



**Transportation Research Board
TRB Global Climate Change Workshop
13 January 2008**

***Overview of International Energy
And GHG Issues***

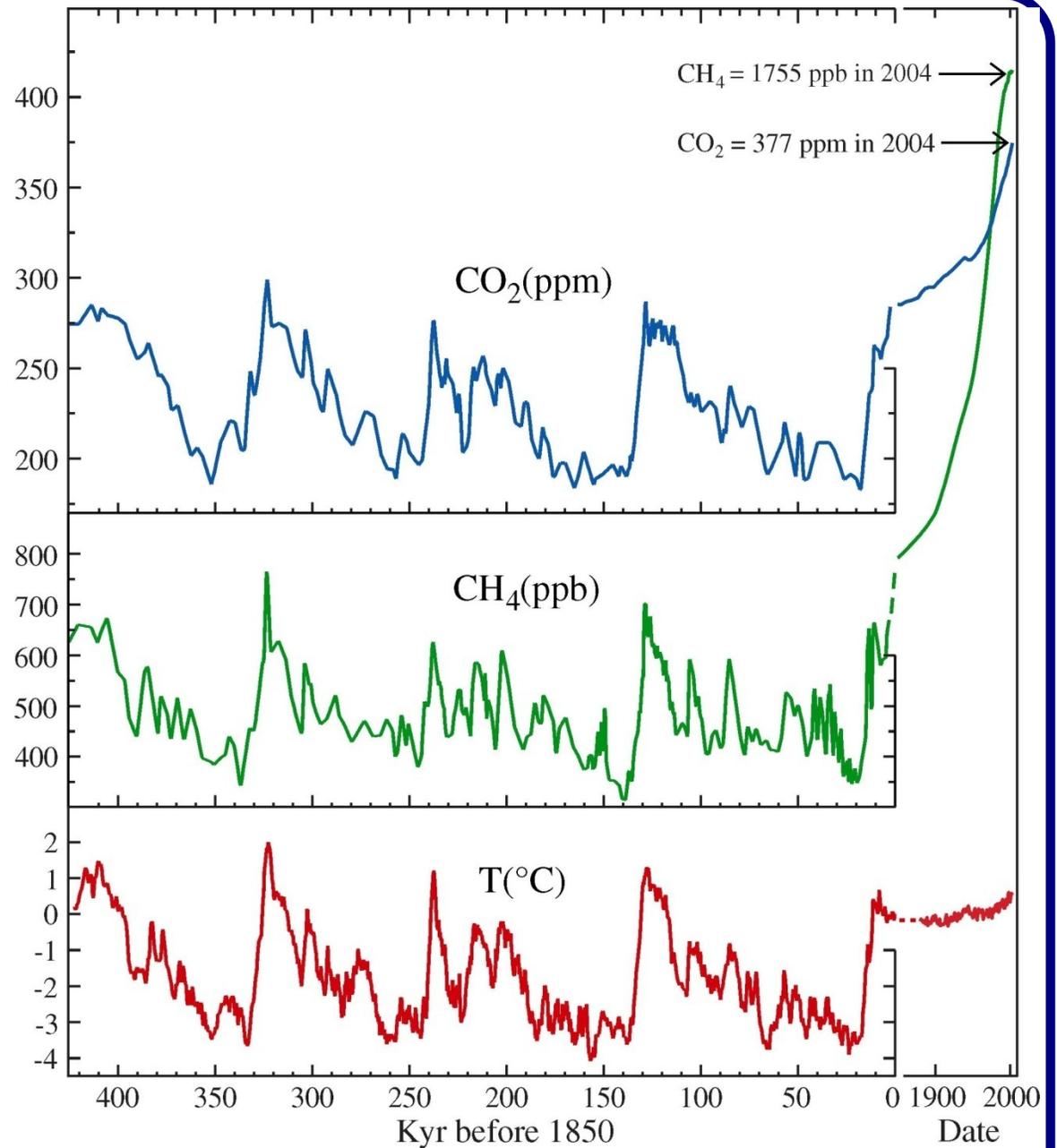
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Trends in Long-Term Perspective

Source: Hansen, *Clim. Change*, **68**, 269, 2005.





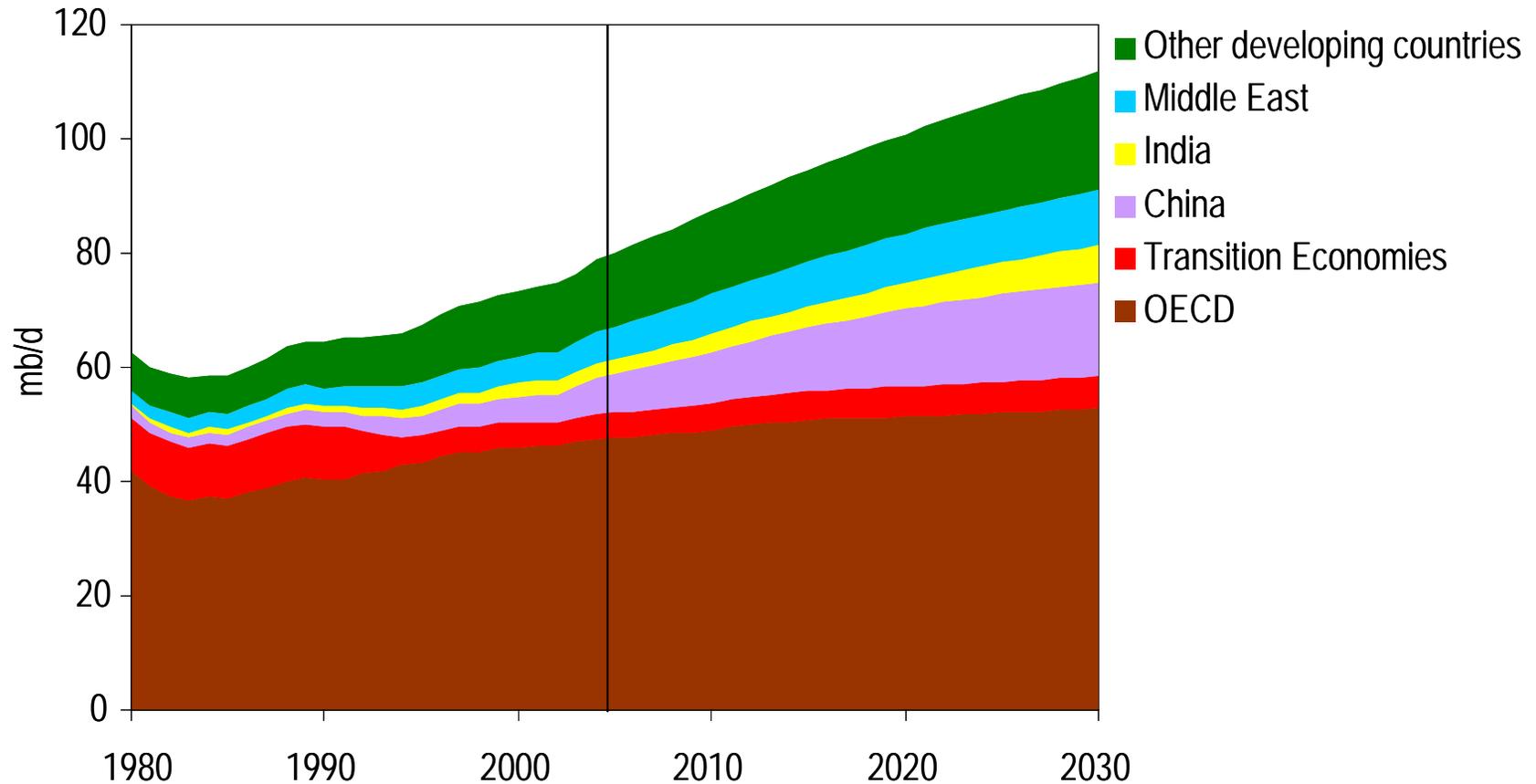
Predicted Impacts of Climate Change

- **1-2°C Temperature Increase**
 - ◆ Retreating glaciers
 - ◆ Extensive damage to coral reefs
 - ◆ Rising intensity of storms
- **2-4°C Temperature Increase**
 - ◆ Significant decreases in water availability in many areas
 - ◆ Losses in crop productivity (except at high latitudes)
 - ◆ Spread of tropical disease vectors
 - ◆ Greater risk of “abrupt” climate change
- **>4°C Temperature Increase**
 - ◆ Rising number of species face extinction
 - ◆ Sea level rise threatens major cities

Source: IPCC, 2006; Stern Report, 2006

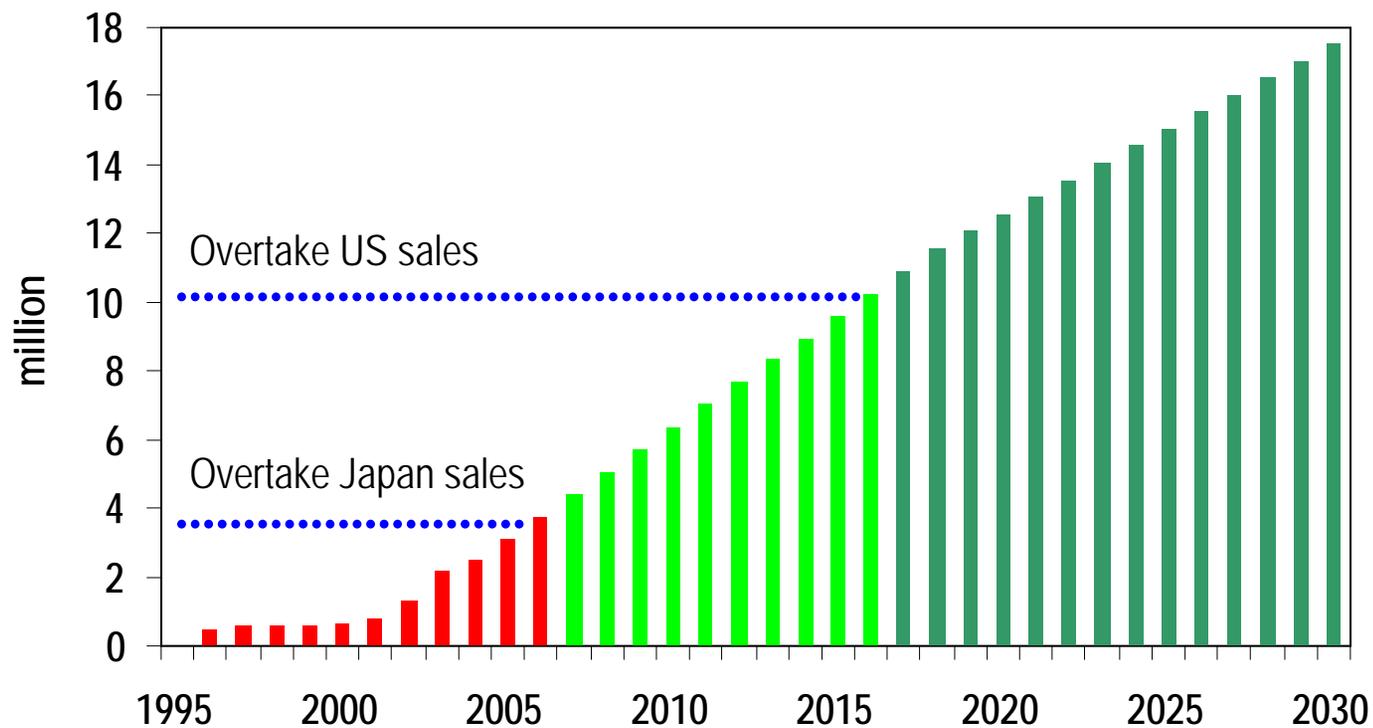


IEA WEO 2007 Reference Scenario: World Oil Demand





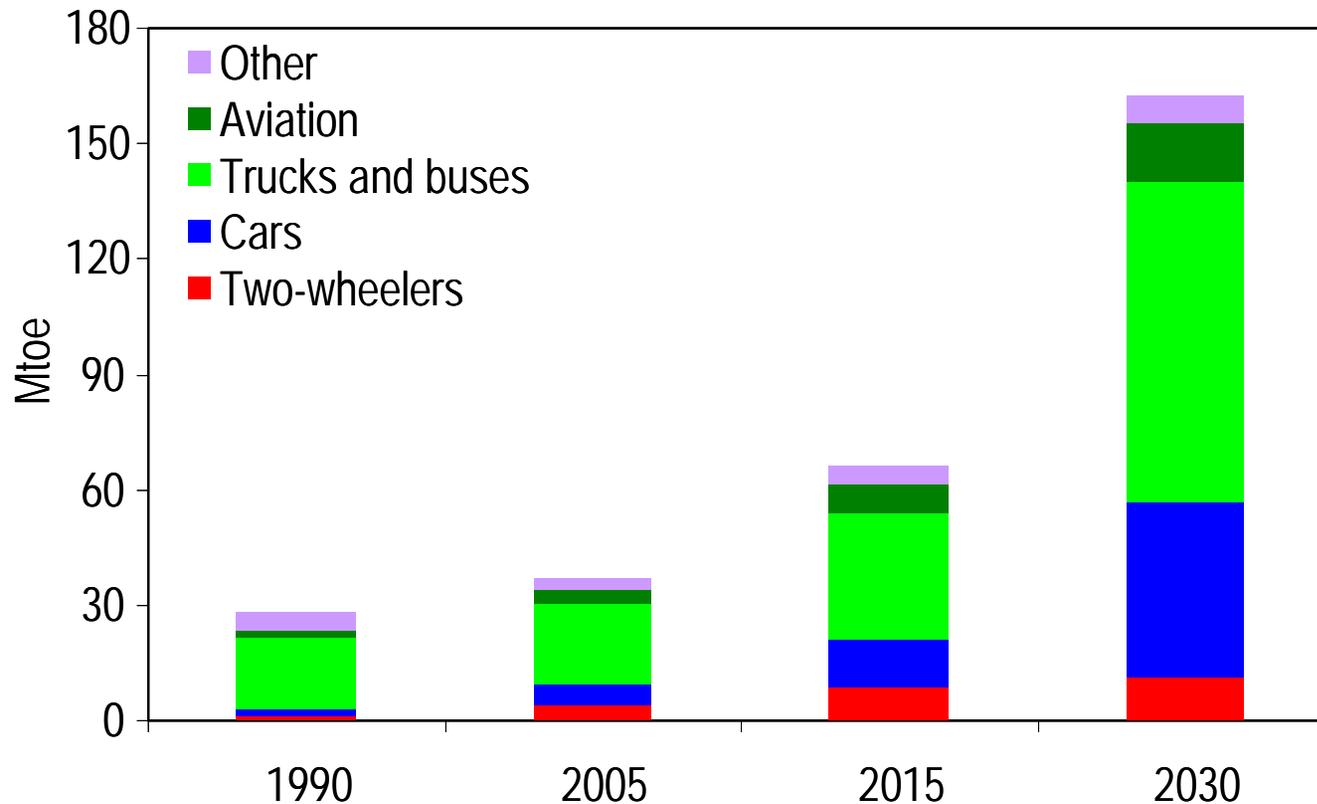
WEO Projections: Light-Duty Vehicle Sales in China



China's oil imports reach 13 mb/d in 2030 as car ownership jumps to 140 per 1 000 people from 20 today



Reference Scenario: India's Transport Energy Demand



Transport demand – mostly oil – grows rapidly as car ownership increases in line with rising incomes

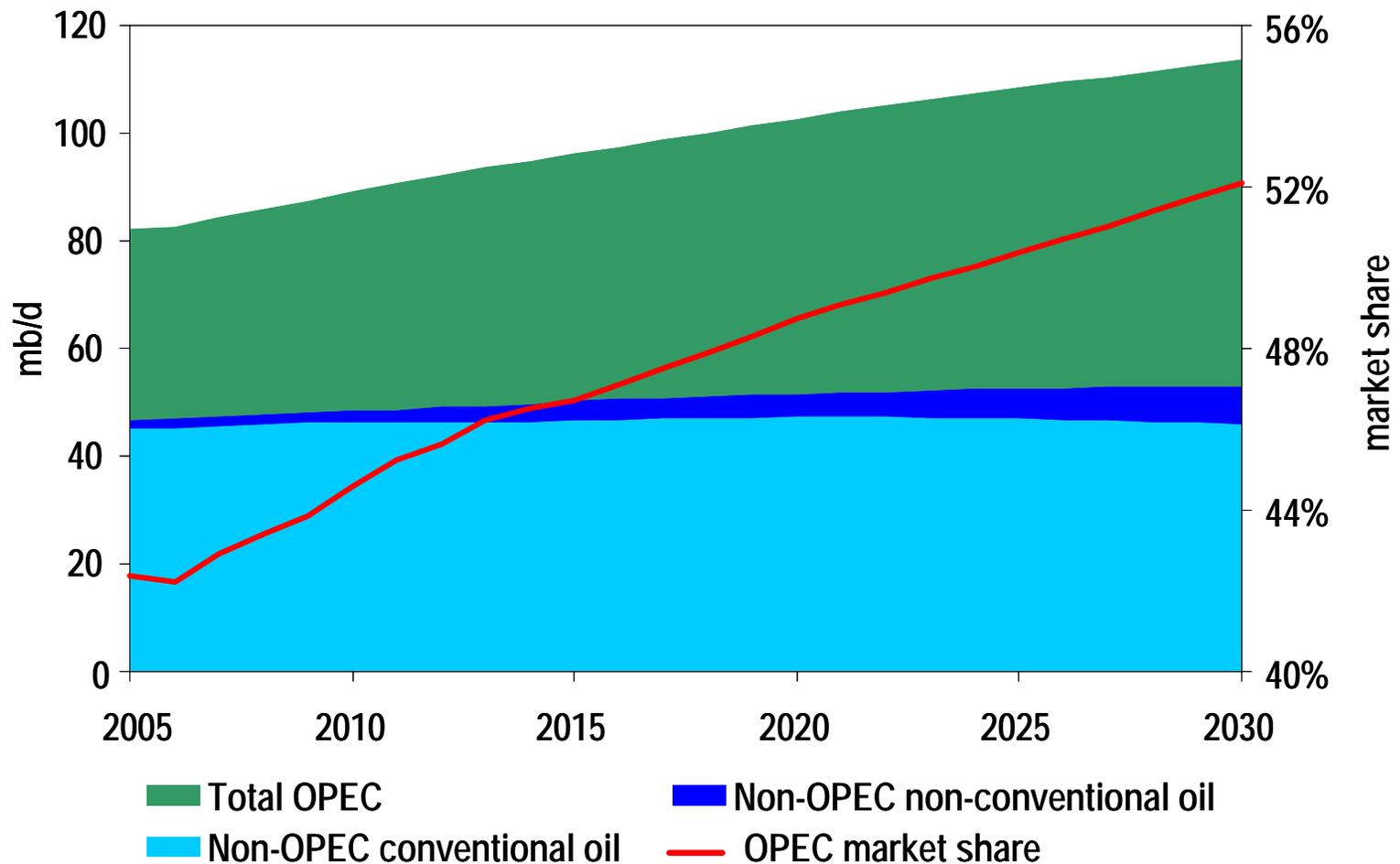


World's Top Five CO₂ Emitters

	2005		2015		2030	
	<i>Gt</i>	<i>rank</i>	<i>Gt</i>	<i>rank</i>	<i>Gt</i>	<i>rank</i>
US	5.8	1	6.4	2	6.9	2
China	5.1	2	8.6	1	11.4	1
Russia	1.5	3	1.8	4	2.0	4
Japan	1.2	4	1.3	5	1.2	5
India	1.1	5	1.8	3	3.3	3

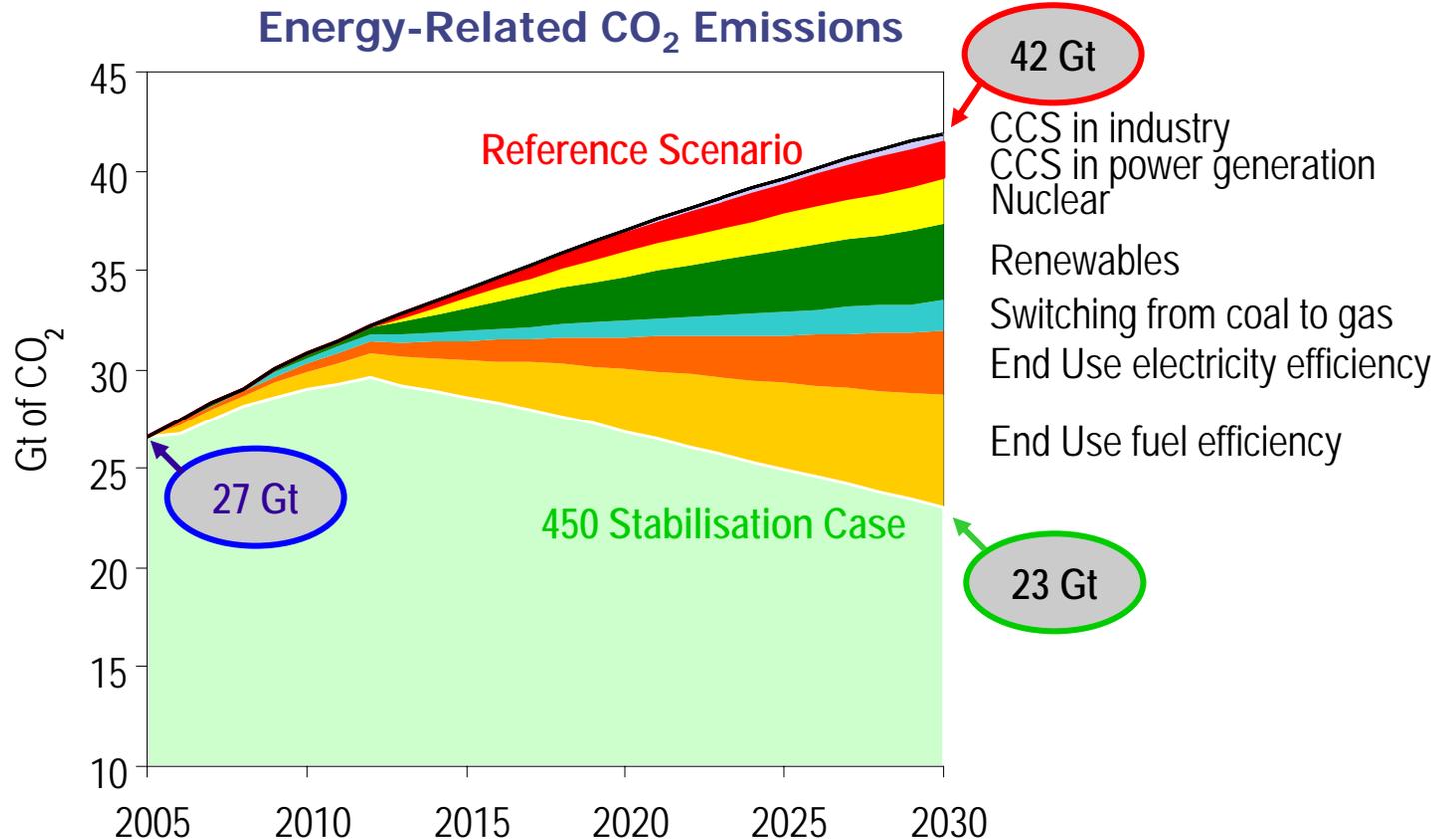


WEO Reference Scenario: World Oil Production





CO₂ Emissions WEO 450 Stabilisation Case



**By 2030, emissions are reduced to some 23 Gt,
a reduction of 19 Gt compared with the Reference Scenario**

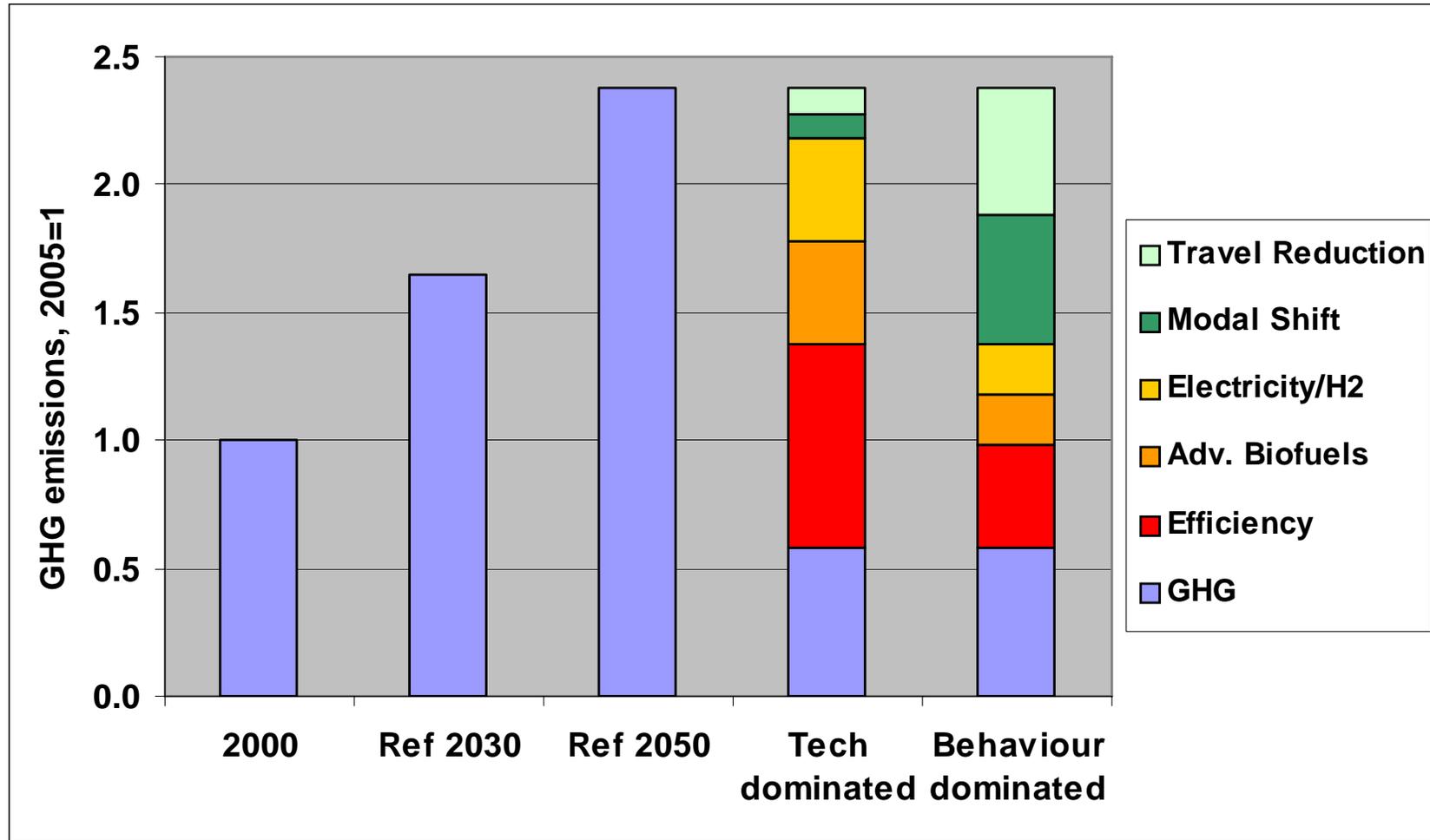


So what does this mean for transport?

- Even if transport cuts less than other sectors, countries like China and US will eventually have to cut transport GHG emissions by more than half relative to reference case projections, e.g:
 - ◆ By 2030, get back close to 2000 levels
 - ◆ By 2050, well below 2000 levels
- How do we get there?



Transport GHG Reductions: Sample Approaches to 2050





Can it be done? A Measures Checklist

● Travel

- ◆ Urban and regional planning!
- ◆ Telematics
- ◆ Trucking and air travel logistics
- ◆ Pricing...and caps?

● Modal Switch

- ◆ Better transit systems (Bogata x 1000)
- ◆ Non-motorized mode infrastructure
- ◆ High speed passenger rail, expanded rail for freight



Measures (cont.)

● Efficiency

- ◆ New LDV efficiency can be doubled by 2030 at modest cost
- ◆ Trucks and aircraft too! – though costs are less clear
- ◆ In use efficiency must not be overlooked

● Biofuels

- ◆ Large potential but must move toward 2nd generation
 - US corn/soy, EU wheat/rape are not the answer
- ◆ Ultimately biofuels' contribution will depend on sustainability
 - We need to better understand impacts around the world



Measures (cont.)

- **Hydrogen/electricity**
 - ◆ **Plug-in hybrids are promising but battery costs must come down**
 - ◆ **Pure EVs and H2 FCVs are stuck in slow gear**
 - **Breakthroughs and massive investments will be needed if these vehicles are to play a major role**
 - ◆ **Low GHG production H2/electricity will be needed as well**



A few policy winners

- **Bus Rapid Transit (Bogota, Jakarta, catching on in China, India, elsewhere)**
- **Low-carbon vehicle policies (Japan, China...US? EU?)**
- **High-speed rail system (Europe, Japan)**
- **Improved NMT infrastructure and public bikes (Paris)**
- **Congestion Charging (London, Stockholm, Milan)**
- **Other urban vehicle restrictions (Berlin, Rome)**



Closing Thoughts

- Transport *must and can* achieve deep GHG reductions, but it won't be easy.
- Substantial efficiency improvements in all modes are available at modest (societal) cost
 - ◆ Costs of other types of measures are widely variable
- Role of biofuels/ hydrogen / electricity could be substantial but there are major challenges and uncertainties
- Some behavioural change probably has to be part of the solution, especially in the short-medium term
- Strong, coordinated policy actions in and across countries will be critical to success