Key Issues Emerging from AR4

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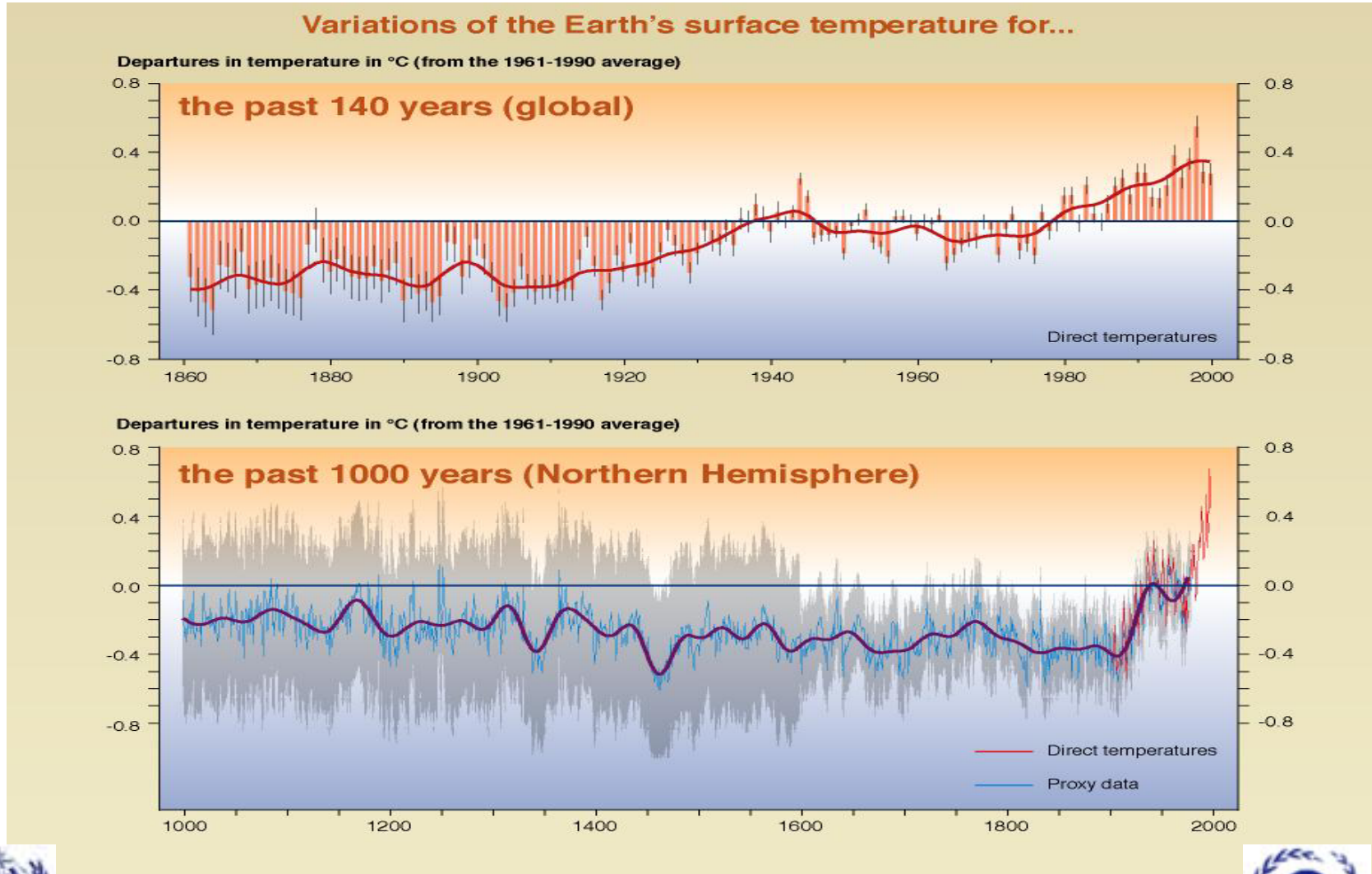
The Global Energy Challenges
URC on Energy, Climate and Sustainable Development
Copenhagen, Denmark, 13 January, 2006

Global mean surface temperatures are increasing

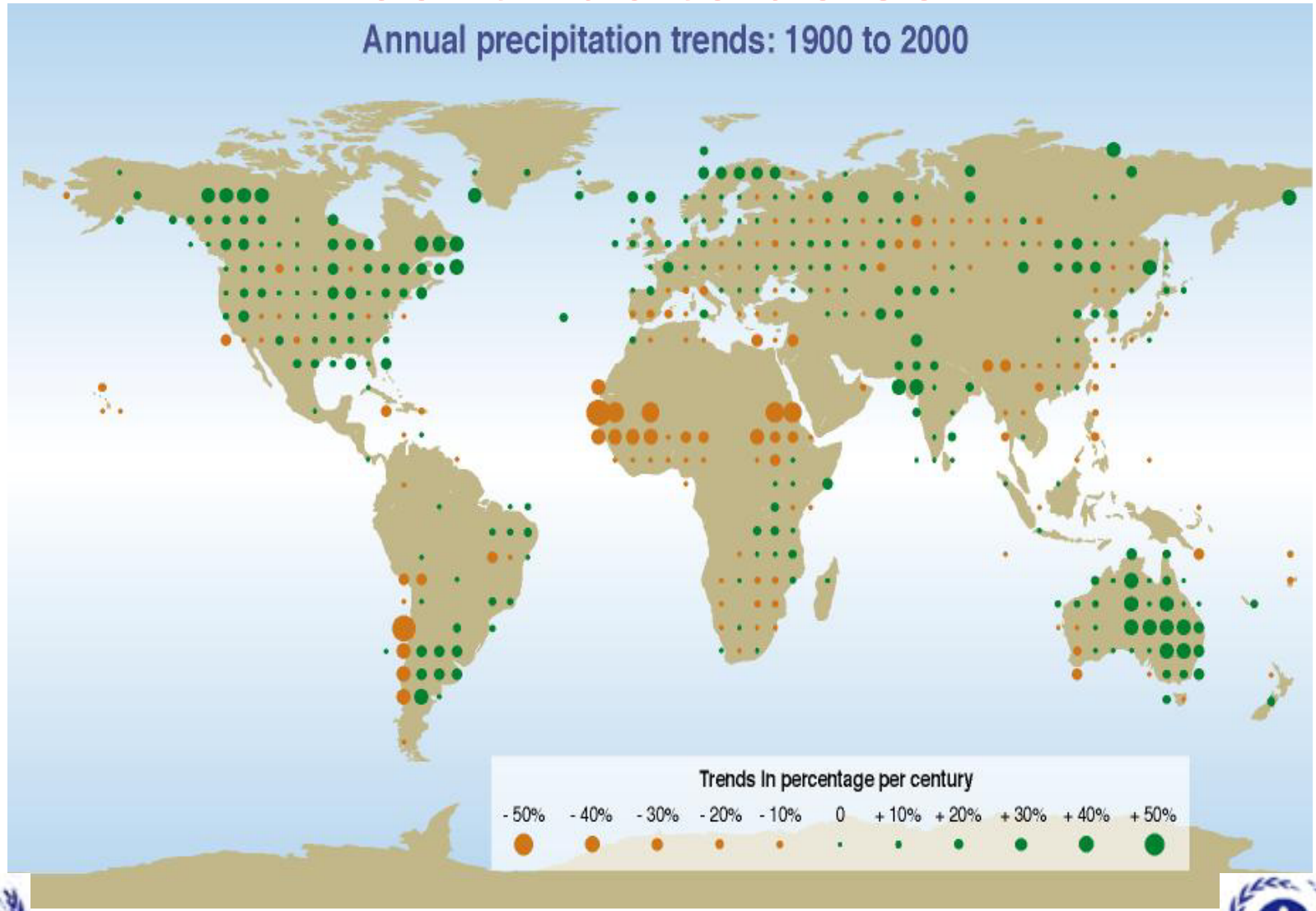


INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC)

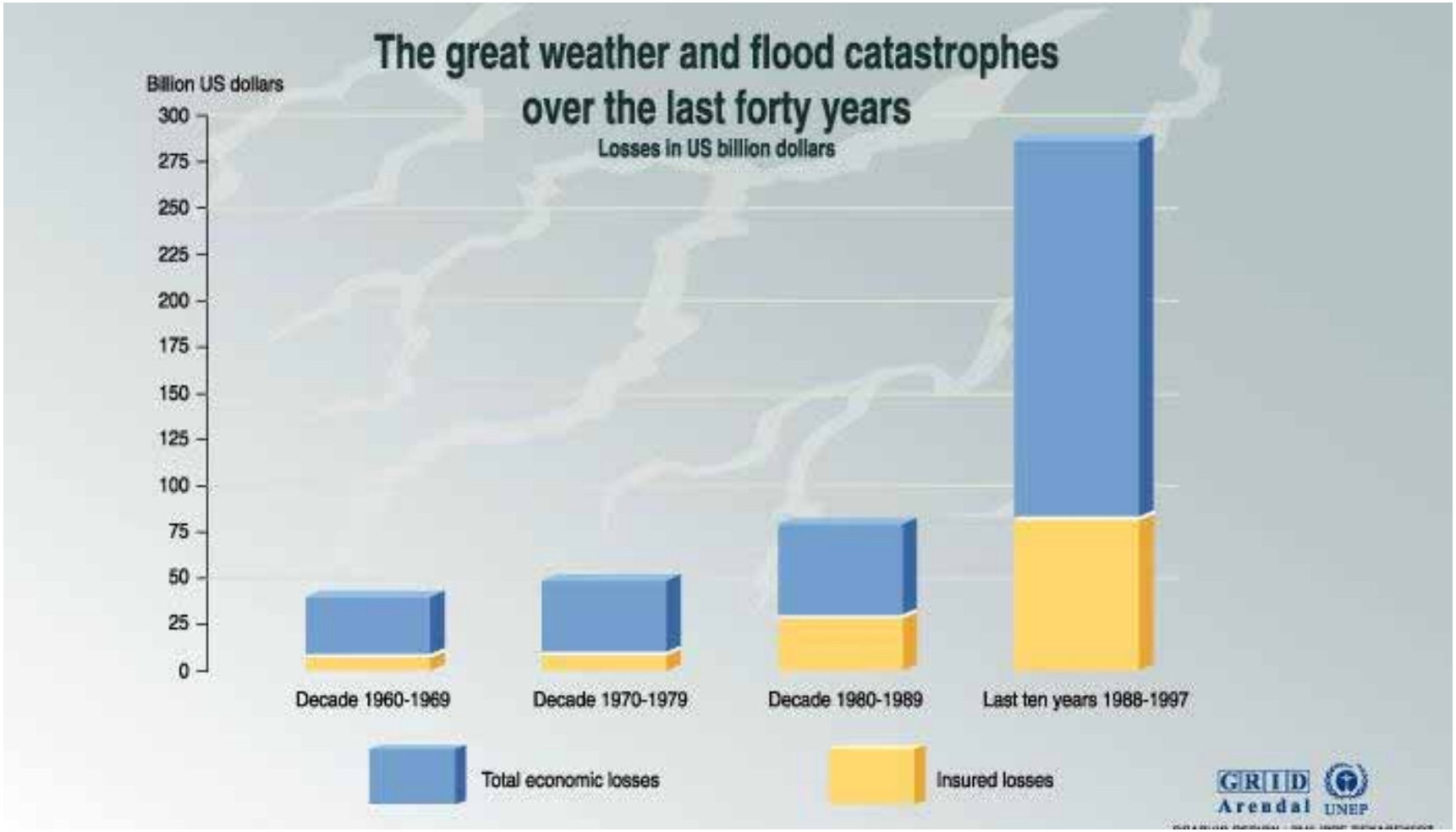
WMO

UNEP

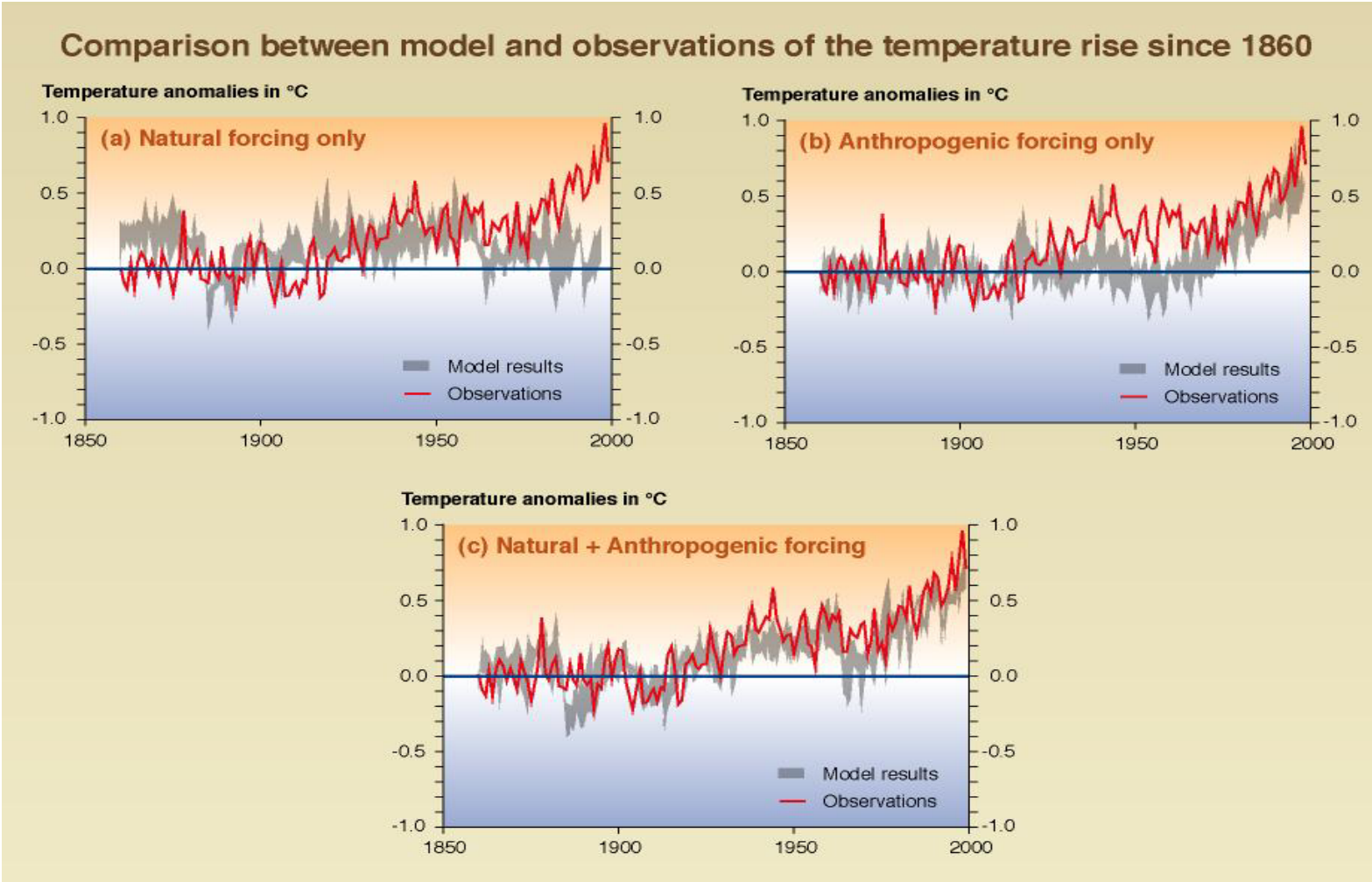
Precipitation patterns have changed and continue to do so



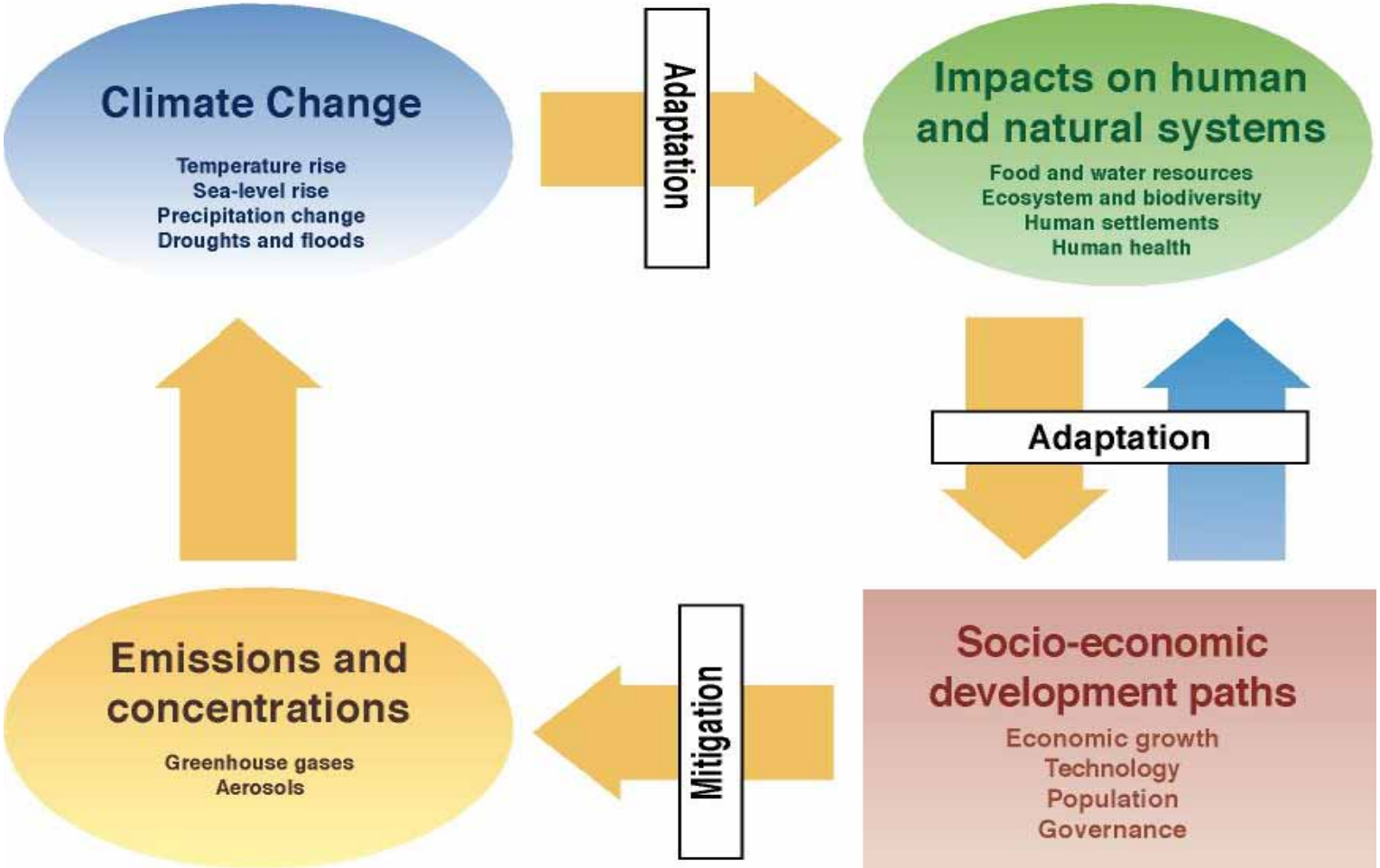
Weather-related economic damages are increasing



Most of the observed warming in the past 50 years is attributable to human activities



Climate change is not just an environmental issue, but a development issue



Extreme weather events are projected to increase

Projected changes during the 21st century

- Higher maximum temperatures; more hot days and heatwaves over nearly all land areas *(very likely)*
- Higher minimum temperatures; fewer cold days frost days and cold spells over nearly all land areas *(very likely)*
- more intense precipitation events over many areas (*very likely*)
- increased summer drying over most mid-latitude continental interiors and associated risk of drought *(likely)*
- increase in tropical cyclone peak wind intensity, mean and peak precipitation intensities *(likely)*

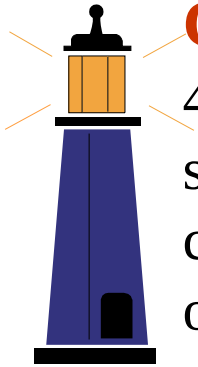
Impacts

- Increased mortality in old people in urban areas
- Damage to crops
- Heat stress on livestock
- Extended range of pests and diseases
- Loss of some crop/fruit
- Land slides, mudslides, damage to property and increased insurance costs
- Reduced rangeland productivity, increased wildfires, decreased hydropower
- Damage to various ecological and socioeconomic systems

Why (poor people in) developing countries are most vulnerable to climate change: impacts worse

Closer to margin of tolerance

for temperature and precipitation changes (more drought- and flood-prone areas)

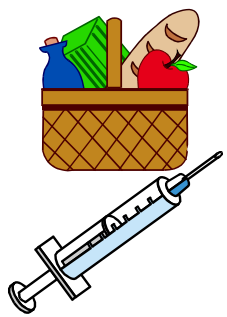


Coastal vulnerability

49 out of 50 countries with shore protection costs due to climate change above 0.5% of GDP are less developed countries

Economic structure

Larger share of the economy in climate sensitive sectors, such as agriculture



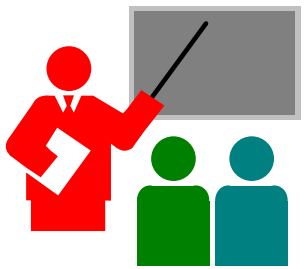
Poorer nutrition and health infrastructure

and therefore higher losses of human life

Why (poor people in) developing countries are most vulnerable to climate change:lower capacity to adapt

Availability of technology

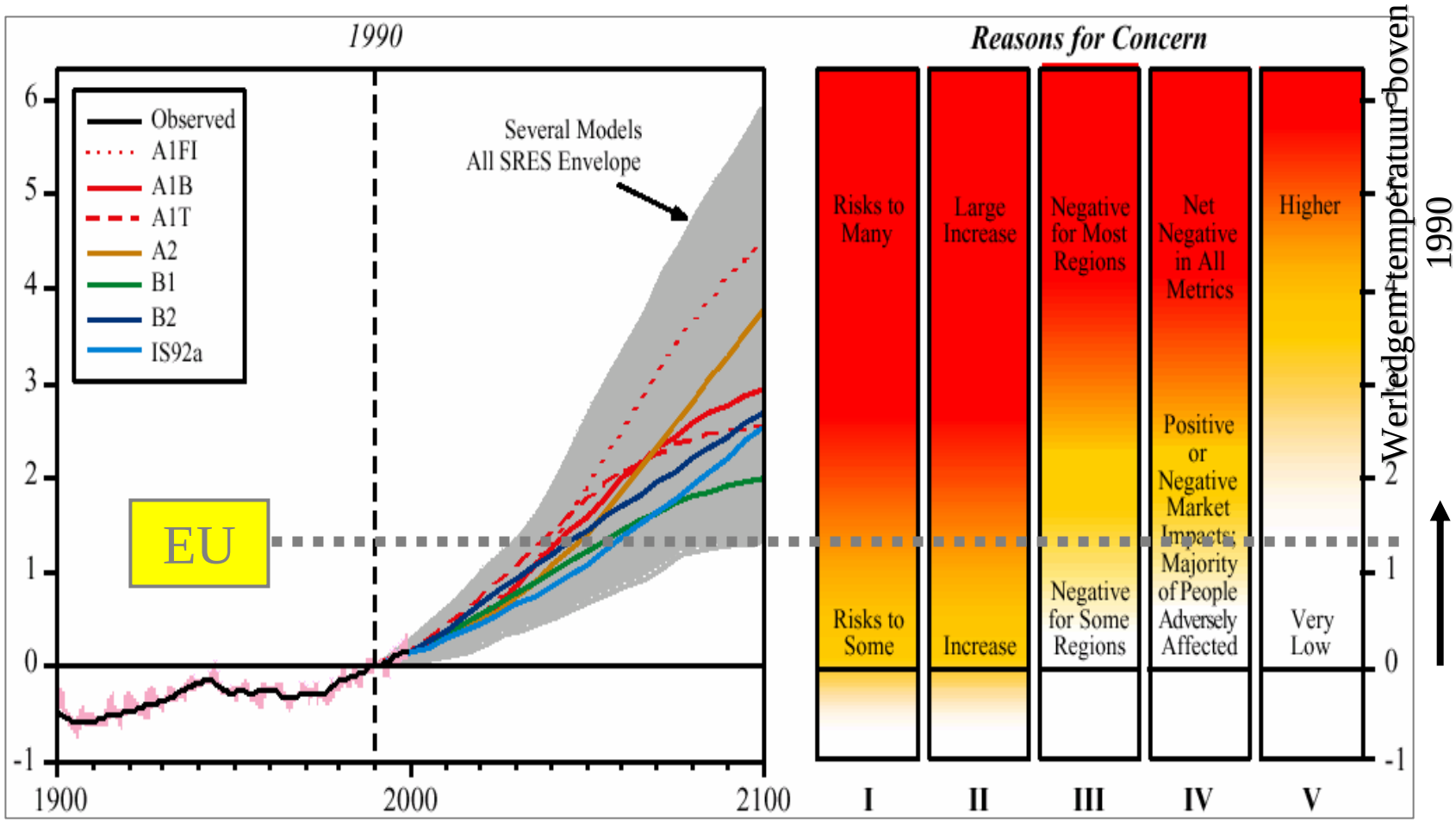
Institutional capacity



Know-how and education

Financial capacity

The Challenge is where to draw the line?



Bron: IPCC, 2001

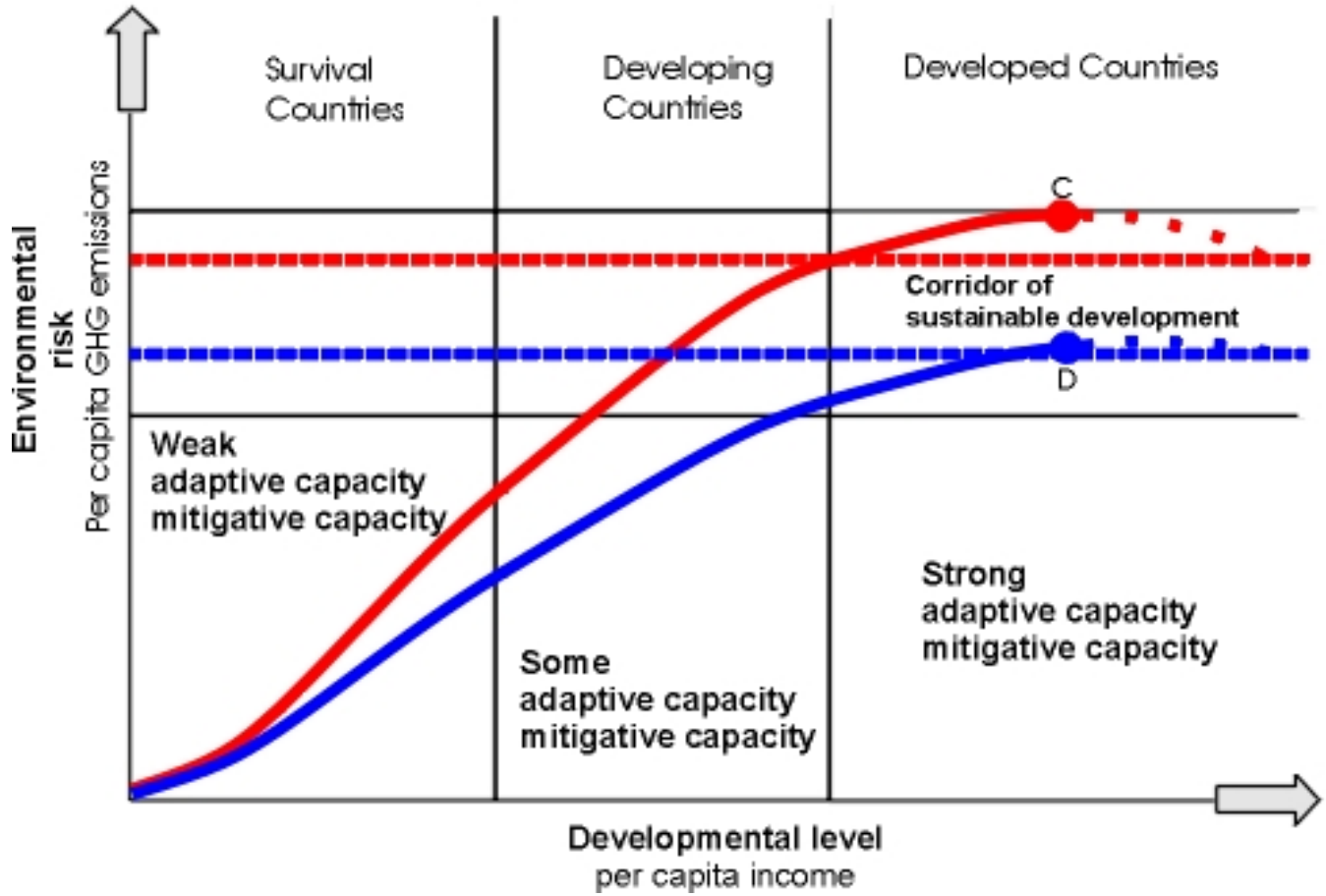
Cross Cutting Themes in AR4

1. Interrelation between Adaptation and Mitigation
2. Sustainable Development
3. Technology
4. Uncertainty & Risk
5. Regional aspects
6. Article 2 and Key vulnerabilities

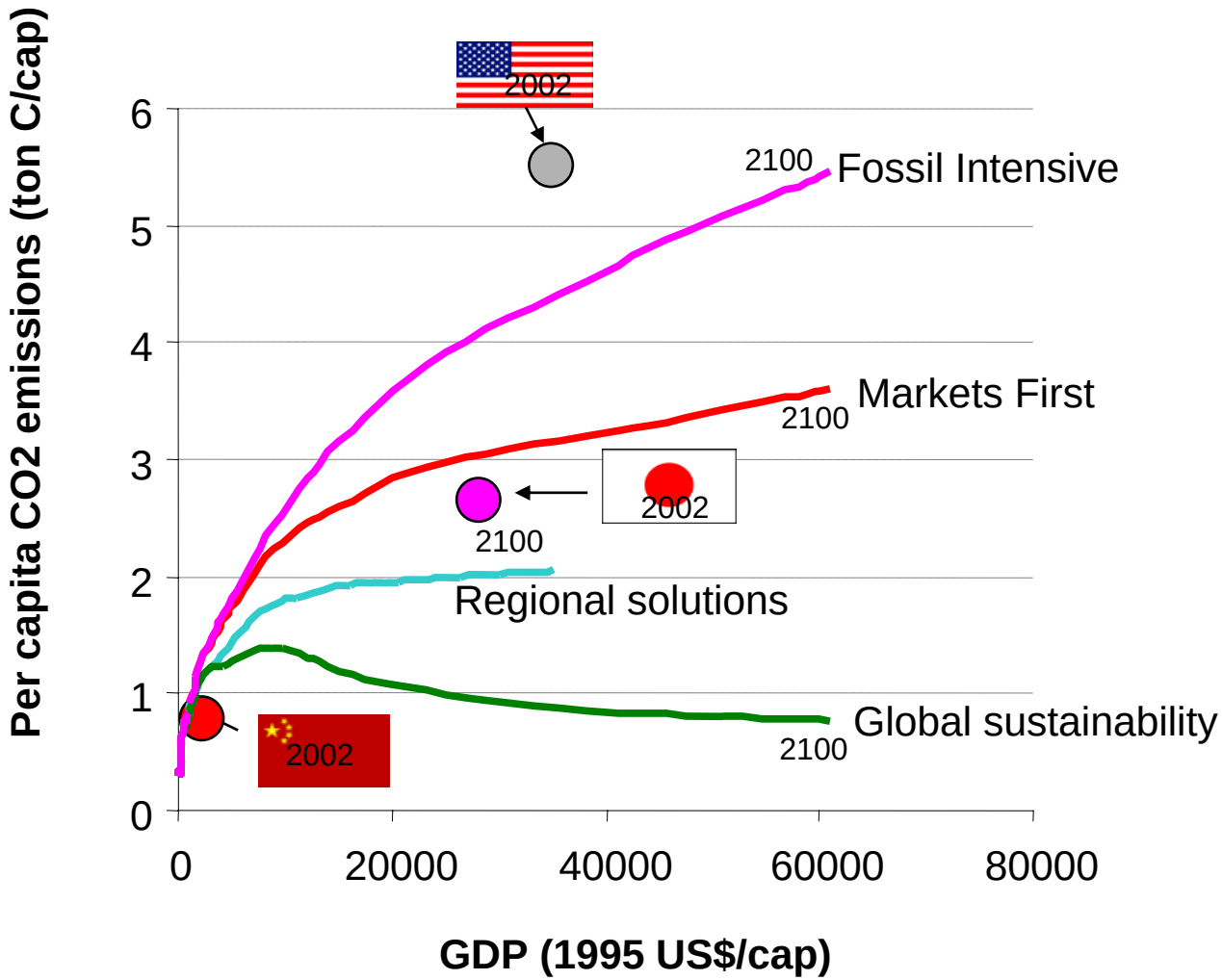
AR4 Products

1. Working Group 1 Report
   Science of Climate Change
2. Working Group 11 Report
   Adaptation to Climate Change
3. Working Group 111 Report
   Mitigation to Climate Change
4. Synthesis Report
   1. Main messages of all group reports
   2. Synthesise cross-cutting information
   3. Provide top-down perspective for decision-makers
   4. Re-assess policy relevant questions addressed in TAR

Regional Differences will become more important in responding to Climate Change

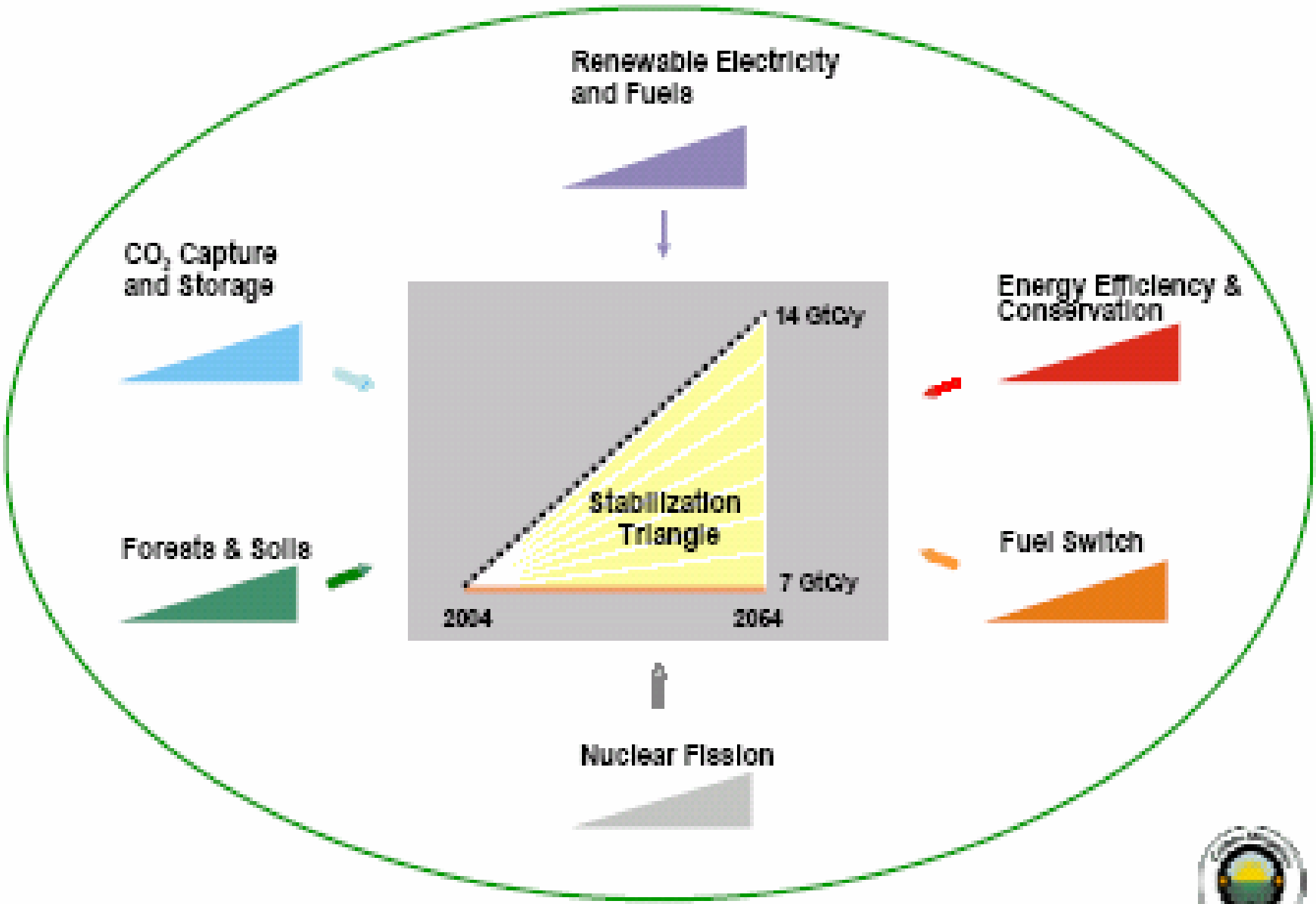


Four different development paths

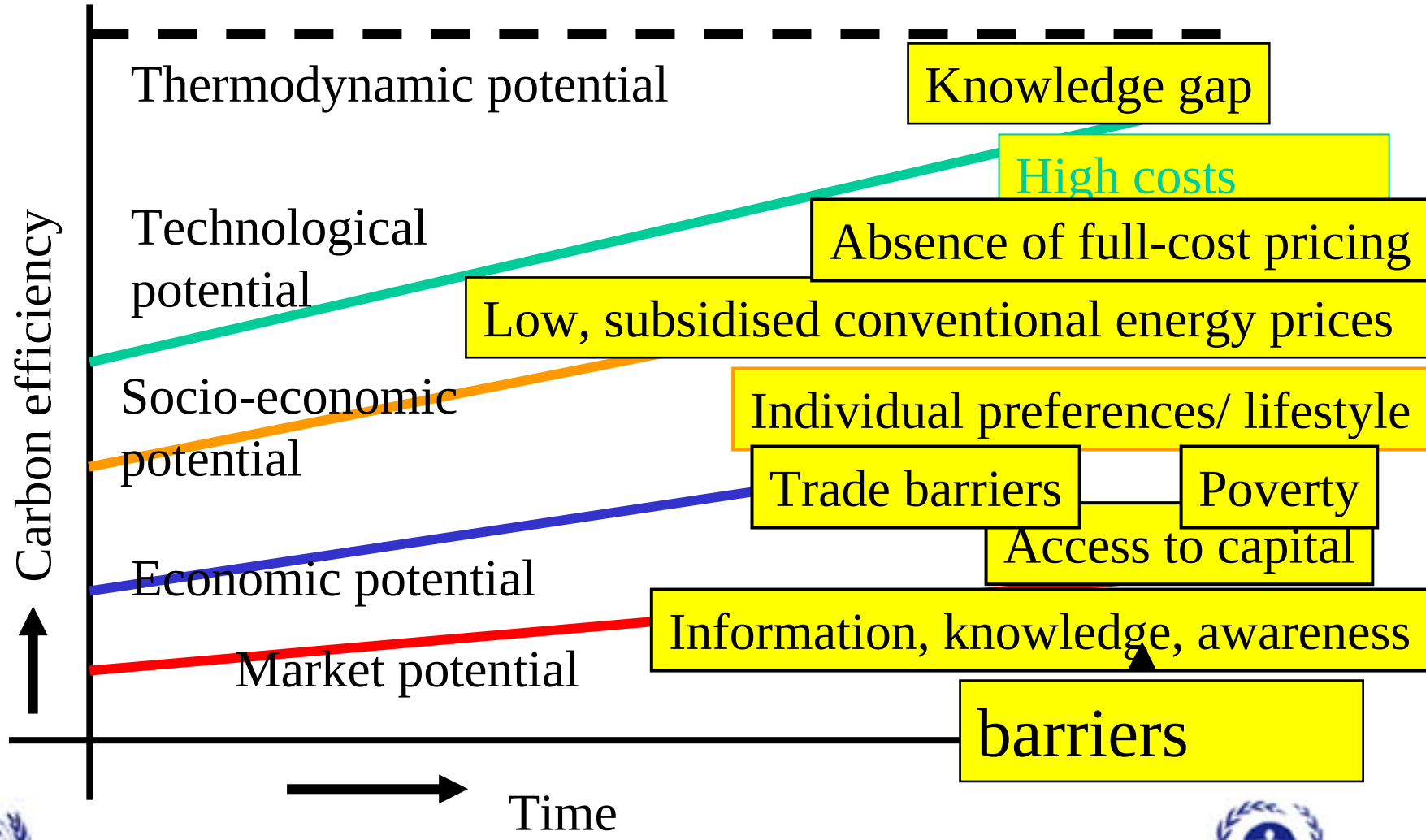


Source: RIVM/ERI, 2001; IMAGE-TIMER calculations

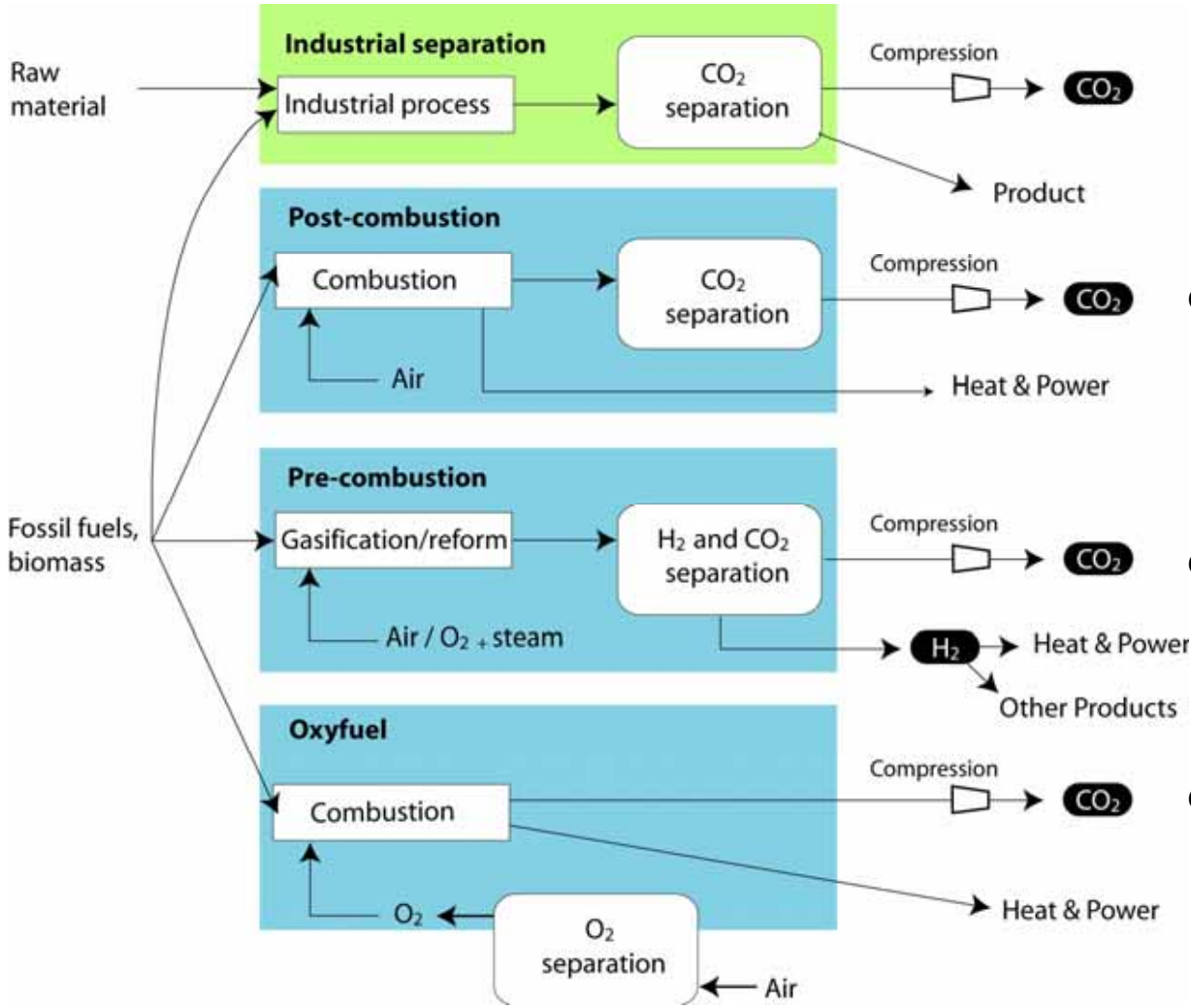
Possible Mitigation Portfolio



Barriers to achieving the potential of technologies



CO_2 capture processes and systems



Concentration: 3 – 15%

Concentration: 15 – 60%

Concentration: 95 – 99%

Maturity of capture technology

Capture option	Research	Demon-stration	Economically feasible under specific conditions	Mature market
Post-combustion			X	
Pre-combustion			X	
Oxyfuel combustion		X		
Industrial separation (natural gas processing, ammonia production)				X

Outlook

- CO_2 capture integration in advanced designs could reduce future CO_2 capture costs and energy penalties
- Future cost reductions will depend on deployment in the marketplace (technology learning) as well as sustained R&D
- CO_2 capture is the first step along the CCS chain

Real CO_2 capture installations

Scope of emissions trading and allocation of emission allowances will have a big effect on costs

- EU: 30% below 1990 by 2020 (CO2 only, per capita convergence 2030, w/wo Afr/Asia) (Bollen et al, 2004)

Country/Region	GNI change (% by 2020)
EU-25	-0.6 to -1.8
Russia	-1.4 to -1.8
Middle-East	-1.3 to +5.7
Africa/Asia Developing	+0.8 to +0.2

Fitting in together in the long term

- An effective climate change strategy will require the integration of development, equity and sustainability within a sustainable development framework
- Conventional economic analysis has to consider both soicial and environmental aspects for optimal decision- making
- Climate change could worsen the gap in distributional goods and services between and within generations as the poor and dis-advantaged are predicted to be the most affected

Summary

1. Controlling climate change risks requires urgent action
2. Low-level stabilisation does not require totally new technologies
3. There are no magic bullets: a portfolio of technology options is needed; excluding options will increase costs
4. Multi-gas strategies, emission trading, optimal timing and strong technology development, diffusion and transfer are essential to keep costs of low-level stabilisation relatively low
5. A big problem for low-level stabilisation is overcoming the many political (e.g. equitable allocation!), social and behavioural barriers to implementing mitigation options
6. Co-benefits (development, security, environment) are important for costs and acceptability

Thank you for your attention