

International policy approaches to address climate change post 2012

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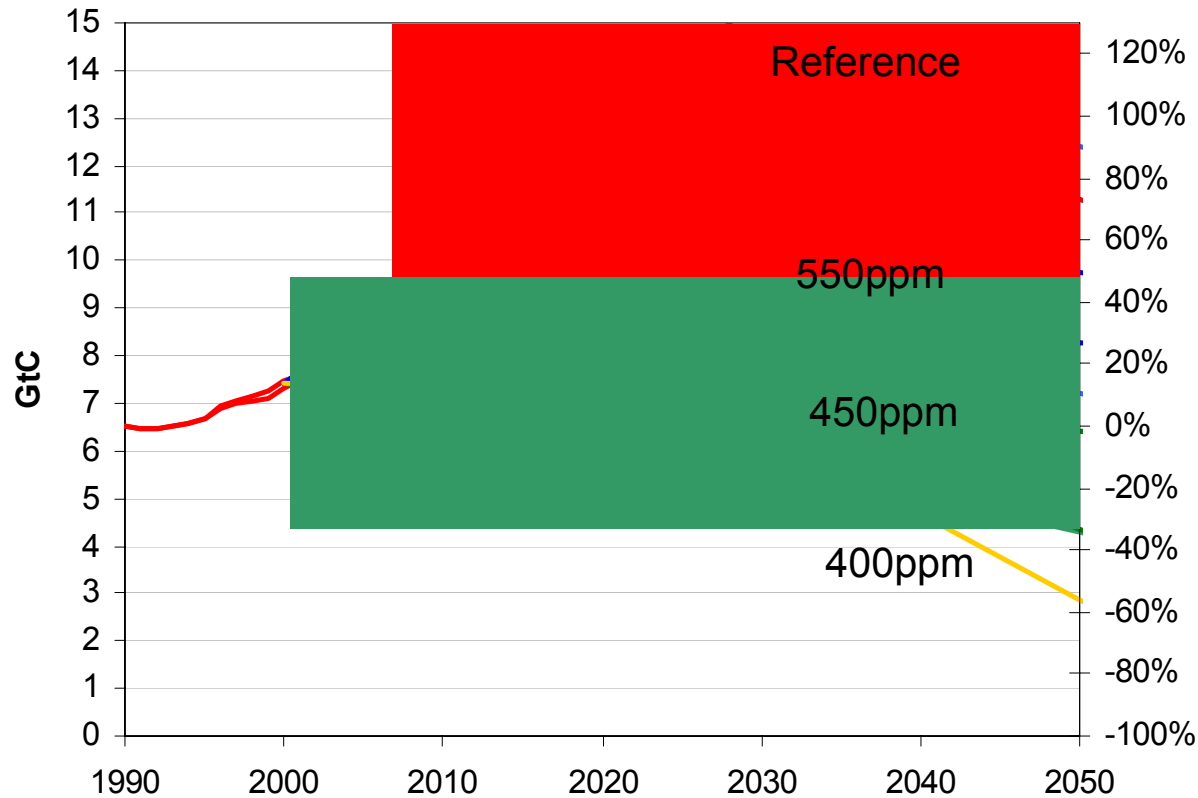


Content

1. Necessary effort to reach EU's 2°C limit
2. Comparison of post 2012 approaches
3. Conclusions



Linking temperature increase to global emissions



Approximate temperature levels at equilibrium (e.g. 2200):

**550ppm CO₂:
4°C (2.5-5.5)**

**450ppm CO₂:
3°C (1.5-4.5)**

**400ppm CO₂:
2°C (1-3)**

(Source: IPCC TAR 2001 and others)

(Source: Ecofys, adapted from post SRES stabilization paths Morita et al. 2001, CO₂ only)



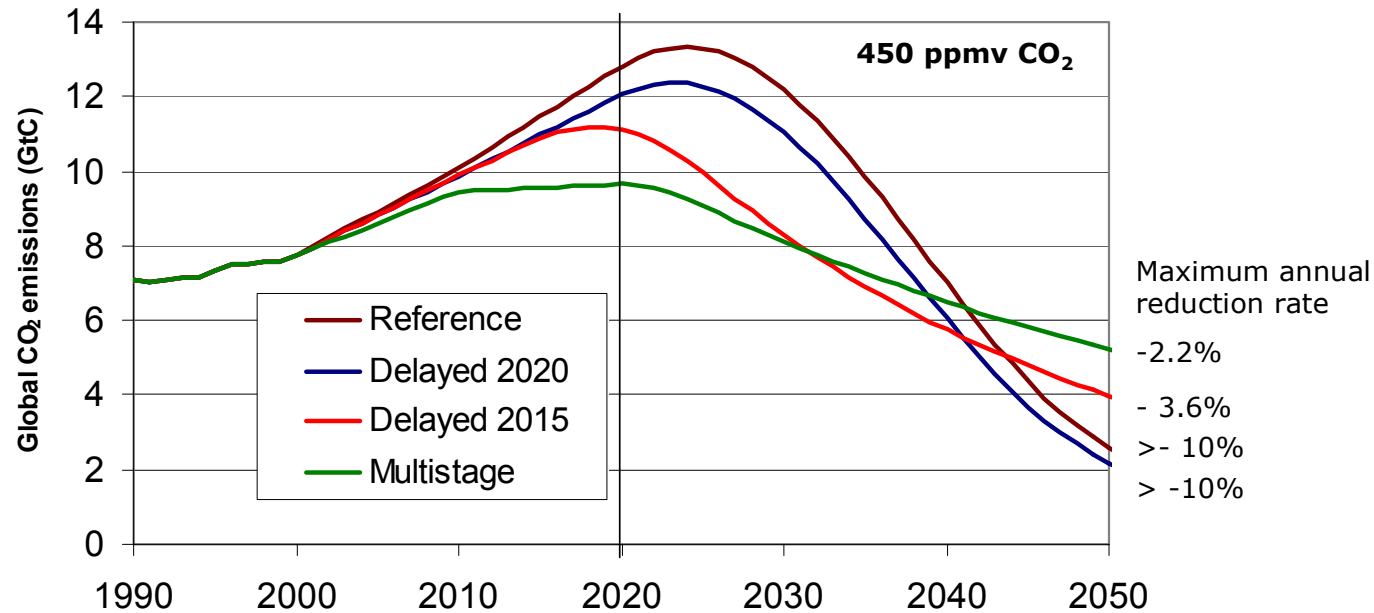
Delay of emission reductions

Reference: Based on SRES A1B scenario

Delayed 2020: Kyoto countries extend their targets to 2020, no action by others

Delayed 2015: Kyoto countries extend their targets to 2015, no action by others

Multistage: All countries reach Kyoto until 2010, followed by ambitious agreement for 2020 for all countries



Delay of 10 to 20 years has significant implications on subsequently necessary emission reductions to meet the same goal

Source: K. Blok, N. Höhne, A. Torvanger, R. Janzic, 2005: "Towards a Post-2012 Climate Change Regime", http://europa.eu.int/comm/environment/climat/pdf/id_bps098.PDF



Why a global policy framework ?

- Problem is global in both sources and effects
- Incentive to free-ride on others efforts
- Major investments at stake: 17 trill. US\$ until 2030 in global energy systems, lock-in effect of inaction
- Action needs policy certainty over next few decades: value of reductions is purely political
- International agreement needed, that is „long, loud and legal“ (long-term, clear and binding)



Content

1. Necessary effort

2. Comparison of post 2012 approaches

3. Conclusions



Approaches

Based on
one/two
principles

Contraction and
Convergence

Global climate
certificate system

Common but diff.
convergence

Triptych

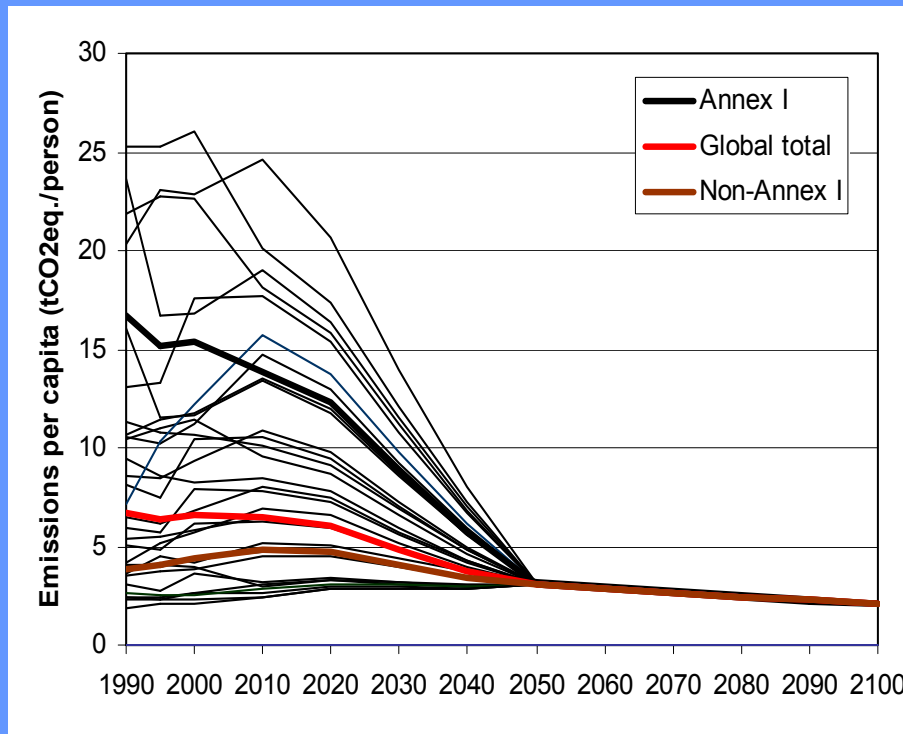
Sophisticated
approaches

Multistage

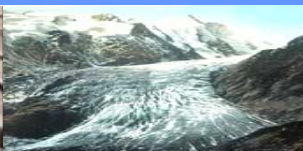


Contraction and Convergence

- Contraction: Agreement on a global emission pathway (e.g. towards 450ppmv)
- Convergence: Per capita emission converge until, e.g., 2050



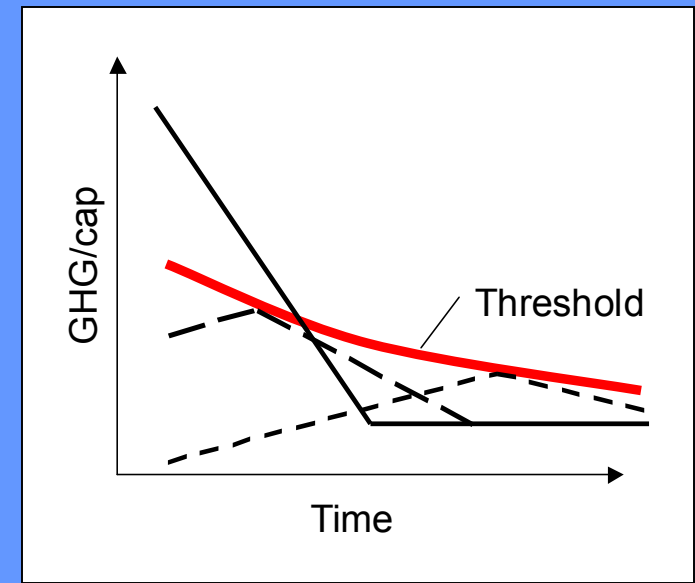
Origin:
Global Commons Institute
[www.gci.org.uk/briefings/I
CE.pdf](http://www.gci.org.uk/briefings/I
CE.pdf)



Common but differentiated convergence (CDC)

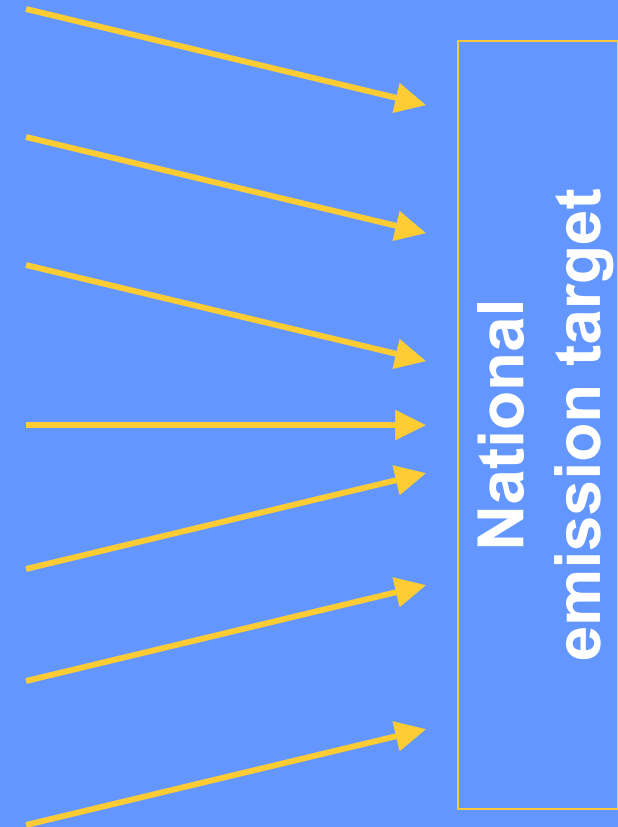
- Three stages
 - No commitments
 - “No-Lose” targets
 - Convergence of per capita emission level to the same level in e.g. 40 years
- Participation threshold:
 - (time dependent) global average per capita emissions

Höhne, den Elzen, Weiss: “Common but differentiated convergence” accepted at Climate Policy 2005



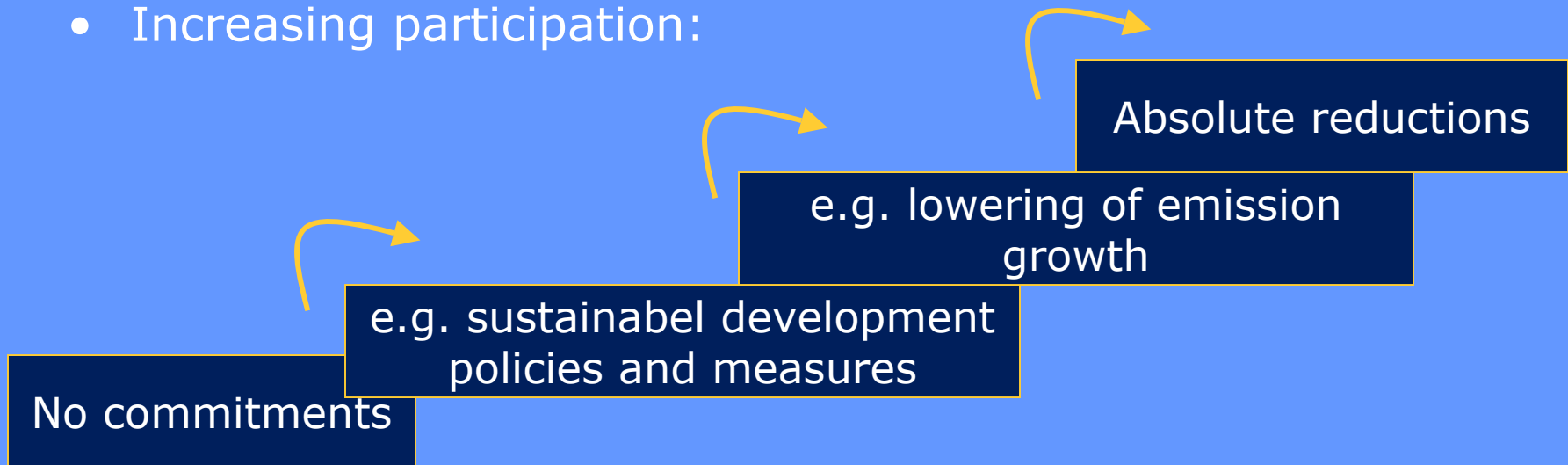
Triptych

Industry	Adjusted BAU production growth with efficiency improvement
Electricity	Adjusted BAU production growth with limit on sources
Domestic	Converging per-capita emissions
Fossil fuel production	Decline to low level
Agricultural	Percentage reduction below BAU
Waste	Converging per-capita emissions
Land use change and forestry	Decline to zero (<i>here excluded</i>)



Multistage

- Increasing participation:



- Countries “graduate” into the next steps based on thresholds (emissions/cap, GDP/cap, human development index)

See also UBA (Germany), EU (EGFA), scientific community (RIVM, Wuppertal Institut), NGOs (CAN proposal)



Options in a multistage setting

- Annex I: Alternatives to absolute emission reduction targets
 - Dynamic targets and “price caps”
 - Sectoral targets / sectoral emission standards
 - Agreements on technology development

Most of the alternatives are unlikely to be sufficient to reach the 2°C limit

- Non-Annex I: incentives for participation
 - Sectoral targets
 - “No lose” or dual targets
 - “Sector crediting mechanisms”
 - Extended CDM
 - “Sustainable development policies and measures”

See also: Höhne and Lahme 2005: “Types of future commitments under the UNFCCC and the Kyoto Protocol post 2012”, Briefing paper for WWF



Four Stages Convergence (UBA 2005)

1	No new commitments	Countries below 3 t CO ₂ -eq. per capita
2	Apply best available technology, sectoral standards	Countries below 3,5 t CO ₂ -eq. per capita
3	Quantified limitations, but possibly non binding, dual, sectoral or dynamic	Countries below 4 t CO ₂ -eq. per capita
4	Quantified absolute emission reduction targets	Countries above 4 t CO ₂ -eq. per capita



South North Dialogue

	Quantitative commitment	Qualitative commitment	Financial support
1. Least developed countries	-	SD PAMS optional	Receive payments
2. Other developing countries	-	SD PAMS obligatory, co-funded	Receive payments
3. Rapidly industrializing developing countries	Limitation if funding provided	SD PAMS obligatory, co-funded	Receive high payments
4. Newly industrialized countries	Limitation	SD PAMS obligatory	Co-funding
5. Annex I but not Annex II	Absolute reduction	-	Low/no payments
6. Annex II	Strict absolute reduction	-	Make high payments

- Thresholds: CO₂/GDP, GHG/cap, emission growth, cumulative emissions, GDP/cap, HDI
- Adaptation commitment

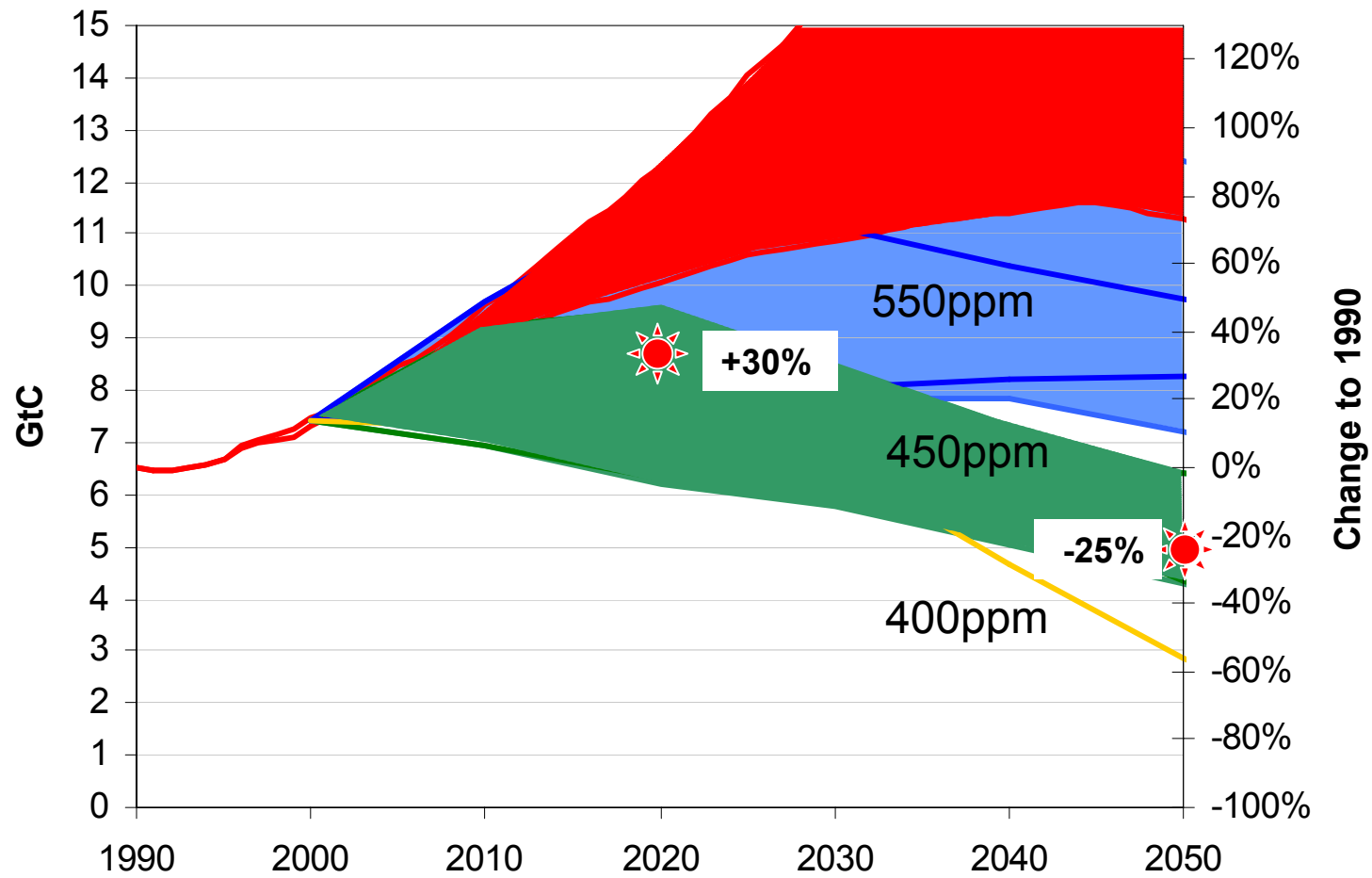


Multistage – Promising Toolbox

- Staged broadening of participation
- Threshold criteria to reflect different responsibilities/capabilities
- Flexible: Different modes of participation in different stages **in a common framework**
- Delayed participation and flexibility vs. environmental integrity
- Heterogeneity not reflected by thresholds



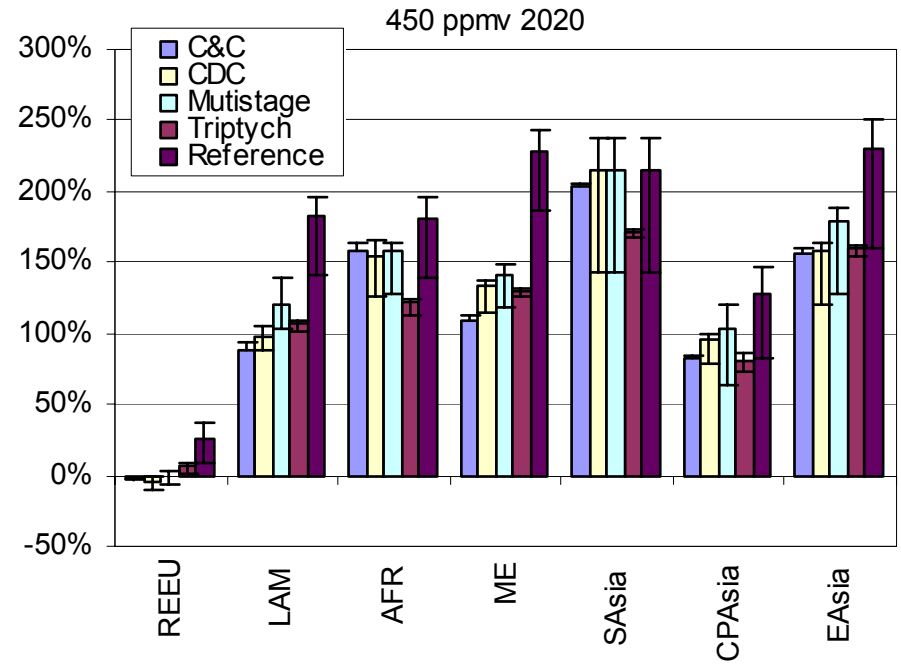
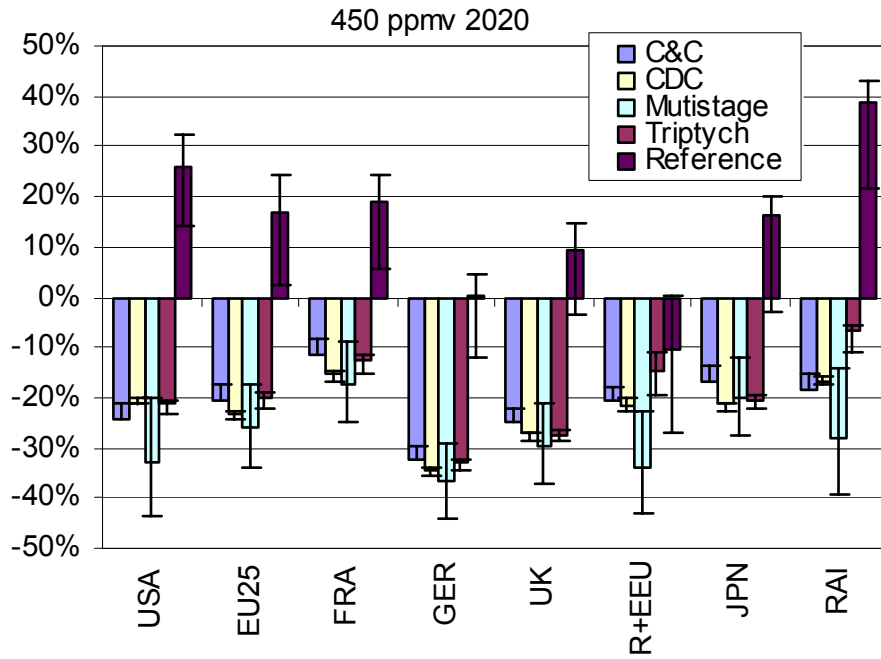
Comparison of emission allowances



Source: post SRES scenarios (stabilization paths), CO2 only



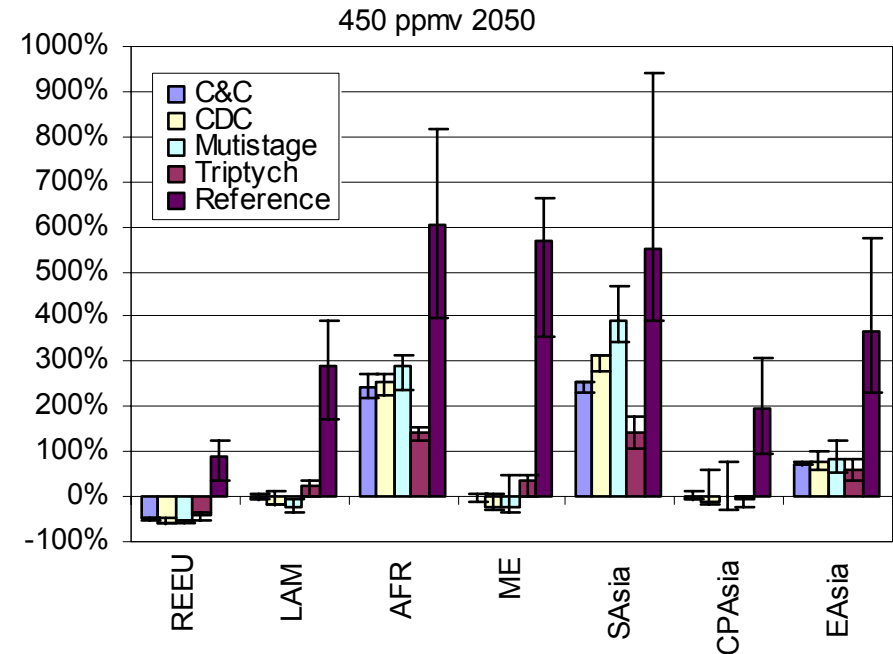
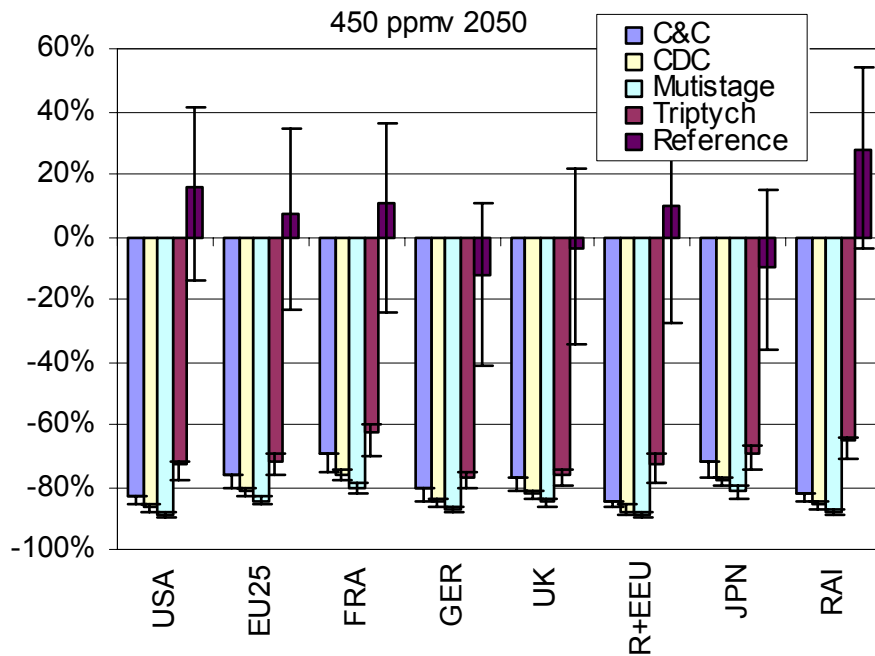
Change 1990 to 2020 towards 450 ppm CO₂



- Annex I: -10% to -30% below 1990
- No participation: South Asia and Africa.
- Deviate from their reference: Latin America, Middle East, East Asia and Centrally planned Asia



Change 1990 to 2050 towards 450 ppm CO₂



- All approaches require drastic reductions
- Annex I: -70% to -90% below 1990
- Substantial deviation from reference in all Non-Annex I regions



Conclusions

- Limiting temperature increase to 2°C above pre-industrial level (EU target) requires stabilization **below** 450 ppmv CO₂
-> reverse the global emission trend in next 20 years
- Delay of global reductions endangers meeting this limit
-> an approach based only on technology R&D would not be sufficient
- Difference in emission allowances between approaches (incremental and structural evolution) is small compared to the total long-term effort.
- Differentiation based on fairness principles can be a starting point to outline elements of a possible agreement, but in the real world, it is likely to be an incremental evolution based on the current structure:
 - Participation in stages (e.g. Annex I, intermediate, Non-Annex I)
 - Possibly alternatives to binding emission reduction targets for some newly participating countries
 - Incentives for developing countries to participate



Backup slides



Future international action on climate change network

Information

- Activities
- Institutions
- Ideas

Diskussion forum

www.fiacc.net

Supported by

- German Federal Environmental Agency
- EU commission
- DG Environment

The screenshot shows a Microsoft Internet Explorer browser window displaying the website <http://www.fiacc.net/>. The page title is "Future International Action on Climate Change Network". The browser's address bar shows the URL. The website header features the title "Future International Action on Climate Change Network" in green and black text, with logos for "Umwelt Bundes Amt" and "EU Environment DG" indicating support. A navigation menu on the left lists: Home, Introduction, Meetings, Processes, Institutions, Approaches, Tools, and Forum. The main content area includes a welcome message, a paragraph about the website's purpose, a "What is new?" section with three bullet points, and a "Last e-mail discussion" section with one bullet point. The browser's status bar at the bottom shows "Internet".

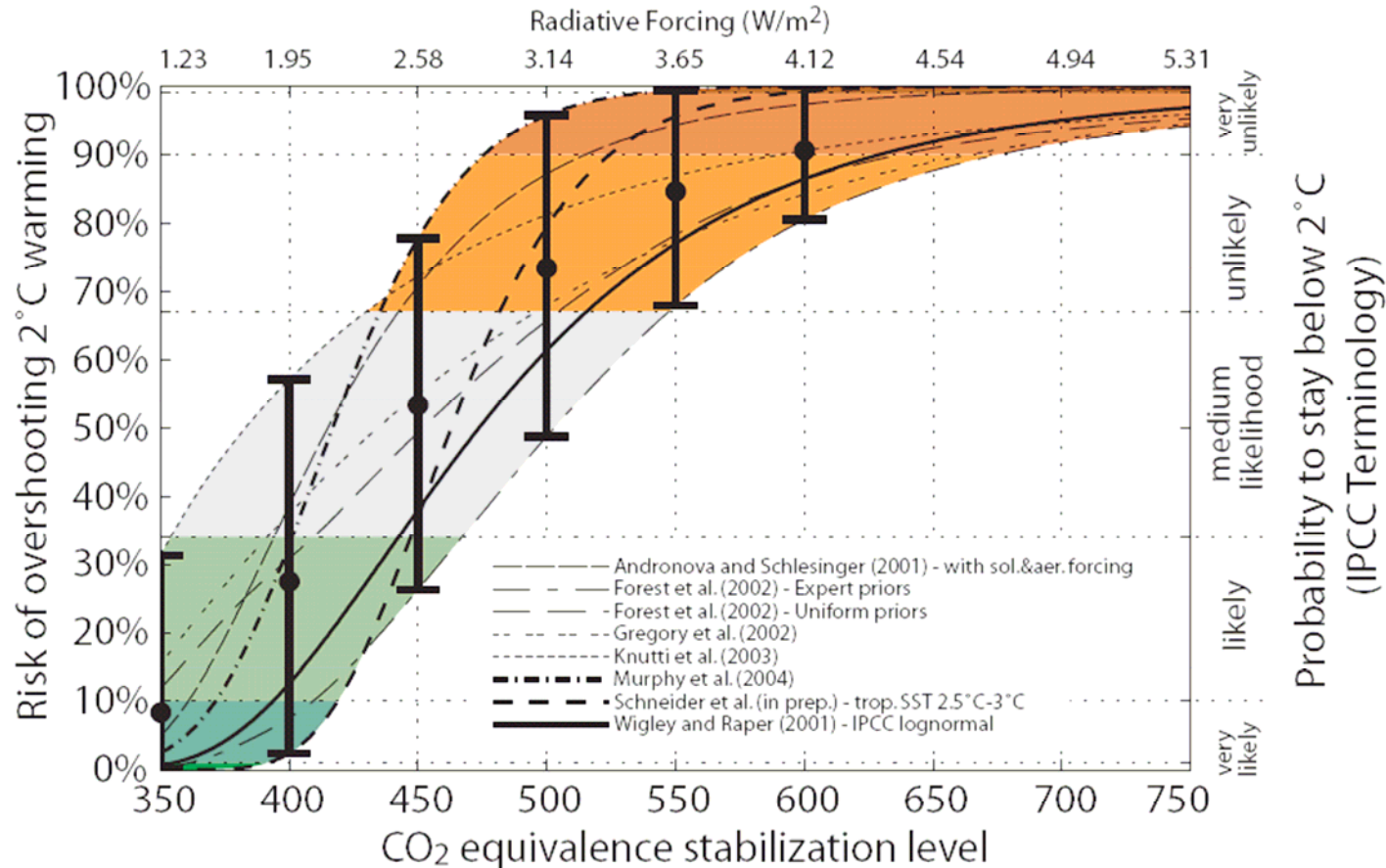


Emission reduction efforts

Reduction below 1990 level		2020	2050
400 ppm CO ₂	Annex I	-25% to -50%	-80% to -90%
	Non-Annex I	Substantial deviation from reference in Latin America, Middle East, East Asia and Centrally planned Asia	Substantial deviation from reference in all regions
450 ppm CO ₂	Annex I	-10% to -30%	-70% to -90%
	Non-Annex I	Deviation from reference in Latin America, Middle East, East Asia and Centrally Planned Asia	Substantial deviation from reference in all regions
550 ppm CO ₂	Annex I	-5% to -25%	-40% to -80%
	Non-Annex I	Deviation from reference in Latin America and Middle East, East Asia	Deviation from reference in most regions, specially in Latin America and Middle East



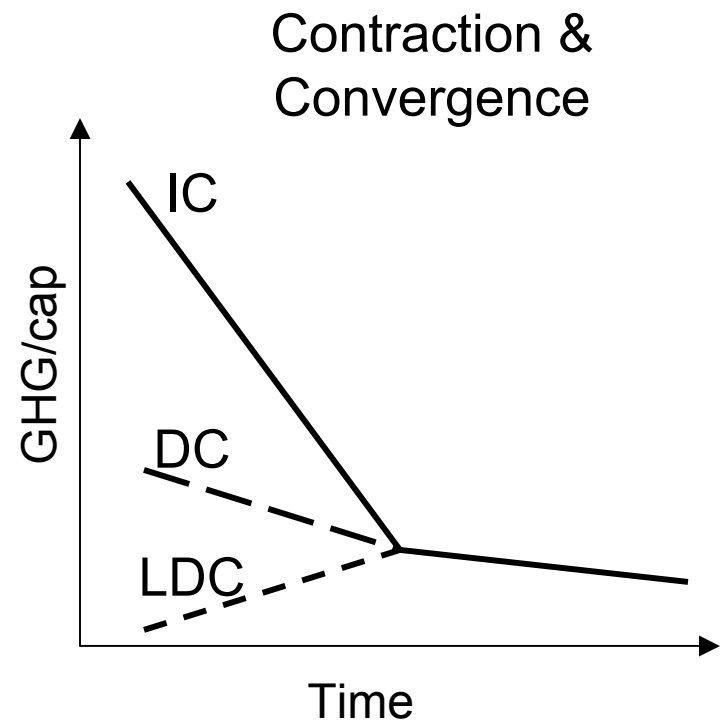
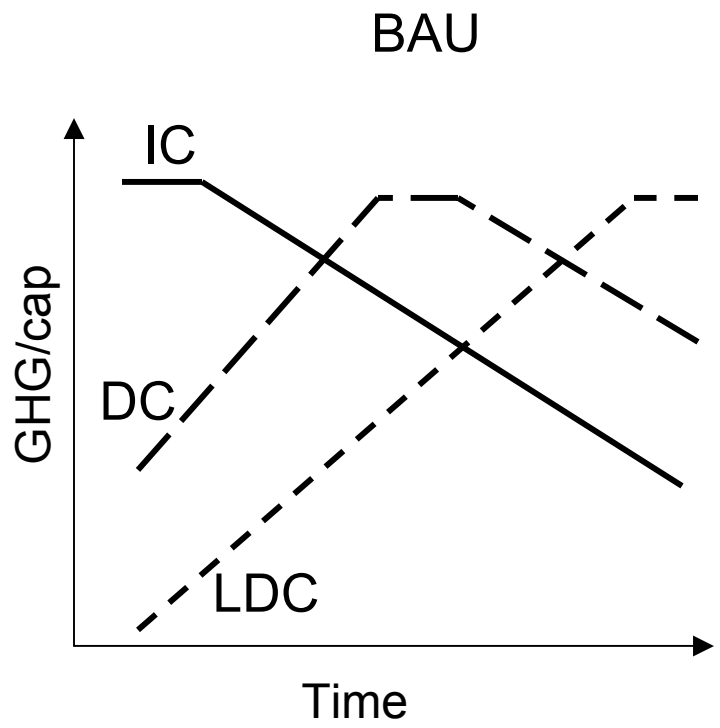
Risk of overshooting 2°C



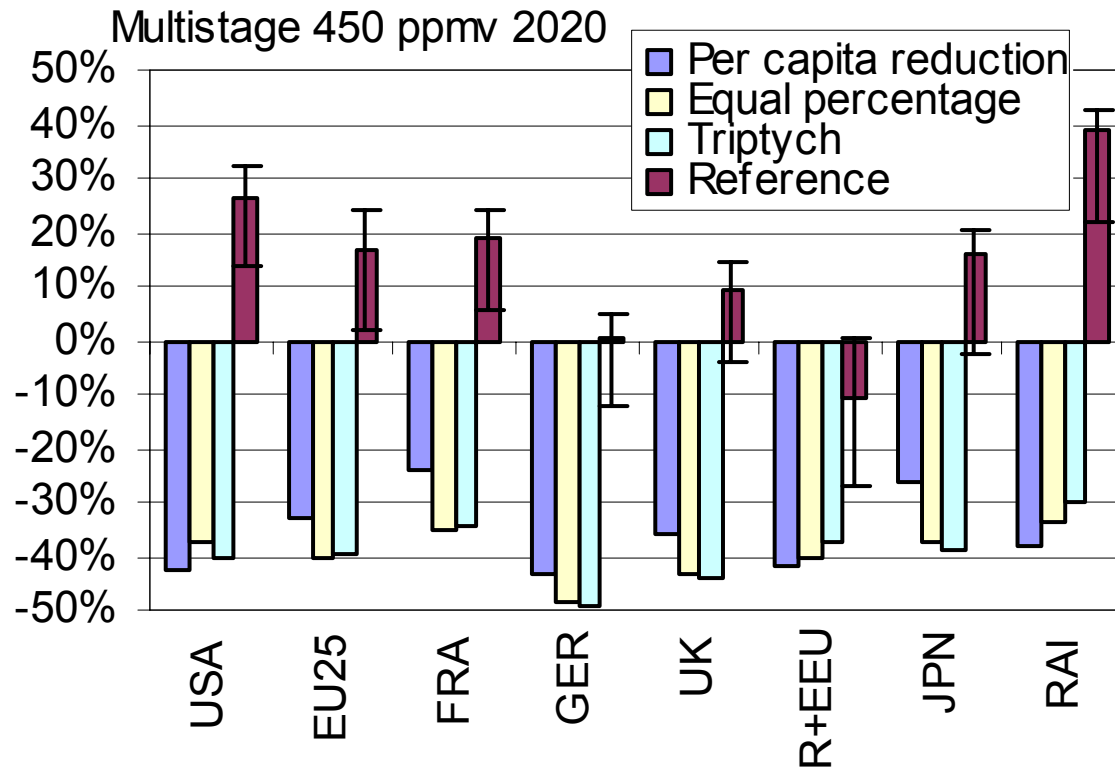
Source: MEINSHAUSEN – ON THE RISK OF OVERSHOOTING 2°C. Paper presented at Scientific Symposium “Avoiding Dangerous Climate Change”, MetOffice, Exeter, 1-3 February 2005



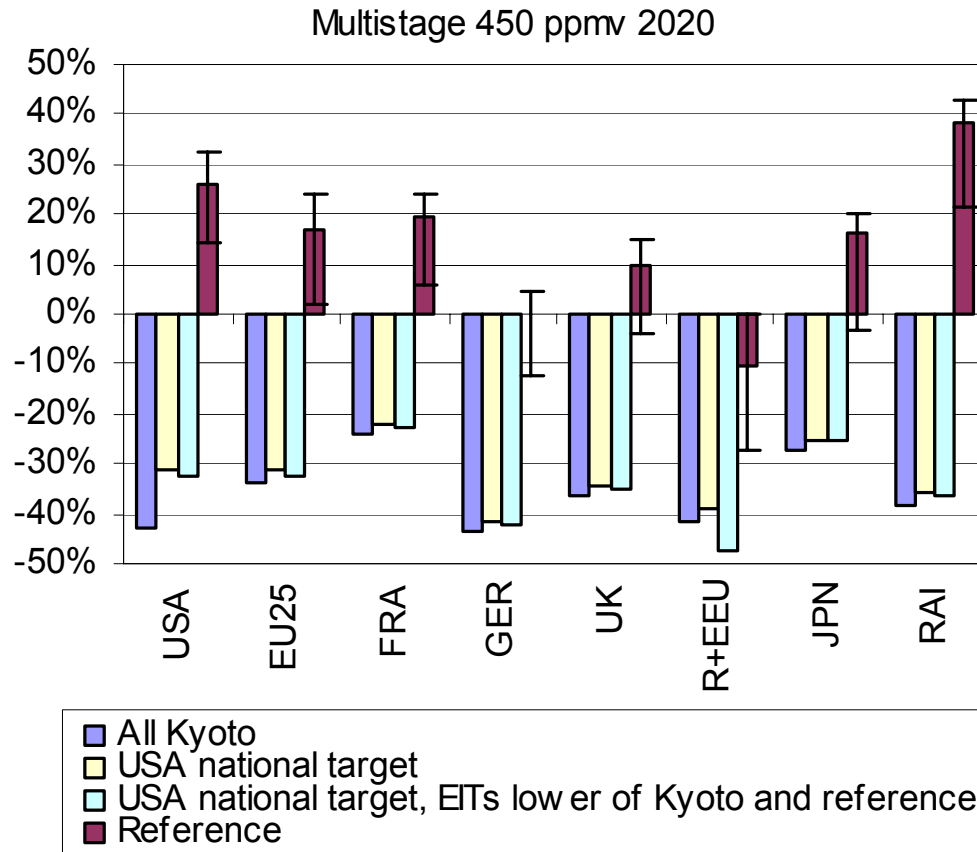
Immediate participation



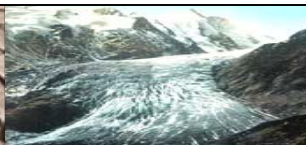
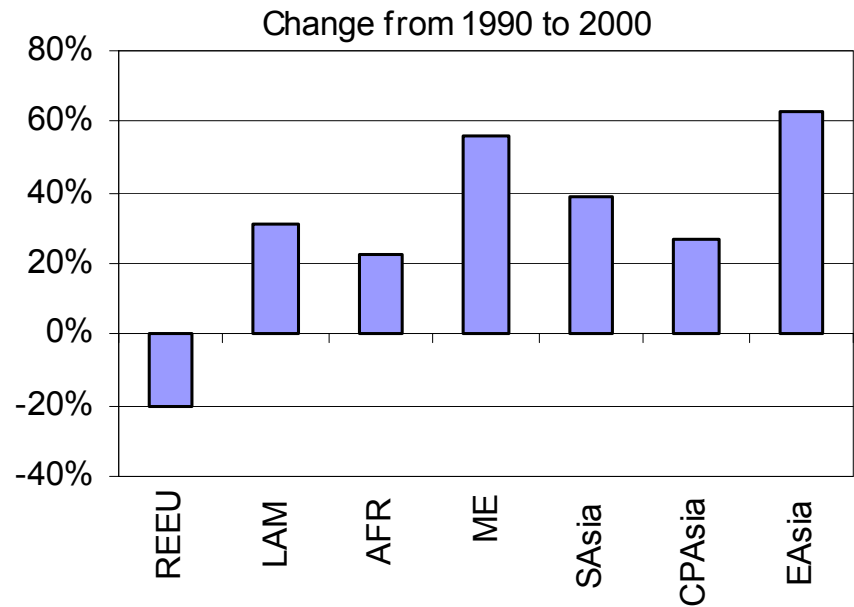
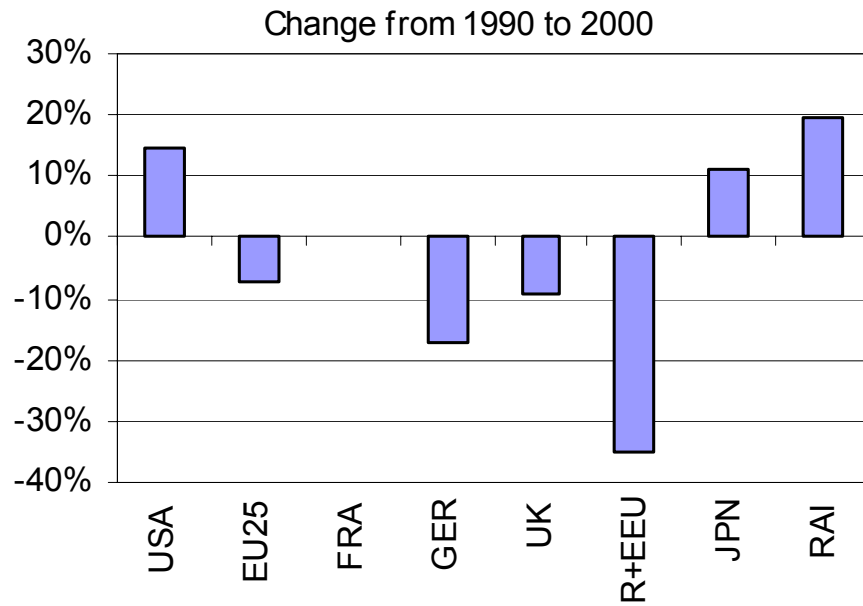
Sensitivity stage 4



Sensitivity USA and EITs until 2010

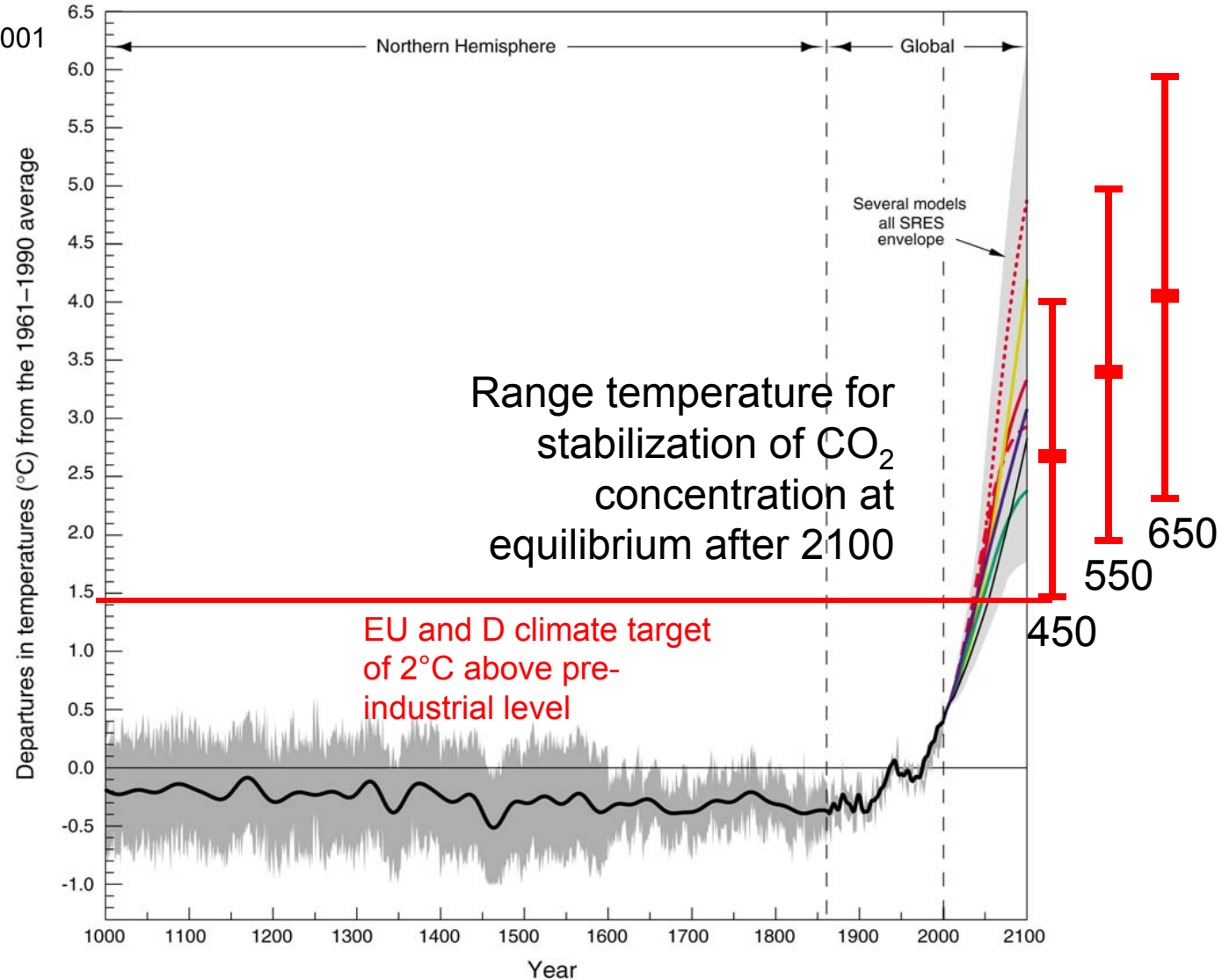


Change 1990 to 2000



Stabilized temperatures at different CO₂ concentrations

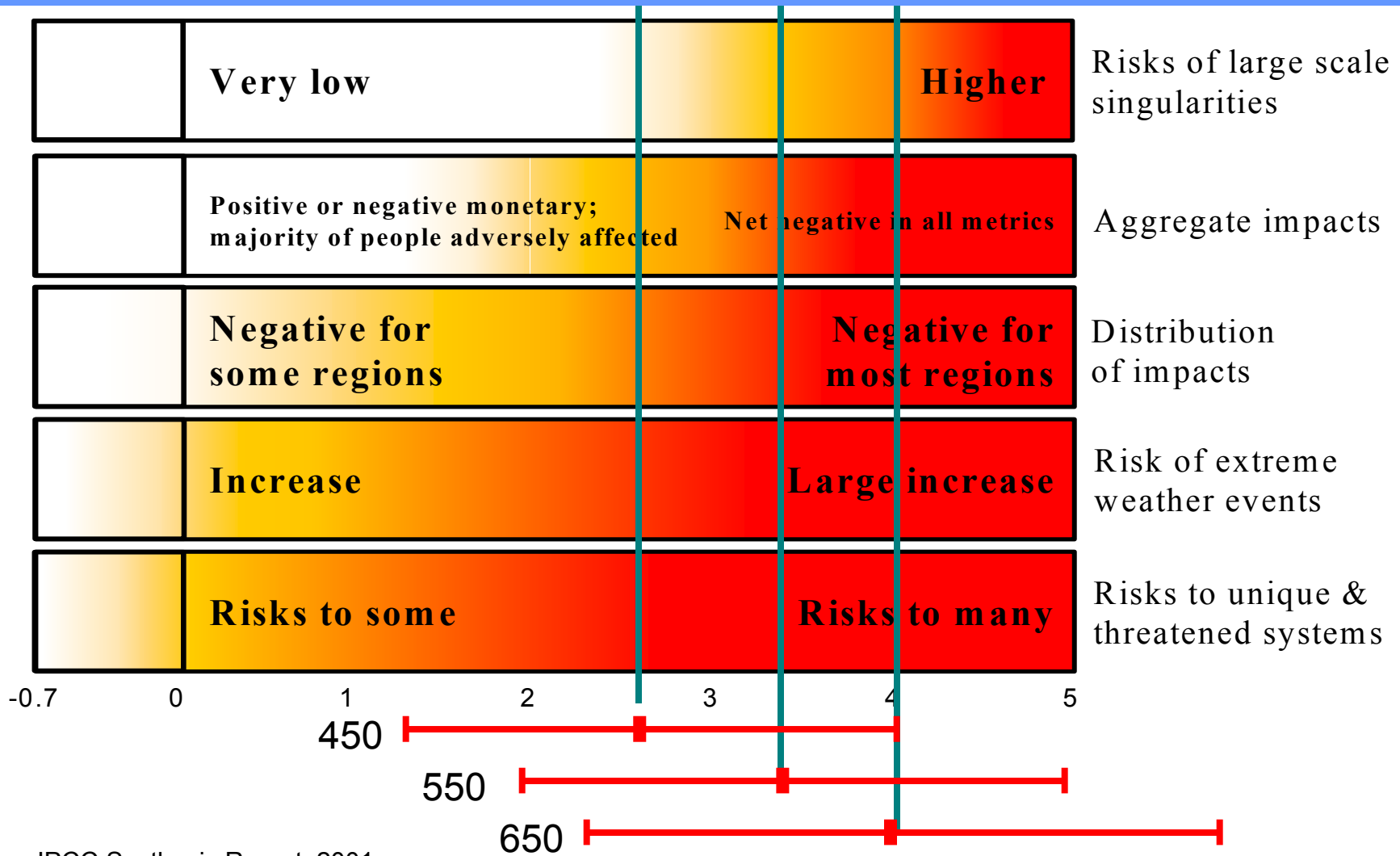
Source: IPCC Synthesis Report, 2001



- 1000 to 1861, N. Hemisphere, proxy data;
- 1861 to 2000 Global, Instrumental;
- 2000 to 2100, SRES projections



Climate change impacts



Source: IPCC Synthesis Report, 2001



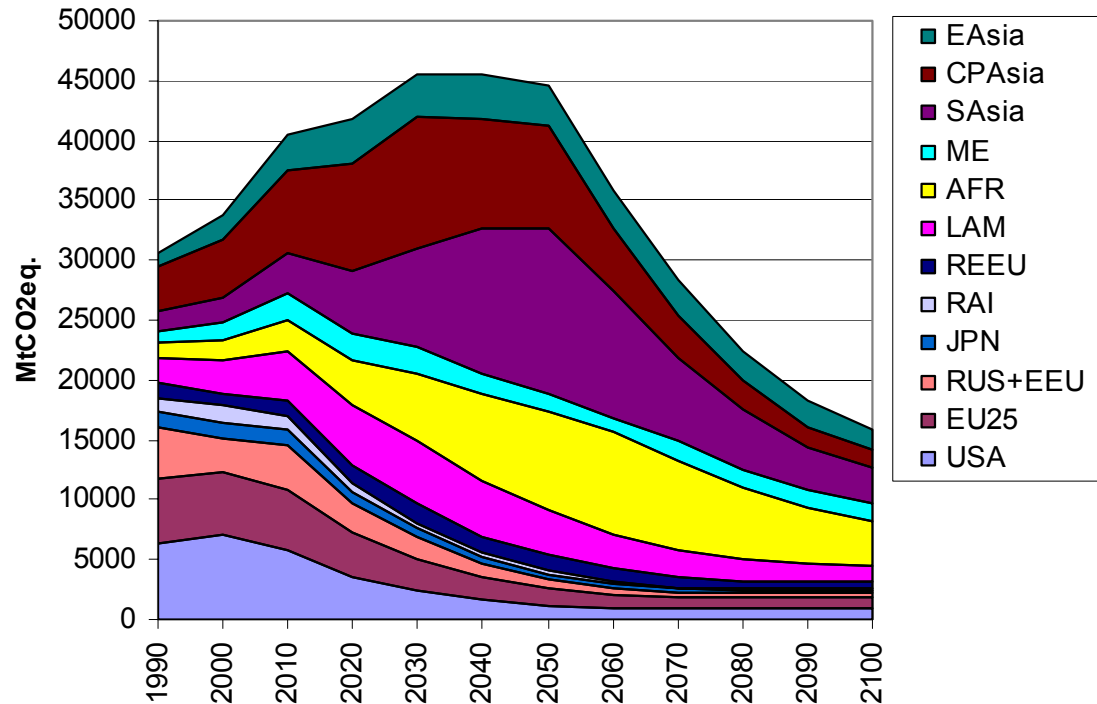
Towards 550 ppmv CO₂

Stage 3

- Entry at 6-10 tCO₂eq./cap
- 10%-15% below reference

Stage 4

- Entry at 9-12 tCO₂eq./cap
- 1-5% reduction per year



Time of entry towards 550 ppmv CO₂

	2020	2030	2040	2050	2060	2070	2080	2090	2100
Annex I	4.0	4.0	4.0	4.0	4.0	4.0	4.4	4.6	4.7
Rest of Eastern Europe	2.1	2.4	2.6	2.9	3.0	3.0	3.1	3.5	3.7
Argentina	2.8	3.7	4.0	4.0	4.0	4.0	4.5	4.7	4.7
Brazil	1.7	1.8	2.3	2.5	2.7	2.7	2.8	3.3	3.8
Mexico	1.8	2.3	2.7	2.8	3.0	3.0	3.2	3.8	4.2
Venezuela	3.0	4.0	4.0	4.0	4.0	4.0	4.2	4.5	4.7
Rest of Latin America	1.3	1.7	1.9	2.1	2.1	2.1	2.2	2.5	2.9
Egypt	1.0	1.0	1.5	1.8	2.3	2.5	2.5	2.7	3.3
South Africa	2.3	2.5	2.7	3.2	3.5	3.7	4.0	4.3	4.7
Nigeria	1.0	1.0	1.0	1.2	1.5	1.8	2.3	2.5	2.8
Rest of North Africa	1.3	1.5	1.8	2.1	2.4	2.5	2.5	2.8	3.3
Rest of Africa	1.0	1.0	1.1	1.2	1.3	1.5	1.8	2.0	2.3
Saudi Arabia	3.0	4.0	4.0	4.0	4.0	4.0	4.5	4.7	4.7
United Arab Emirates	3.0	4.0	4.0	4.0	4.0	4.0	4.5	4.7	4.7
Rest of Middle East	2.2	2.3	2.6	2.9	3.2	3.2	3.5	3.8	4.0
China	1.0	1.5	1.7	2.2	2.5	2.7	2.8	3.2	4.0
India	1.0	1.0	1.0	1.5	1.8	2.2	2.3	2.3	2.5
Indonesia	1.0	1.0	1.0	1.3	1.5	1.7	2.0	2.0	2.3
South Korea	3.0	4.0	4.0	4.0	4.0	4.0	4.2	4.2	4.5
Malaysia	2.5	3.0	3.5	3.7	3.8	4.0	4.2	4.3	4.5
Philippines	1.0	1.0	1.0	1.0	1.2	1.2	1.3	1.7	2.0
Singapore	3.0	3.8	4.0	4.0	4.0	4.0	4.0	4.5	4.7
Thailand	1.5	1.8	2.3	2.8	3.0	3.3	3.7	4.0	4.3
Rest of Asia	1.2	1.2	1.2	1.3	1.4	1.5	1.5	1.7	1.8



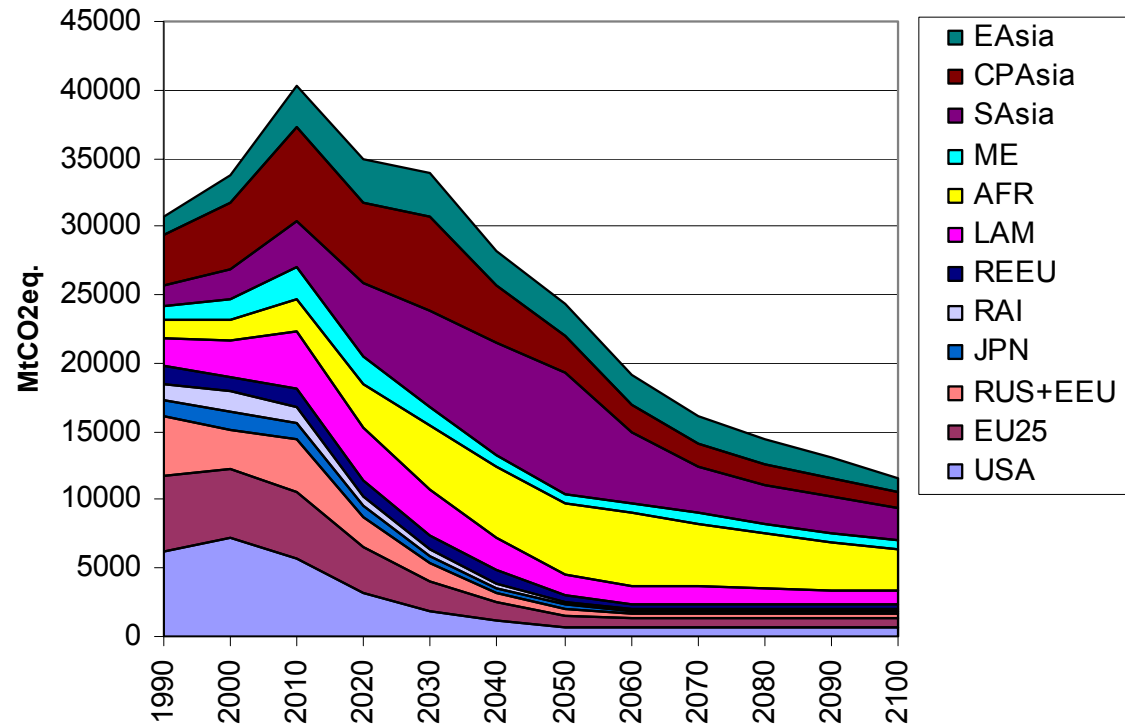
Towards 450 ppmv CO₂

Stage 3

- Entry at 3.5-4 tCO₂eq./cap
- ~30% below reference

Stage 4

- Entry at 5-5.5 tCO₂eq./cap
- ~5% reduction per year



Time of entry towards 450 ppmv CO₂

	2020	2030	2040	2050	2060	2070	2080	2090	2100
Annex I	4.0	4.0	4.0	4.0	4.1	4.9	5.0	5.0	5.0
Rest of Eastern Europe	2.6	3.2	3.4	3.4	3.6	4.1	4.2	4.3	4.3
Argentina	3.0	4.0	4.0	4.0	4.2	5.0	5.0	5.0	5.0
Brazil	3.0	3.0	3.8	4.0	4.2	5.0	5.0	5.0	5.0
Mexico	3.0	3.8	3.8	3.8	4.3	4.8	5.0	5.0	5.0
Venezuela	3.0	4.0	4.0	4.0	4.2	5.0	5.0	5.0	5.0
Rest of Latin America	2.4	2.7	2.8	3.2	3.2	3.5	3.8	3.9	4.0
Egypt	1.8	2.0	2.8	3.3	3.7	3.8	4.7	4.8	5.0
South Africa	3.0	4.0	4.0	4.0	4.7	5.0	5.0	5.0	5.0
Nigeria	1.0	1.0	1.7	2.0	2.5	3.3	3.7	4.3	4.7
Rest of North Africa	2.2	2.3	2.8	3.4	3.4	3.9	4.0	4.1	4.2
Rest of Africa	1.1	1.2	1.4	1.6	1.9	2.2	2.4	2.7	3.0
Saudi Arabia	3.0	4.0	4.0	4.0	4.2	5.0	5.0	5.0	5.0
United Arab Emirates	3.0	4.0	4.0	4.0	4.2	5.0	5.0	5.0	5.0
Rest of Middle East	2.8	3.4	3.4	3.6	3.9	4.4	4.5	4.5	4.5
China	3.0	3.0	3.2	3.7	3.7	4.2	4.7	5.0	5.0
India	1.0	1.5	2.0	2.3	3.2	3.3	3.8	4.0	4.3
Indonesia	1.0	1.7	2.0	2.3	2.3	2.5	2.7	3.0	3.7
South Korea	3.0	4.0	4.0	4.0	4.2	4.5	5.0	5.0	5.0
Malaysia	3.0	4.0	4.0	4.0	4.2	5.0	5.0	5.0	5.0
Philippines	1.0	1.0	1.5	1.7	1.8	1.8	1.8	2.3	2.8
Singapore	3.0	4.0	4.0	4.0	4.2	4.7	5.0	5.0	5.0
Thailand	3.0	3.2	3.7	3.8	4.2	4.8	5.0	5.0	5.0
Rest of Asia	1.2	1.3	1.5	1.7	1.7	1.8	1.9	2.1	2.3



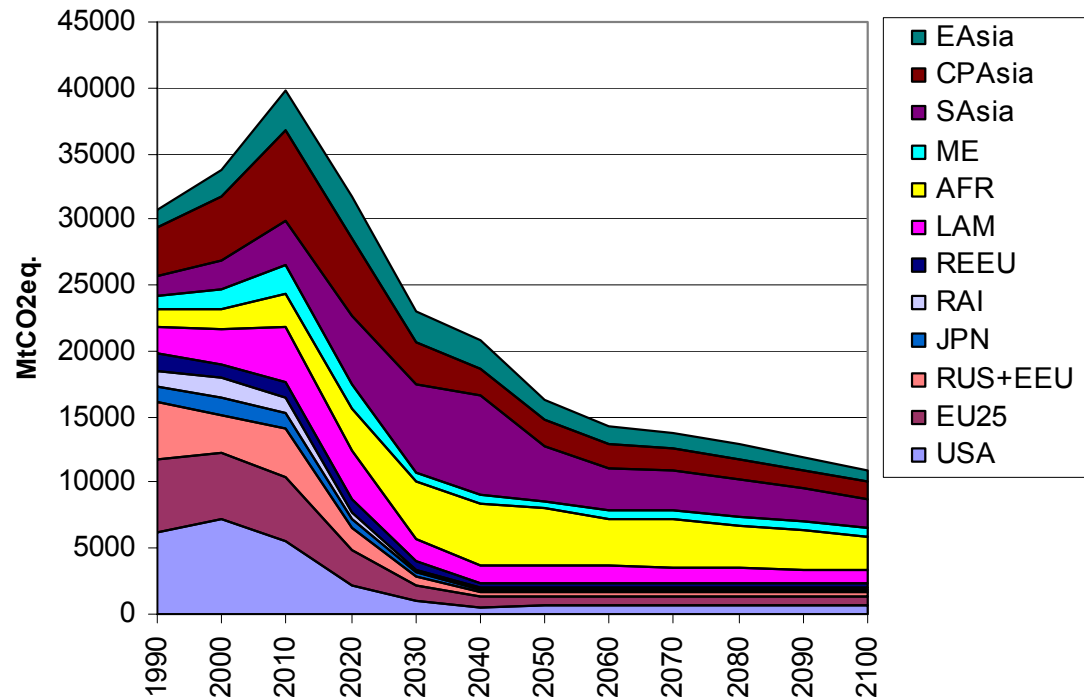
Towards 400 ppmv CO₂

Stage 3

- Entry at 3.5 tCO₂eq./cap
- ~30% below reference

Stage 4

- Entry at 4 tCO₂eq./cap
- ~8% reduction per year

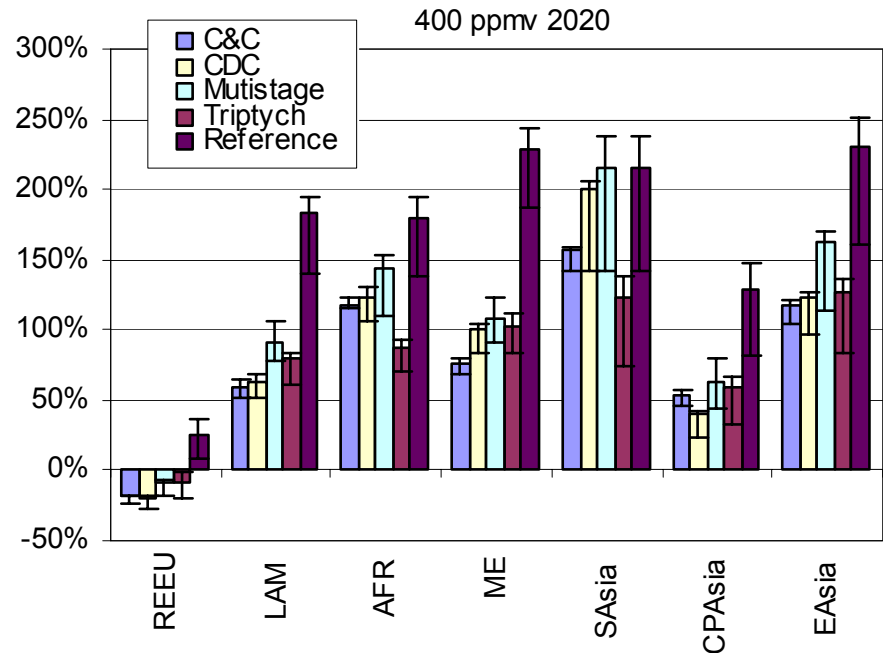
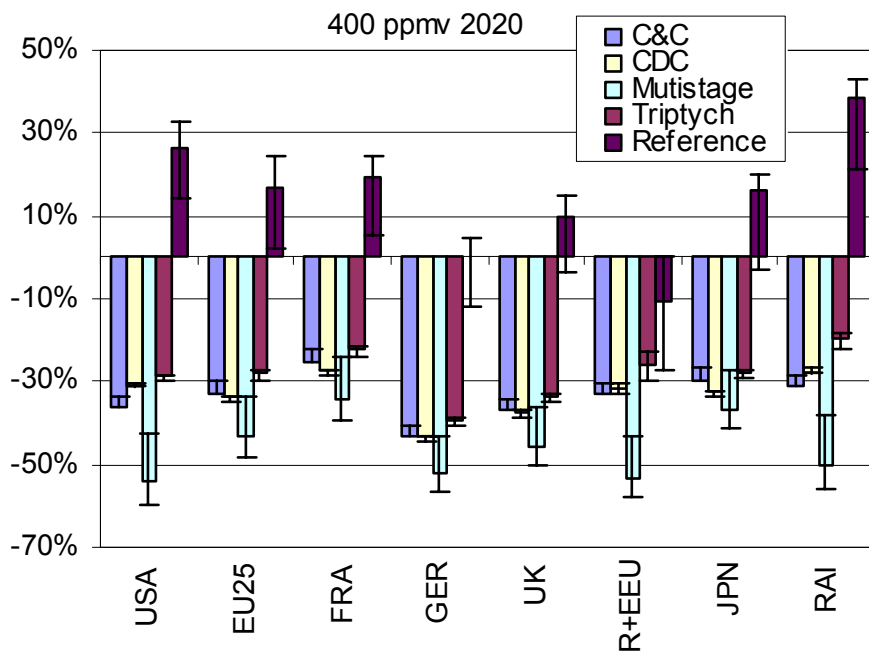


Time of entry towards 400 ppmv CO₂

	2020	2030	2040	2050	2060	2070	2080	2090	2100
Annex I	4.0	4.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0
Rest of Eastern Europe	2.6	3.4	3.5	4.1	4.3	4.5	4.5	4.6	4.6
Argentina	3.0	4.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0
Brazil	3.0	4.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0
Mexico	3.0	4.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0
Venezuela	3.0	4.0	4.0	4.3	5.0	5.0	5.0	5.0	5.0
Rest of Latin America	2.5	3.1	3.3	3.9	4.2	4.2	4.3	4.4	4.6
Egypt	1.8	2.0	2.7	3.7	4.0	5.0	5.0	5.0	5.0
South Africa	3.0	4.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0
Nigeria	1.0	1.0	1.7	2.5	3.3	4.0	4.8	5.0	5.0
Rest of North Africa	2.2	2.7	3.1	4.0	4.3	4.5	4.7	4.7	4.8
Rest of Africa	1.1	1.2	1.4	1.8	2.1	2.5	3.0	3.3	3.7
Saudi Arabia	3.0	4.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0
United Arab Emirates	3.0	4.0	4.0	4.3	5.0	5.0	5.0	5.0	5.0
Rest of Middle East	2.8	3.6	3.6	4.5	4.5	4.5	4.5	4.5	4.5
China	3.0	3.7	3.7	4.7	4.8	5.0	5.0	5.0	5.0
India	1.0	1.5	2.3	3.0	3.3	4.3	4.8	5.0	5.0
Indonesia	1.0	1.7	2.3	3.0	3.2	3.8	4.2	4.5	4.7
South Korea	3.0	4.0	4.0	4.2	5.0	5.0	5.0	5.0	5.0
Malaysia	3.0	4.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0
Philippines	1.0	1.0	1.5	2.0	2.5	3.0	3.7	3.8	4.3
Singapore	3.0	4.0	4.0	4.5	5.0	5.0	5.0	5.0	5.0
Thailand	3.0	4.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0
Rest of Asia	1.2	1.3	1.5	1.7	2.1	2.3	2.6	2.9	3.2

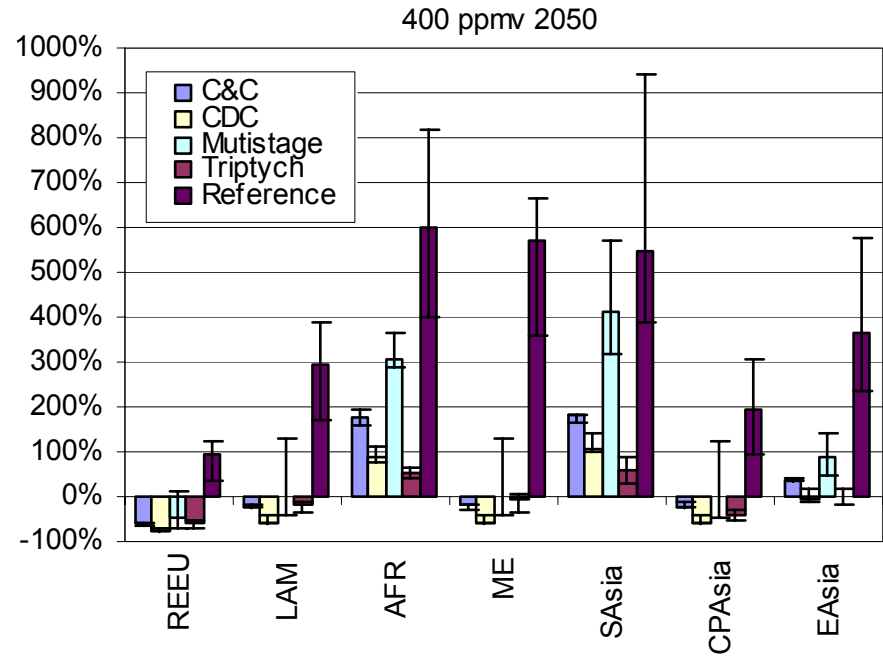
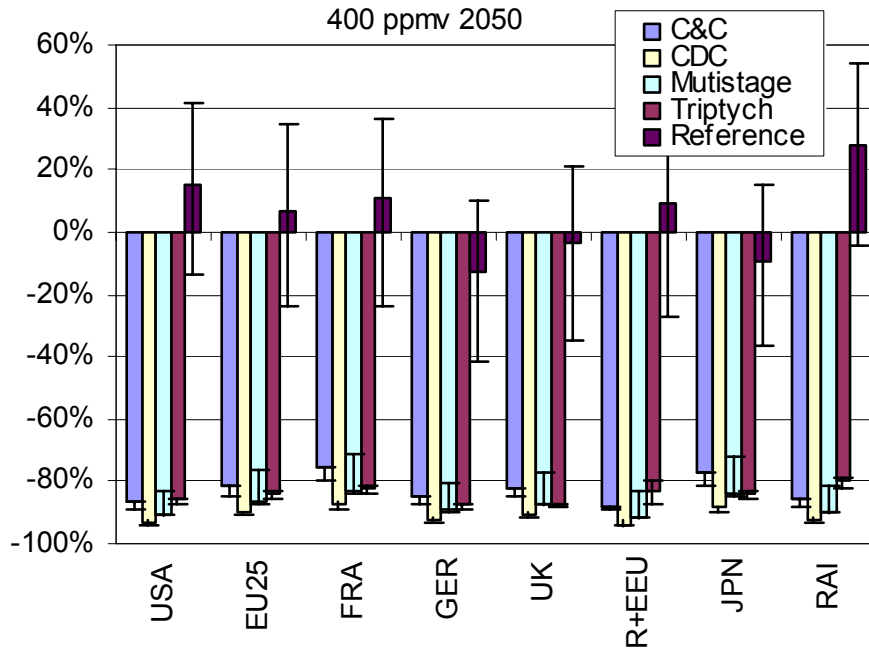


Change 1990 to 2020 towards 400 ppm CO₂



- Annex I: -25% to -50% below 1990
- No participation: only a very few countries
- Deviate from their reference: all Non-Annex I regions

Change 1990 to 2050 towards 400 ppm CO₂



- Annex I: -80% to -90% below 1990
- Substantial deviation from reference in all Non-Annex I regions

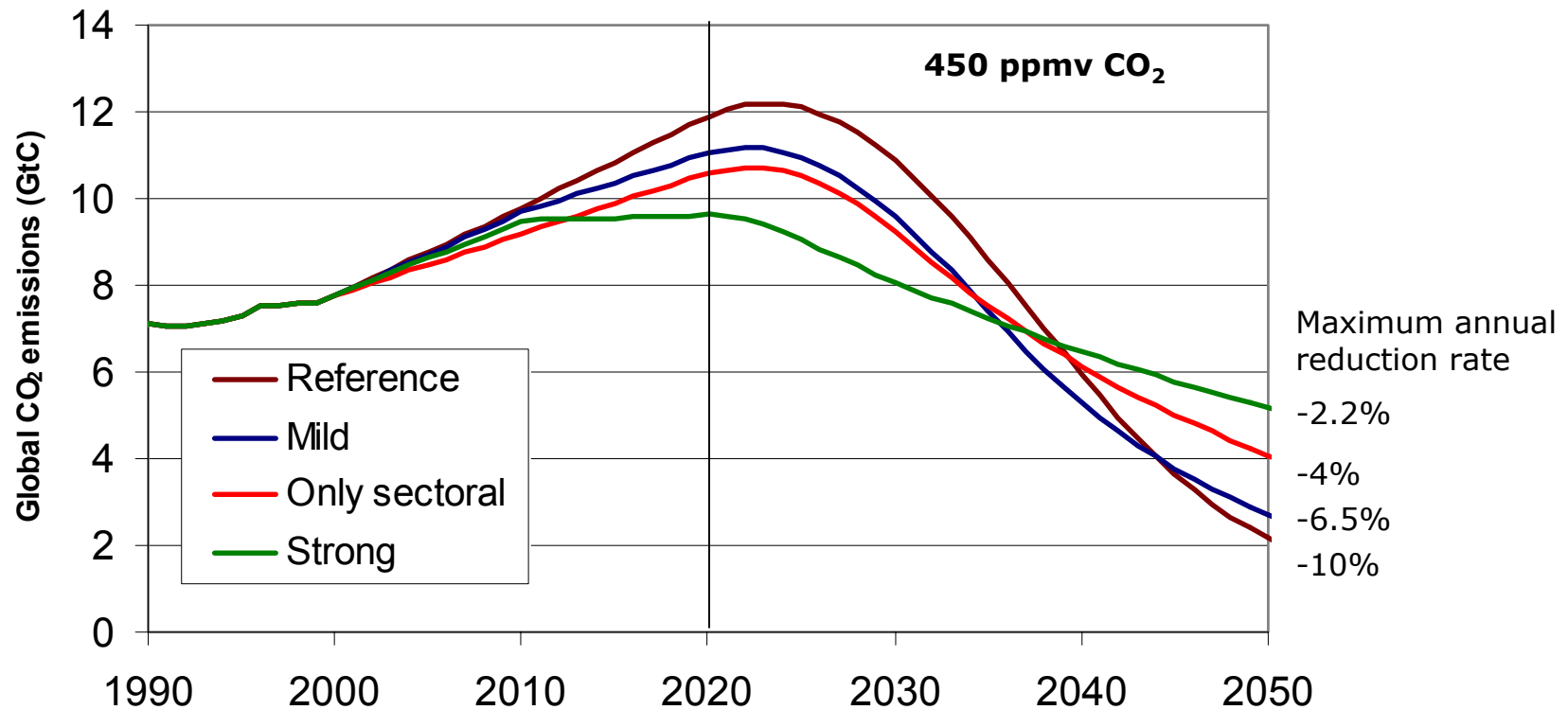


Sectoral scenarios until 2020

Scenario	Condition	
"Mild"	Annex I excl. USA	-15% below 1990 level in 2020
	USA	+10% above 1990 level in 2020
	Non-Annex I	Reference
"Strong"	Annex I excl. USA	-30% below 1990 level in 2020
	USA	+0% at 1990 level in 2020
	Non-Annex I	Sectoral for electricity, iron & steel and cement
"Sectoral only"	All countries	Sectoral for electricity, iron & steel and cement



Reductions after 2020 towards 450



Global emission levels necessary to stay below 450 ppmv CO₂ concentration assuming that all greenhouse gases are reduced in the same proportion and that the global trend cannot change be faster than 0.5 percentage points per year using the MAGICC model. For 550 ppmv the difference between the cases is less pronounced (maximum annual reduction rate of 0.6%, 0.9%, 0.9%, 1% for immediate reductions after 2020)

