Rail, Energy and CO_2: Moving towards sustainability

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International Energy Agency

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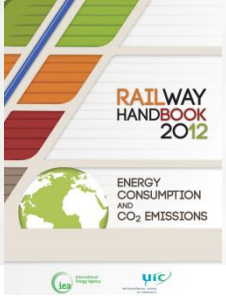

- Railway in the big picture
- The need for energy and CO_2 data in the rail sector: IEA/UIC data handbook
- The potential of improving railway efficiency
- Modal shifting towards rail: ETP 2012
  - Impact on CO_2
  - Impact on infrastructure needs
- Conclusions

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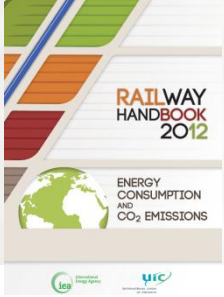
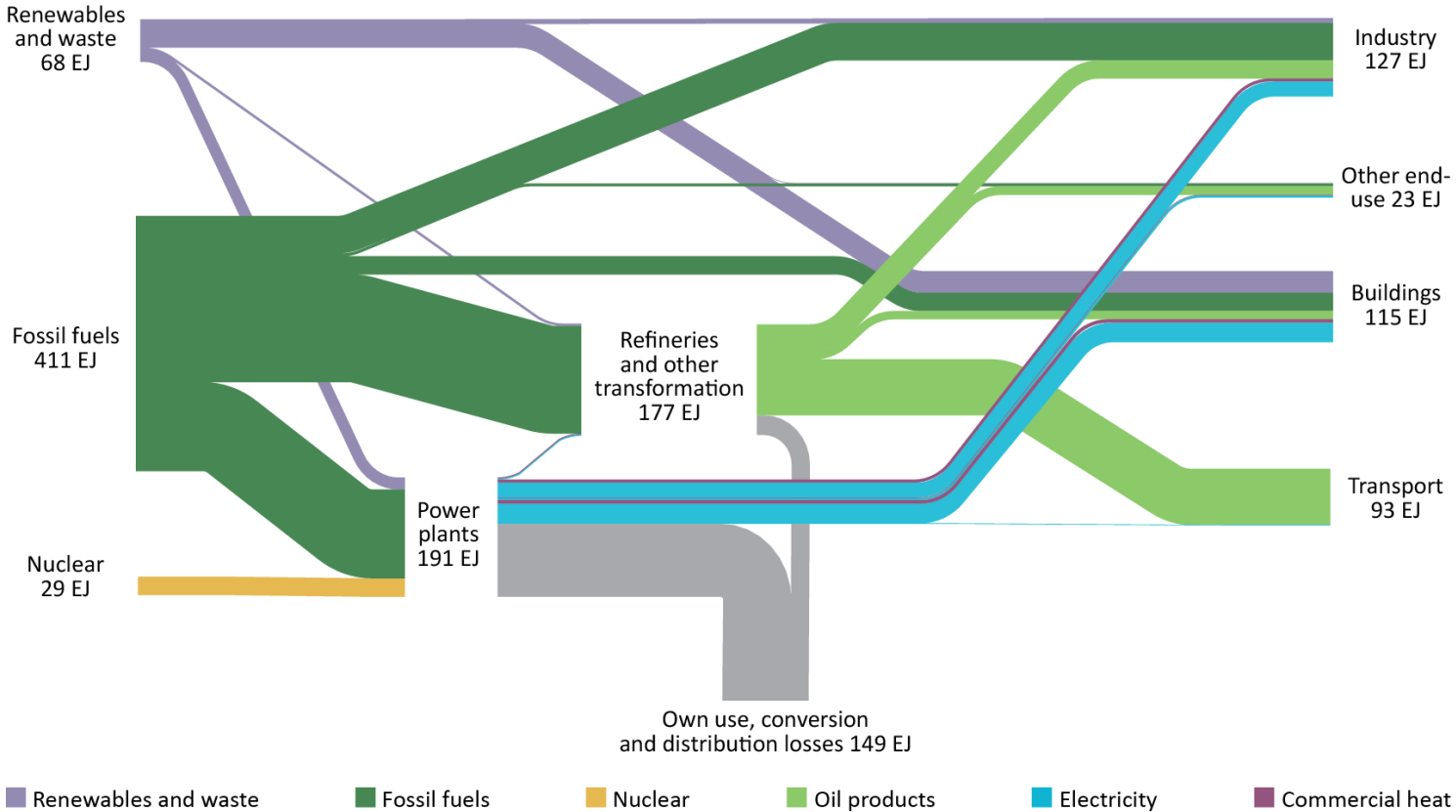
Rail in the big picture



- Transport is 25% of the final energy use
- 92% of the supply of the transport sector comes from oil
- More than 60% of the oil is used in the transport sector



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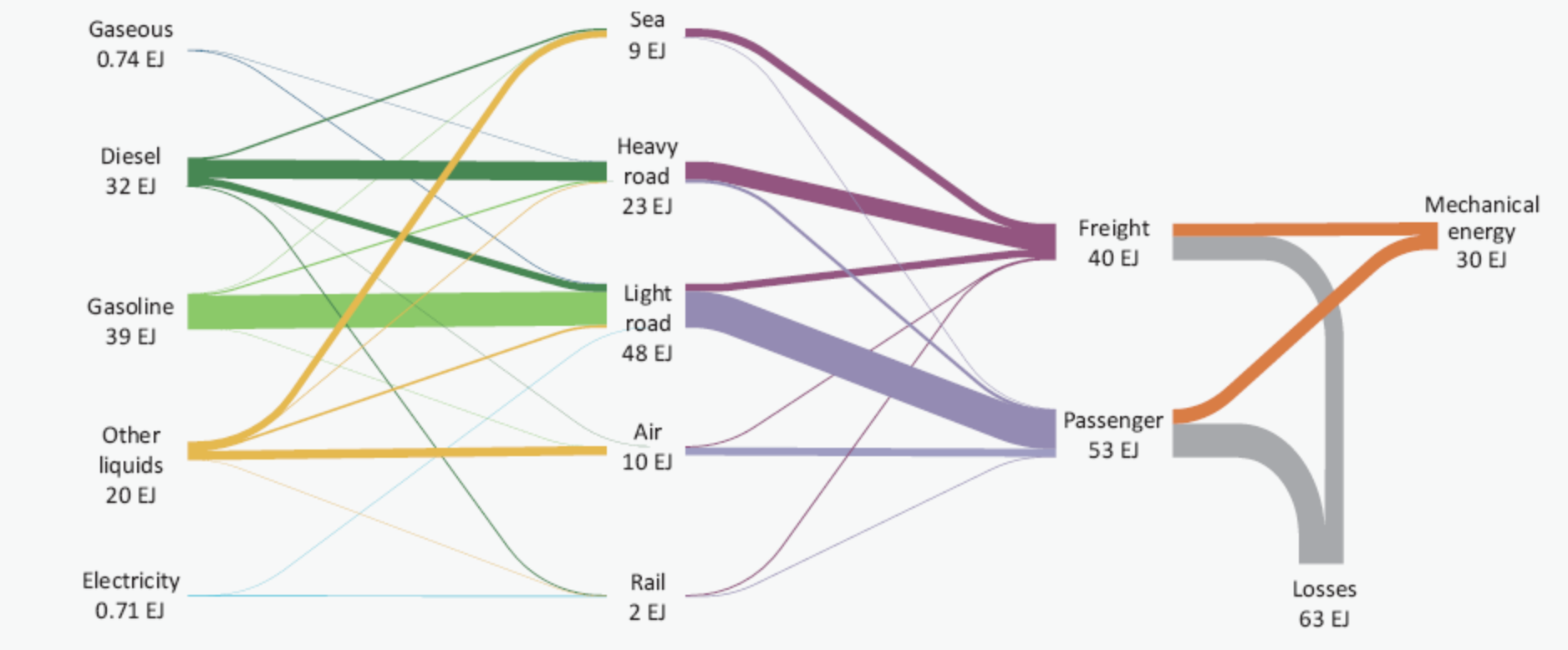
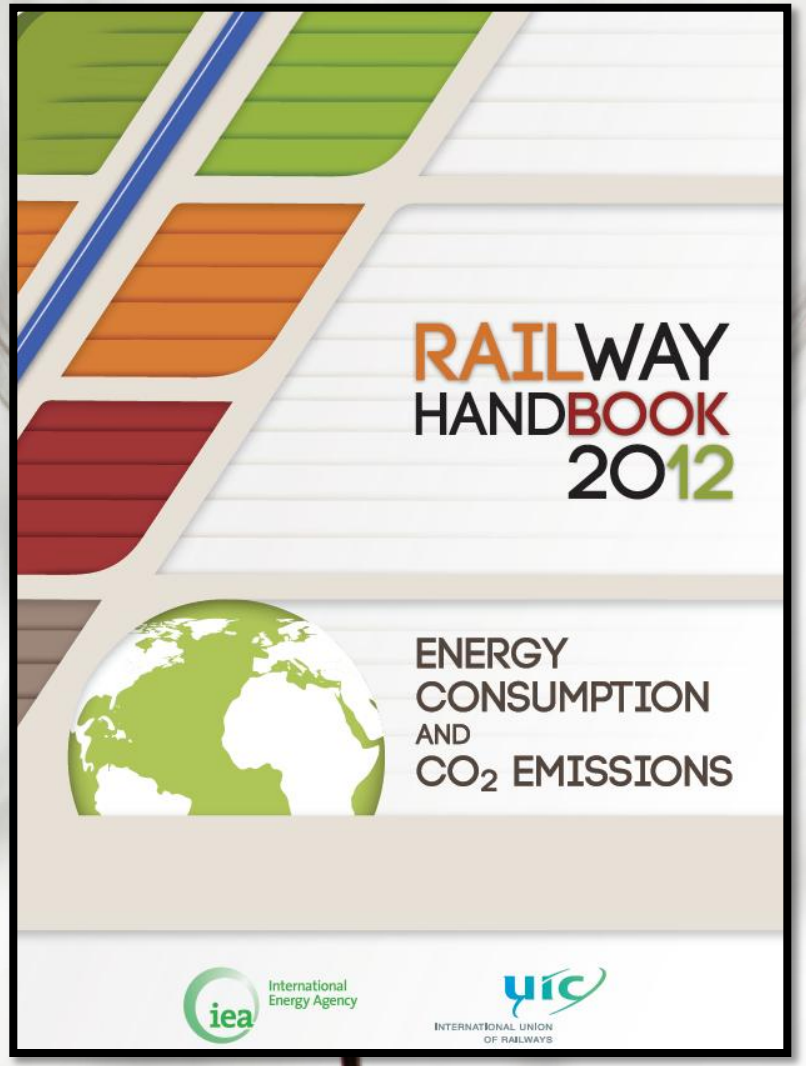
Rail in the big picture

- Rail is 2% of the transport energy use
- 2/3 of the supply of the rail sector comes from oil
- 1/3 of the energy use goes to passenger rail





RAILWAY Handbook 2012

Energy Consumption and CO_2 emissions

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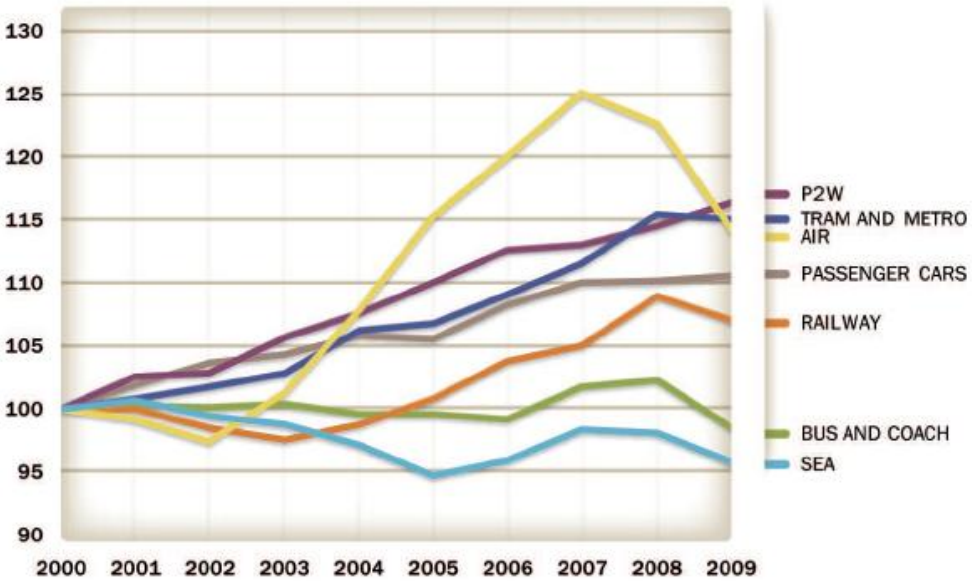
IEA/UIC railway handbook

- Rail ways traffic activity in EU27

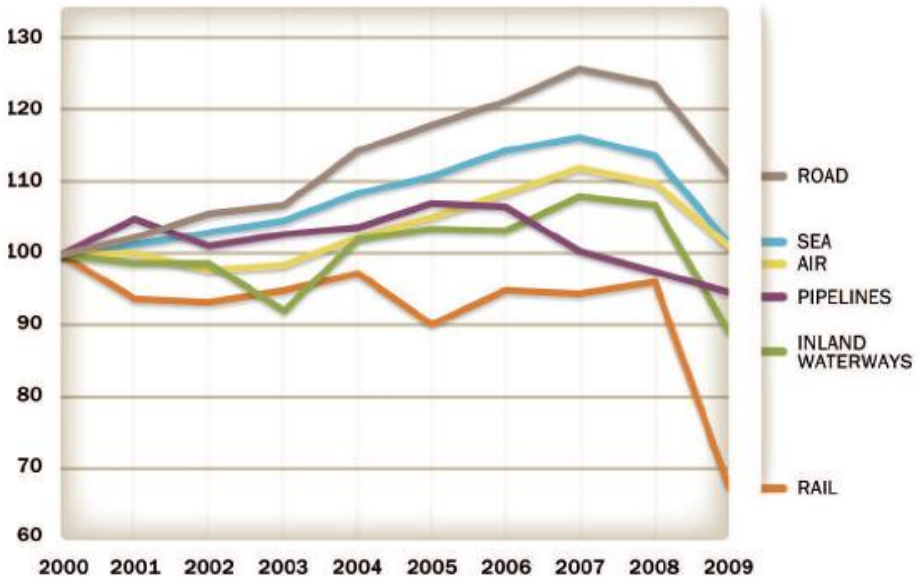
Fig.3: Modal evolution of passenger traffic activity, 2000-2009 (pkm)



Year 2000=100

Source: EC (2011) and UIC (2011a)

Fig.7: Modal evolution of freight traffic activity, 2000-2009 (tkm)

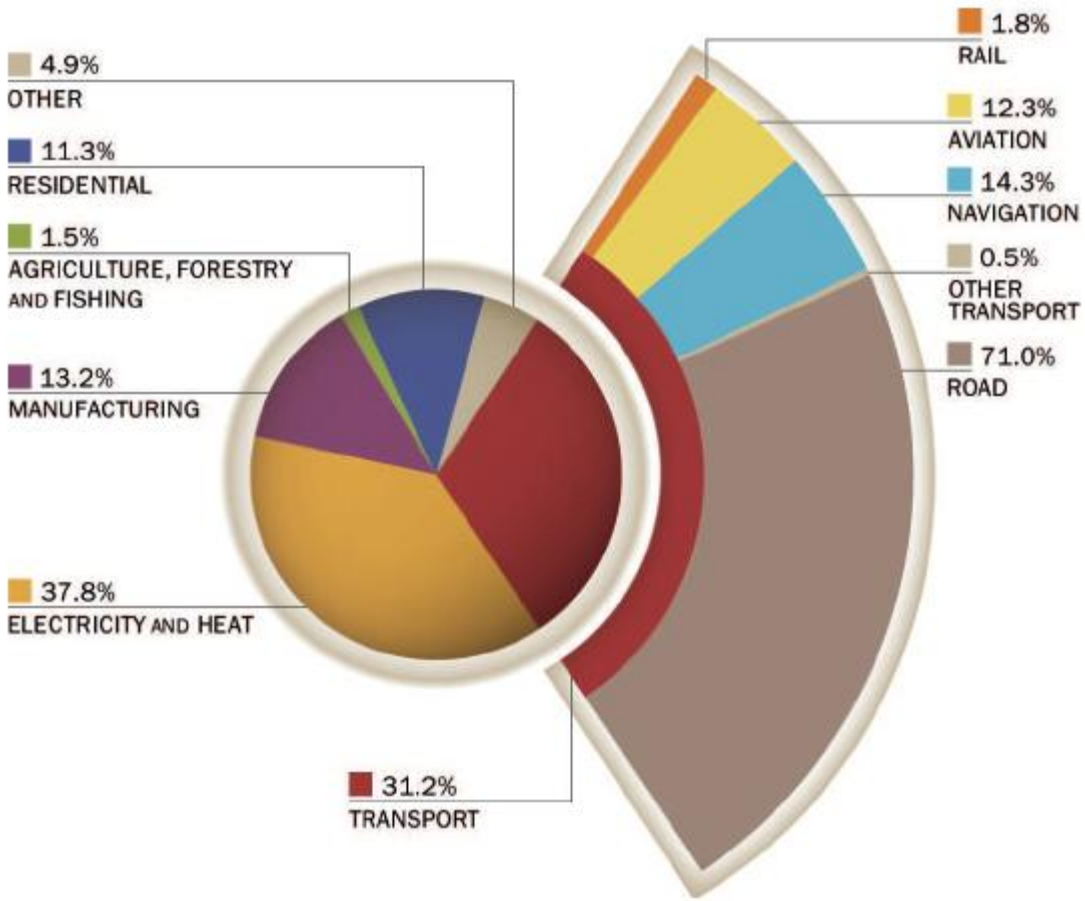


Year 2000 = 100

Source: EC (2011) and UIC (2011a)

CO_2 emissions are tiny (EU27)

Fig.9: CO_2 Emissions from fuel combustion by sector, 2009



Note: Emissions from rail electric traction are included into the transport sector, see Methodology Notes, p. 107.

Train CO_2 efficiency in the EU27

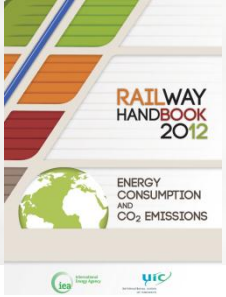
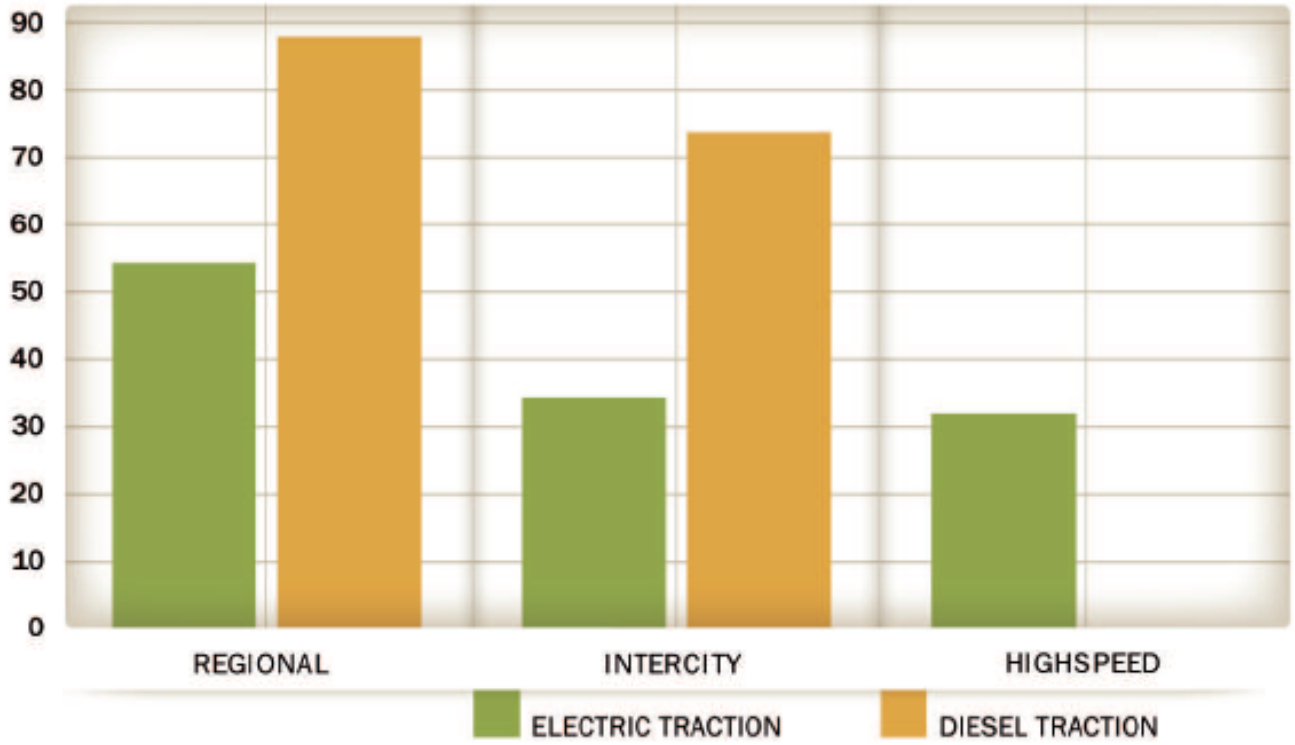


Fig.33: Passenger specific CO_2 emissions by service type and traction type, 2005 (gCO_2/pkm)



Source: elaboration based on UIC (2011b)

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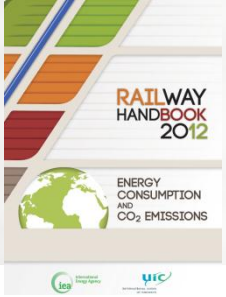
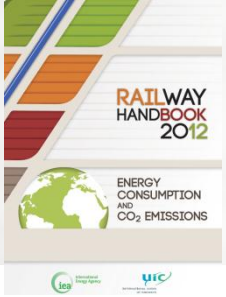
Improving railways efficiency

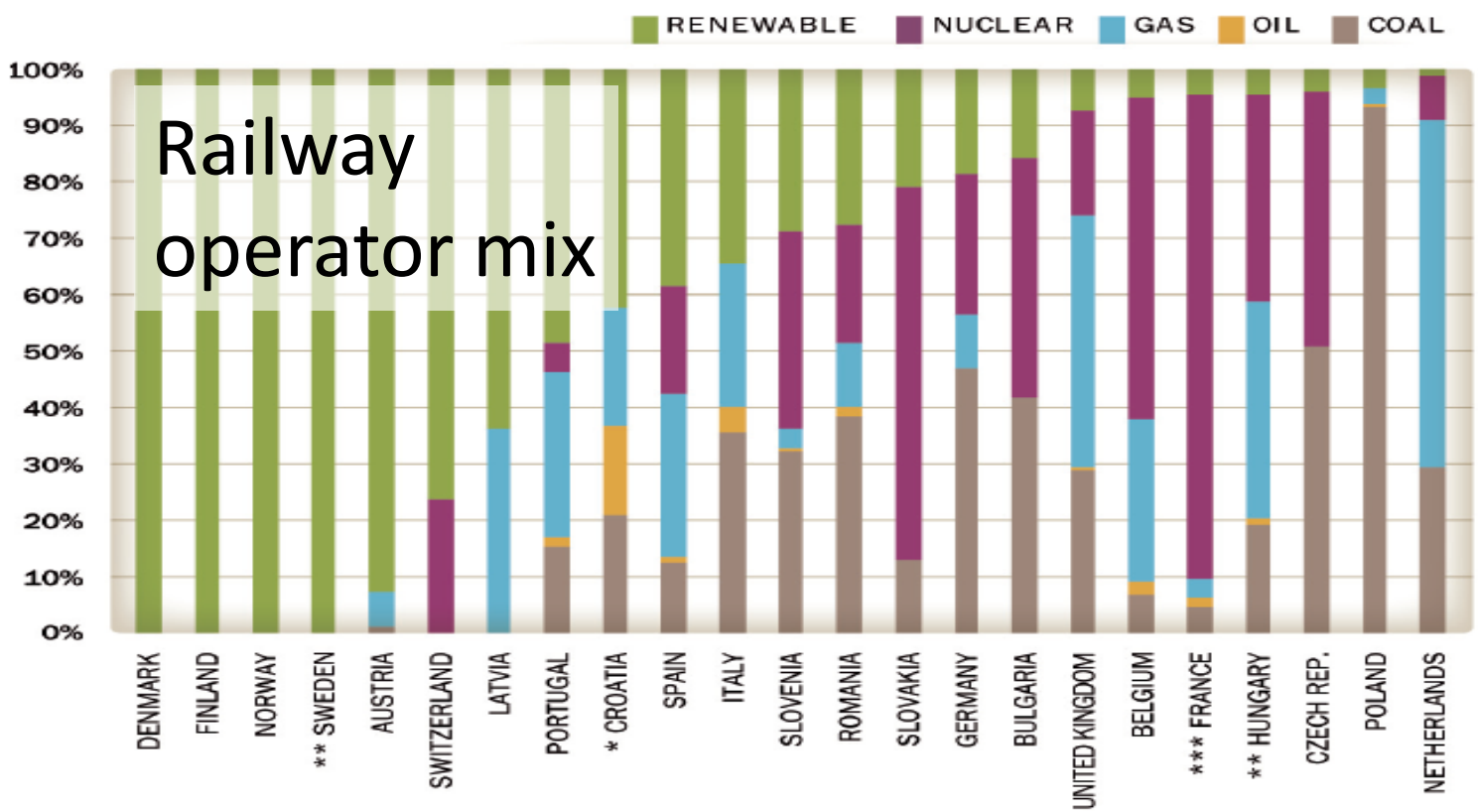


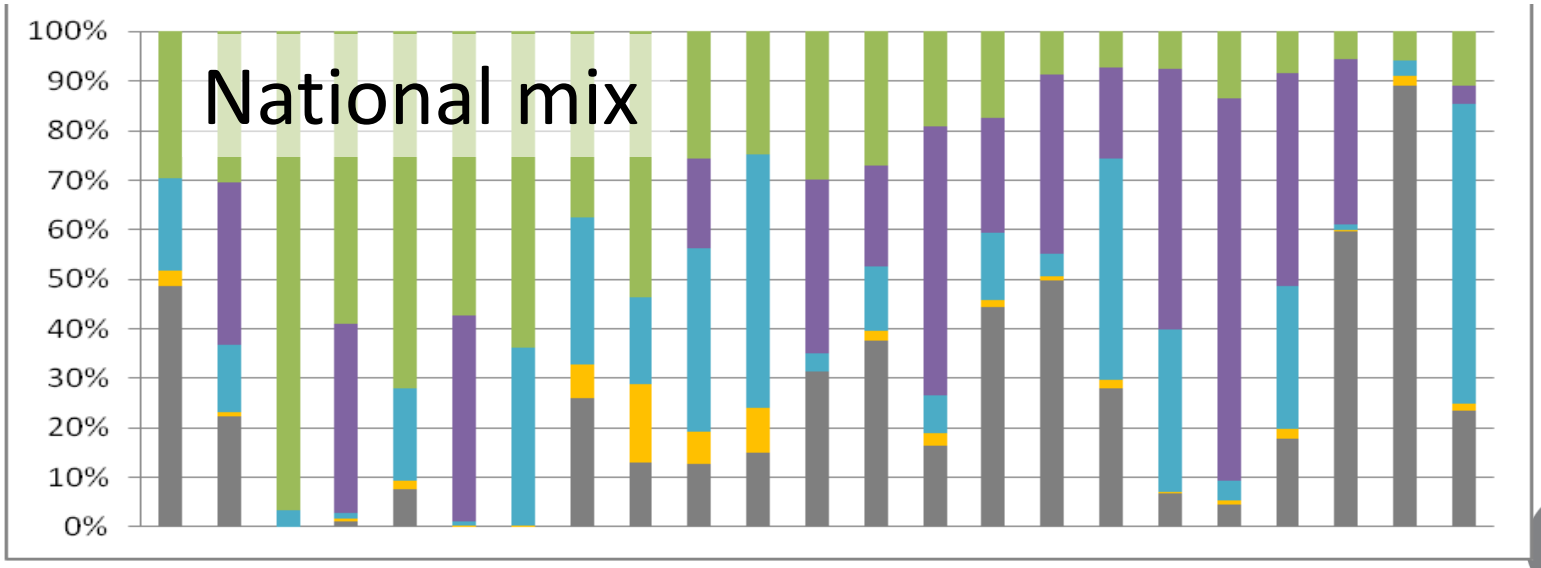
- Benefits of electrification, aka the « no-brainer »
  - Rapid return on investment (<10 years)
  - Decarbonization made easier
  - Other co benefits
    - Noise
    - Local pollutants

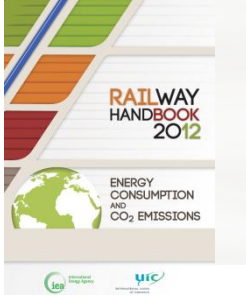
Improving rail efficiency



- CO_2 intensity of electricity generation







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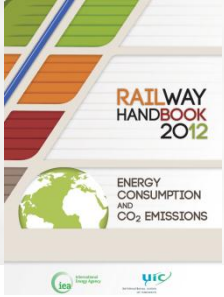
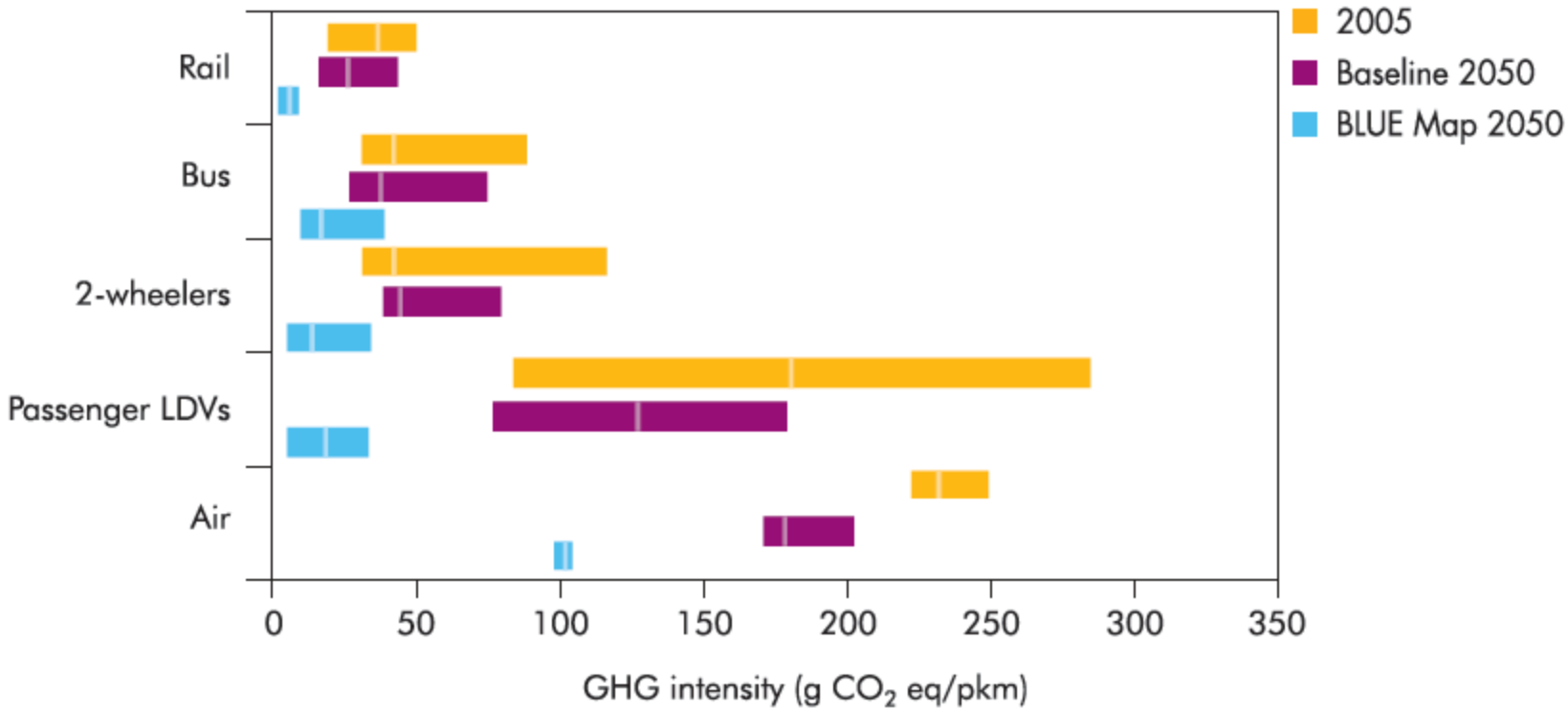
Importance of « Improve » strategies



- Other modes are working hard as well



Note: The clear line indicates world average, the bar representing MoMo regions' discrepancy.

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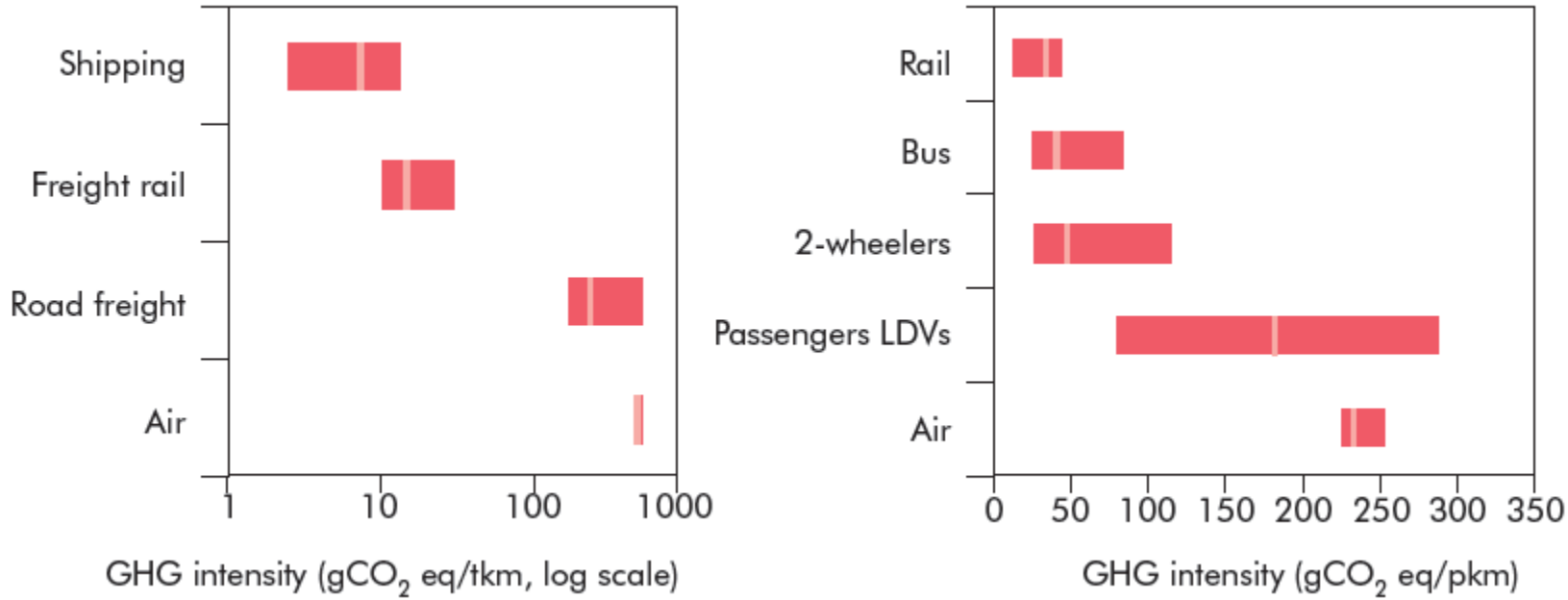
Potential of modal shifting

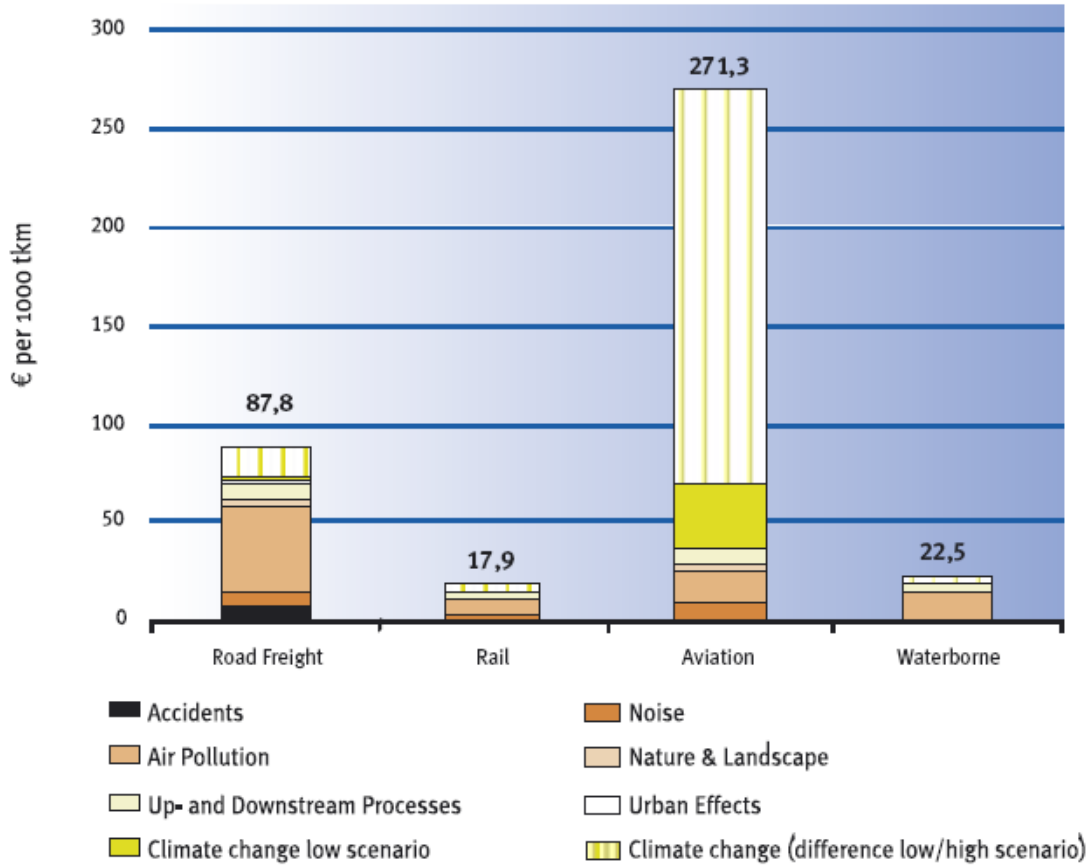


- Significant benefits to shift from road to rail
- Even Bigger benefits from air to rail

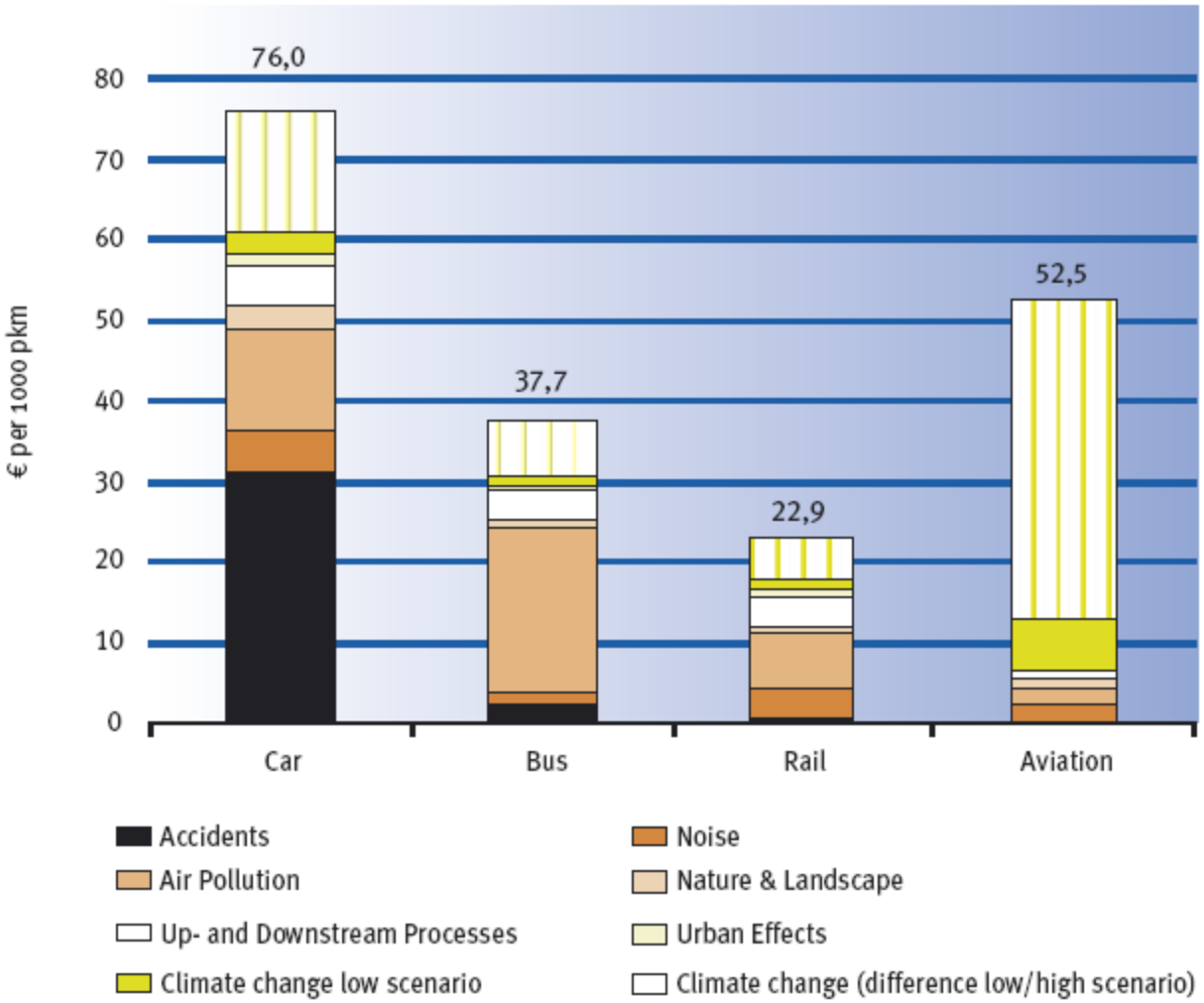
Policies for shifting towards rail

- True cost of transport, including external costs, Freight

FIGURE 1 AVERAGE EXTERNAL COSTS: FREIGHT 2000 (EXCL. CONGESTION)

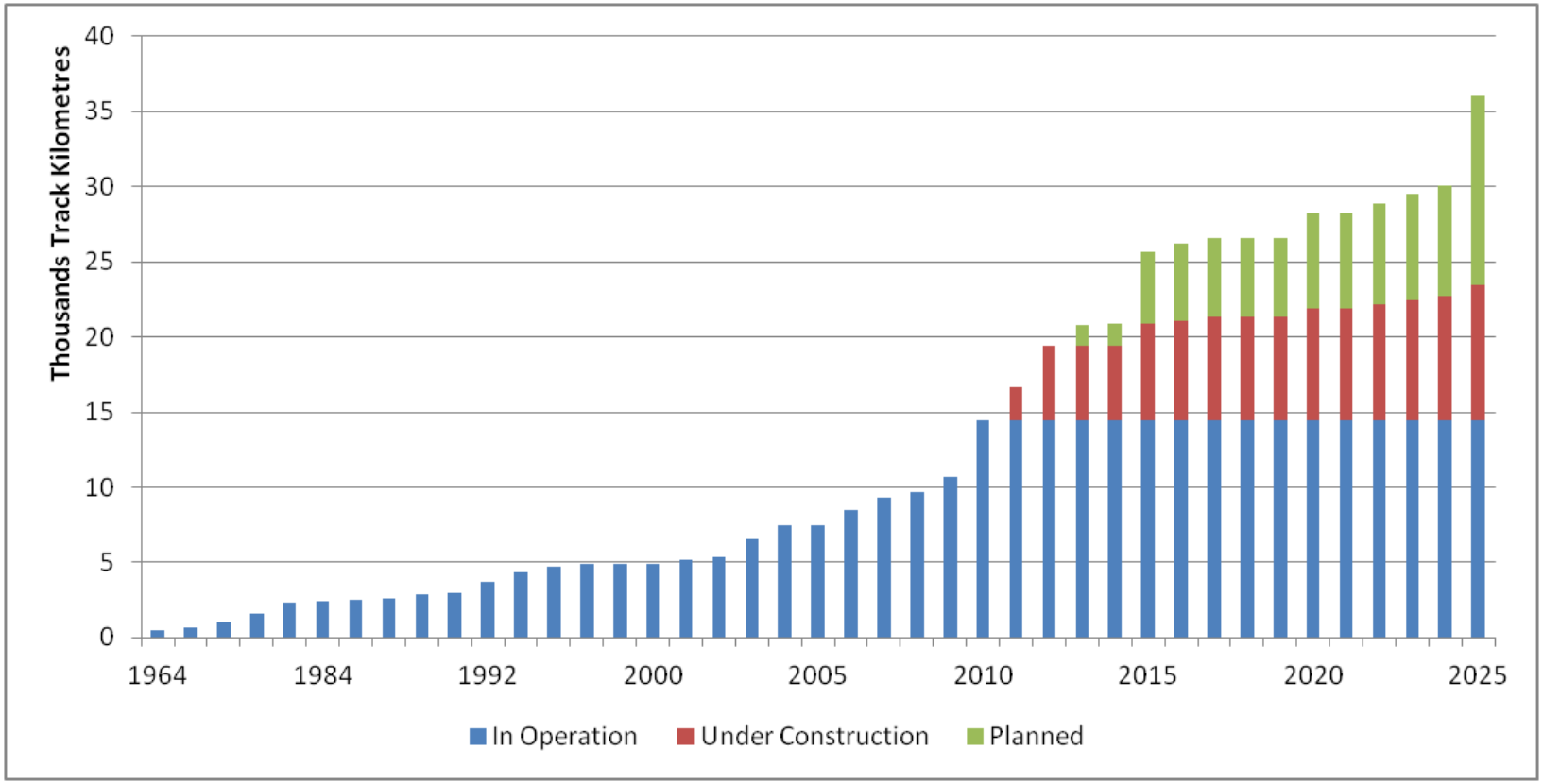


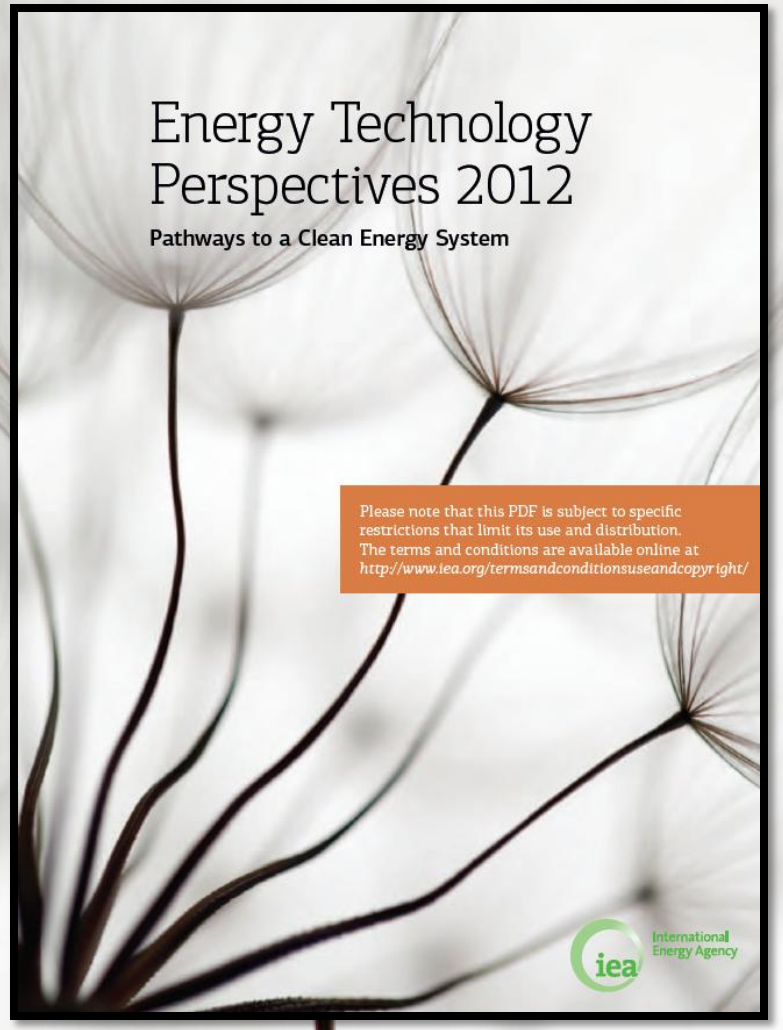
External costs internalization, Passenger



Other policies to promote rail

- High speed rail network development





ETP 2012

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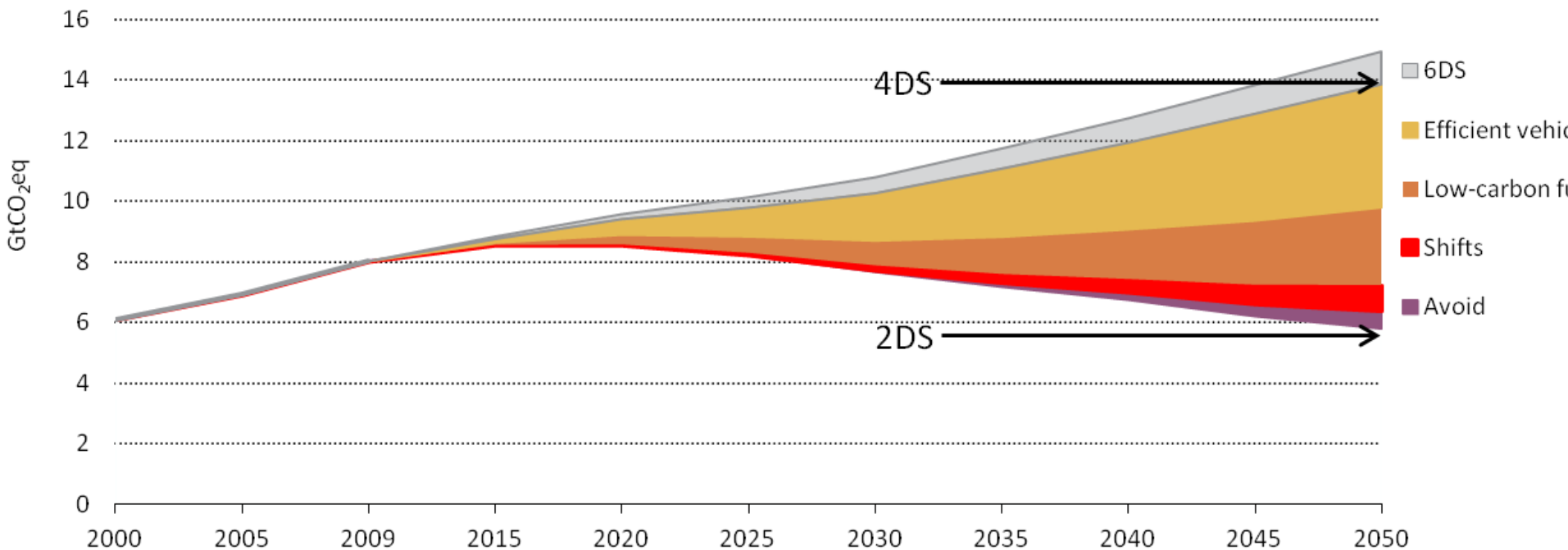
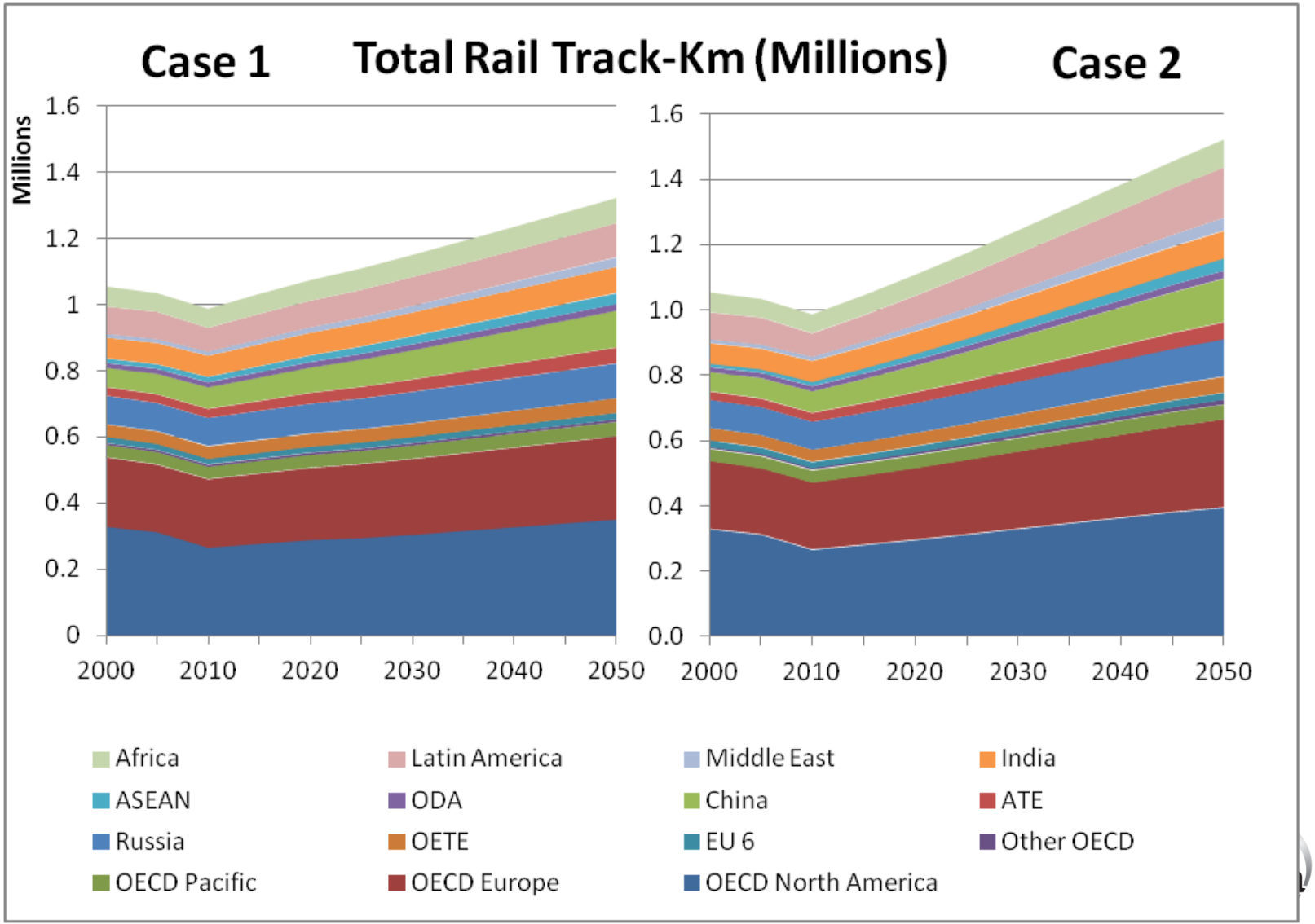
ETP 2012 scenarios

- Modal shift plays a modest role,
  - Still inevitable to reach 2DS



Focus on Infrastructure Investment



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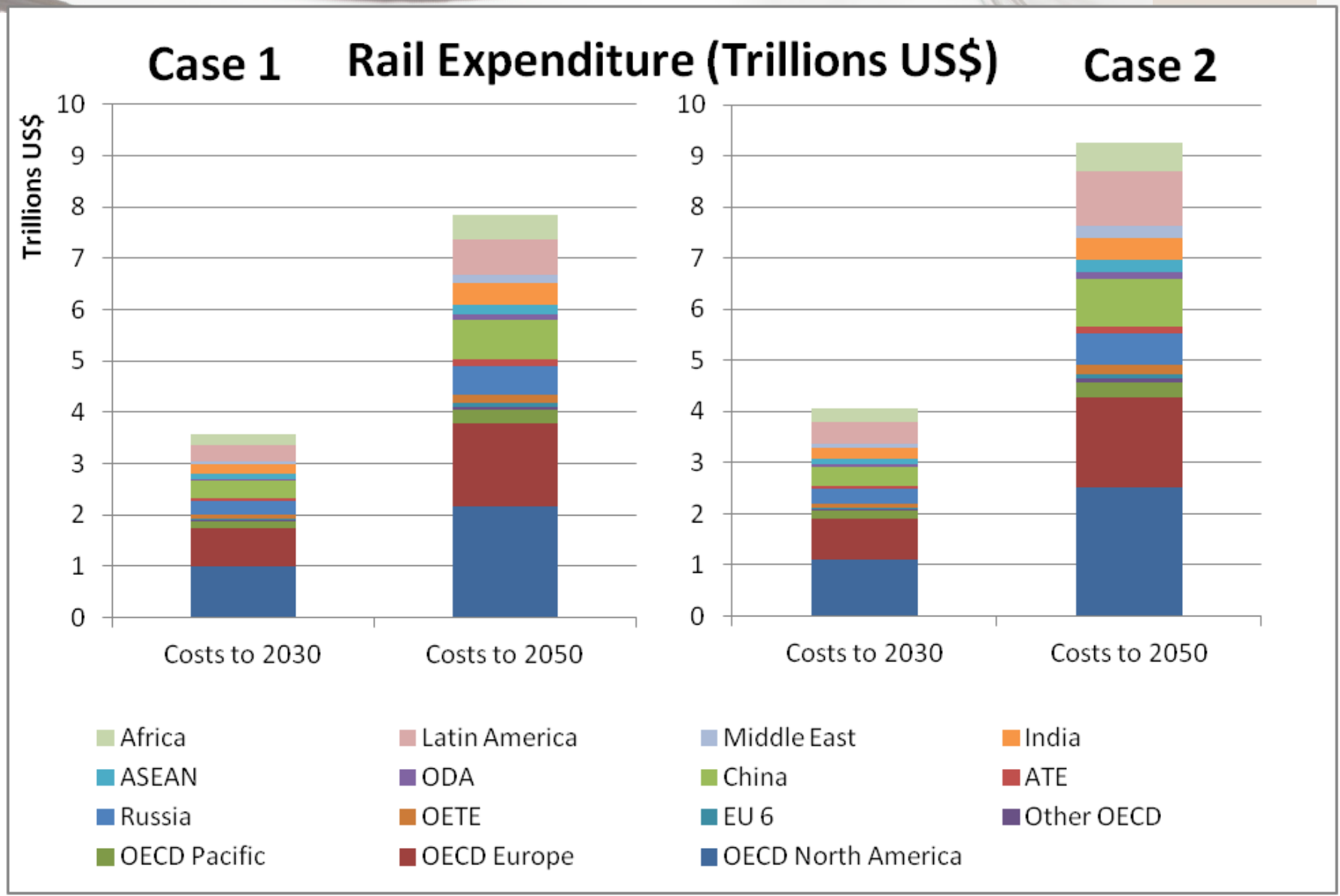
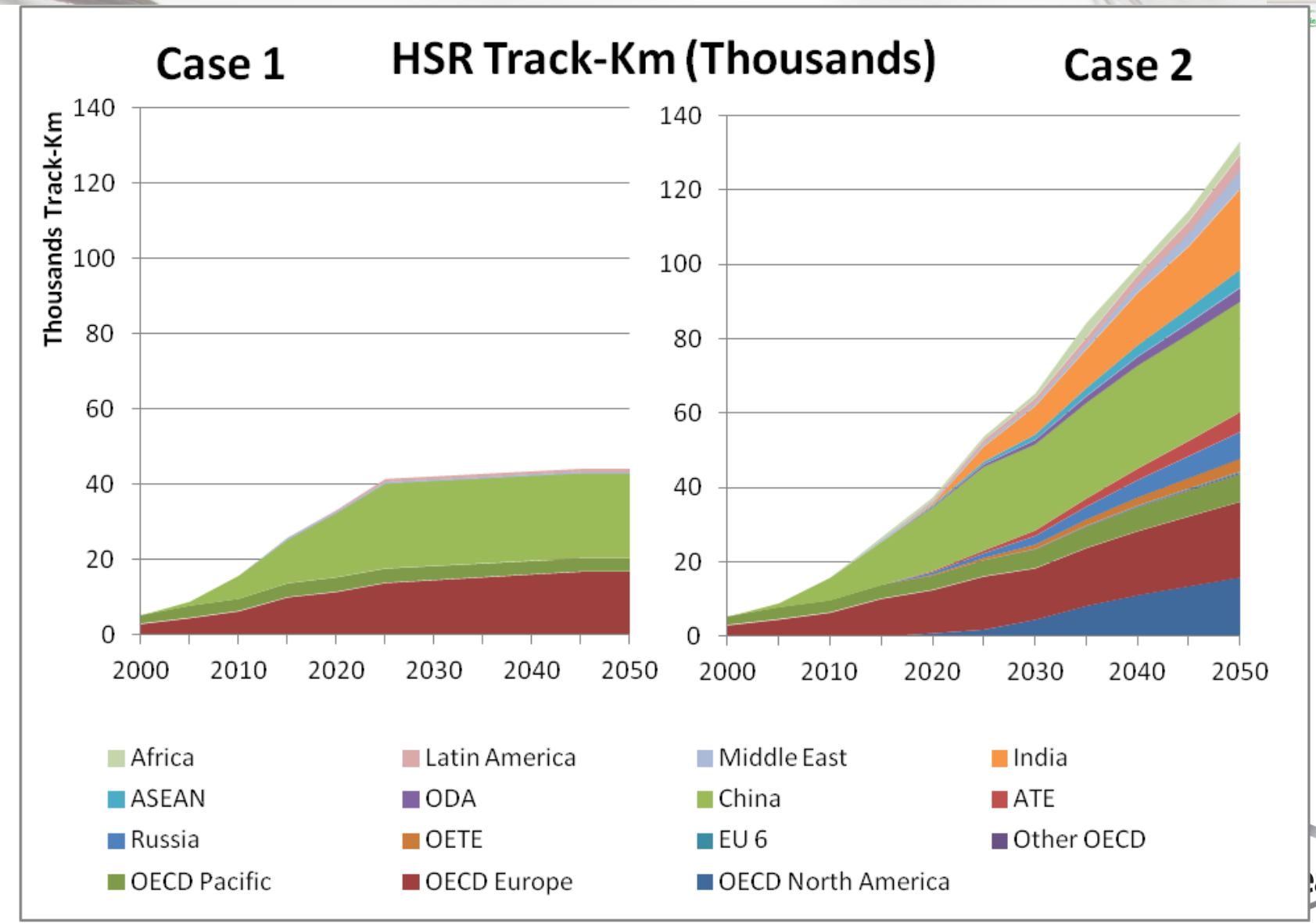
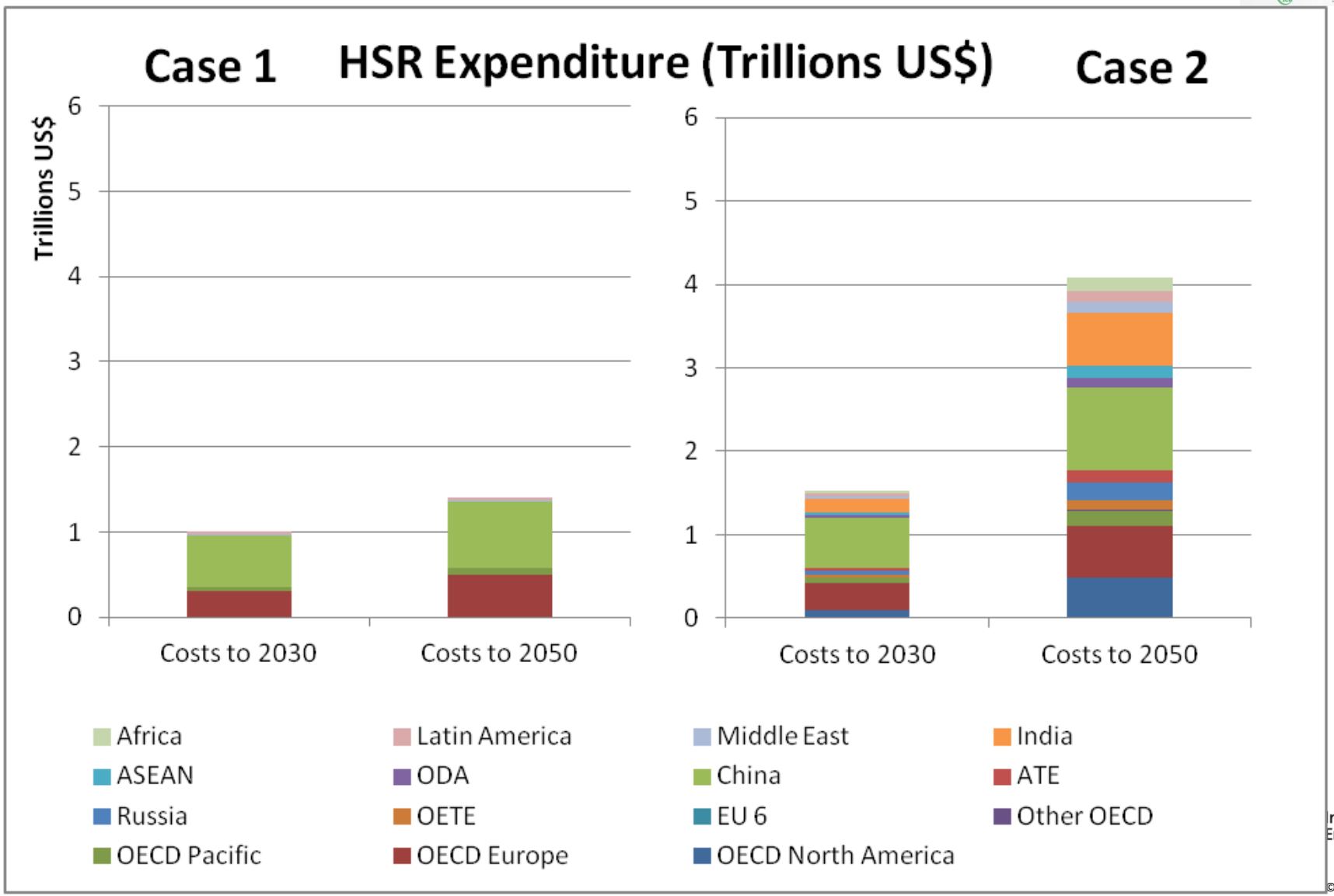
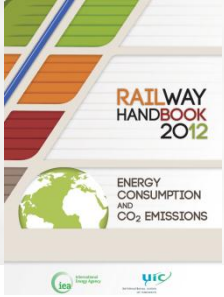

Case 1
Rail Expenditure (Trillions US$)
Case 2
Trillions US$
10
9
8
7
6
5
4
3
2
1
0
Costs to 2030
Costs to 2050
Costs to 2030
Costs to 2050
Africa
Latin America
Middle East
India
ASEAN
ODA
China
ATE
Russia
OETE
EU 6
Other OECD
OECD Pacific
OECD Europe
OECD North America





Conclusions



- Rail is probably the most sustainable (motorized) mode of transportation, esp. when electrified:
  - Decarbonization made easy
  - Pollutant emission centralized at power plants

- Improving rail efficiency is important
- Modal shift represent much bigger potential savings

- High speed could play a big role in modal shifting strategy

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Thank you

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