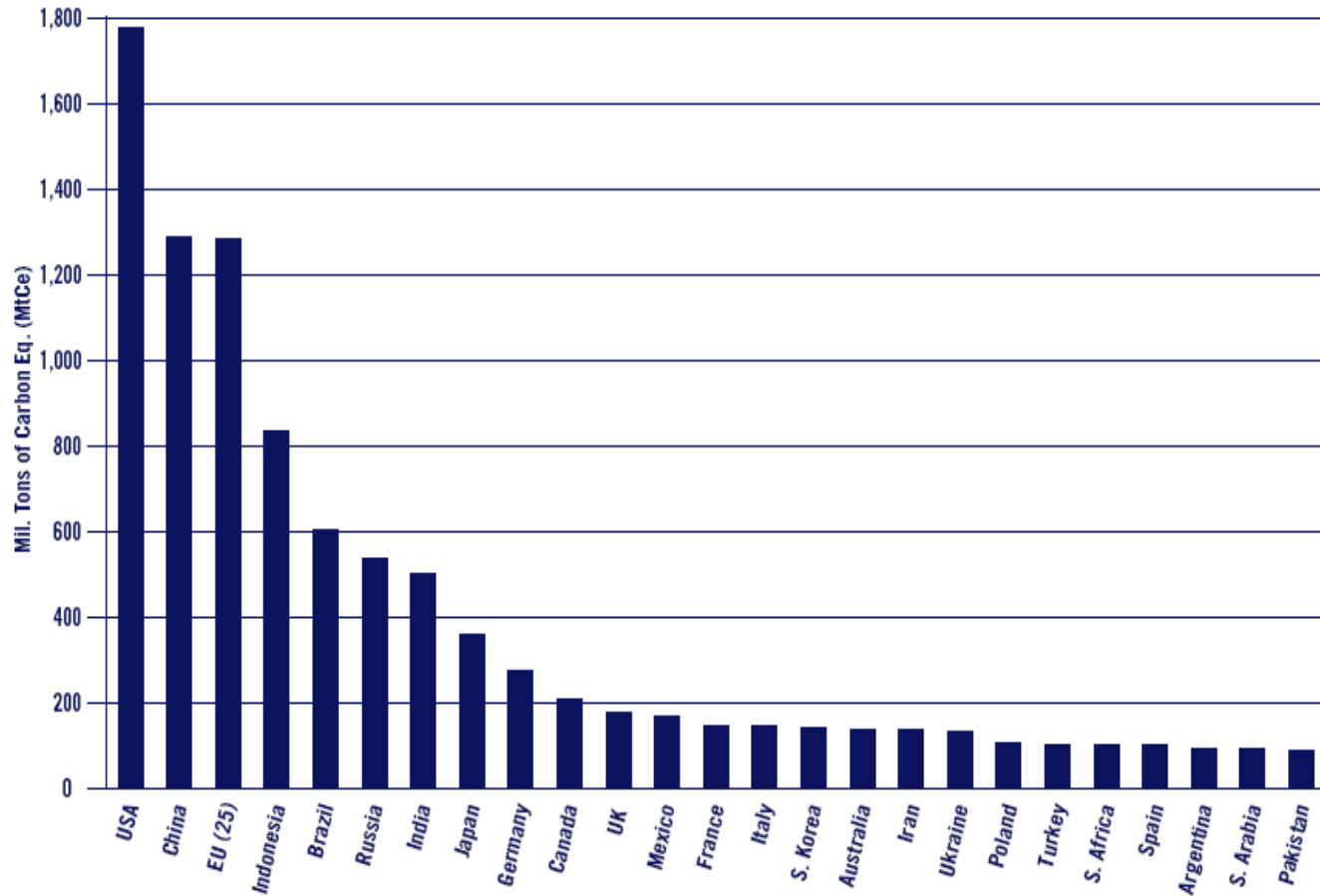


Climate Change: Frameworks for Policy and Action

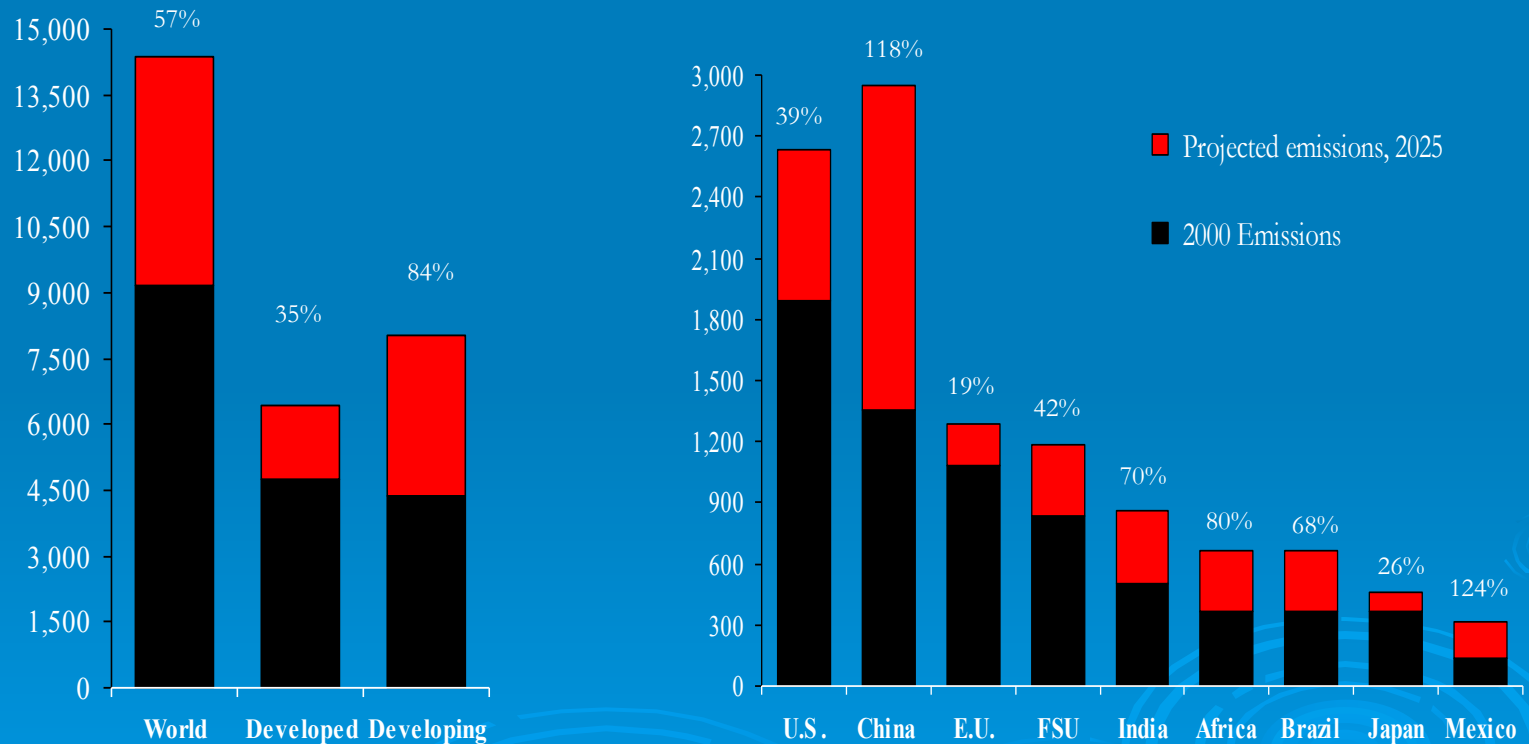
Chris Beaman♪
19 January 2006♪



Total GHG Emissions and Relative Sectoral Shares (2000, all GHGs; including Land Use Change/Forestry)

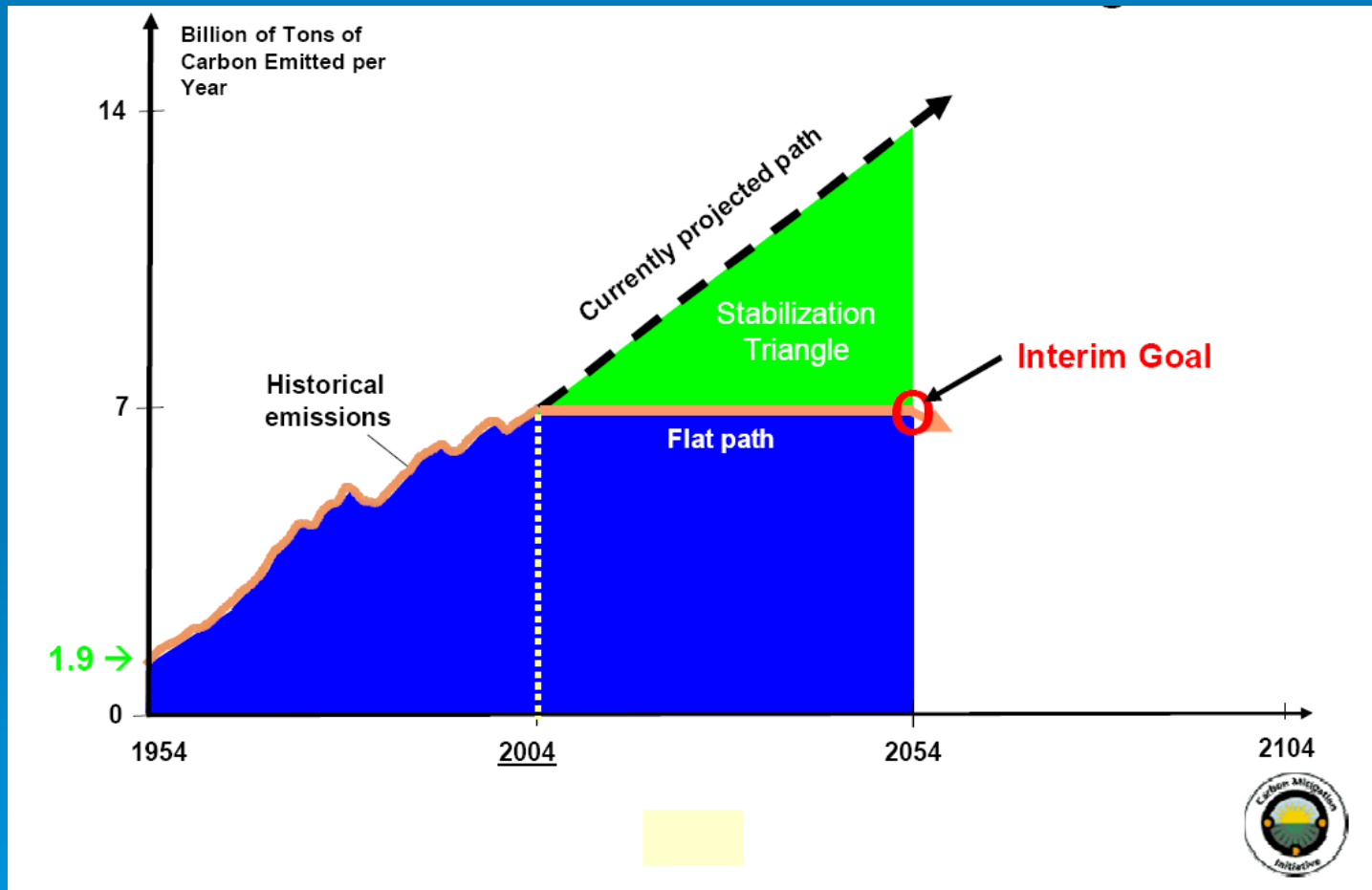


Projections of Future GHG Emissions



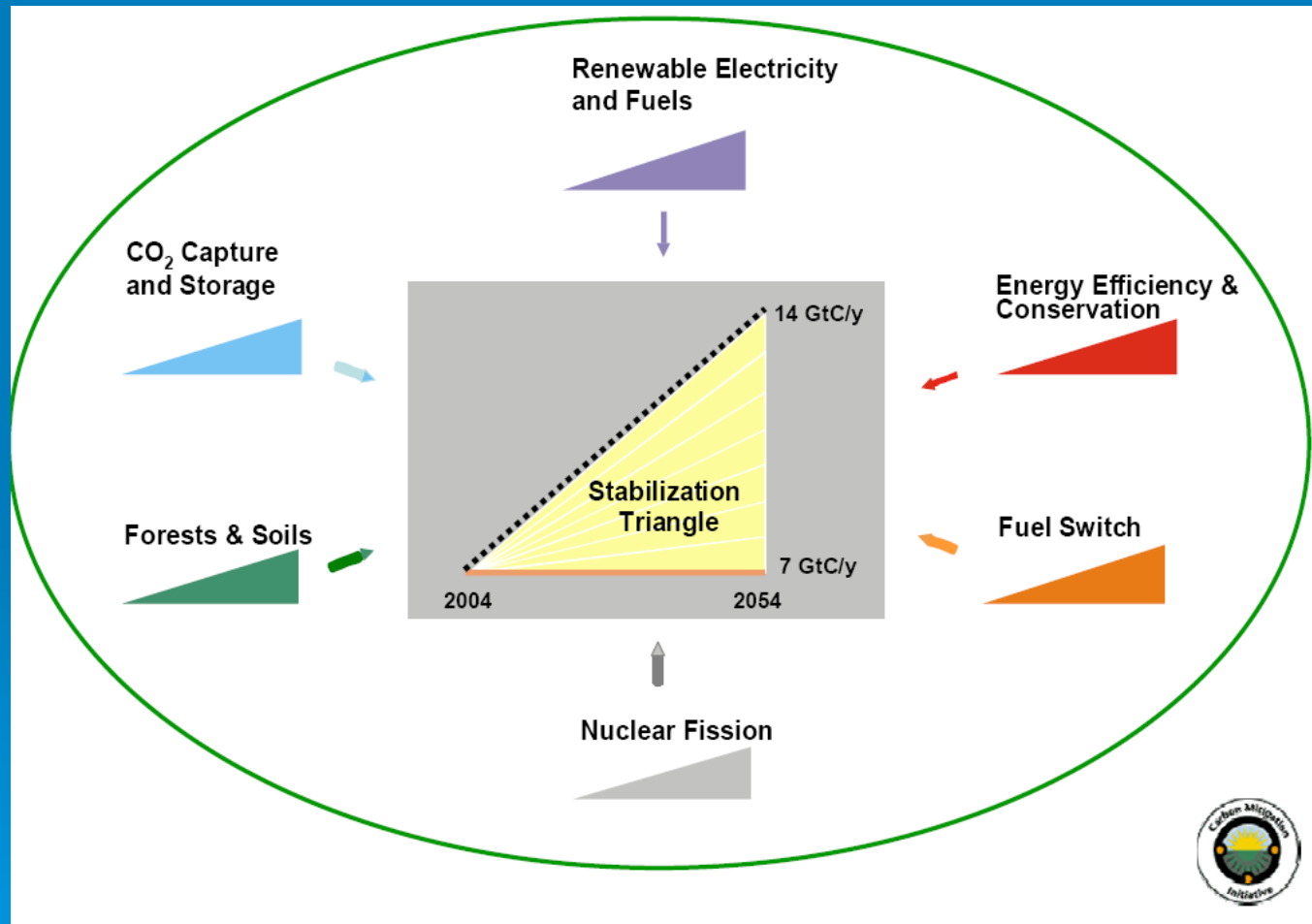
Source: Sustainable Energy Advisory Board 18 September 2005
 International Climate Change between Gleneagles and Montreal by H. Derwent

The Stabilization Triangle



Source: Stabilization Wedges: Mitigation Tools for the Next Half-Century by R. Socolow, February 03, 2005 ↵

Fill the Stabilization Triangle with Seven Wedges



Source: Stabilization Wedges: Mitigation Tools for the Next Half-Century by R. Socolow, February 03, 2005

Wedges♪

EFFICIENCY

- Buildings, ground transport, *industrial processing, lighting, electric power plants.*

DECARBONIZED ELECTRICITY

- Natural gas for coal
- Power from coal or gas with CCS
- Nuclear power
- Power from renewables: wind, photovoltaics, *solar concentrators (troughs and dishes), hydropower, geothermal.*

DECARBONIZED FUELS

- Synthetic fuel from coal, natural gas, and biofuels, with carbon capture and storage
- Biofuels
- Hydrogen
 - from coal and natural gas, with carbon capture and storage
 - from nuclear energy
 - from renewable energy (hydro, wind, PV, etc.)

FUEL DISPLACEMENT BY LOW-CARBON ELECTRICITY

- *Grid-charged batteries for transport*
- *Heat pumps for furnaces and boilers*

NATURAL SINKS

- Forestry (reduced deforestation, afforestation, new plantations)
- Agricultural soils

METHANE MANAGEMENT

- *landfill gas, cattle, rice, natural gas*

From Long-Range Climate Science to “Action This Day”♪

- **Temperature increase** → **Gradual Warming**

0c 1 - **2** - 3 - 4 - 5 - 6

→ **Tipping Points**

- **CO2 equivalent Build-up**

380 - 400 - **450** - **500** - **550** - 600 - 650 - 700 - 750

- **Annual Emissions:** -- US - **EU** - Japan - China - India - Russia -- Other

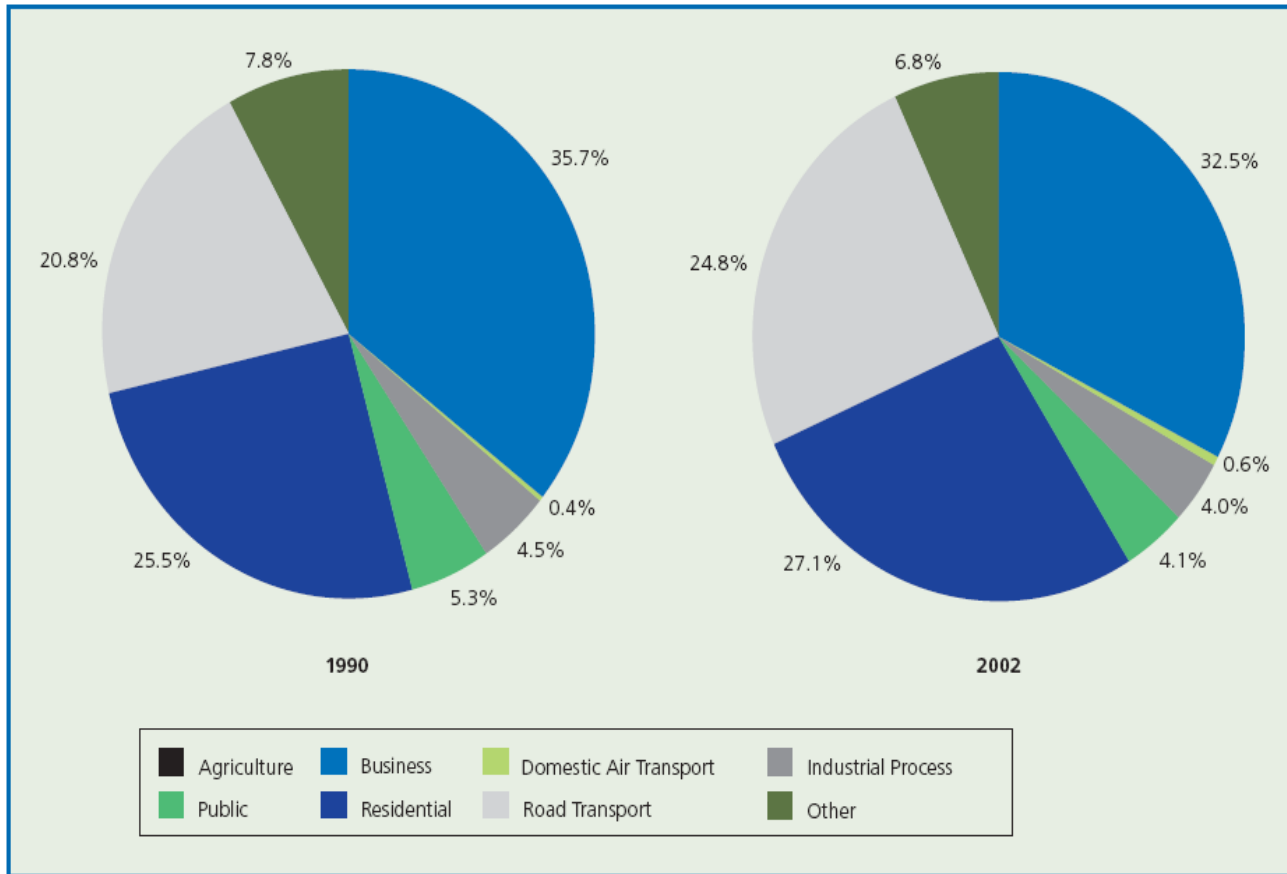
- **Key EU Countries** - Germany - **UK** - Spain - Italy

- **% Reduction**

12.5 (2008/12) - 20 (2012) - **60** (2050 - RCEP) - 80

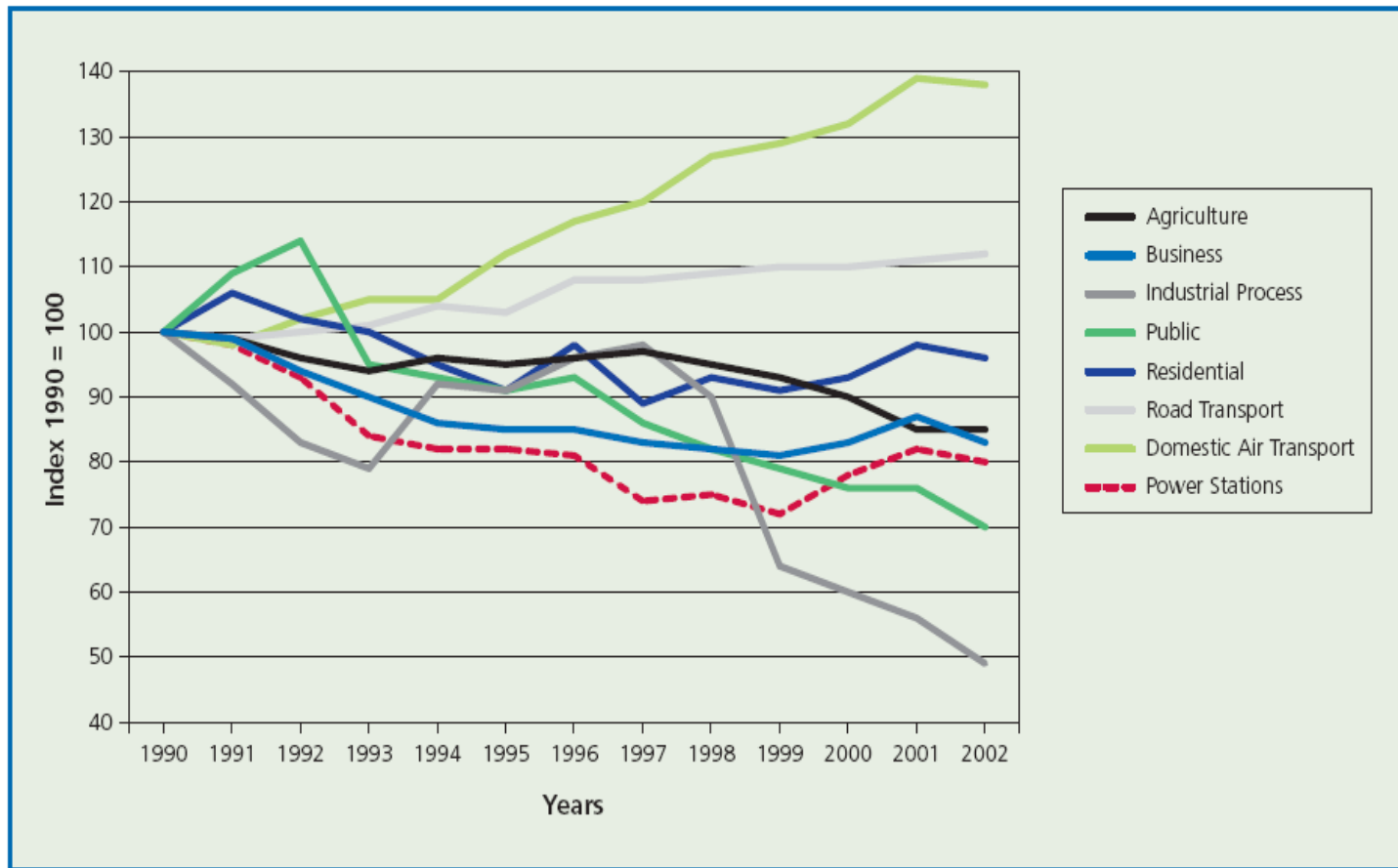
- **Key UK Sectors** - **Business** - **Residential** - Industrial Process - **Public** -
- Road Transport - Domestic Air Transport - International Aviation - Shipping

End User Carbon Dioxide Emissions as Percentages of UK National Total



Source: Review of the UK Climate Change Programme, Consultation Paper, December 2004

Index of End User Greenhouse Gas Emissions 1990-2002



Source: Review of the UK Climate Change Programme, Consultation Paper, December 2004

Carbon Dioxide Emissions by End User, MtC

Source	Base year	1990	1995	2000	2005	2010	2015	2020
Business	58.3	58.3	50.1	49.3	49.7	44.5	45.1	46.7
Industrial processes	7.4	7.4	7.7	7.3	7.1	7.3	7.4	7.6
Transport	39.2	39.2	39.8	41.3	42.5	43.3	44.6	45.9
Residential	41.7	41.7	38.4	39.5	38.6	34.9	34.4	33.8
Public	8.7	8.7	8.0	6.7	6.2	5.7	5.5	5.2
Agriculture	1.6	1.6	1.4	1.2	1.2	1.2	1.1	1.0
Land use change	5.3	5.3	4.5	4.2	3.3	2.4	2.0	1.7
Waste management	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.1
Exports	2.5	2.5	3.5	3.0	3.2	2.6	2.0	1.8
Total	165.1	165.1	153.5	152.7	151.9	142.0	142.4	143.9

Source: Review of the UK Climate Change Programme, Consultation Paper, December 2004

Carbon Dioxide Emissions: Actual/Red Scenario 2050

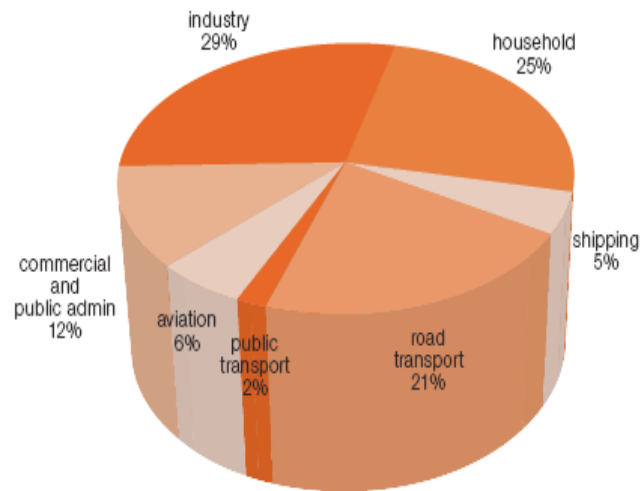


Figure 19
Sectoral split of carbon emissions
for **Today**

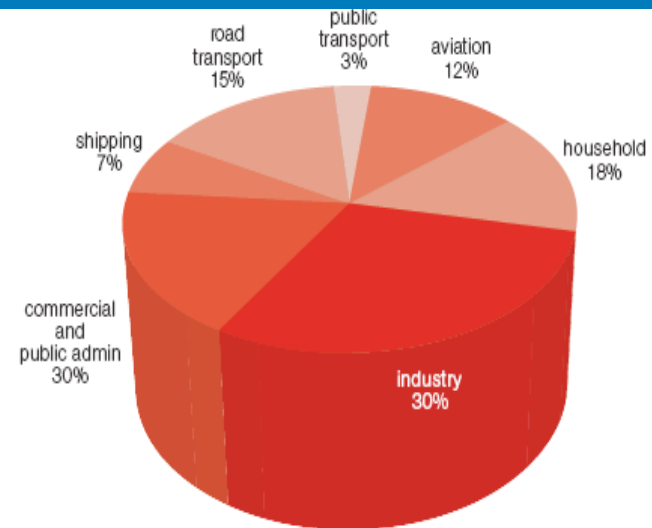


Figure 20
Sectoral split of carbon emissions
for the **Red** scenario

Carbon Dioxide Emissions: Blue/Turquoise Scenarios 2050

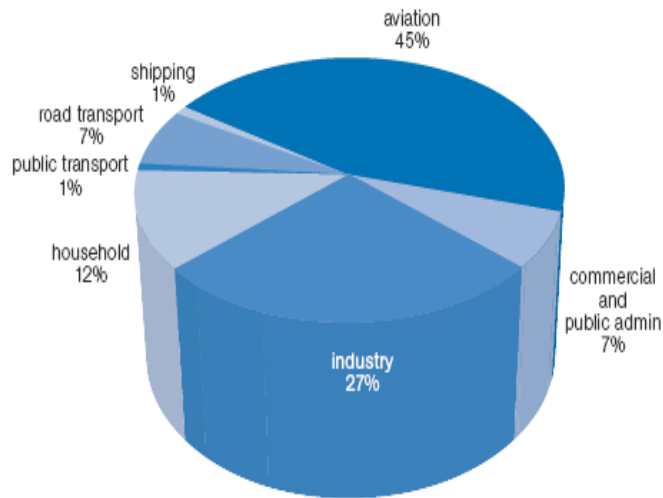


Figure 21
Sectoral split of carbon emissions
for the **Blue** scenario

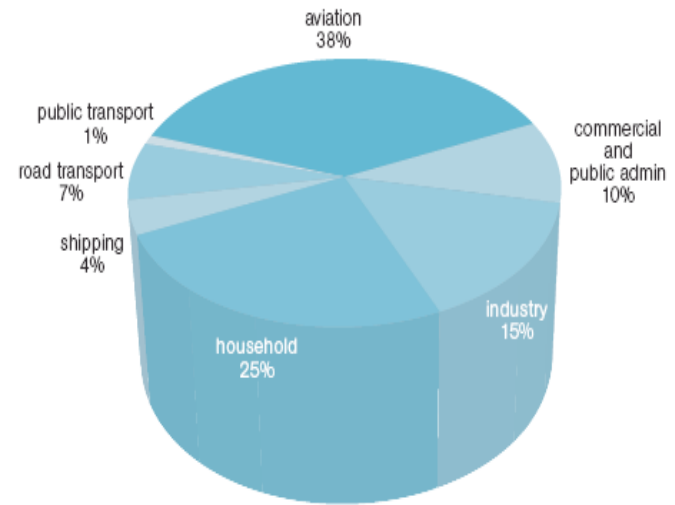


Figure 22
Sectoral split of carbon emissions
for the **Turquoise** scenario

Carbon Dioxide Emissions: Purple/Pink Scenarios 2050

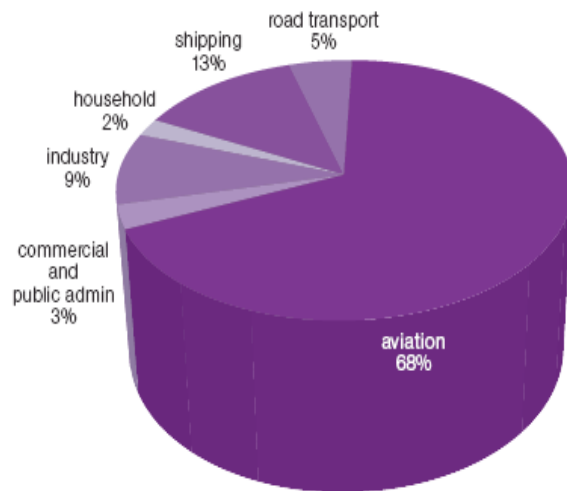


Figure 23
Sectoral split of carbon emissions
for the **Purple** scenario

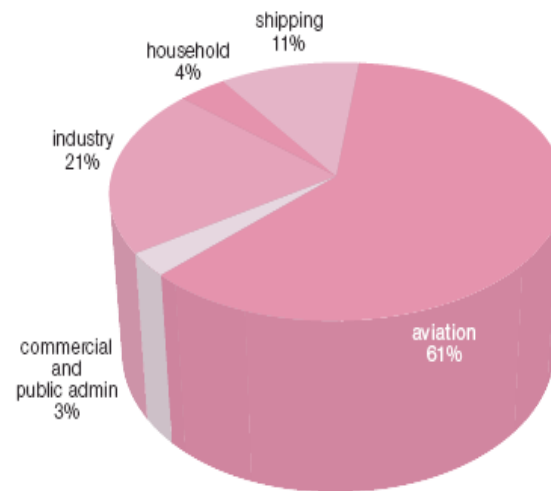


Figure 24
Sectoral split of carbon emissions
for the **Pink** scenario