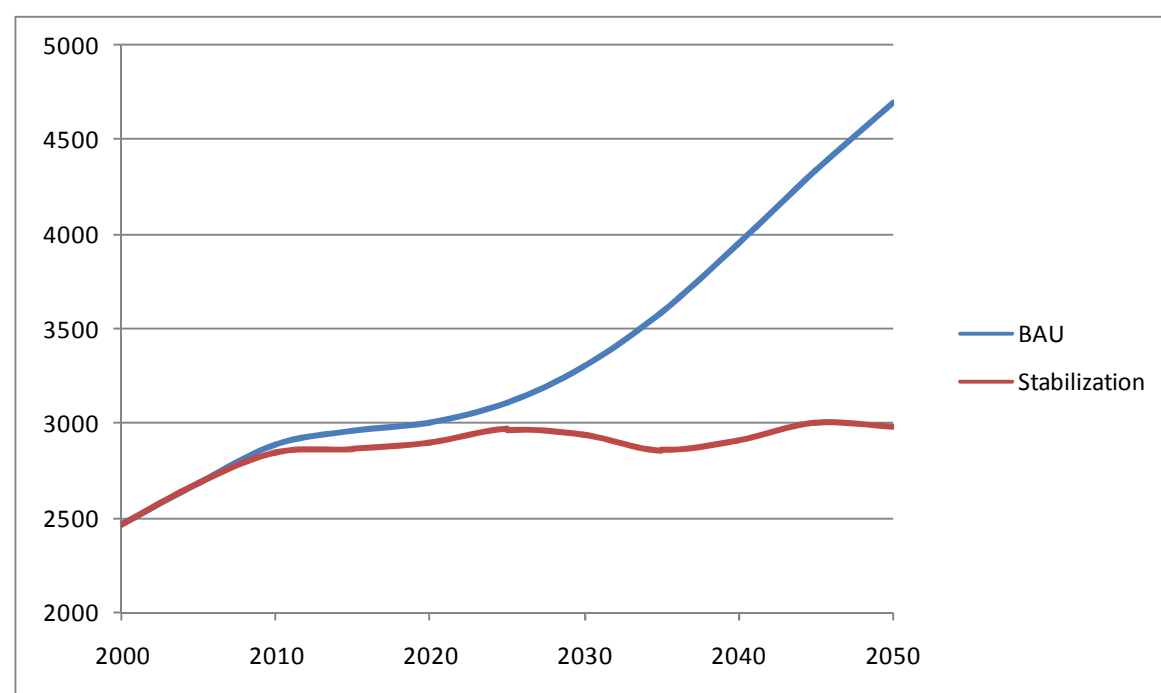
# SHIFT vs CLEAN GHG reduction potential (IEA 2009)

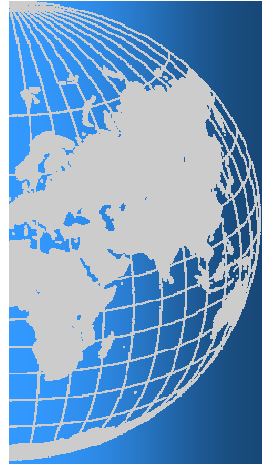




## Emissions global vehicle fleet BAU vs improving efficiency 50% by 2050 with existing technology (MoMo model IEA 2009)

World CO2 emissions, GFEI interventions using existing technologies (IEA MoMoModel 2008)



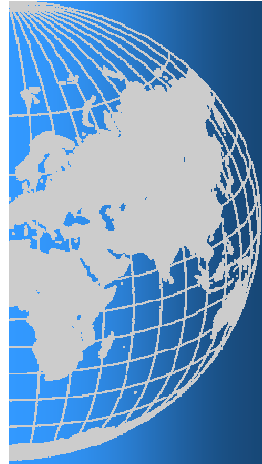


## Opportunities for rail

- Rail accounts for small portion of freight movement, and declining
- Road freight has no real low/ no carbon option apart from biofuels. Rail freight is much more efficient than road freight
- Thus there is an opportunity and need for major modal split
- If half of all long-haul trucking growth would move to rail, rail freight would increase 20% and freight GHG emissions would be reduced by 15% (by 2050)





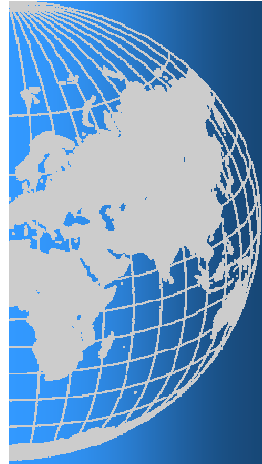


## Opportunities for rail - continued

- This would need strong policy incentives; although a high oil price will help a little, it will not be much (low elasticity)
- High Speed Rail (HSR) competitive with air travel up to at least three hours of HSR travel, or 700 to 800 km
- Energy intensity of HSR varies significantly with operating conditions, passenger load factors, and source of electricity generation
- Average energy consumption per passenger-km is around 1/3 to 1/5 of airplanes and car energy use per passenger-km







## Opportunities for rail - continued

- Currently proposed and planned HSR lines in several regions and countries, e.g. Europe, China, US, Argentina
- Rail should make the “green” argument





## UNEP core projects in transport

### *Global Fuel Economy Initiative (GFEI)*

- 50 By 50 Campaign to improve fuel economy (L/100km) by 50% by 2050
- Launched this year together with IEA, IT and FIA Foundation
- [www.50by50campaign.org](http://www.50by50campaign.org)



### *Partnership for Clean Fuels and Vehicles (PCFV)*

- Highly successful global partnership launched at WSSD
- Near worldwide elimination of leaded gasoline
- Reducing sulfur levels in fuels and promoting cleaner vehicles
- [www.unep.org/PCFV](http://www.unep.org/PCFV)





## UNEP core projects in transport

### *Share the Road (StR)*

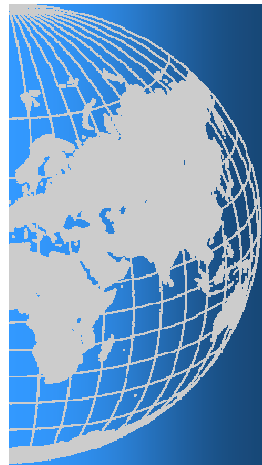
- Joint initiative with FIA Foundation and other partners for minimum 10% allocation of road investments for safety, inclusive of non-motorized transport (NMT) infrastructure
- [www.unep.org/urban\\_environment/nmt\\_roads](http://www.unep.org/urban_environment/nmt_roads)



### *Public Transport*

- Promoting Sustainable Transport in Latin America: bus rapid transit (BRT), bus regulation and planning (BRP) and NMT
- Network for Environmentally Sustainable Transport in Latin America and the Caribbean (NESTLAC)
- Global Initiative on Promoting BRT
- Interested in strategic initiatives to promote rail





Thank you for your attention!

For more information:  
[Clean.transport@unep.org](mailto:Clean.transport@unep.org)

