

# Key steps in the transition to a low carbon society

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*Low Carbon Society Conference  
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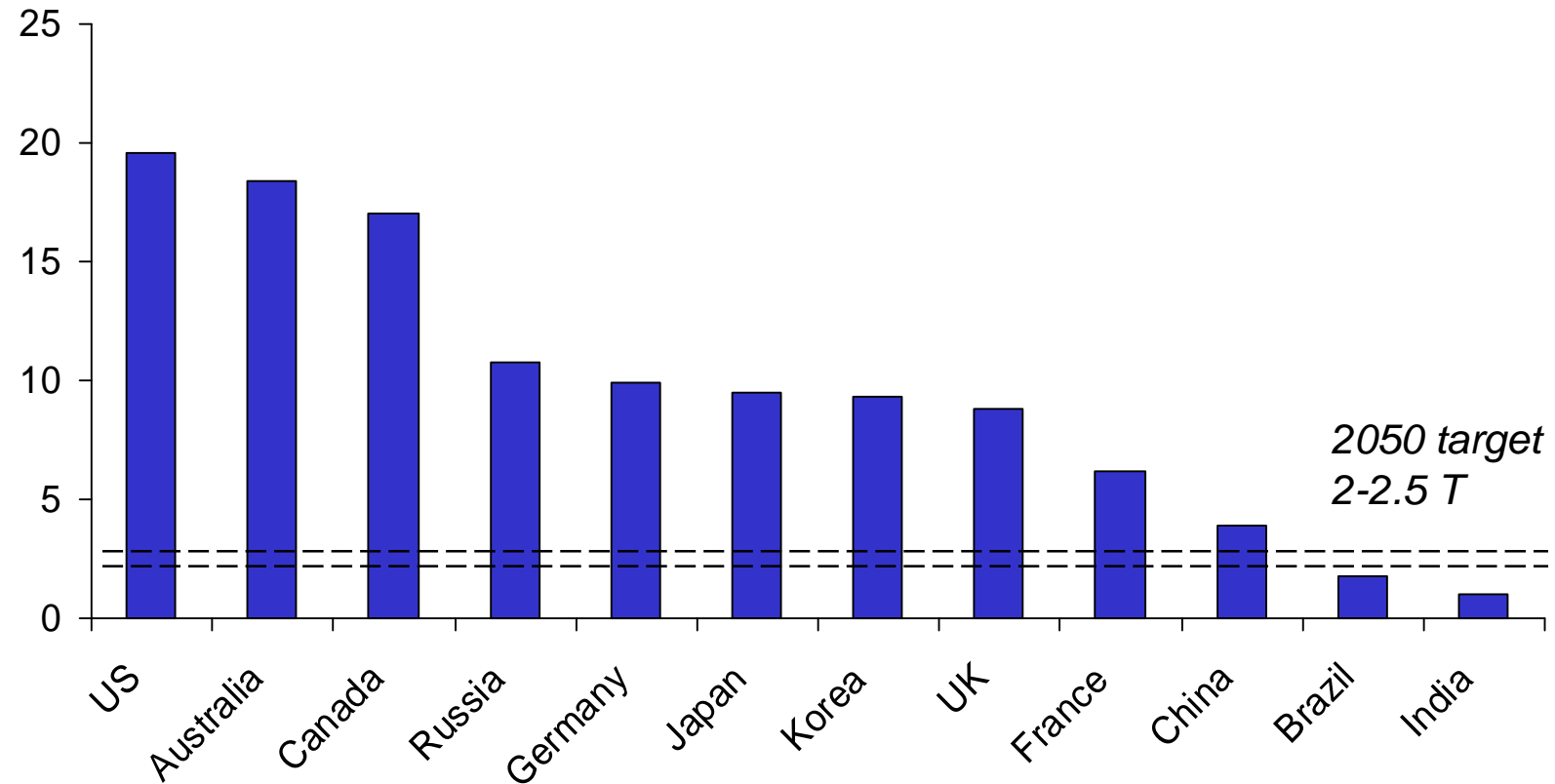
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# Outline

- Meeting the “80% challenge”
- Implications for energy and transport
- Carbon pricing and economic instruments
- Key steps in the transition to a Low Carbon Society

# Carbon emissions per head

CO<sub>2</sub> per capita, 2005 values

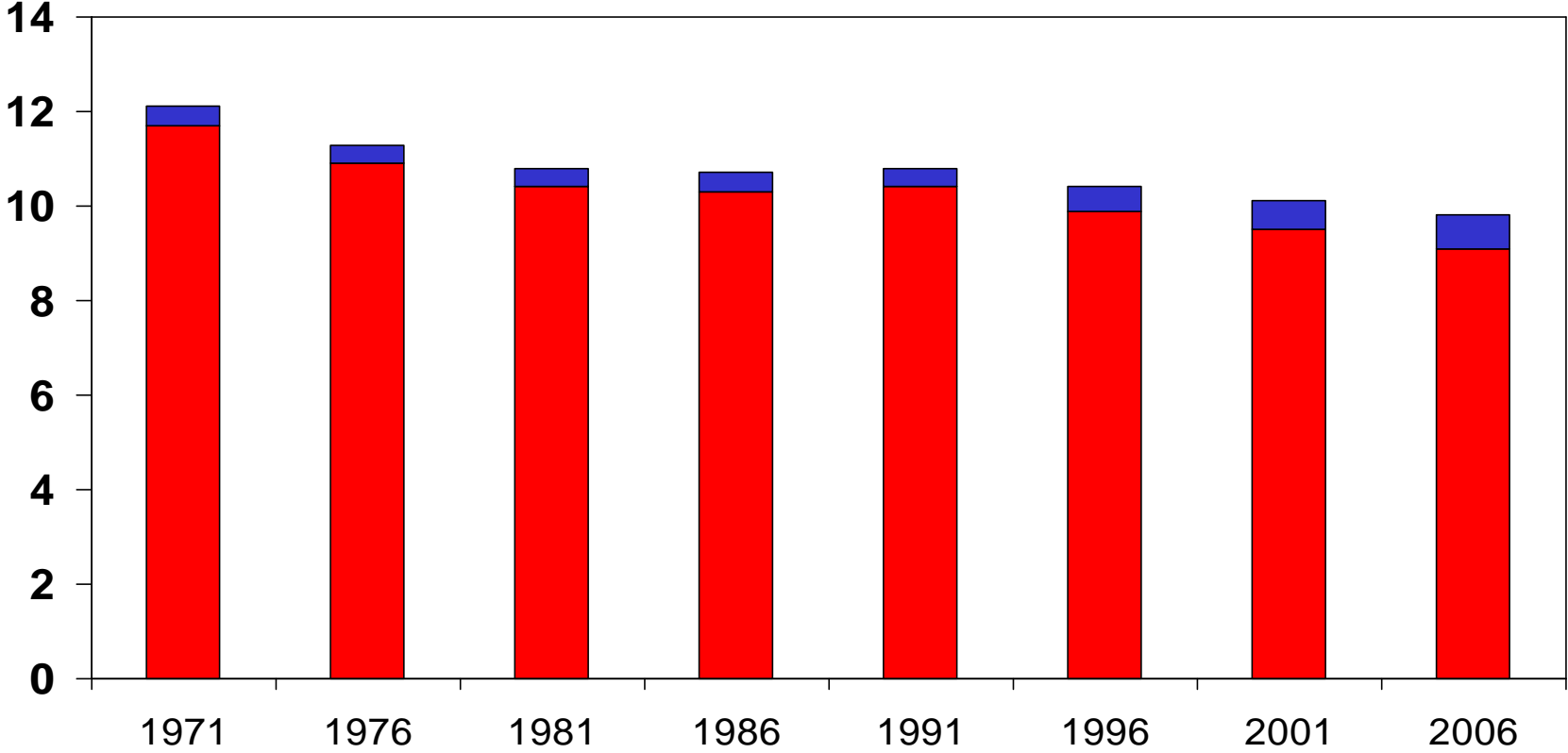


Source: OECD

# UK CO2 emissions per capita

*Tonnes per head of population*

■ Domestic emissions ■ International air & shipping

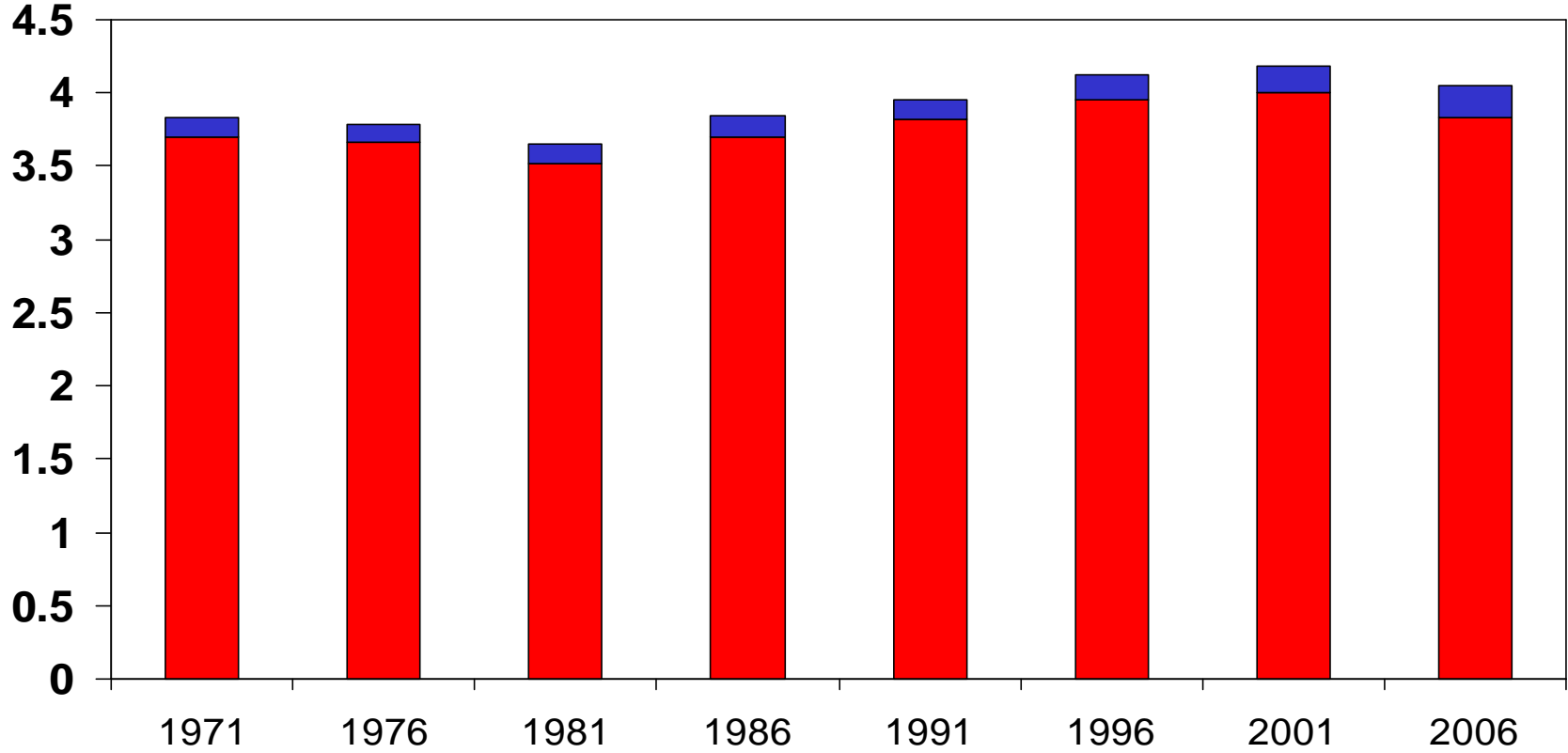


Sources: DECC/DEFRA database;  
*International aviation and shipping – Commission for Integrated Transport 2007 Climate Change Report*

# UK Energy Consumption

*Tonnes of oil equivalent per head of population*

■ Domestic use ■ International air & shipping



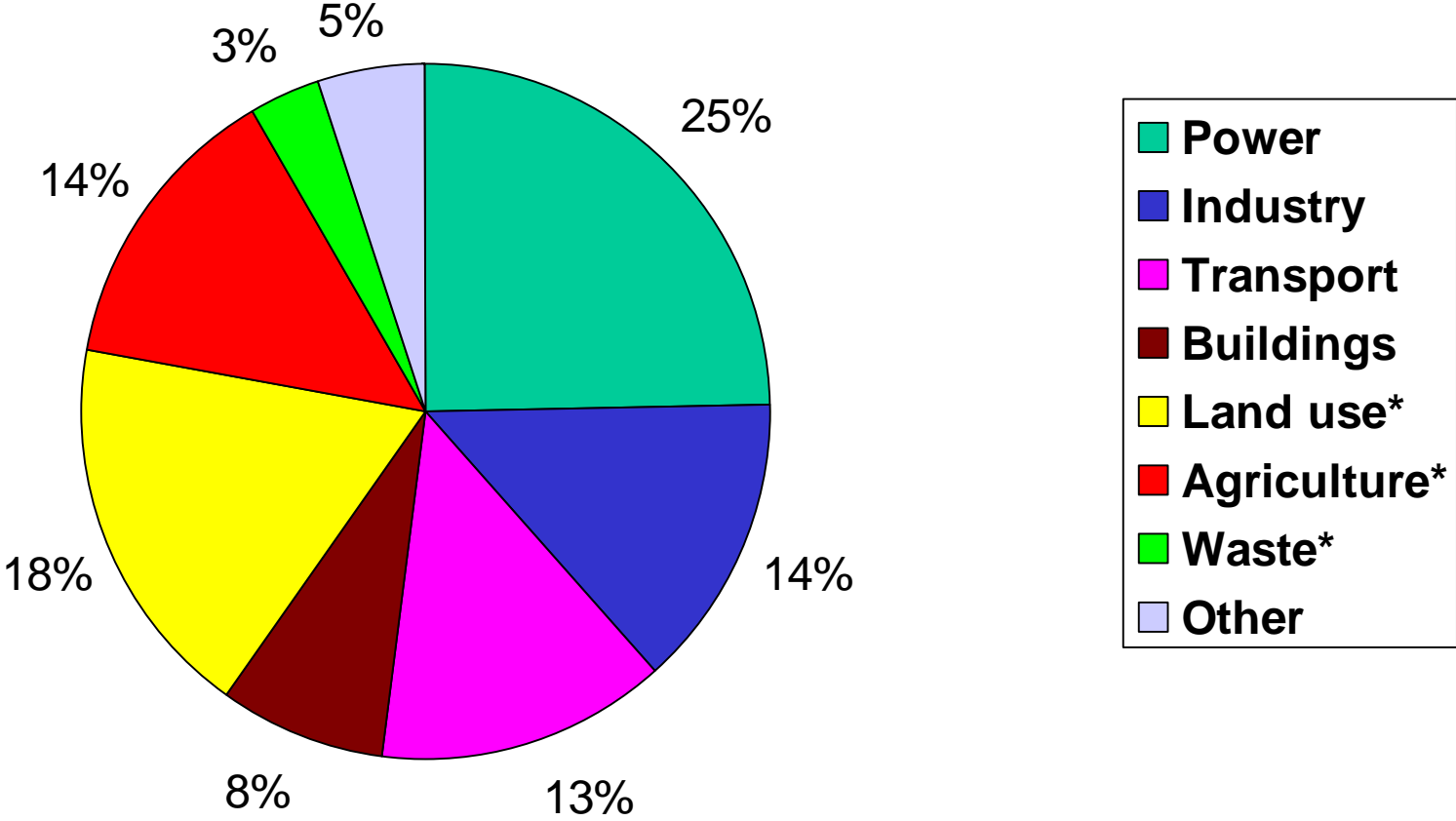
*Sources: Department of Business Innovation and Skills; International aviation and shipping –  
Authors' estimates based on Commission for Integrated Transport 2007 Climate Change Report*

# A 50:50 route to c.80% cuts

- 50% cut in per capita energy use by 2050
- 50% cut in proportion of energy from carbonised sources (from c.90% to c.45%)
- Achieving half of these targets (75%) by 2020 delivers 33% cut on 2005 levels (CCC target is 31%)

# Greenhouse gas emissions, by source

Global GHG emissions in 2000 = 42GT CO<sub>2</sub> equivalent



Source: Stern Review (2006)

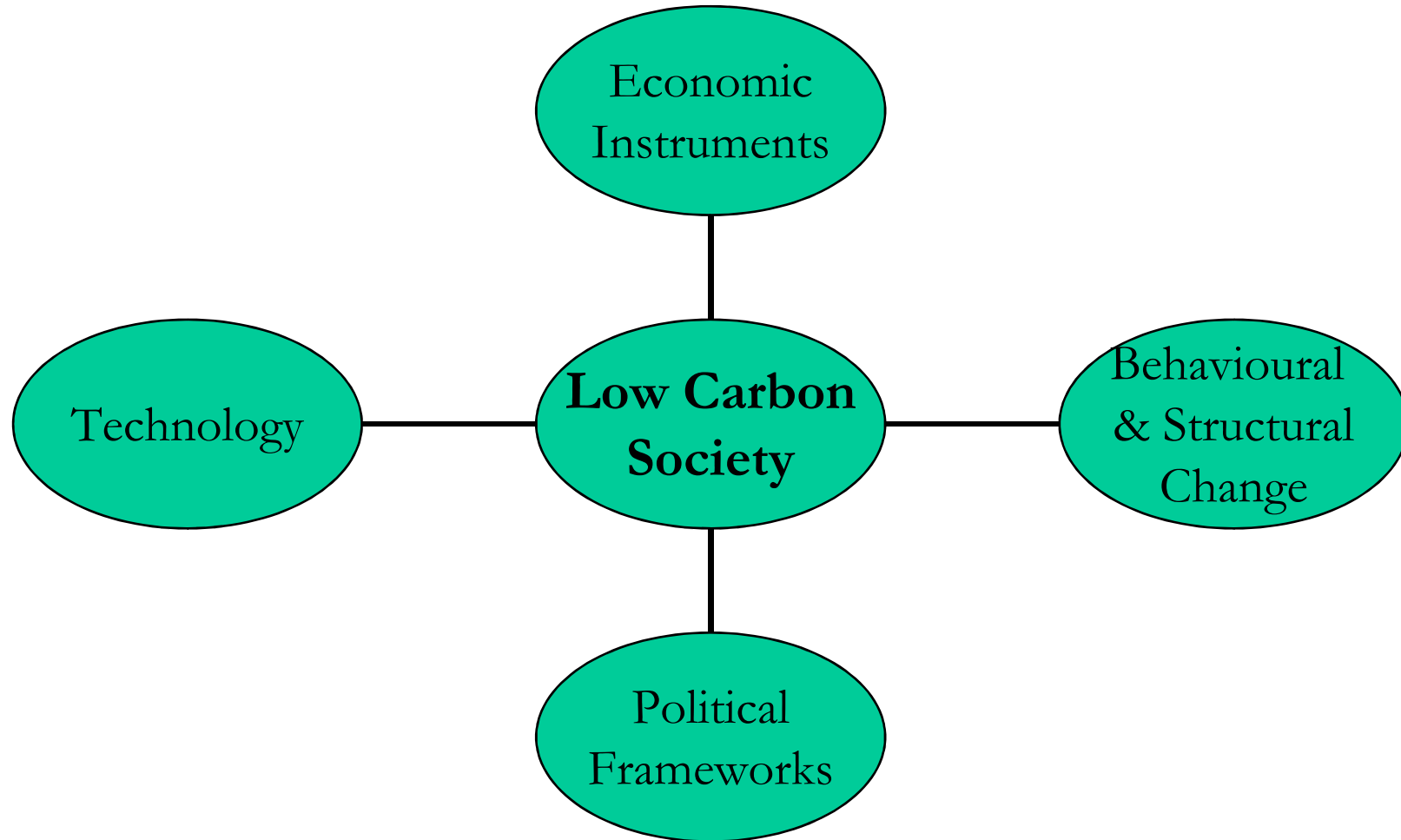
\* Non-energy emissions

# Key steps

- “Decarbonisation” of power sector and transport
- Big shift in energy efficiency of industry, buildings & appliances
- Cutting non-energy emissions from agriculture, changes in land use & waste



# Building the “low carbon society”

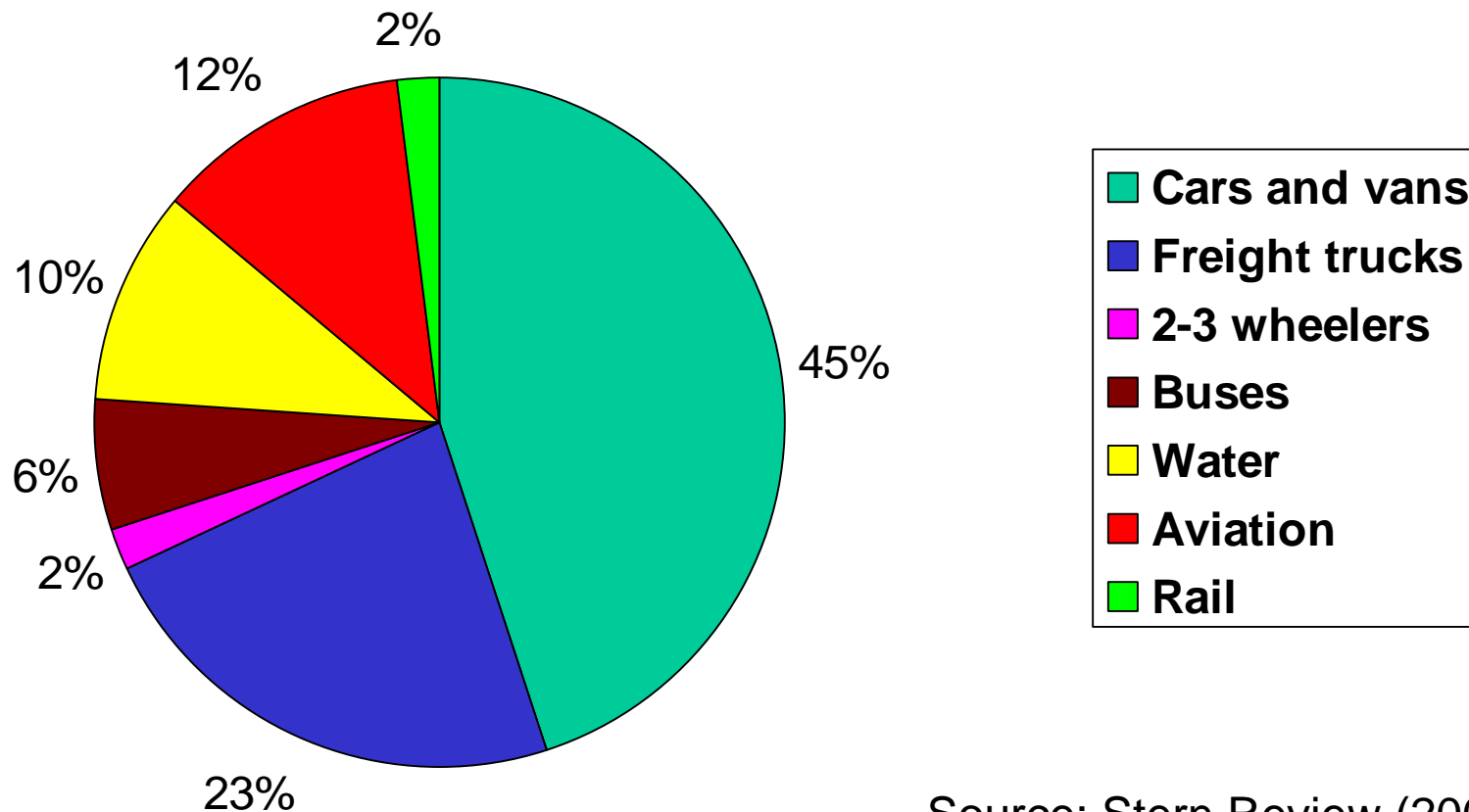


# Decarbonisation of power sector

- Conventional renewables
- Nuclear power
- Carbon capture and storage
- Bio-fuels and bio-mass
- Energy storage schemes

# CO<sub>2</sub> emissions from global transport

Total CO<sub>2</sub> emissions in 2000 = 5.6 GT



Source: Stern Review (2006)

# Transport carbon emissions

*Excluding international aviation and shipping*

	<i>CO<sub>2</sub> emissions (million tonnes)</i>	<i>CO<sub>2</sub> per capita (tonnes/head)</i>	<i>Transport as % of total CO<sub>2</sub> emissions</i>
United States	1813	6.1	31%
Canada	160	5.0	29%
Australia	80	3.9	21%
France	135	2.2	35%
United Kingdom	129	2.2	24%
Italy	119	2.0	26%
Japan	268	2.0	21%
Germany	159	1.9	19%
Russia	206	1.4	13%
Brazil	138	0.7	41%
China	332	0.3	7%
India	96	0.1	8%

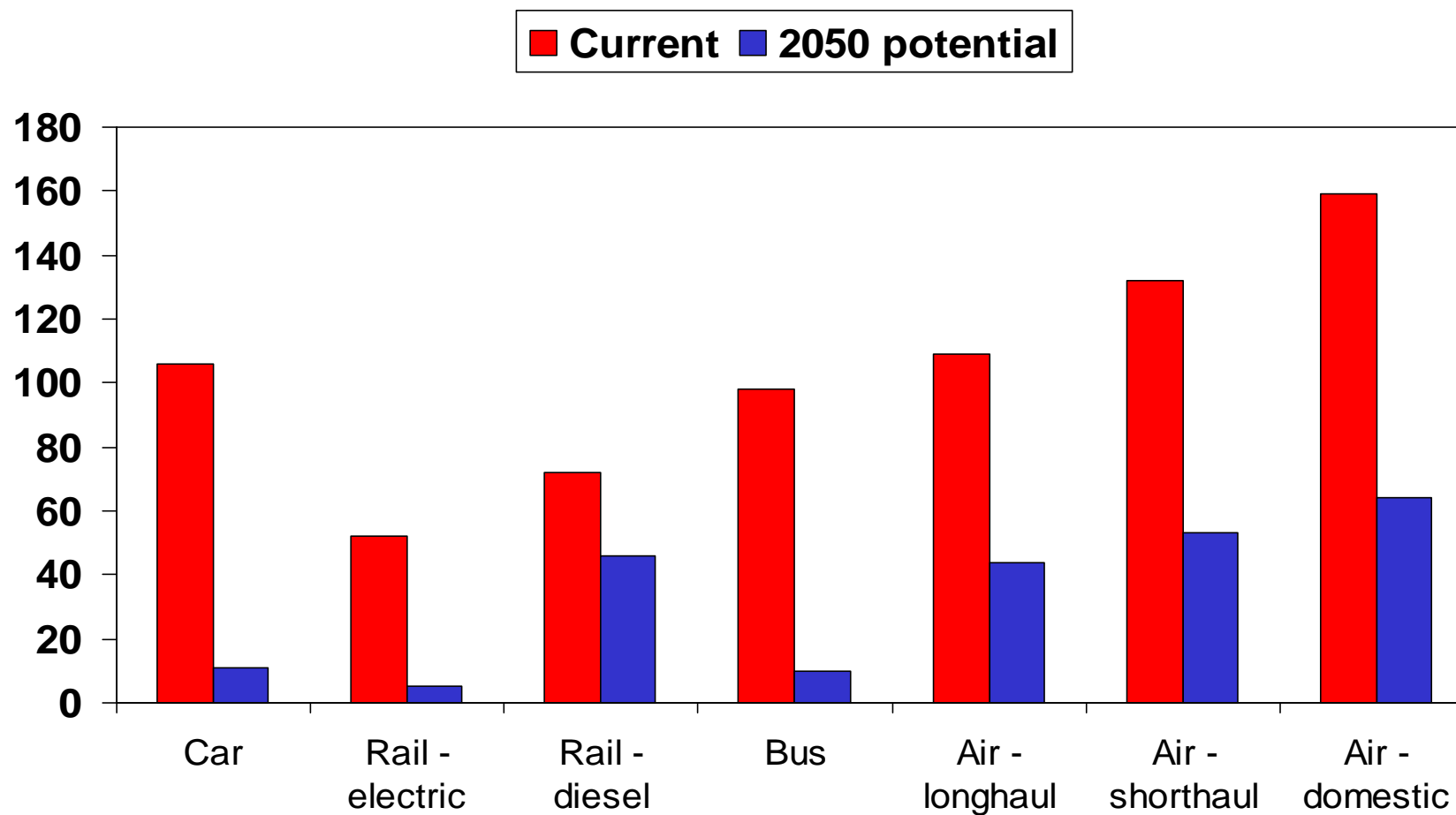
*Source: OECD*

# Transport – cutting emissions

- Reduce travel
- Transport “system” efficiency
- Mode shift and behavioural change
- Carbon efficiency of individual modes

# CO<sub>2</sub> emissions by UK transport mode

Grams per passenger km



Sources: Committee on Climate Change, 2008; CfIT (2007); and author's estimates.

Note that 2050 figures are illustrative – based on 90% decarbonised electricity

*“It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest.”*

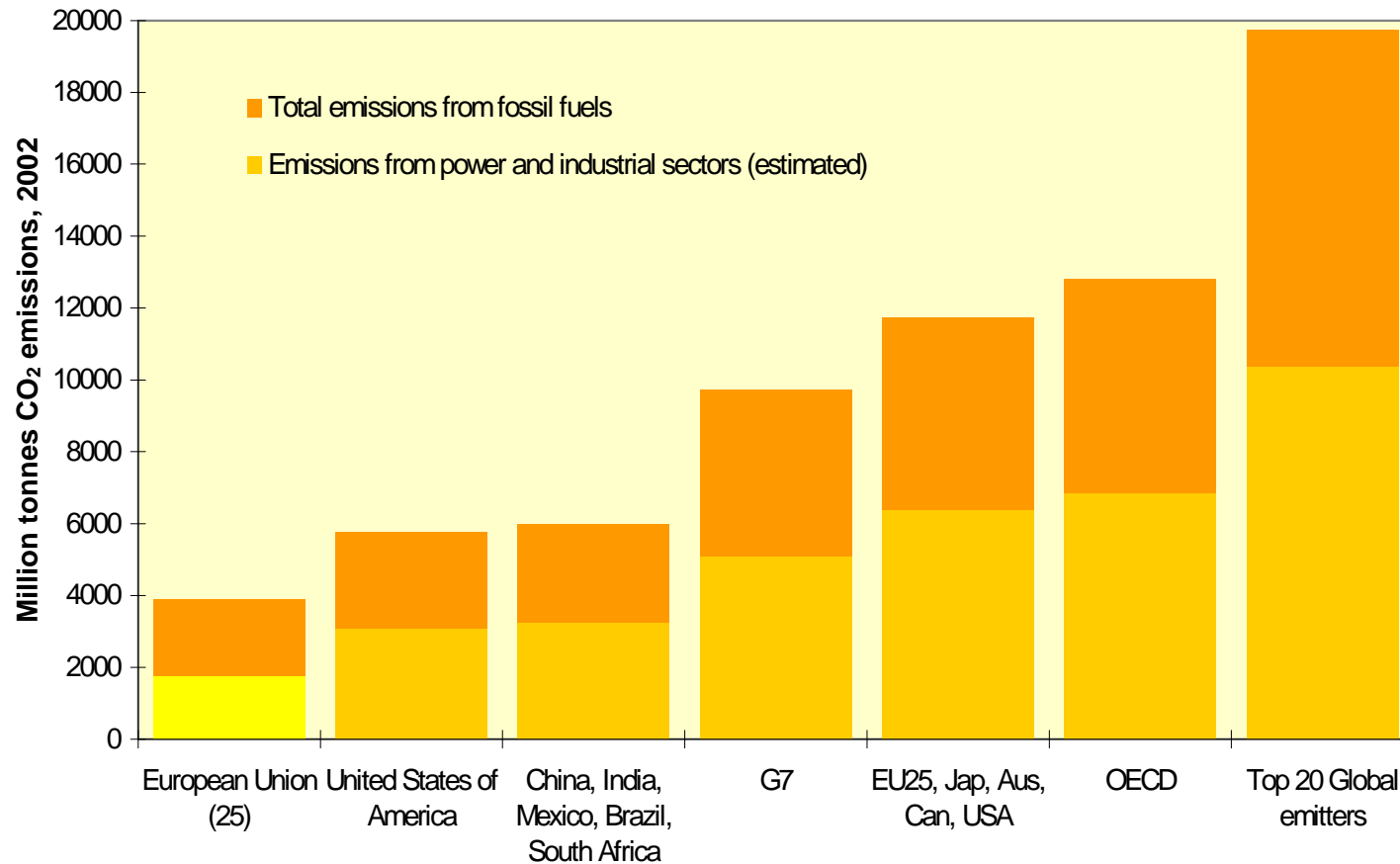
Adam Smith, *Wealth of Nations*, 1776

# Potential economic instruments

- Emissions trading
- Carbon taxes
- Energy taxes
- Incentives for developing and embodying low carbon technologies
- Energy efficiency incentives



# Potential size of carbon markets



Extending EU ETS to power and industrial sectors in Top 20 countries would create a market of US\$90-350 bn

# Emissions trading – key conditions

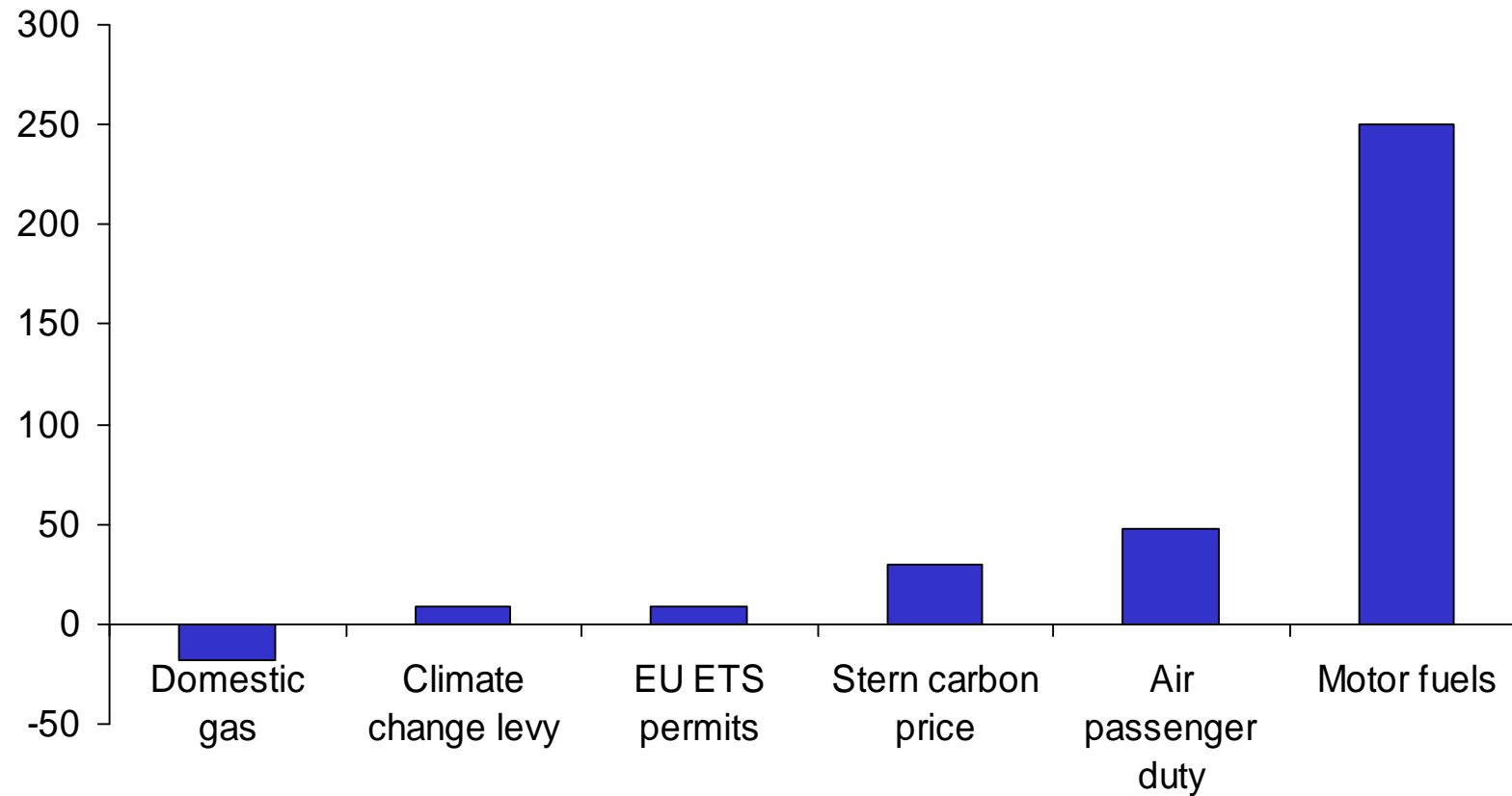
- Comprehensive geographically
- Wide sectoral coverage
- Long-term framework of caps/targets to drive investment
- Robust monitoring and reporting
- Strong institutions to underpin credibility and protect against political interference

# Emissions trading in practice

- EU ETS is best established scheme
- Targets and framework relatively short-term
- Sector coverage limited – transport, agriculture and domestic energy use excluded
- Prices have been volatile
- Emissions reductions have been modest
- Political pressures and influences on allocation process

# UK carbon “taxes”

£/T of CO<sub>2</sub>, 2009 values



# Key steps in the transition to a Low Carbon Society

- Twin track approach: major shift in energy efficiency, while decarbonising energy sources
- Massive expansion of low/zero carbon electricity supply, using a wide range of technologies
- Electrification of road transport, alongside increasing use of bio-fuels
- Heavy investment in low carbon technologies – especially in energy sector and transport
- Much stronger economic incentives to economise on energy use and shift to low carbon alternatives
- Wide range of economic instruments to be developed, providing consistent & long-term price signals