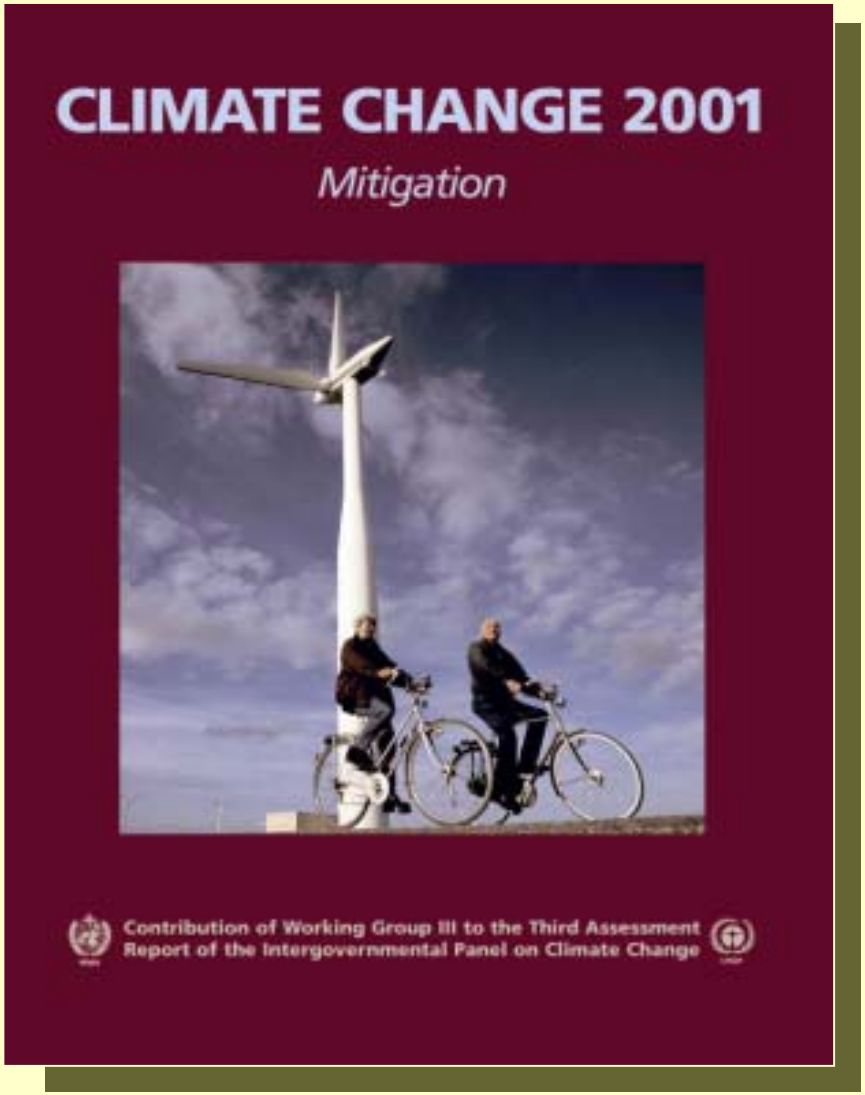
IPCC Third Assessment Report



Outline of WG3

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The TAR WG 3 process

- Broad array of disciplines, geographical balance of authors: 150 LAs, 80 CAs, over 300 reviewers, 64 authors from developing countries
- 3 year process involving four LA meetings
- The assessment used over 4000 peer reviewed literature and publicly available relevant reports
- Previous IPCC reports, including Special Report on Technology Transfer, and Emission Scenarios
- SPM was approved and underlying report accepted unanimously by IPCC WG 3 plenary in Accra, Ghana, March, 2001

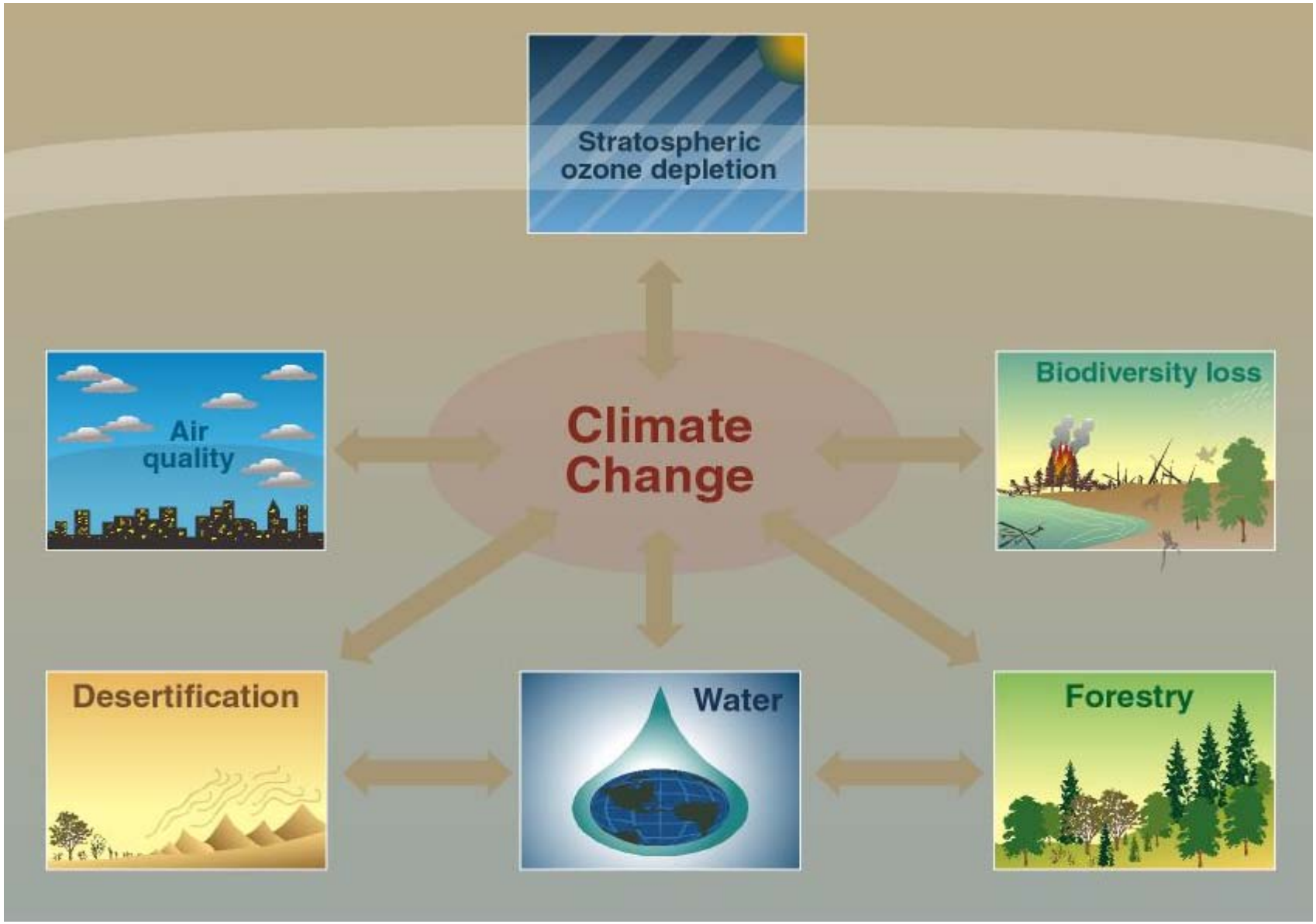
Structure of the report

- Setting the stage: climate change and sustainable development
- GHG mitigation scenarios and implications
- Technological and economic potentials
- Barriers and opportunities
- Policies, measures and instruments
- Mitigation cost and ancillary benefits
- Decision making frameworks

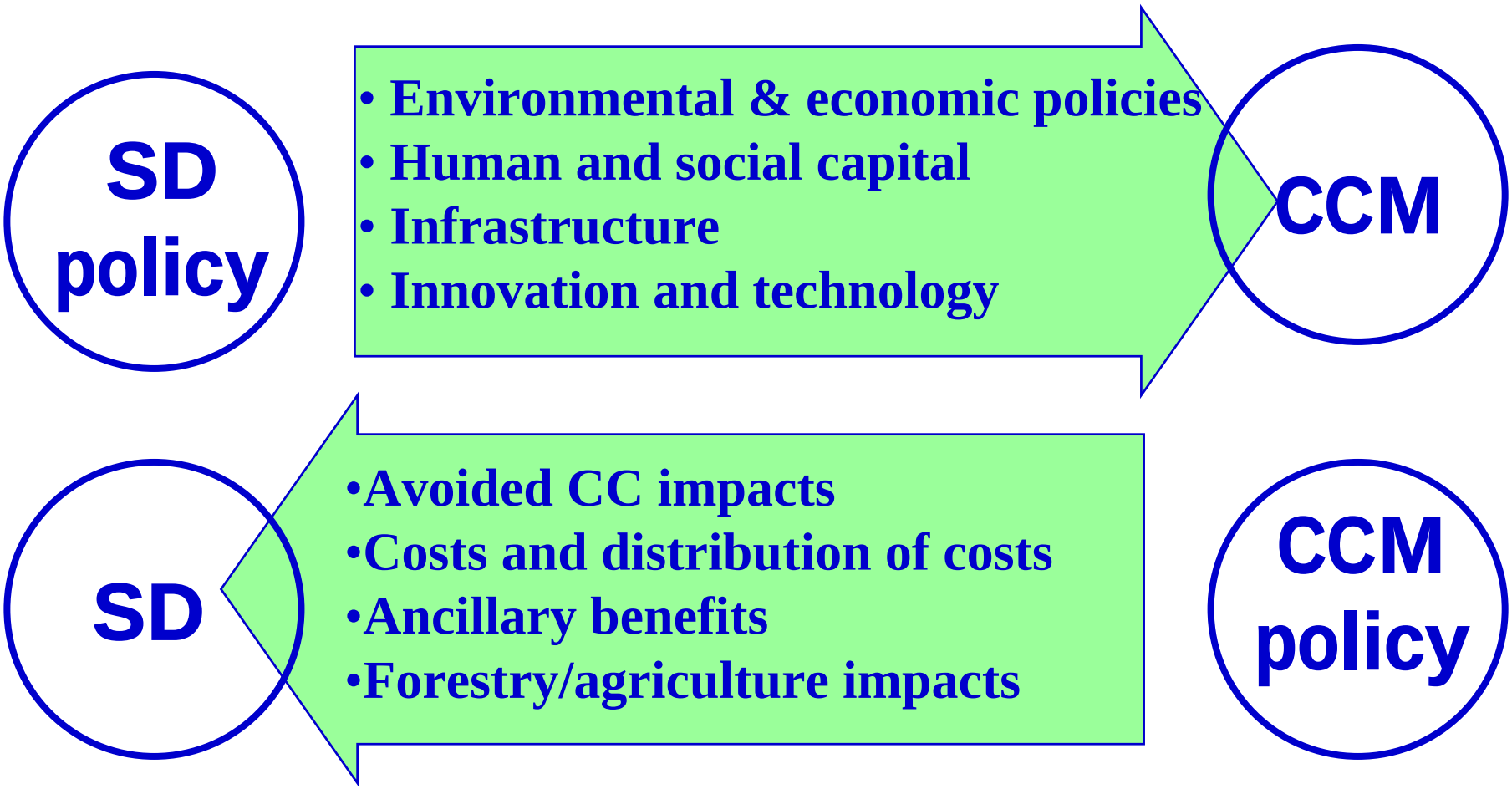
Main messages (1)

There is a strong link between sustainable development, environmental management and climate change mitigation

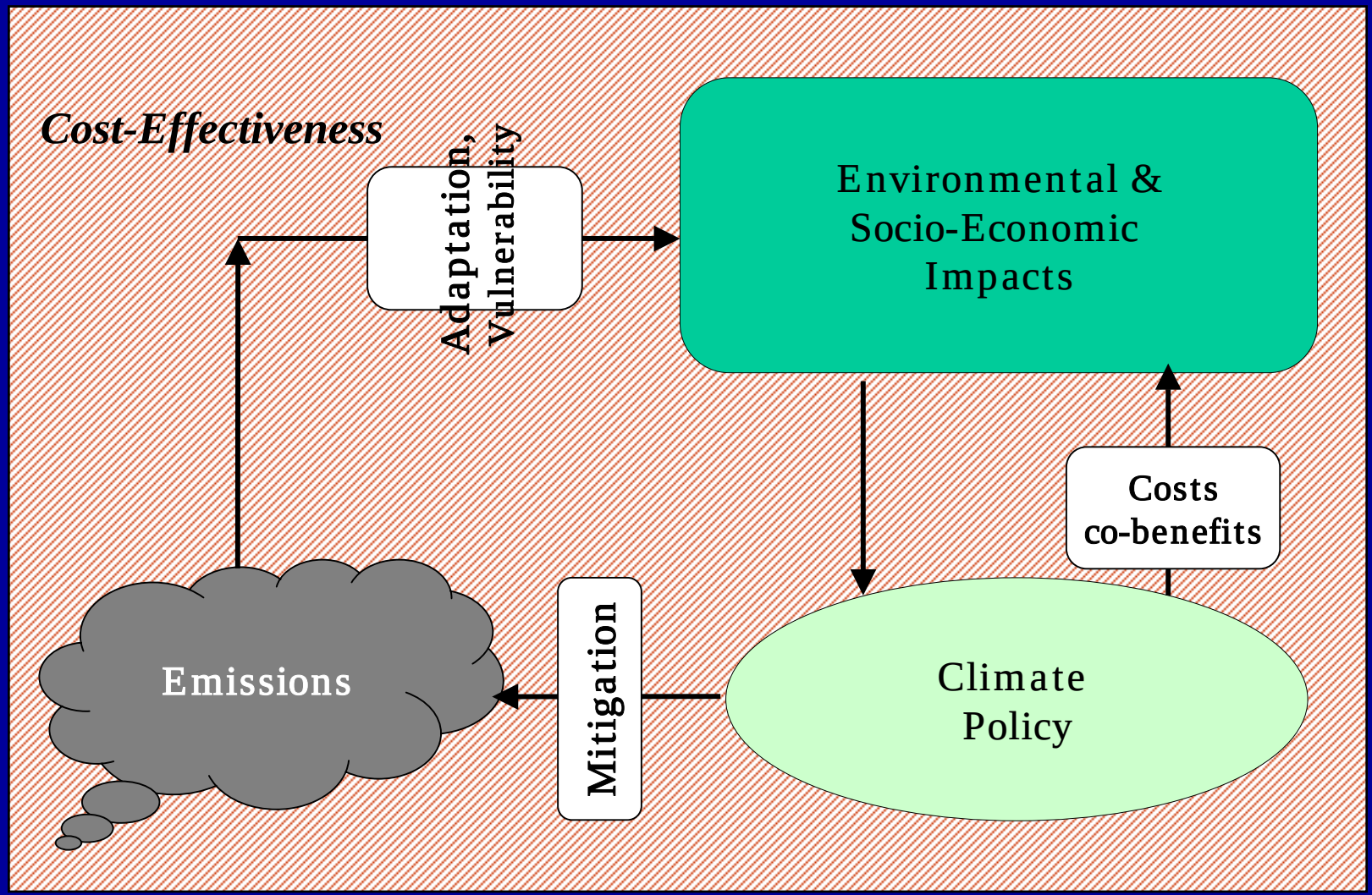
Mitigation and Other Environmental Issues



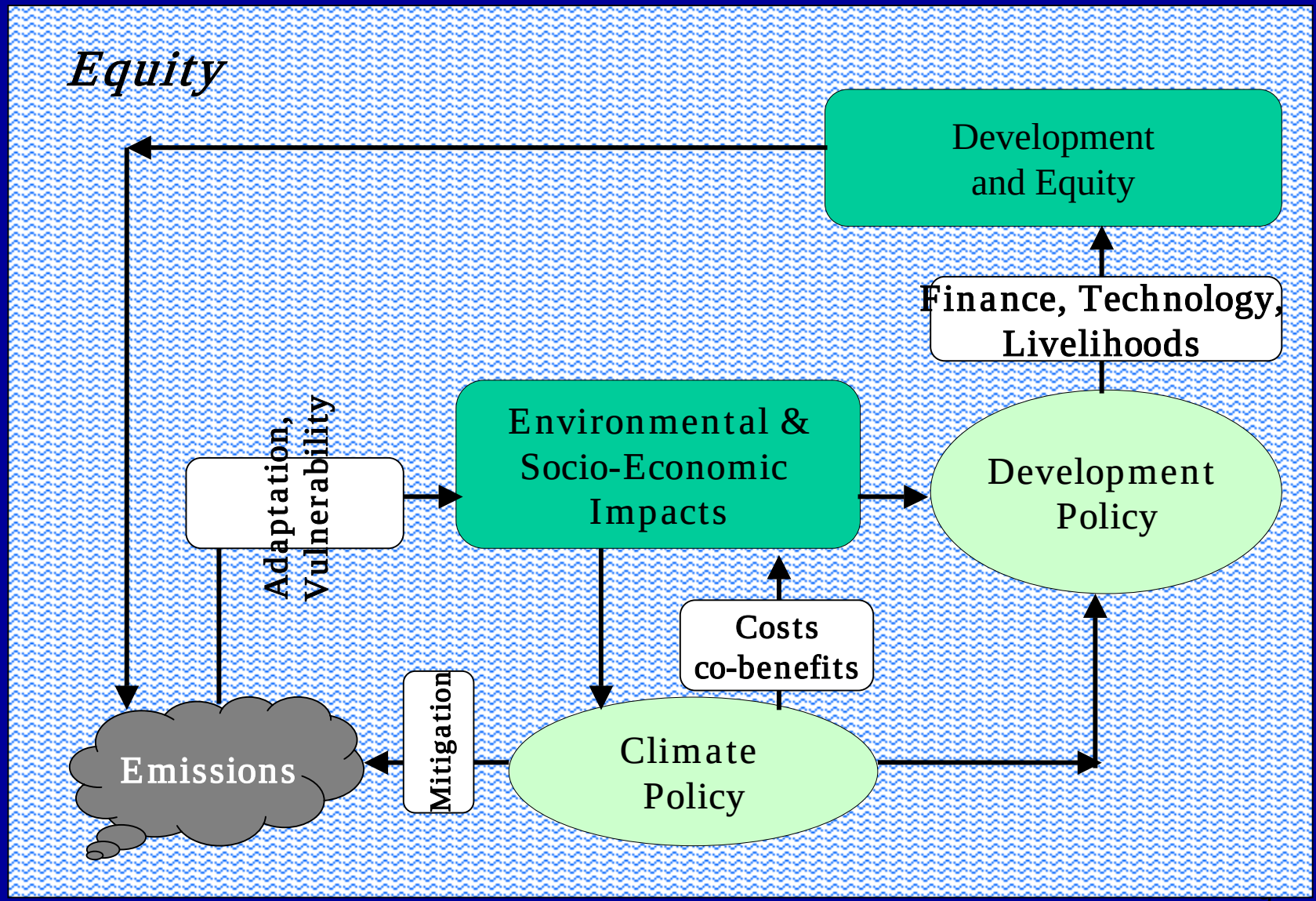
Linkages between Climate Change Mitigation and Sustainable Development



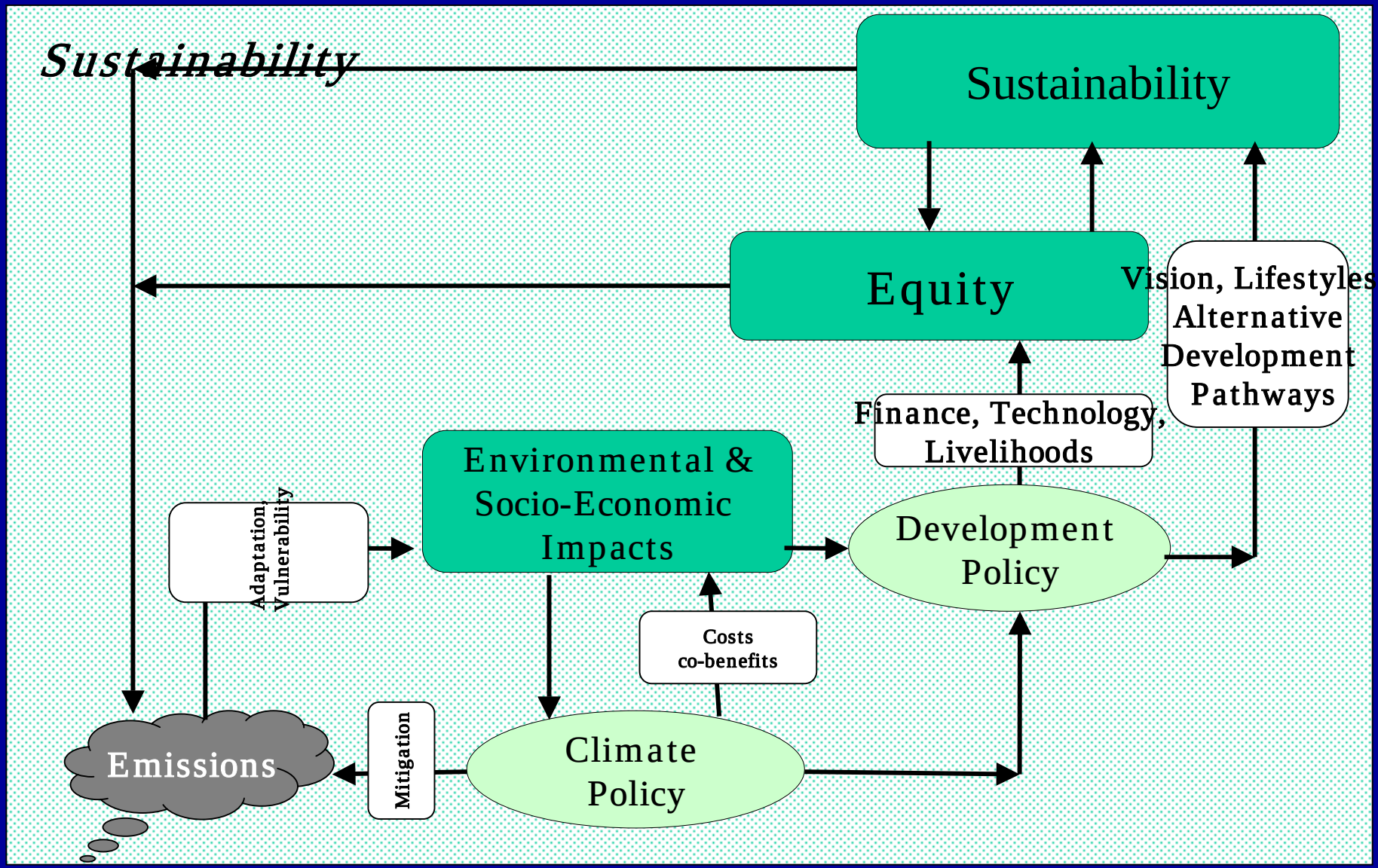
: The Scope of Climate Mitigation Analysis: The cost-effectiveness perspective



The Scope of Climate Mitigation Analysis: The equity perspective



The Scope of Climate Mitigation Analysis: The sustainability perspective



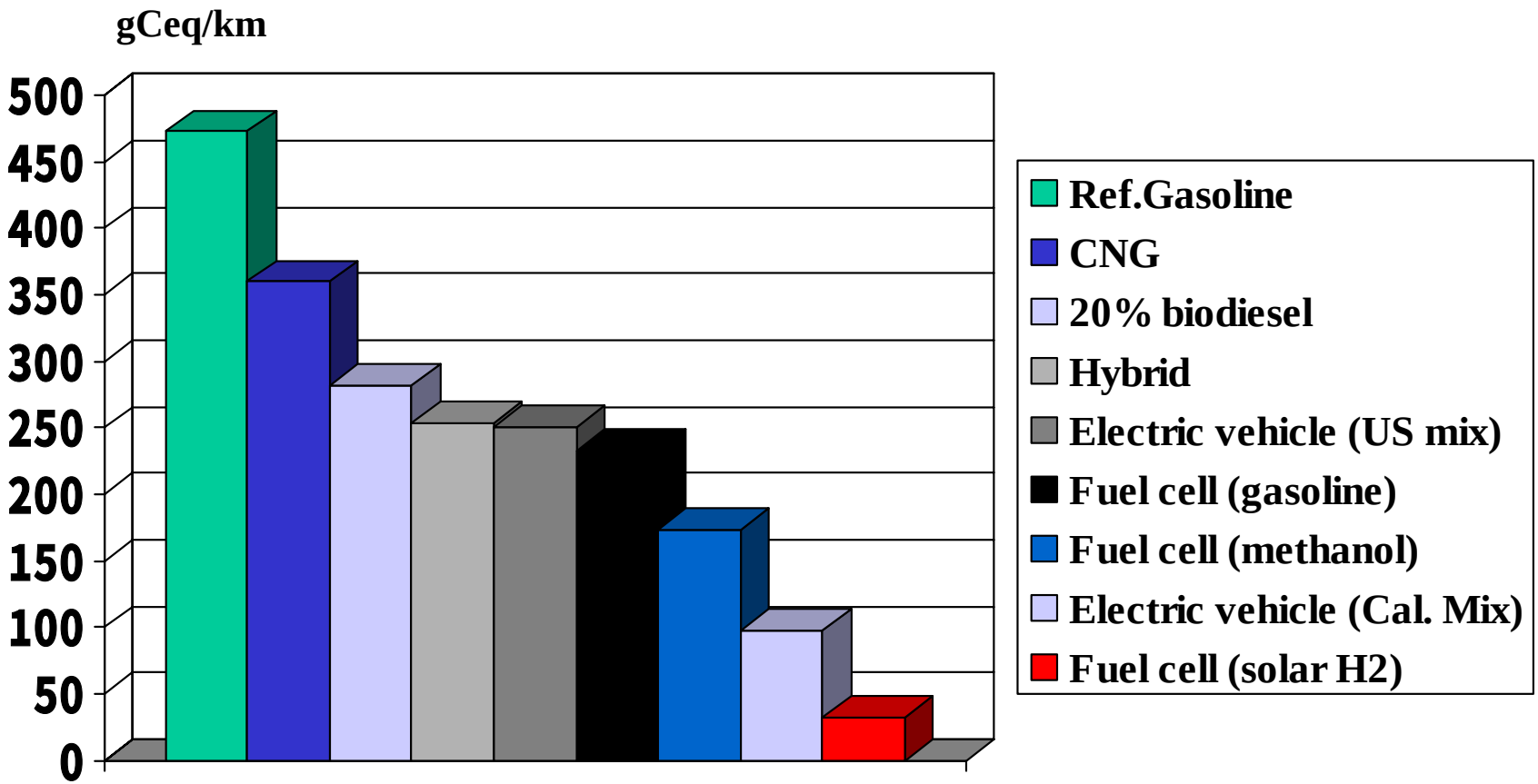
Main messages (2)

Technologies are presently available, in the short term, to stop the growth of global GHG emissions and, in the long term, to limit climate change impacts

Mitigation options

- **Energy efficiency**
- Decarbonisation
  - energy sources
  - CO2 removal and storage
- Biological carbon sequestration
- Reducing other greenhouse gases from industry, agriculture, waste management

GHG emissions per kilometer for different vehicle technologies



Source: Moomaw et al, IPCC, 2001

Mitigation options

- Energy efficiency
- **Decarbonisation**
  - **–energy sources**
    - – CO2 removal and storage
- Biological carbon sequestration
- Reducing other greenhouse gases from industry, agriculture, waste management

Long term technical potential renewable and nuclear energy supply

	Long-term Technical Potential (EJ/yr)
Hydro	>50
Geothermal	>20
Wind	>630
Ocean	>20
Solar	>1600
Biomass	>440
Total Renewable	>2800

2100 Total Energy Demand for SRES scenario ranges 515-2737 EJ/yr

Nuclear 77-4620 EJ/yr on average over 100 years

Mitigation options

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- **Decarbonisation**
  - energy sources
  - **CO2 removal and storage**
- Biological carbon sequestration
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Carbon dioxide storage capacities

Reservoir type	**Global capacity (GtC)**
Disused oil fields	100
Disused gas fields	400
Deep saline reservoirs	> 1000
Unminable coal measures	40
Deep ocean	> 1000
Total	**> 2500**

Emissions to be avoided: 300-1500 GtC up to 2100

Source: Moomaw et al, IPCC, 2001

Mitigation options

- Energy efficiency
- Decarbonisation
  - energy sources
  - CO2 removal and storage
- **Biological carbon sequestration**
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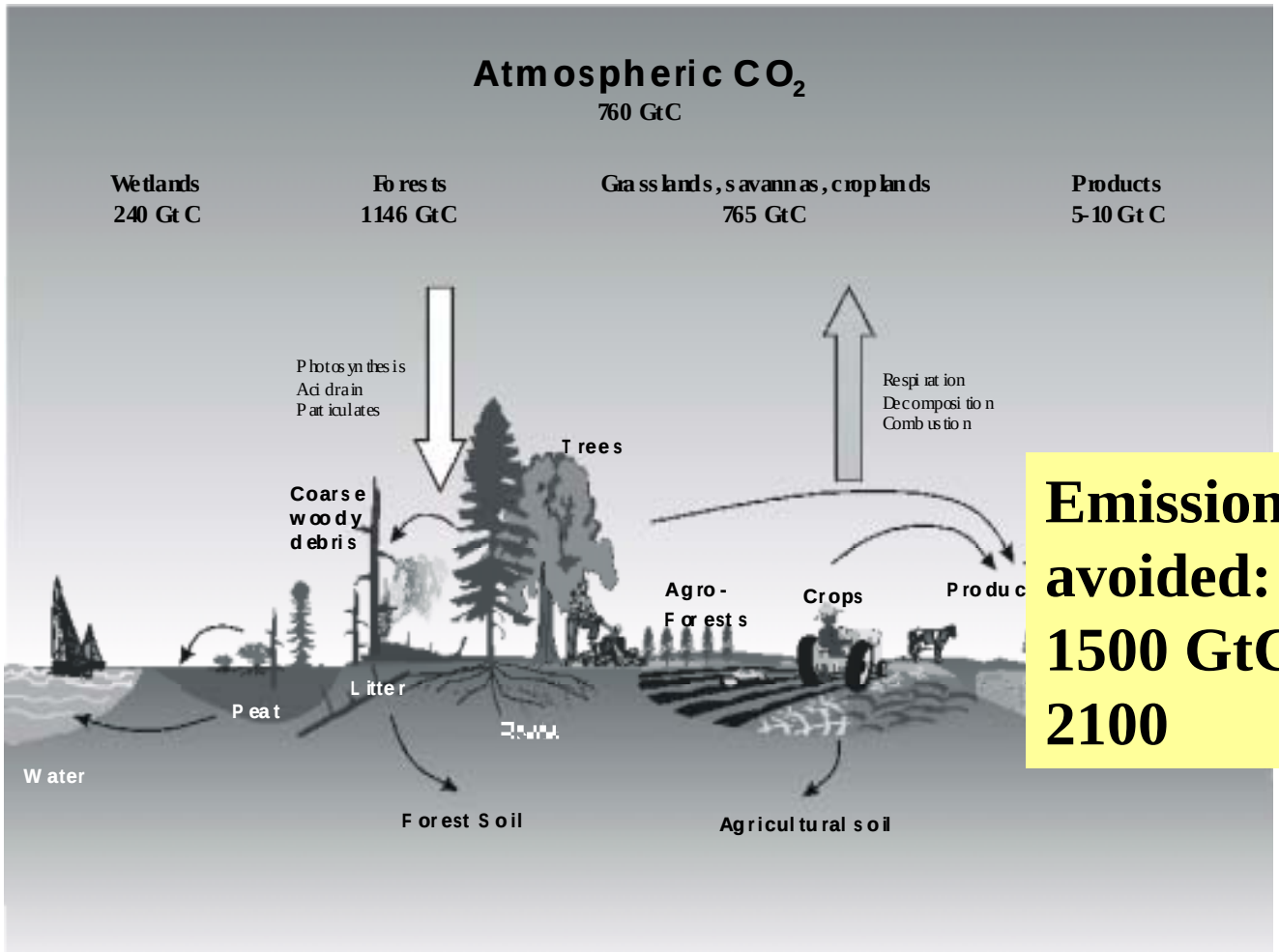
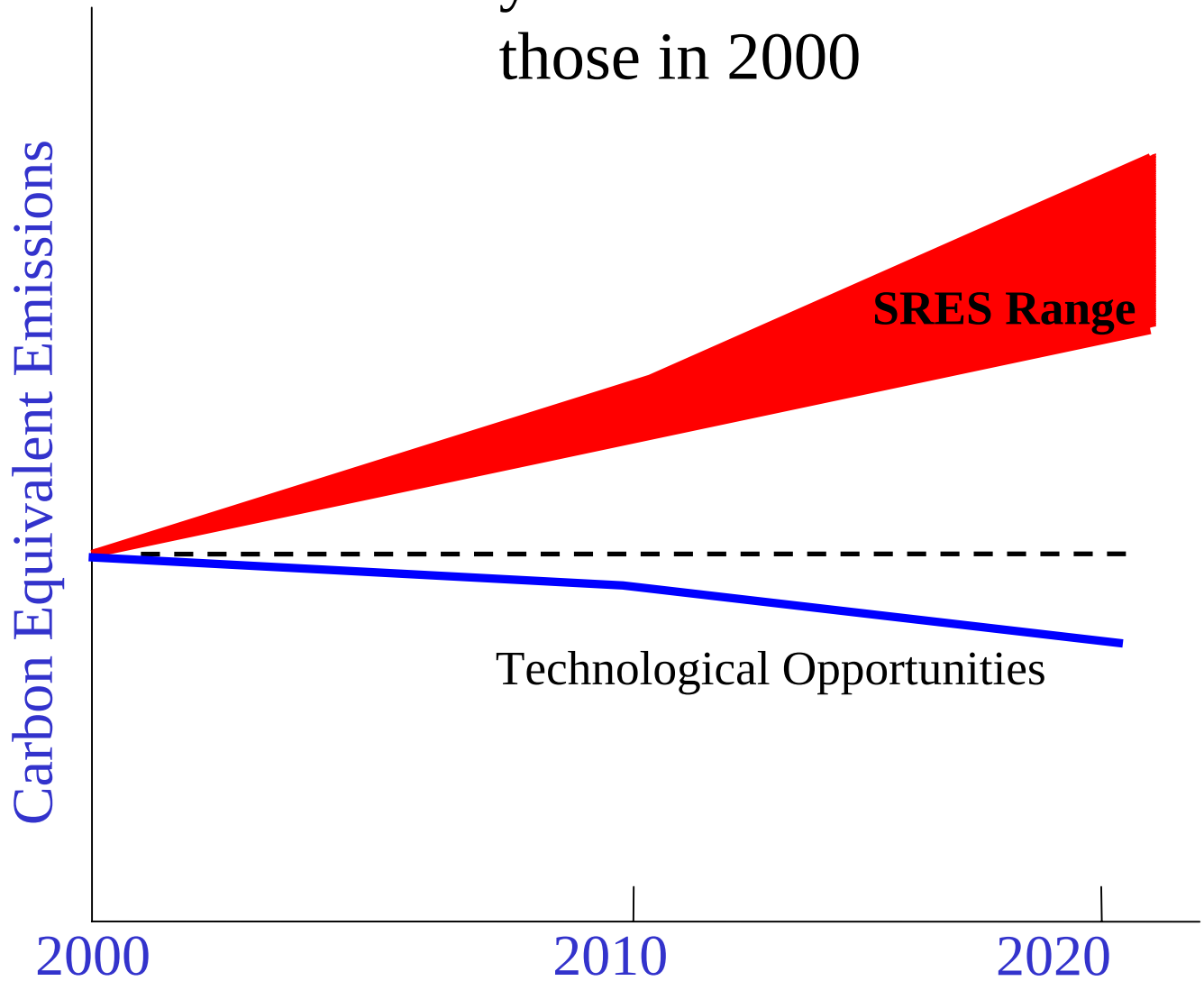
Biological mitigation potential: 100GtC up to 2050



Emissions to be avoided: 300-1500 GtC upto 2100

Technology improvements have the potential to reduce emissions by 2010 and 2020 to levels below those in 2000



Main messages (3)

The problem of controlling emissions is to overcome the many political, economic, social and behavioural barriers to implement mitigation options

Market and Institutional Barriers (Market Failures) to Achieving Economic Potential: Examples

- Lack of information
- Lack of access to capital, especially for smaller firms
- Absence of full-cost pricing
- Risk aversion in financial institutions, including Multilateral Development Banks
- Trade barriers, such as tariffs or export restrictions

Social and Cultural Barriers to Achieving Socioeconomic Potential: Examples

- Individual behavior
- Social values and preferences
- Cultural traits and norms
- Gender issues

Main messages (4)

The costs of implementing the Kyoto Protocol can be kept low, provided implementation is done efficiently

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Regional costs of Kyoto: Annex B

- Macro-economic modelling studies: 0.1-1.1% of 2010 GDP with emission trading (0.2-2% without).
- Costs can be even lower (or net benefits) with efficient use of sinks, other GHG's, CDM and JI and/or no-regrets opportunities.
- National cost estimates vary more widely.
- Economies in transition generally benefit.

Regional costs of Kyoto: non-Annex B developing countries

The same modelling studies suggest spillover effects of Annex B actions on non-Annex B countries:

- Most countries: slight losses or slight benefits due to changes in terms of trade, changes in costs of energy imports, relocation of industries.
- Oil-exporting developing countries: 0.05-0.2% reduction in 2010 GDP (but in worst case as much as 12% fall in projected oil revenues with emissions-permit trading, 25% without).

Regional costs of Kyoto: non-Annex B developing countries

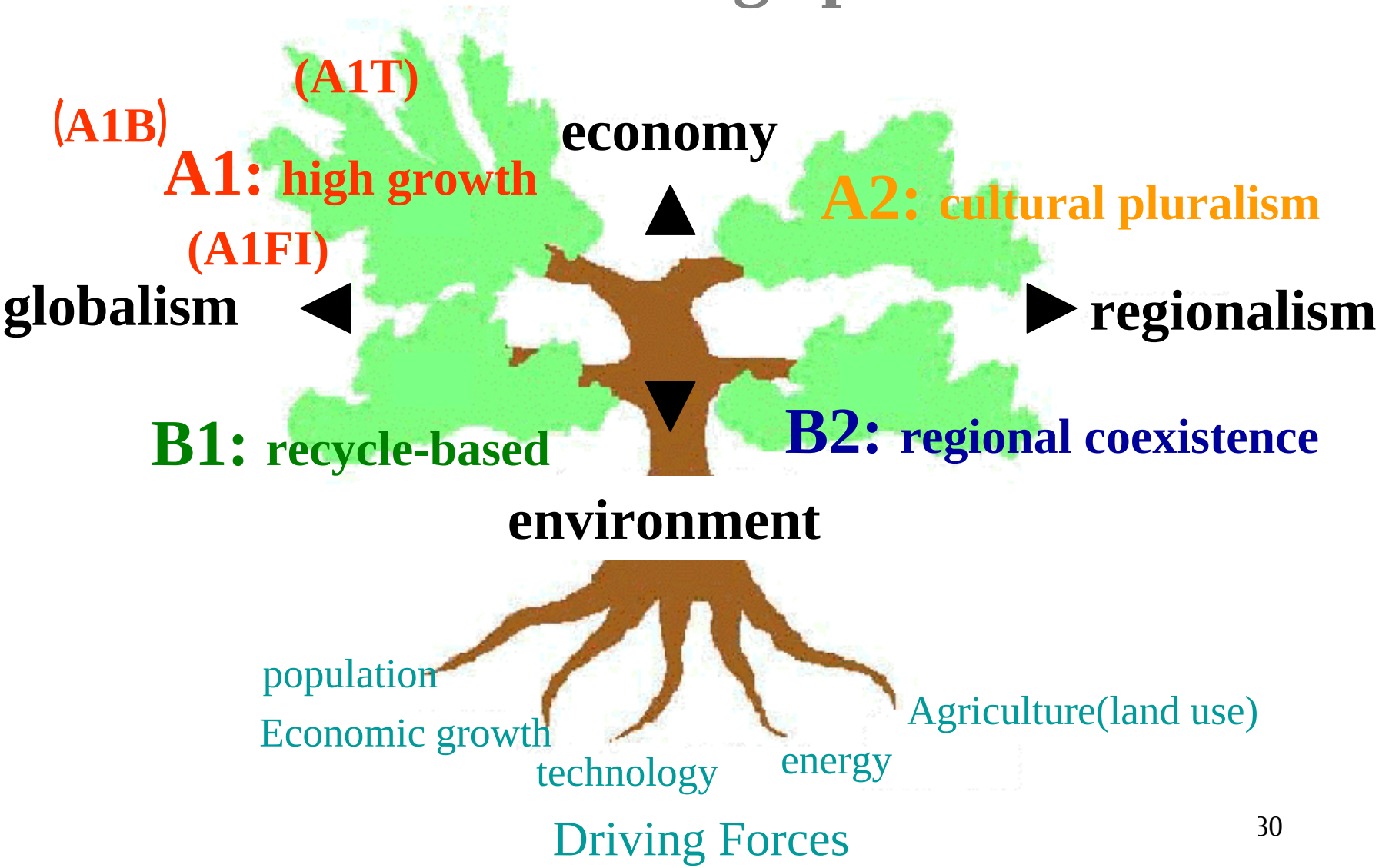
Costs do not include effects of e.g.

- actions related to sinks, other GHG's, CDM and JI
- use of OPEC's market power
- actions related to funding, insurance and the transfer of technology

Main messages (5)

- Long-term costs depend on the choice of future development path
- Integrating climate policies and sustainable development policies improves the prospect of achieving stabilization and sustainable development goals

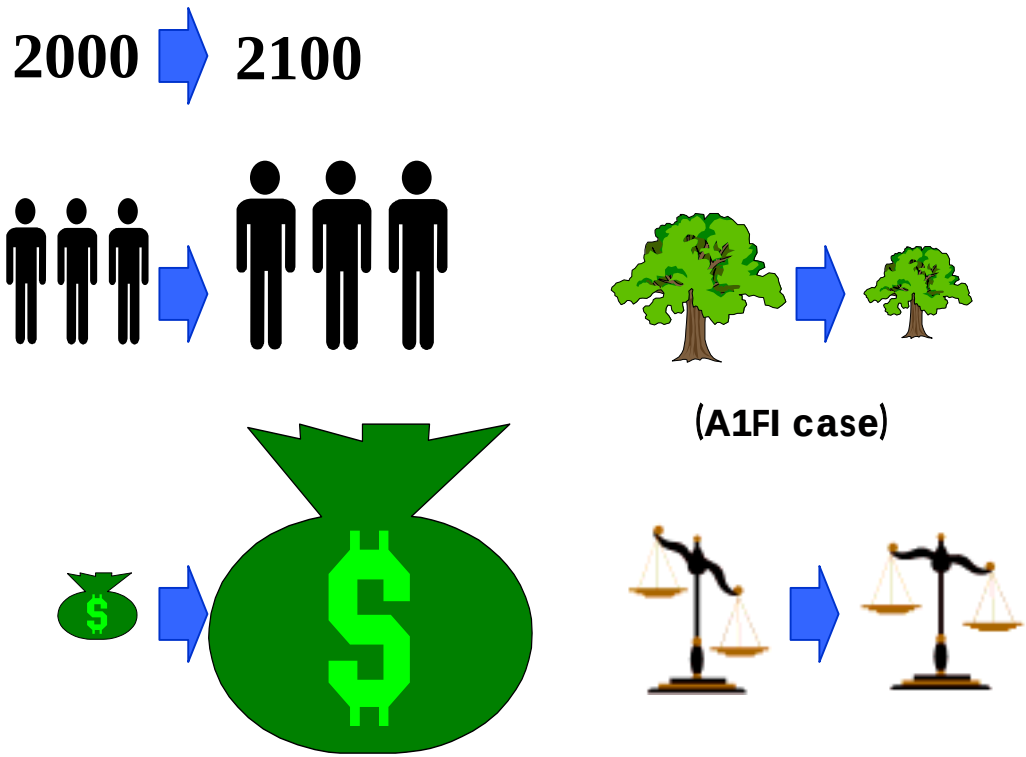
Socioeconomic development scenarios for climate change prediction

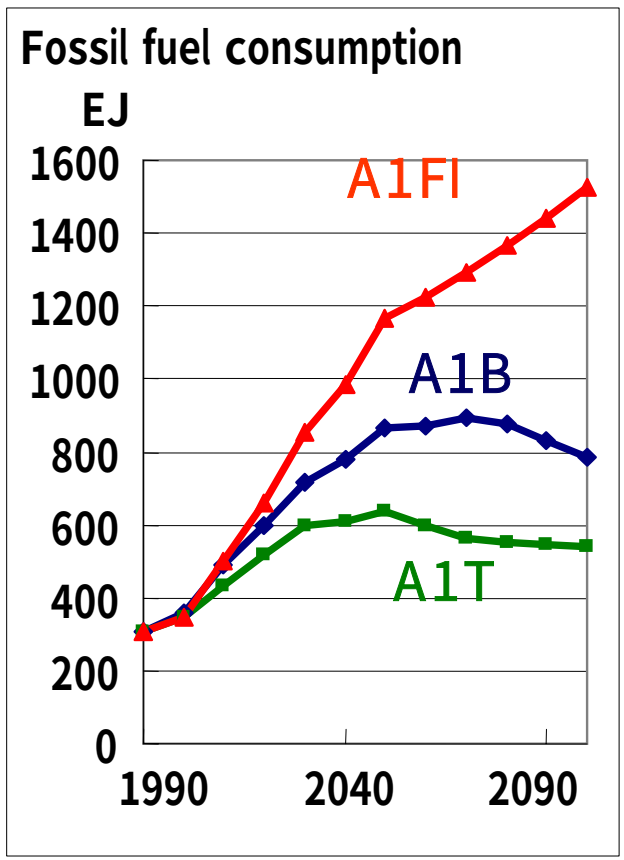


A1: high growth

A future world of very **rapid economic growth**, **low population growth** and **rapid introduction of new and more efficient technology**.

Major underlying themes are convergence among regions, capacity building and increased cultural and social interactions, with a substantial reduction in regional differences in per capita income.





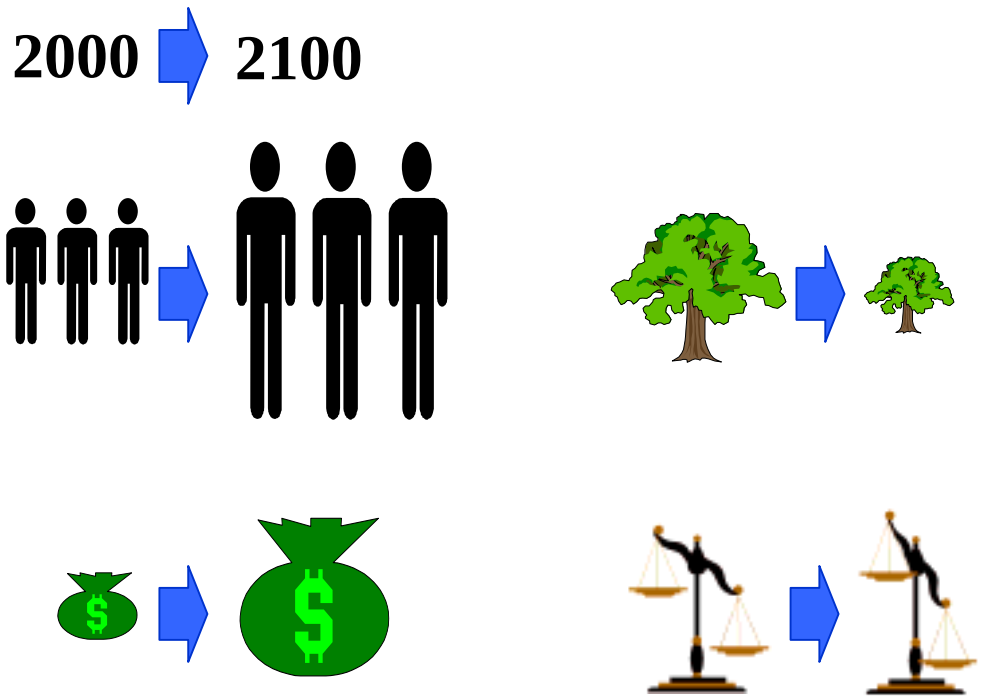
A2: cultural pluralism

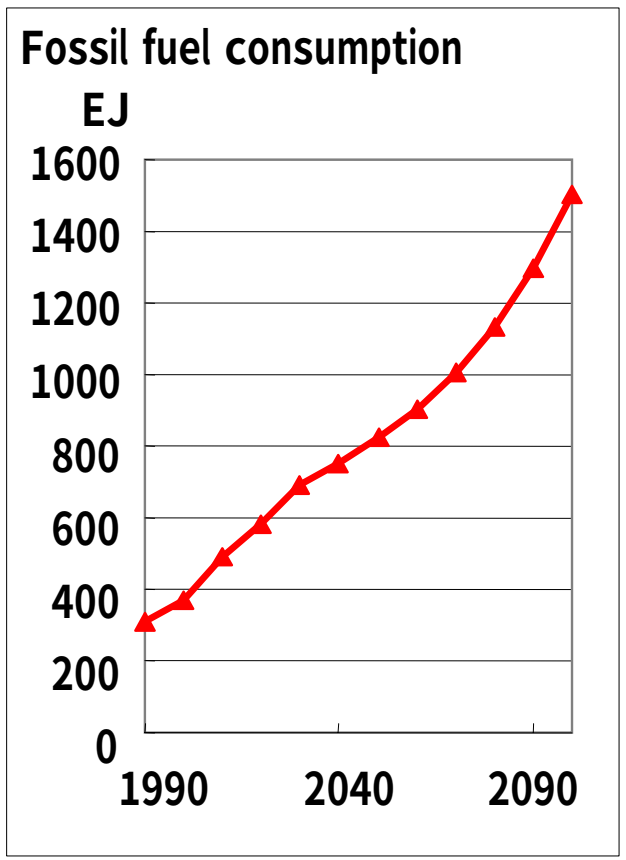
A very **heterogeneous** world.

The underlying theme is **self-reliance and preservation of local identities**.

Fertility patterns across regions converge very slowly, resulting in **high population growth**.

Economic development is primarily regionally-oriented, and per capita economic growth and technological change are more fragmented and slow compared to other storylines.



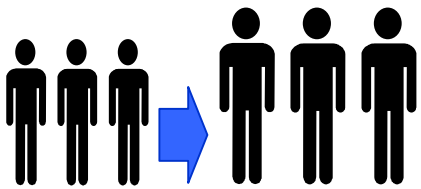


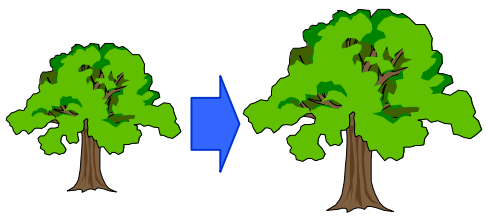
B1: recycle-based

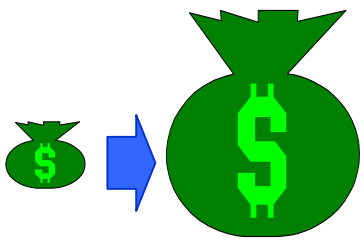
A convergent world with rapid change in economic structures toward a **service and information economy, reduction in material intensity** and the introduction of clean and resource-efficient technologies.

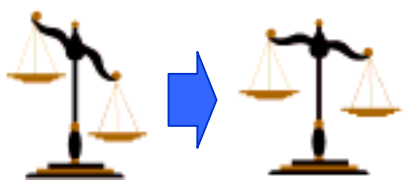
The emphasis is on **global solutions to economic, social and environmental sustainability**, including through improved equity, but without additional climate initiatives.

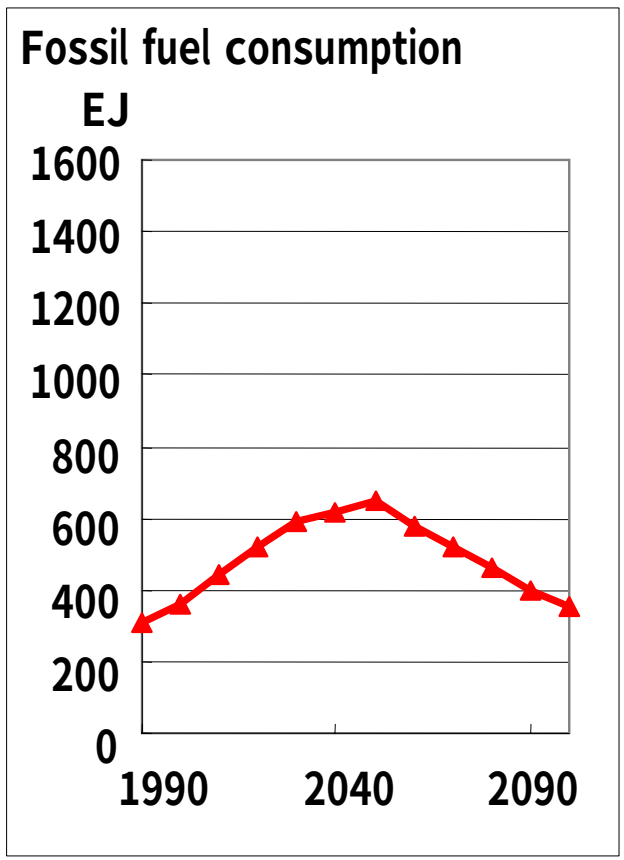
2000 ➡ **2100**











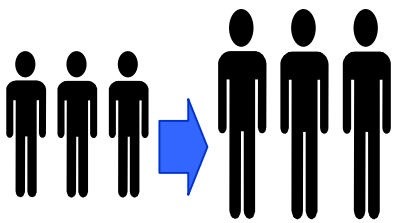
B2: regional coexistence

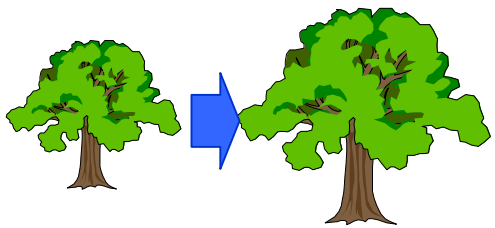
A world in which the emphasis is on **local solutions to economic, social, and environmental sustainability**.

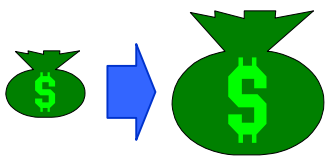
It is a world with less rapid, and more diverse technological change, but with a strong emphasis on community initiative and social innovation to find local and regional solutions.

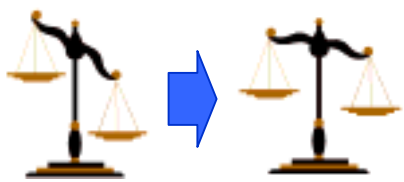
While policies are also oriented towards **environmental protection and social equity**, they are focused on local and regional levels.

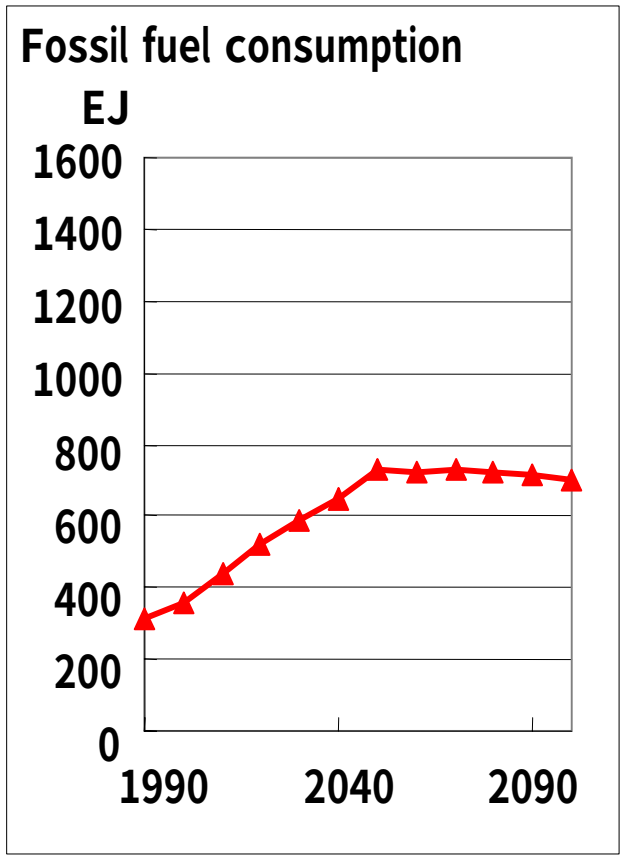
2000 ➡ **2100**



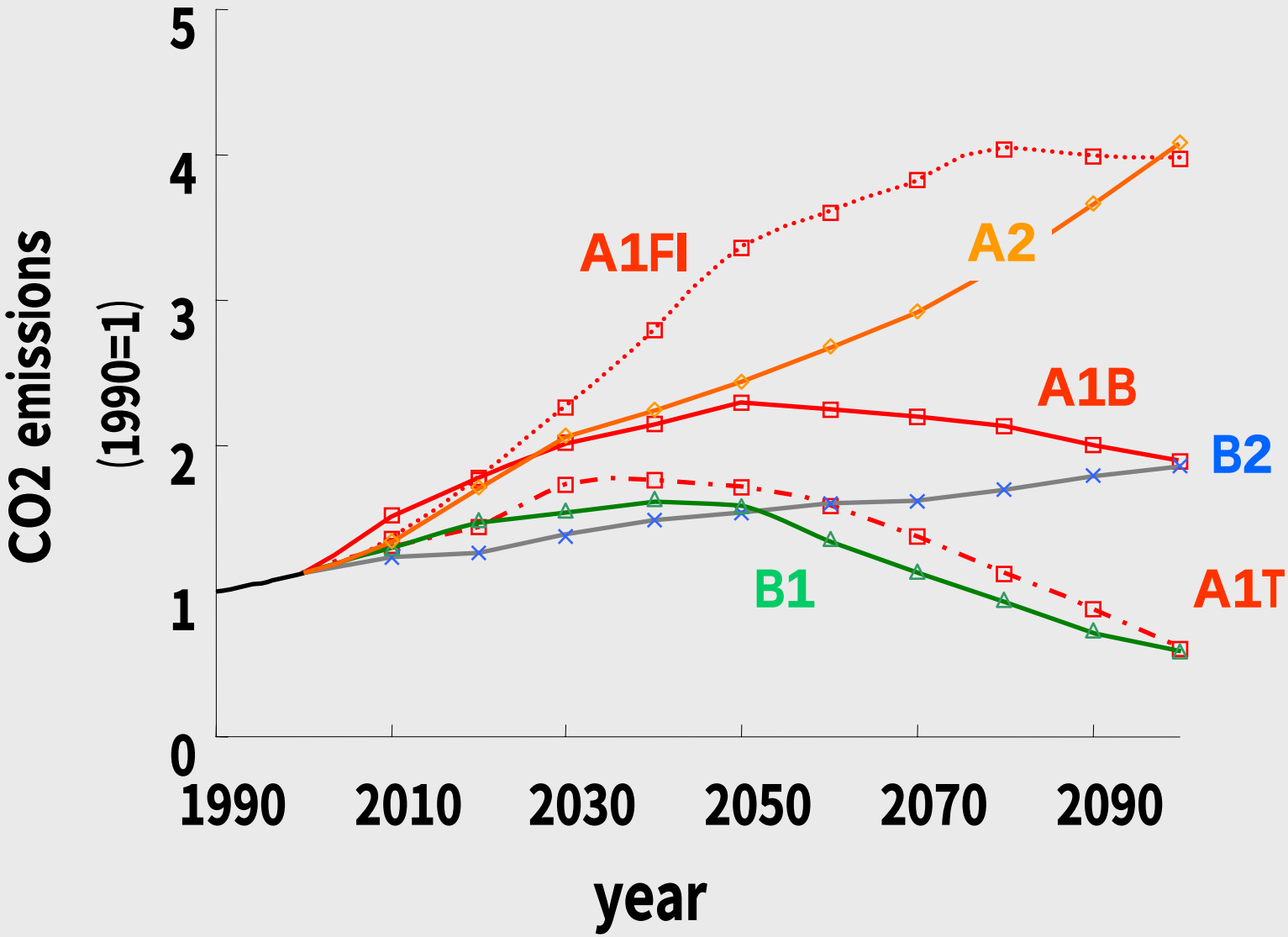




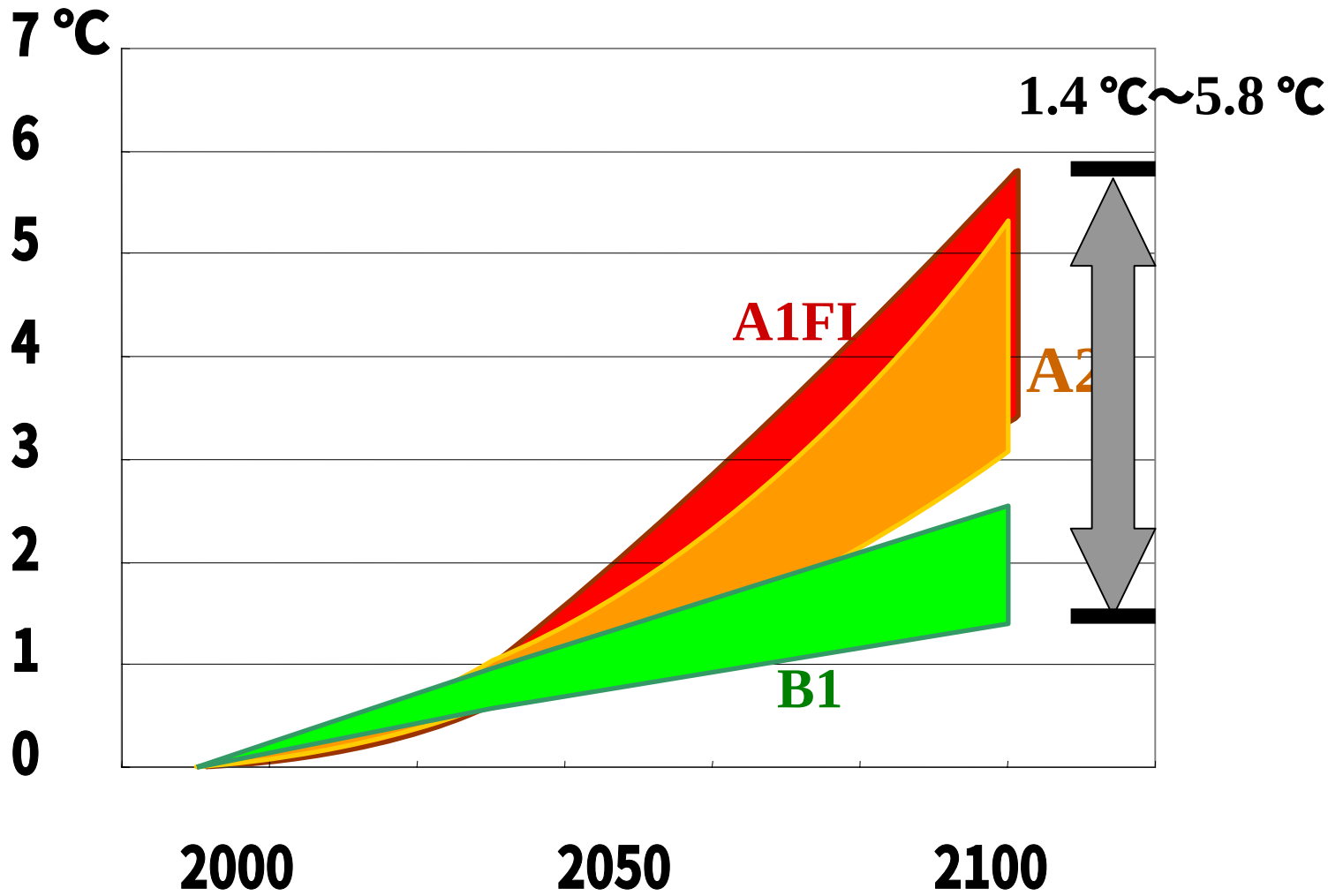




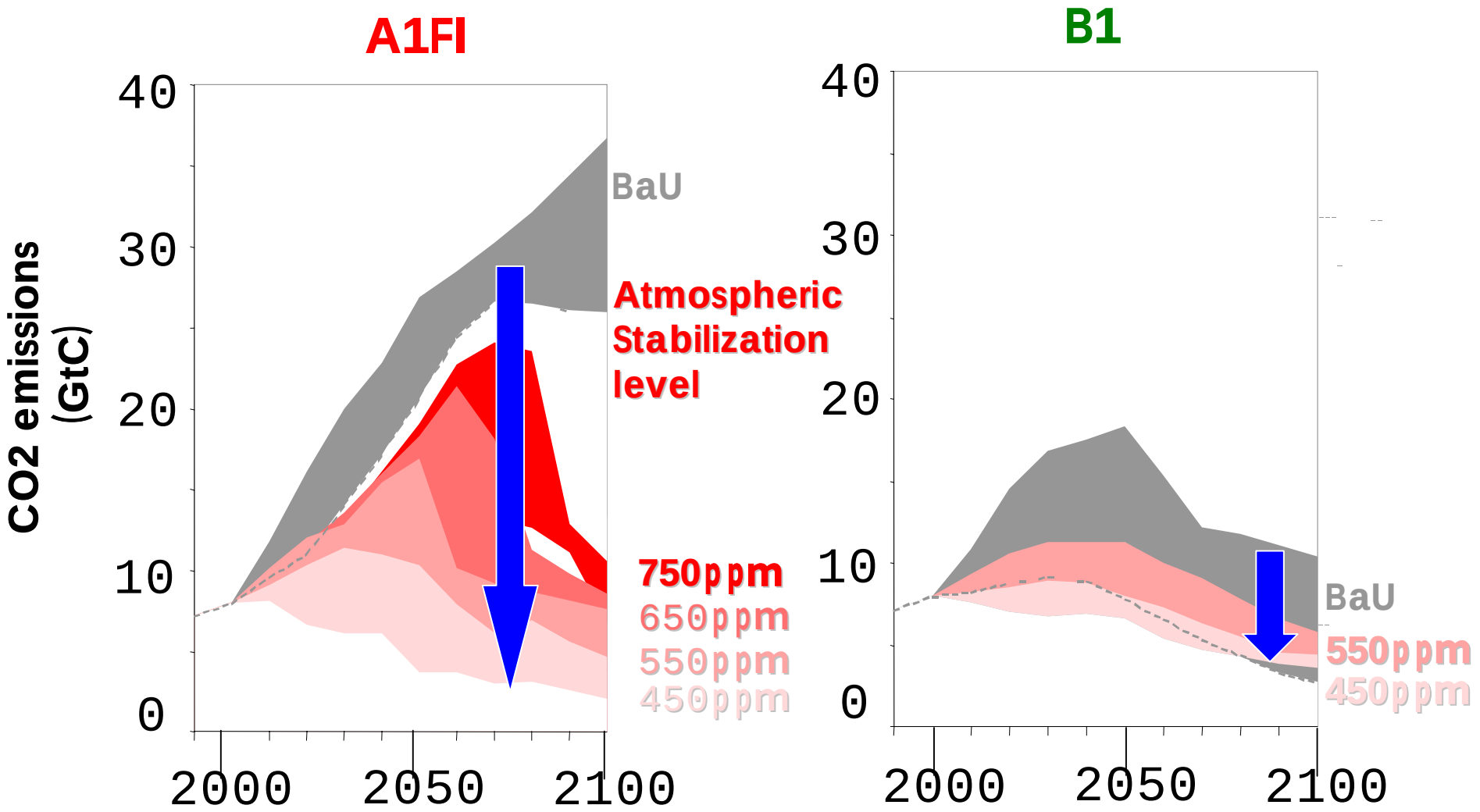
Different development path would cause different emission scenarios



Different development path would Cause different climate change scenario



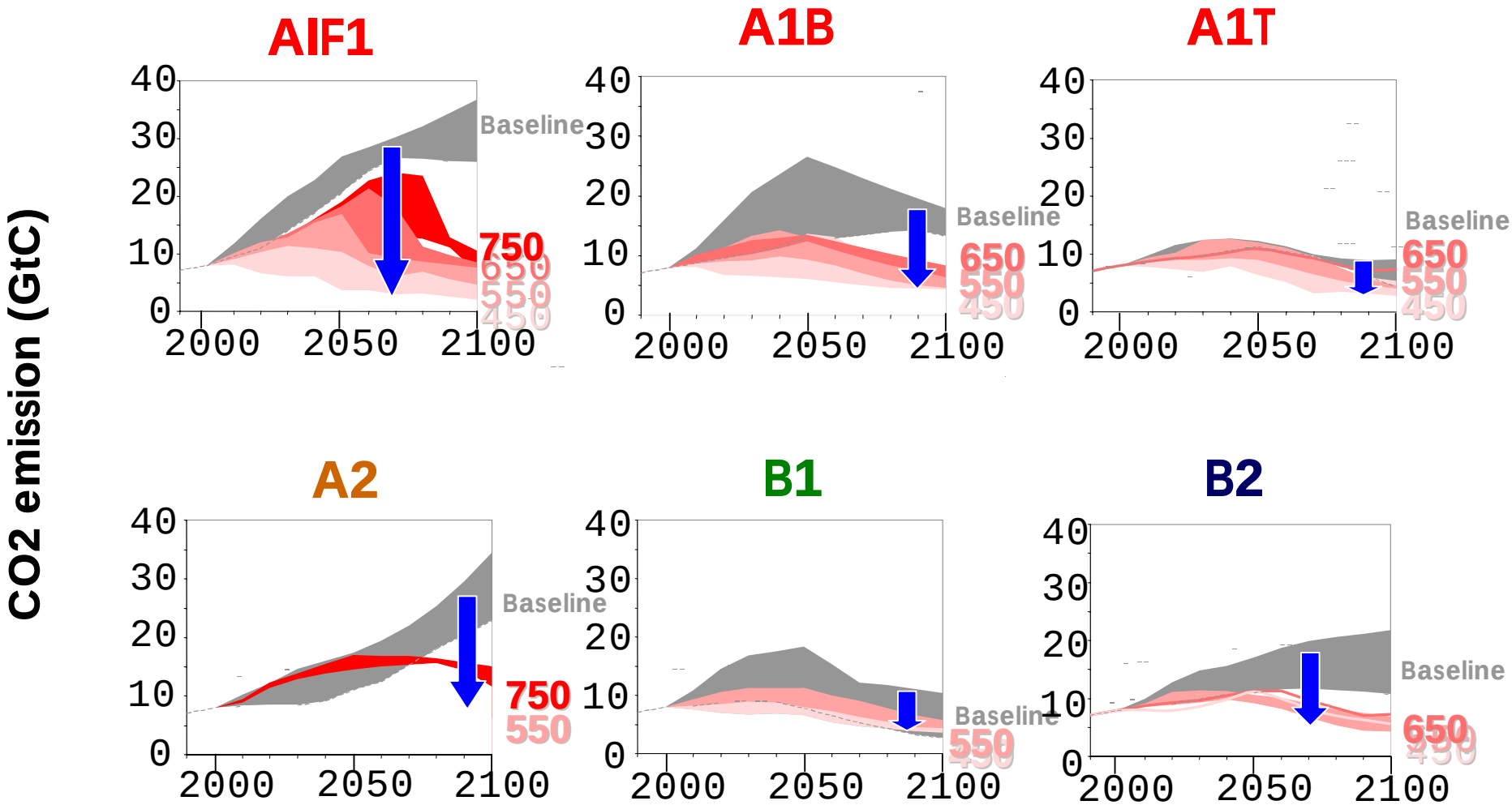
Difficulty of GHG reduction depends on development path or future world



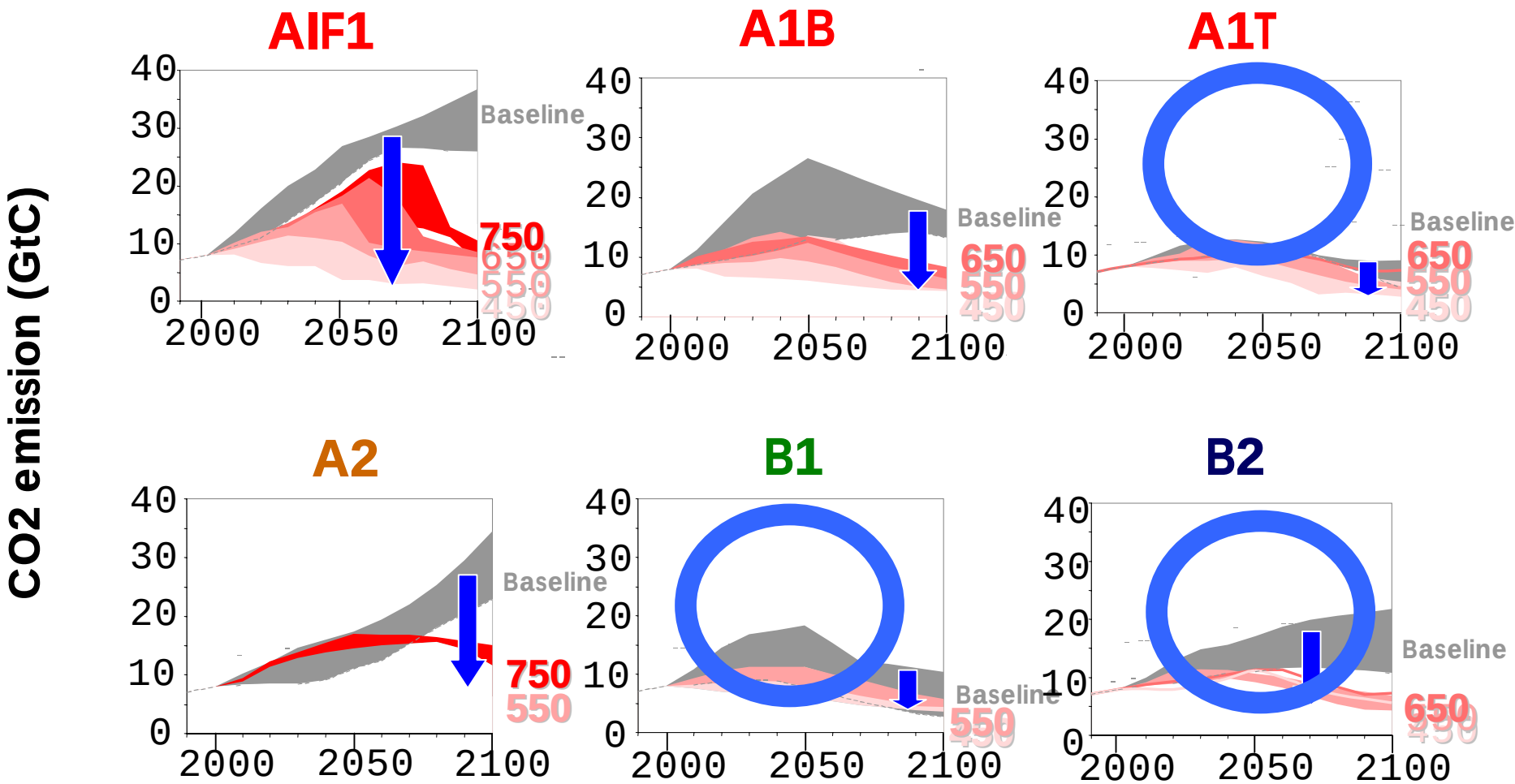
(range of 9 model quantifications)

Different mitigation scenarios

for different SRES worlds and different targets

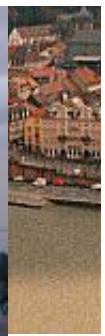


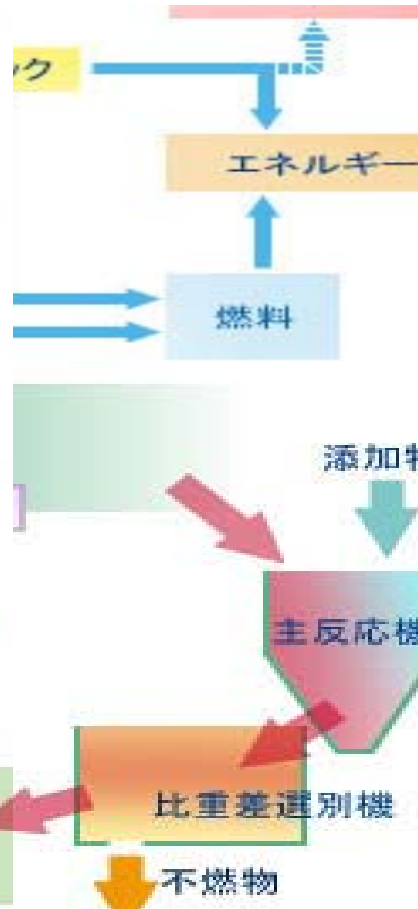
Which SRES worlds are easier for climate change mitigation ?
(for economic-environment integration)



AIT: advanced technology driven high growth society

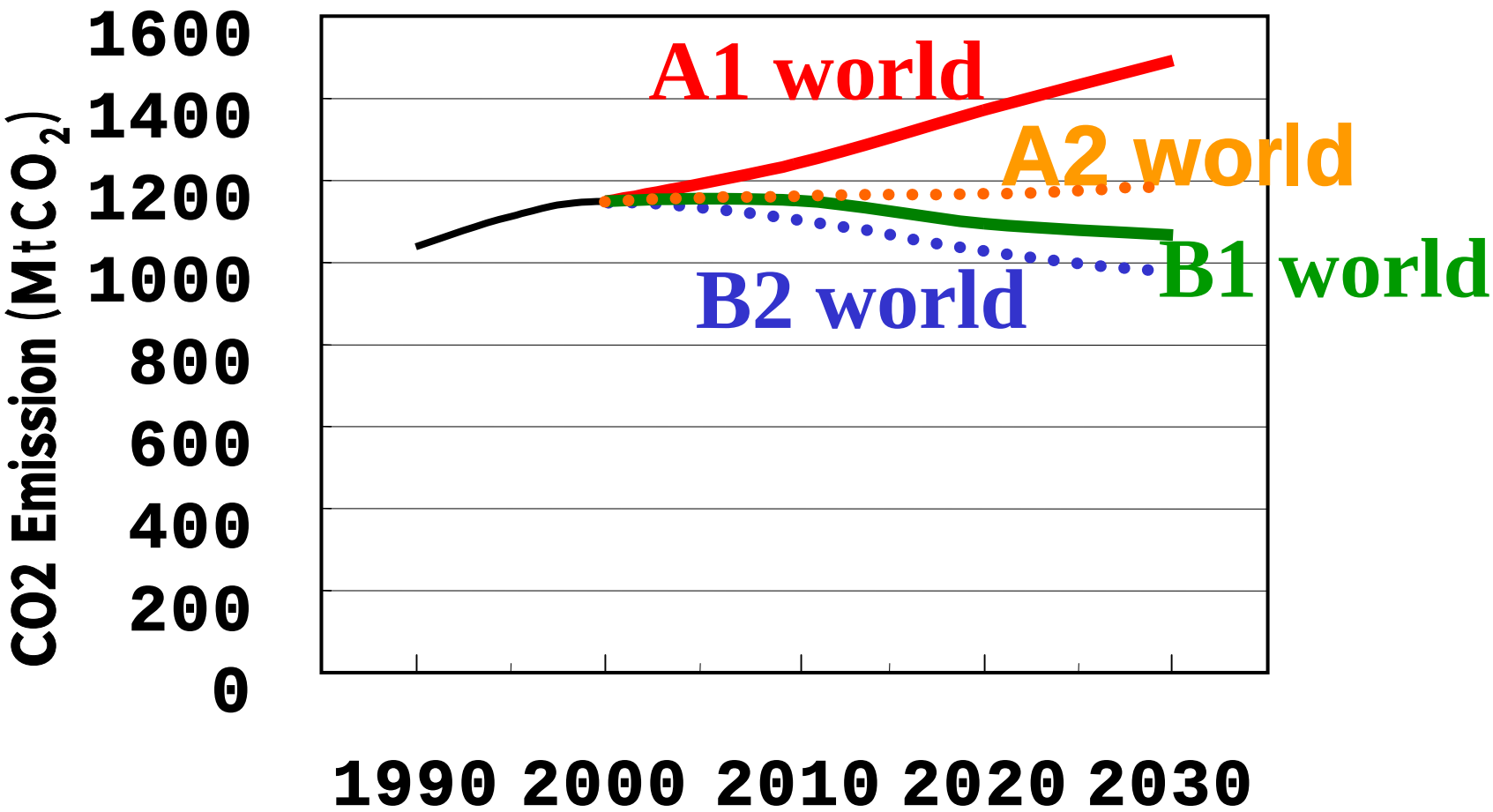
B1: recycle-based society





B2: regional coexistence society

Japanese Domestic CO2 emission scenarios based on SRES



Main messages of WG3

1. Strong linkage between sustainable development and climate change mitigation
2. High technological potential for mitigation
3. Necessity to overcome barriers to implement technologies
4. Mitigation cost can be kept low
5. Necessity to integrate climate policies with sustainable development policies