Scientific and methodological aspects of the Brazilian Proposal

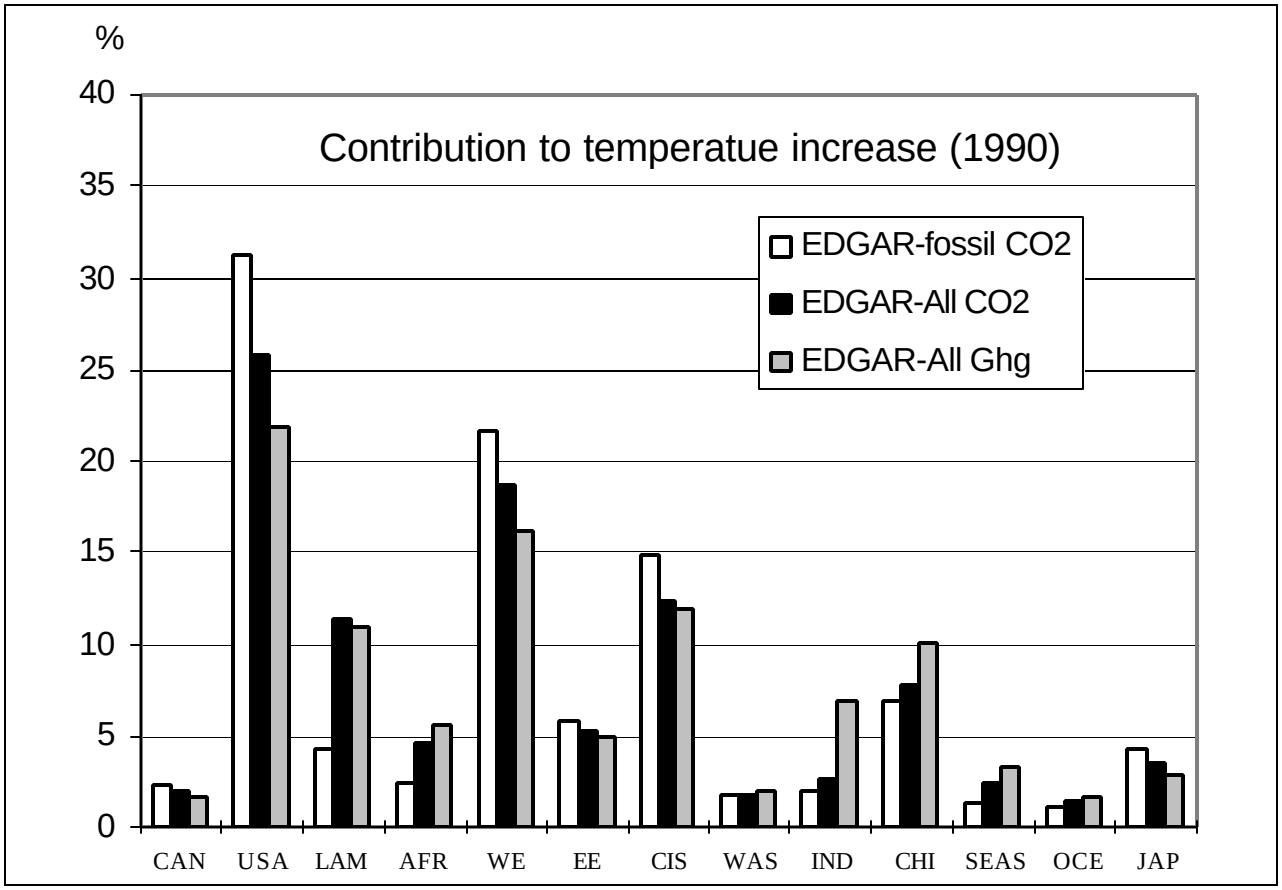
Some important aspects that are not specifically addressed by way of presentations

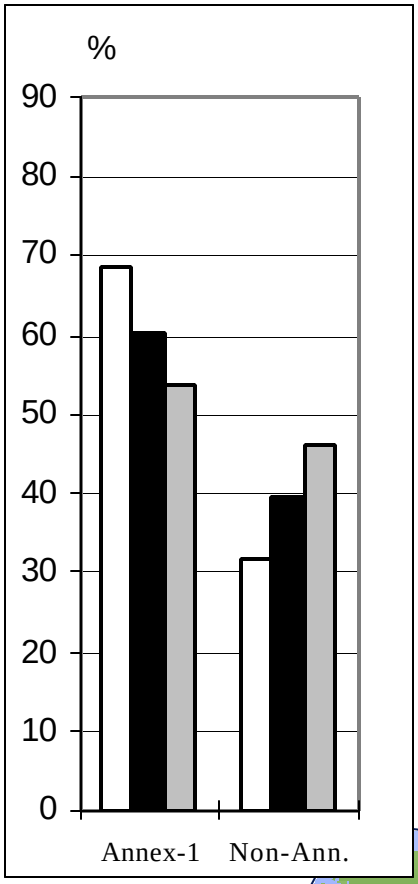
Michel den Elzen, Bert Metz

RIVM, The Netherlands

UNFCCC Workshop , Bonn May, 2001

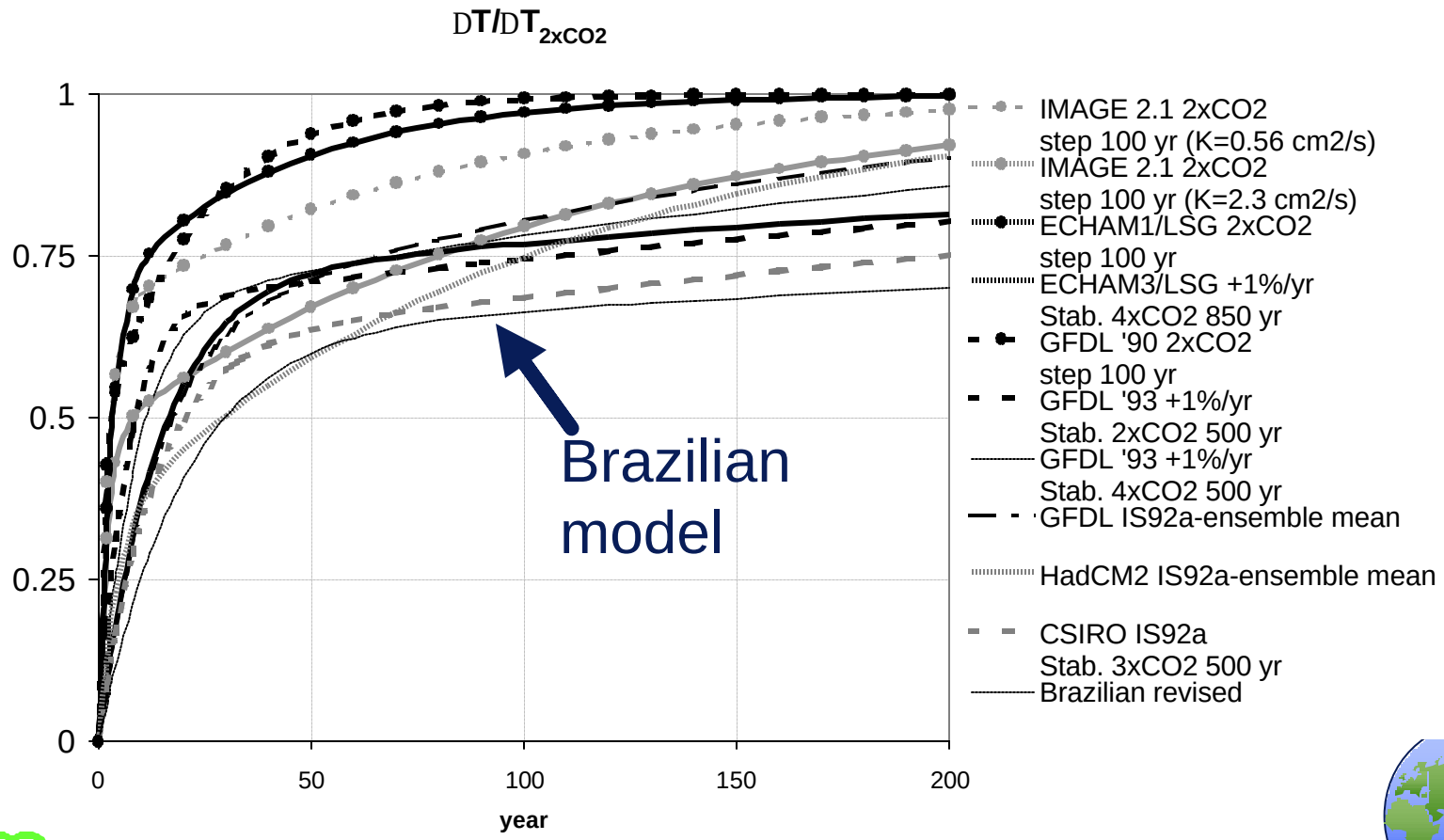
It does matter to include land-use CO2 emissions





Source: den Elzen et al, 1999

Brazilian model has significantly slower climate response to increased radiative forcing than most GCMs and Integrated Assessment Models



Effect of simplified carbon cycle model in Braz proposal

Table 3.3 The atmospheric CO_2 concentration projections (ppmv) for the year 2100 for a set of emissions scenarios; these apply to the original Brazilian model (UNFCC, 1997), the revised Brazilian model, the IMAGE model (Alcamo *et al.*, 1998), the meta-IMAGE model (den Elzen, 1998) and the MAGICC model (Wigley and Raper, 1992).

Model	*IS92a*	*IPCC Stab. 450 ppmv*	*IMAGE Stab 450 ppmv*
Original Brazilian model*)	800	380	421
Revised Brazilian model**)	676	430	446
Meta-IMAGE	690	445	475
MAGICC	710	450	-

*) the 1990 version of the original Brazilian model

**) the scaled version of the revised Brazilian model

What indicator could be used as a measure of contribution to climate change?

- Current emissions/ CO2-equivalent emissions
  - neglects historical emissions
  - Favourable for Annex I regions
  - how to deal with GWPs?
- Cumulative historical emissions
  - does not account for atmospheric decay of historical emissions
  - Favourable for Non-Annex I regions
- CO2 concentration
  - model-outcome (uncertainties in the land-use emissions/sinks)
  - does not account for non-CO2 greenhouse gases
  - Favourable for Non-Annex I regions

What indicator could be used as a measure of contribution to climate change?

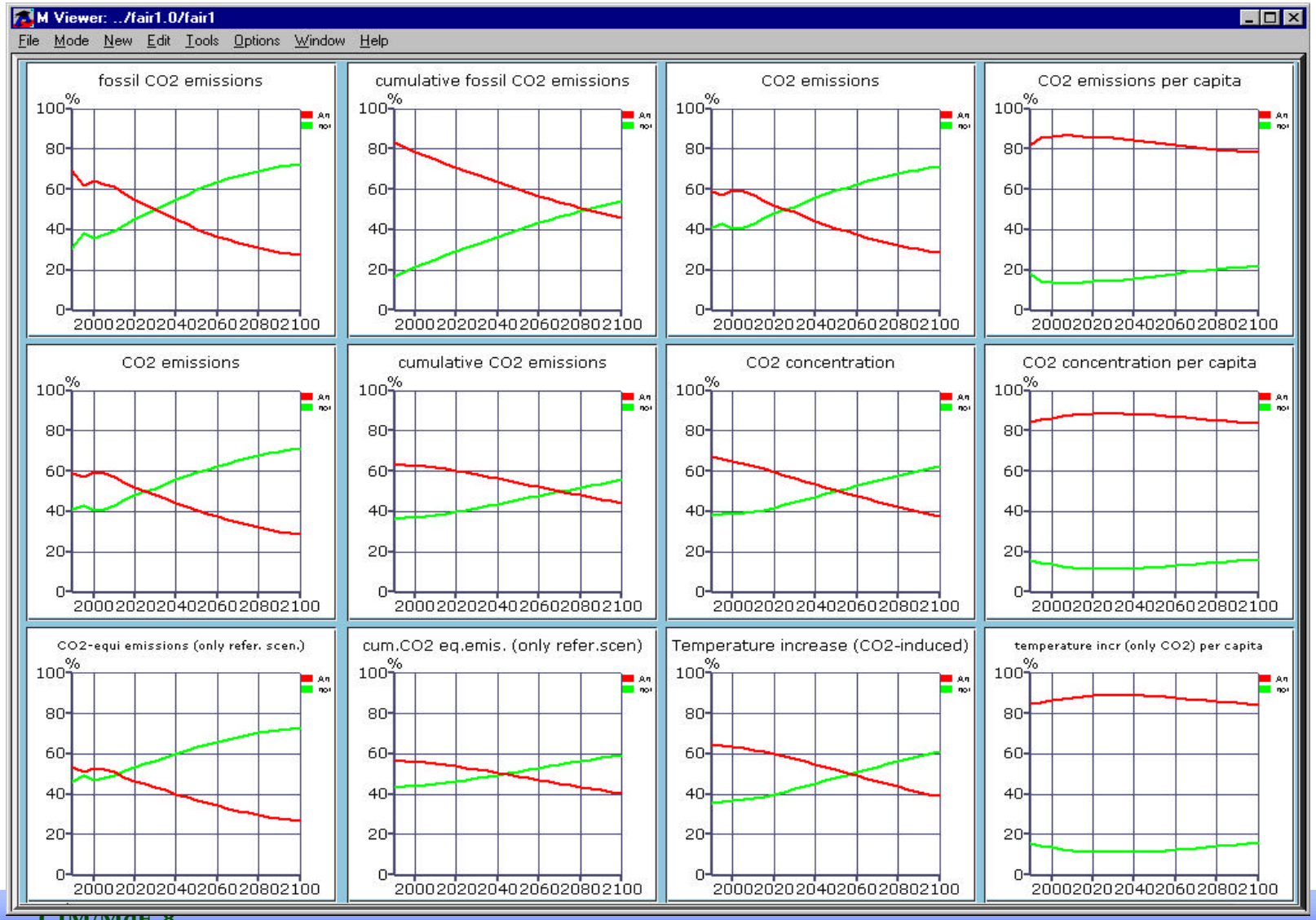
- Radiative forcing
  - accounts for historical emissions/non-CO2 greenhouse gases
  - can be measured
  - uncertainties in the land-use emissions/sinks & anthropogenic emissions of non-CO2 greenhouse gases)
  - non-linearity issue of attribution (early vs late emitters)
- Global mean surface temperature increase
  - anthropogenic contribution is difficult to measure
  - cumulation of uncertainties
  - how to deal with delays in climate system (warming is still in the pipeline)?

What indicator could be used as a measure of contribution to climate change?

- Rate of temperature increase
  - total different outcomes as absolute temperature increase
  - disadvantage for the regions with fast-growing emissions
  - needs more study
- Sea level rise
  - gives similar outcomes as absolute temperature increase
  - but even more sea level rise is in the pipeline.

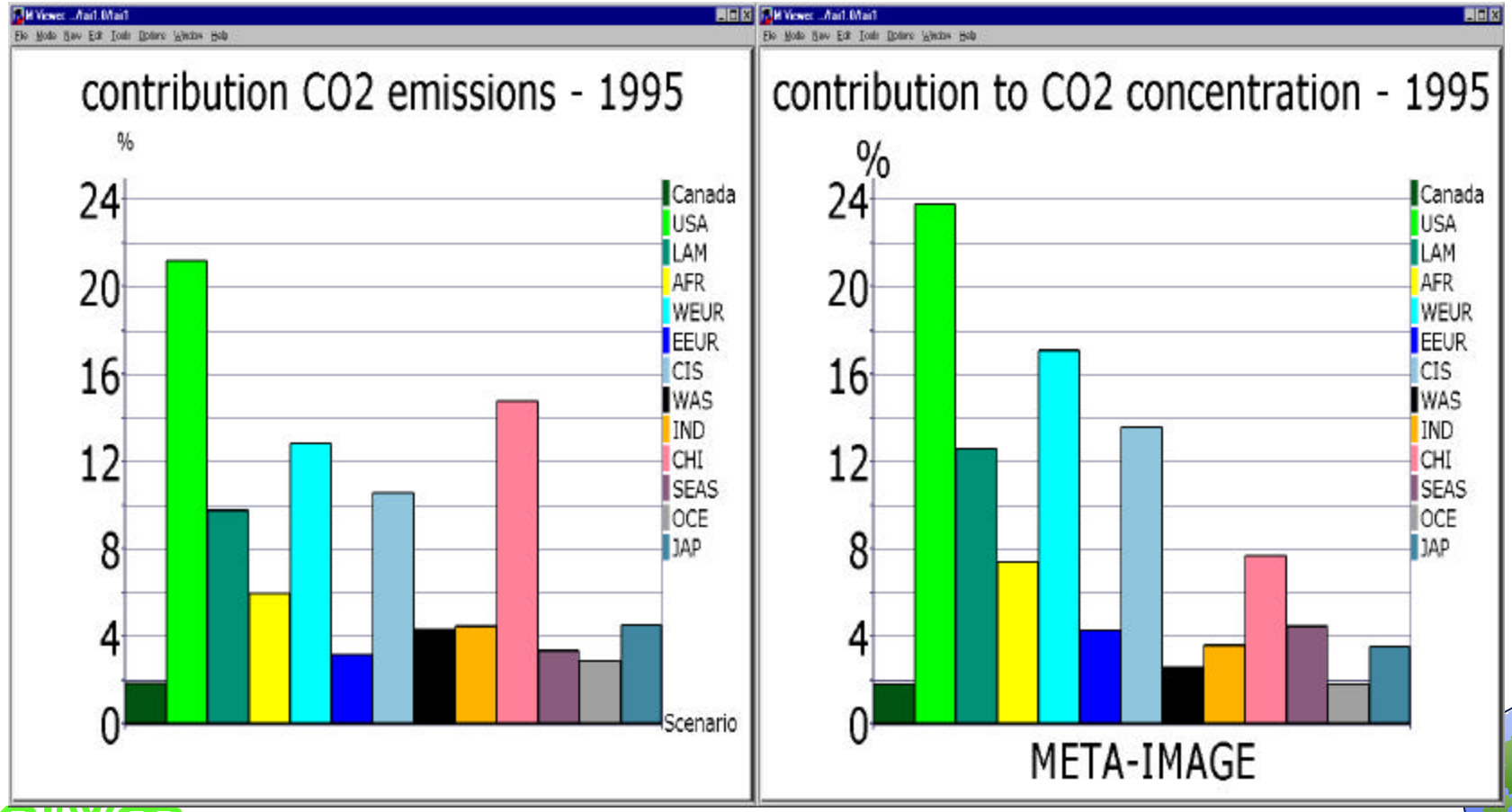
Choice of indicator has significant influence on sharing responsibility

(IMAGE IS92a scenario; EDGAR-HYDE historic data)



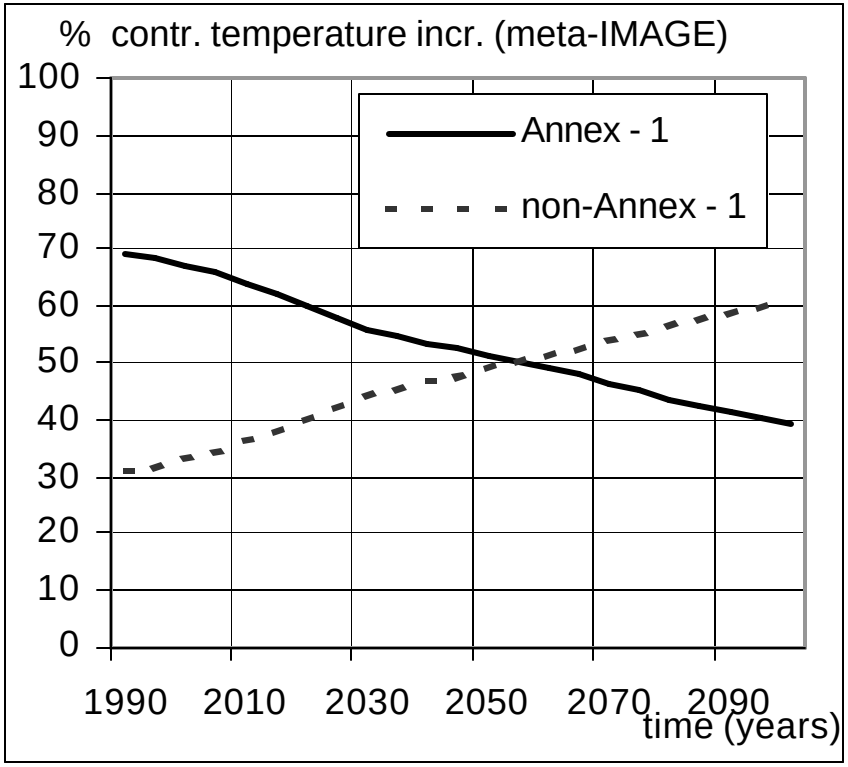
What indicator could be used as a measure of contribution to climate change?

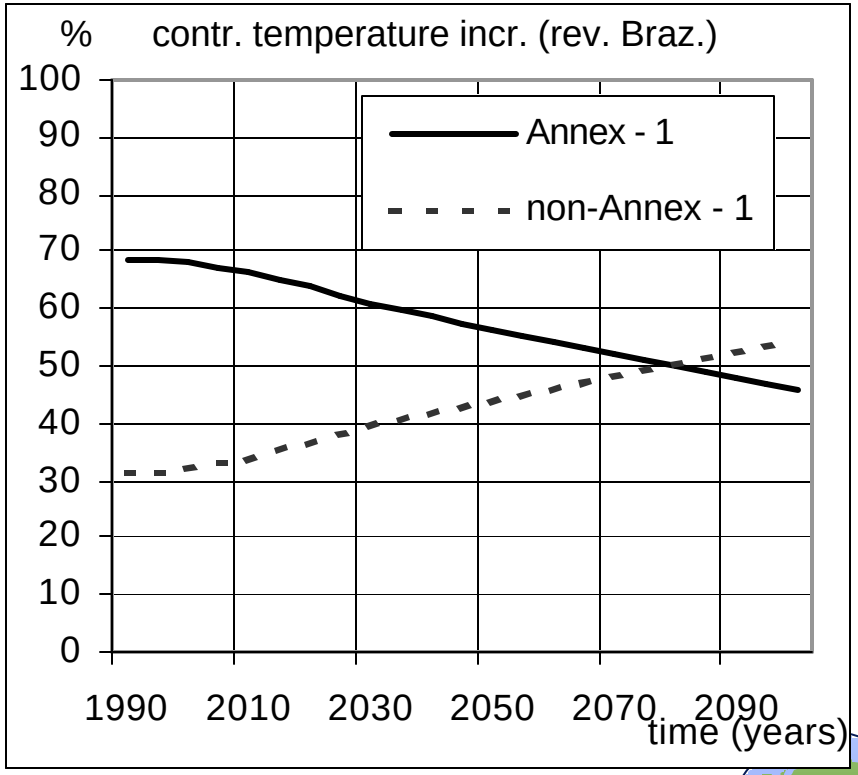
- Illustration of regional contribution to 1995 CO2 emissions and concentration:



Does the “policy maker model” proposed by Brazil accurately describe the contribution?

- Model underestimates the non-Annex I contribution to temperature increase

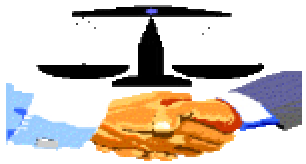




The use of the Brazilian proposal and other approaches in the context of differentiation of future commitments

Bert Metz

RIVM, The Netherlands



FAIR

Framework to Assess International Regimes for burden sharing

- **Two functions:**
  - Construct / evaluate global emission profiles
  - Evaluate regimes for differentiation of commitments
- **Regime modes:**
  - Increasing participation (multi-stage):
    - Number of parties and level of involvement in global emission control gradually increase according to participation / contribution rules (within global profile)
  - Convergence:
    - All parties participate in the regime from the start with (per capita) emission rights converging over time (within global profile)
  - Triptych:
    - Contribution based on rules differentiated per sector (without global profile)

FAIR - Convergence

- Principles: combination of sovereignty and egalitarian principles of need/right
  - From status quo to equal per capita emission rights
  - No accounting for historical emissions
- Top-down approach: global ceiling
- Full participation: All parties join a common regime from the start
- Policy levers:
  - convergence year
  - rate of convergence (lineair / non-lineair (e.g. GCI))
  - gases: CO_2 or CO_2-equivalent emissions
  - with /without minimum permits (e.g. CSE survival emissions)

FAIR - Triptych (1)

- Principles: Combination of capability and need principles of equity; no accounting for historical emissions
- Sector oriented approach: different regimes for different sectors
- Sectors in Triptych:
  - **Domestic sectors** : residential, commercial, light industry, transport, agriculture
  - **Internationally oriented energy-intensive industry sectors**: cement, iron & steel, non-ferrous metals, chemical, refineries etc.
  - **Power generation**: electricity power plants

FAIR - Triptych (2)

- Bottom-up approach: emission permits are calculated by applying specific rules to each of the sectors
- Full participation: All parties join a common regime from the start
- Policy levers in Triptych:
  - **Domestic sectors**: convergence year and overall reduction in domestic emissions
  - **Industrial sectors**: regional efficiency and de-carbonisation targets
  - **Power generation**: regional efficiency, de-carbonisation and CO_2 free share targets

FAIR - Increasing Participation (1)

- Top-down approach: global ceiling
- Policy levers for accession:
  - participation rules / criteria
  - rules /criteria for differentiation of contribution to reduction efforts

FAIR - Increasing Participation (2)

- Participation Rules:

  determine who should participate when

  All Annex-1 countries:

  1. follow Kyoto restrictions, or Baseline emissions
  2. participate in regime

  Non-Annex I parties: Multi stage- Approach:

  1. follow Baseline emissions
  2. de-carbonisation of economy
  3. stabilisationof emissions
  4. participation in regime

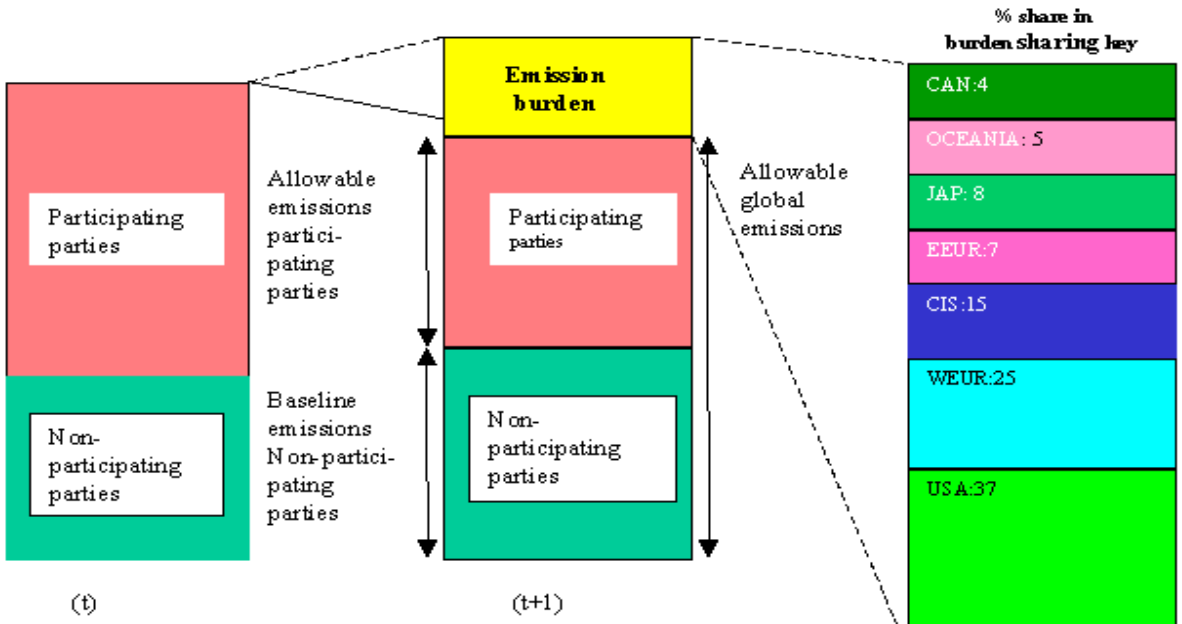
  Triggers: income, emission level and/or timing

FAIR - Increasing Participation (3)

- Rules for differentiation of commitments:
  determine who does what to achieve emissions ceiling

- Principles / criteria
  - *polluter pays principle (responsibility):*
    - *emissions; emission/GDP; cumulative emissions; contribution to concentrations / global warming ('Brazilian proposal'))*
  - *egalitarian principle (need/right):*
    - *per capita emissions*
  - *ability to pay principle (capability):*
    - *per capita income*

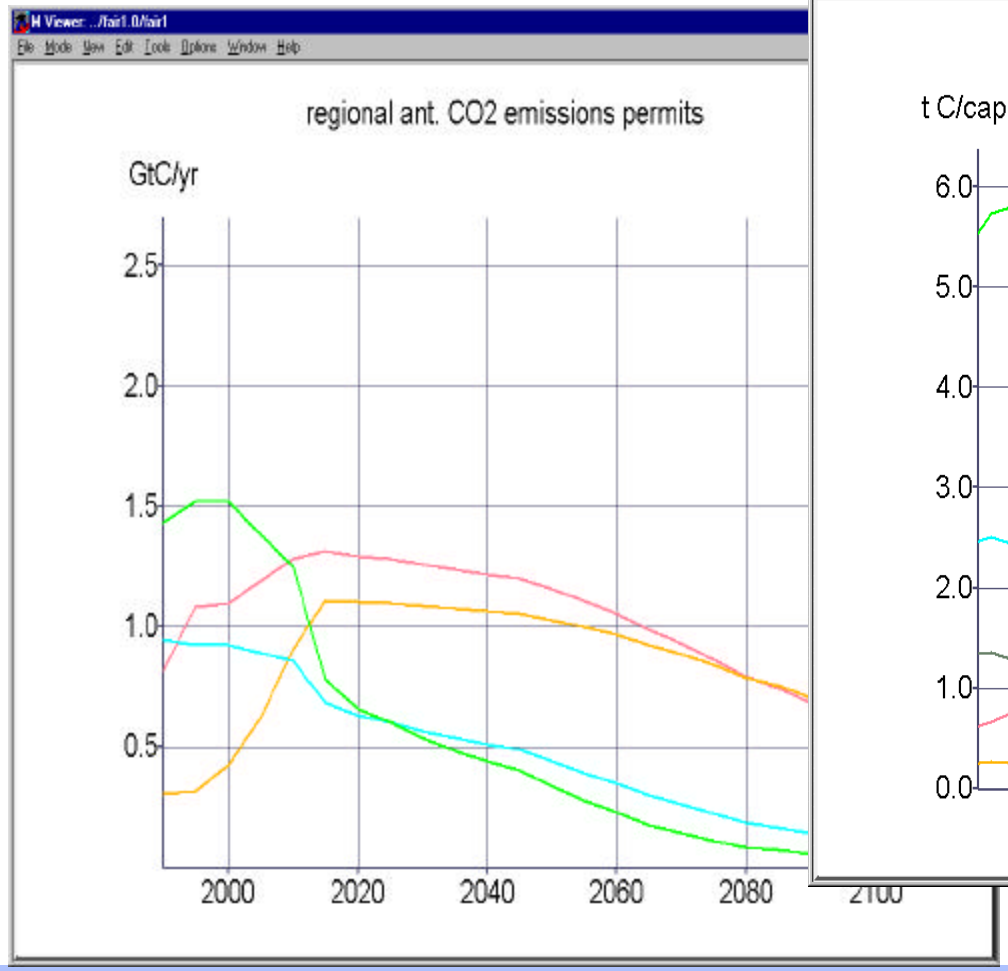
FAIR -increasing participation: how it works

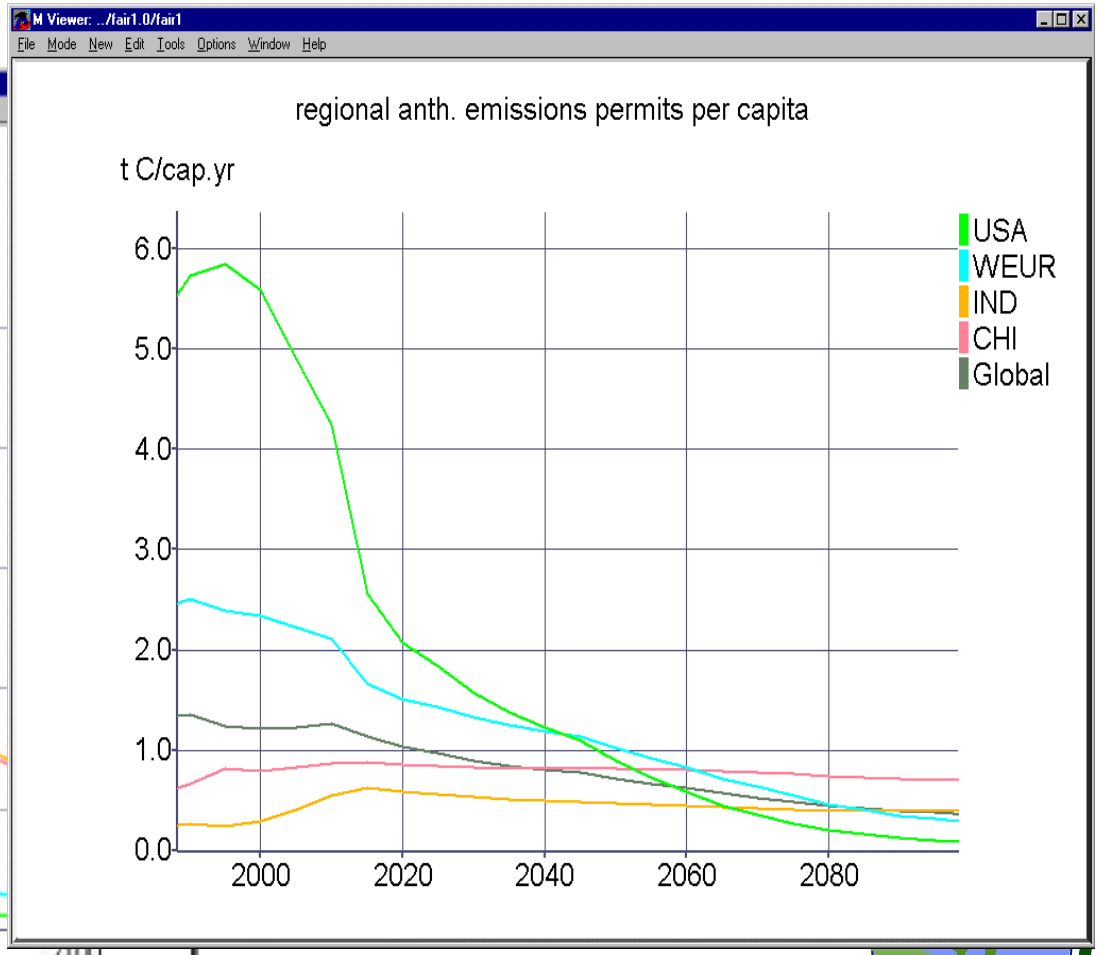


Example:
USA emissions (t) = 1.70 GtC;
Emission burden (t+1) = 0.5 GtC;
USA share in emission burden key = 37%
Allowable emissions USA at (t+1) = 1.7 - (0.37 *0.5) = 1.52GtC

Applying Braz prop for all countries after 1st commitment period leads to emission reduction targets

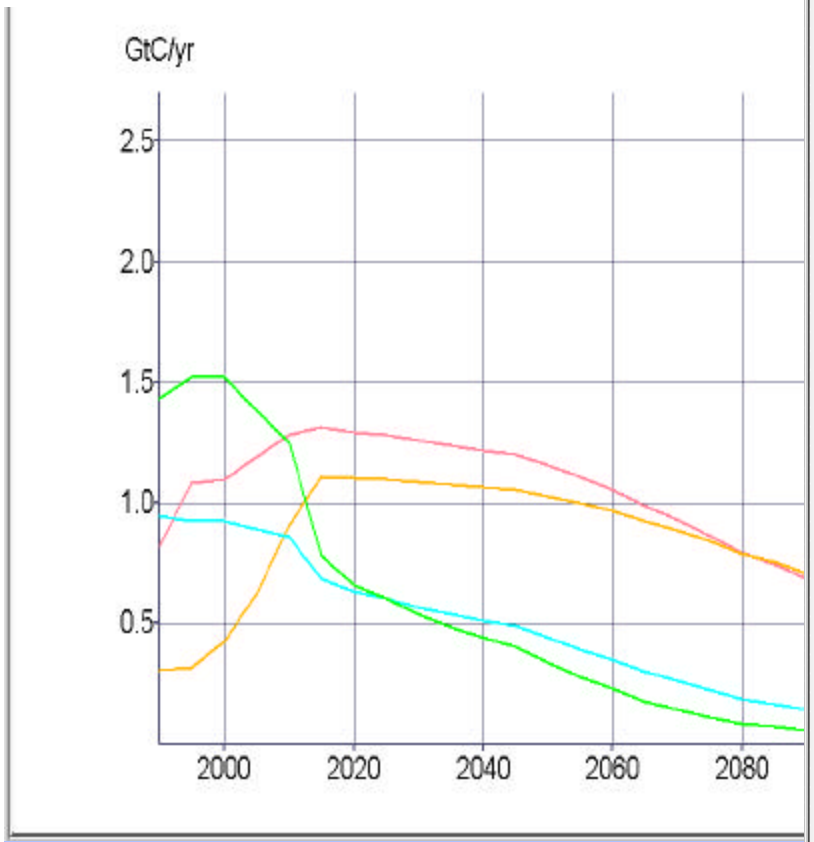
for developing countries (case: 450ppm stab + Kyoto)



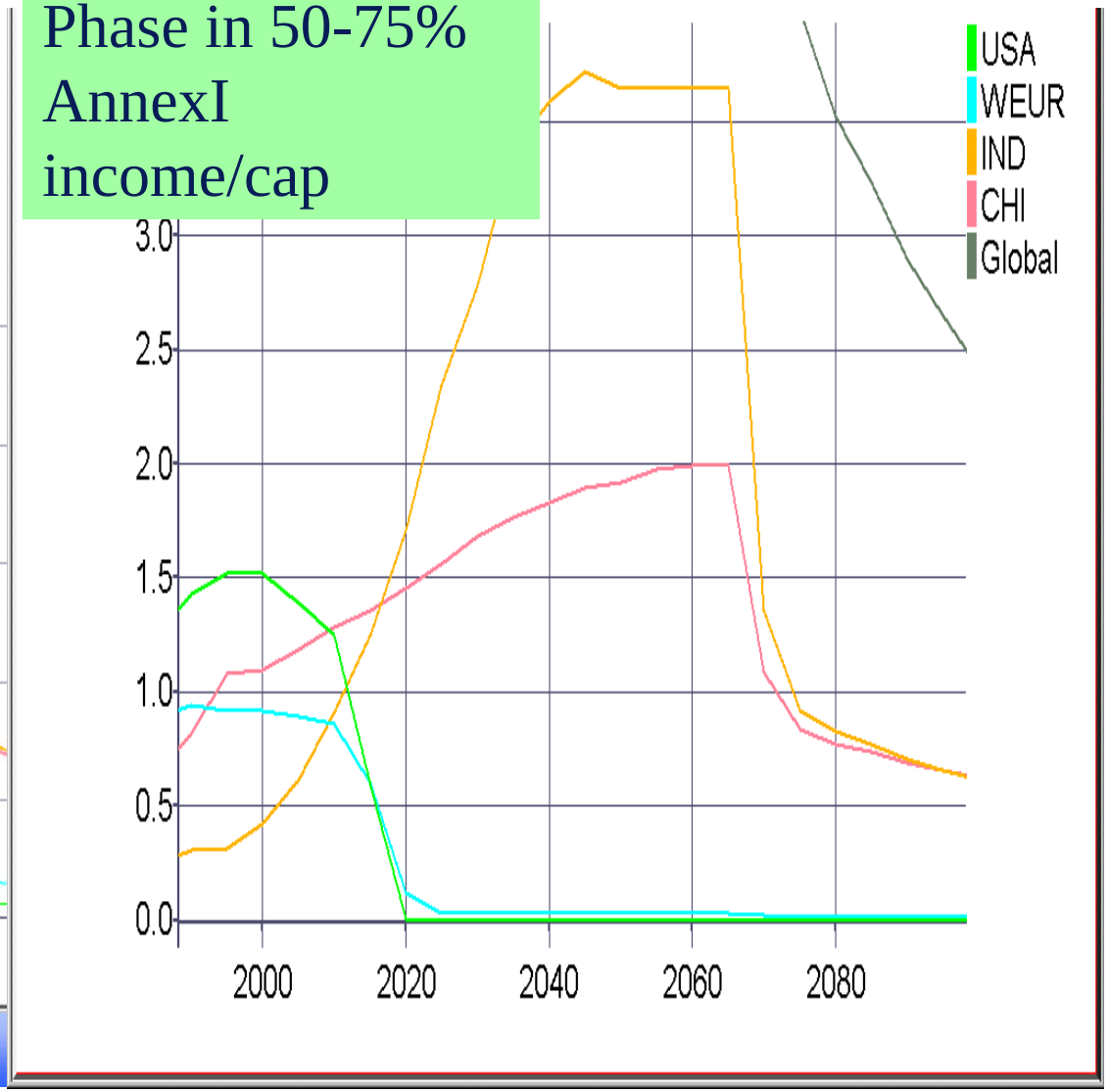


Effect of “phasing-in” provisions is bigger than rules for sharing reduction efforts (1)

No phase-in

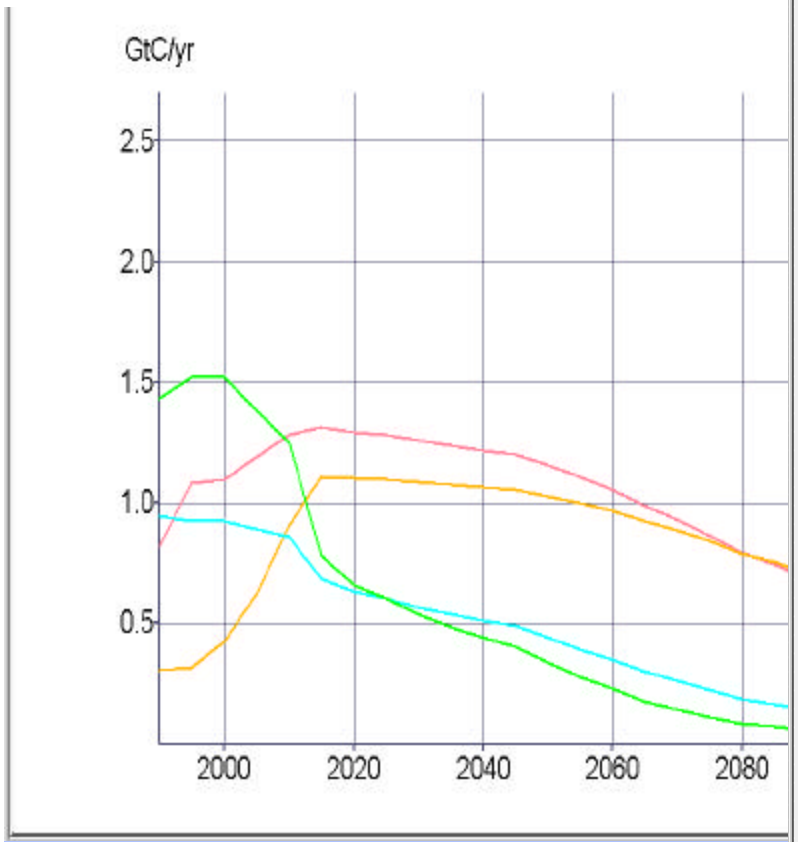


Phase in 50-75% AnnexI income/cap

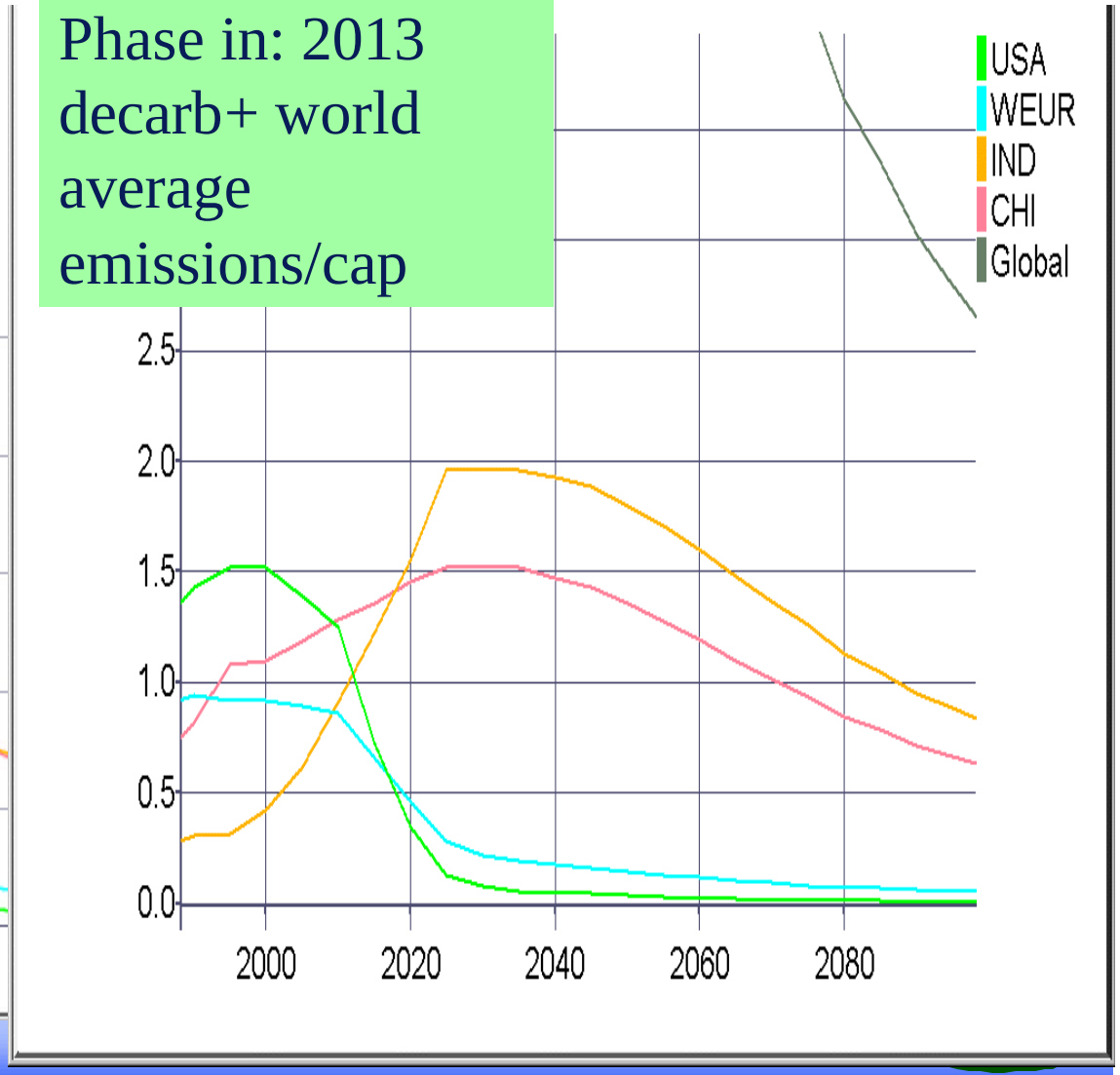


Effect of "phasing-in" provisions is bigger than rules for sharing reduction efforts (2)

No phase-in

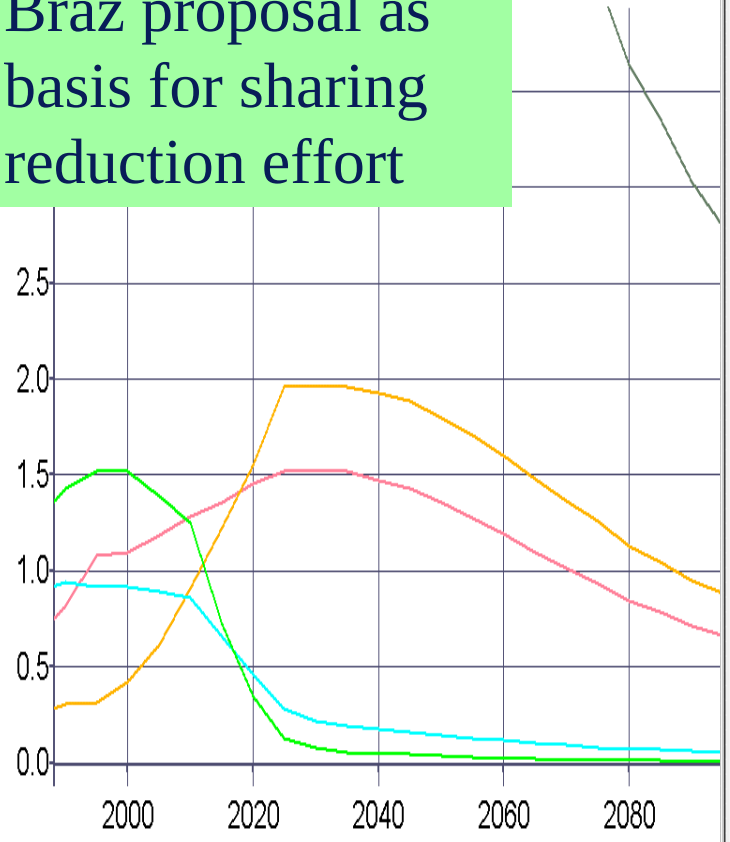


Phase in: 2013 decarb+ world average emissions/cap

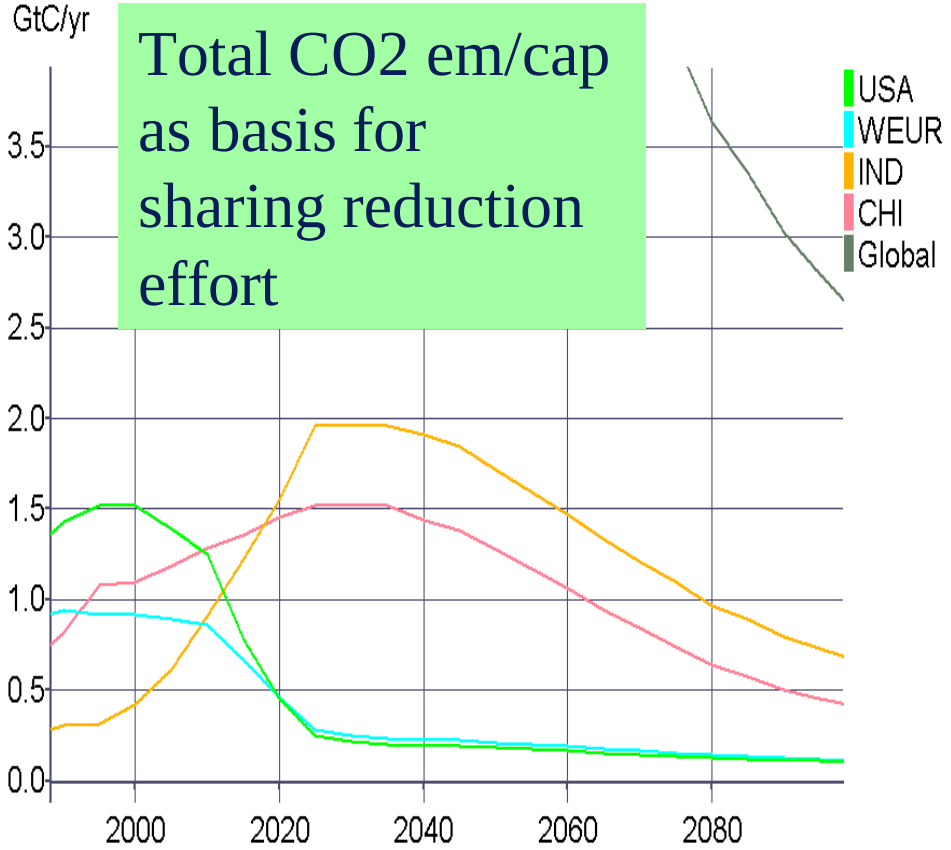


Effect of "phasing-in" provisions is bigger than rules for sharing reduction efforts (3) (case 450 ppm+Kyoto; 2013 decarb+ world av CO2/cap)

Braz proposal as basis for sharing reduction effort

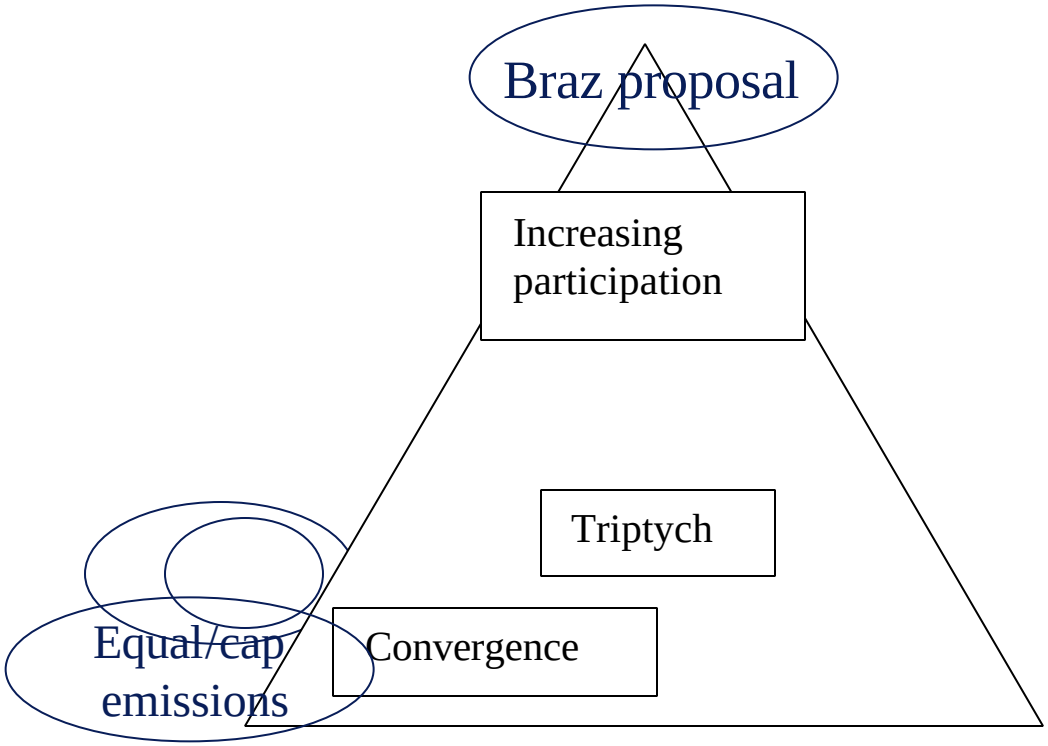


Total CO2 em/cap as basis for sharing reduction effort



Different approaches to differentiation of commitments

Responsibility / polluter pays principle



Need / egalitarian equity principle

Capability / ability to pay principle