Are more comprehensive and long-term climate agreements possible?

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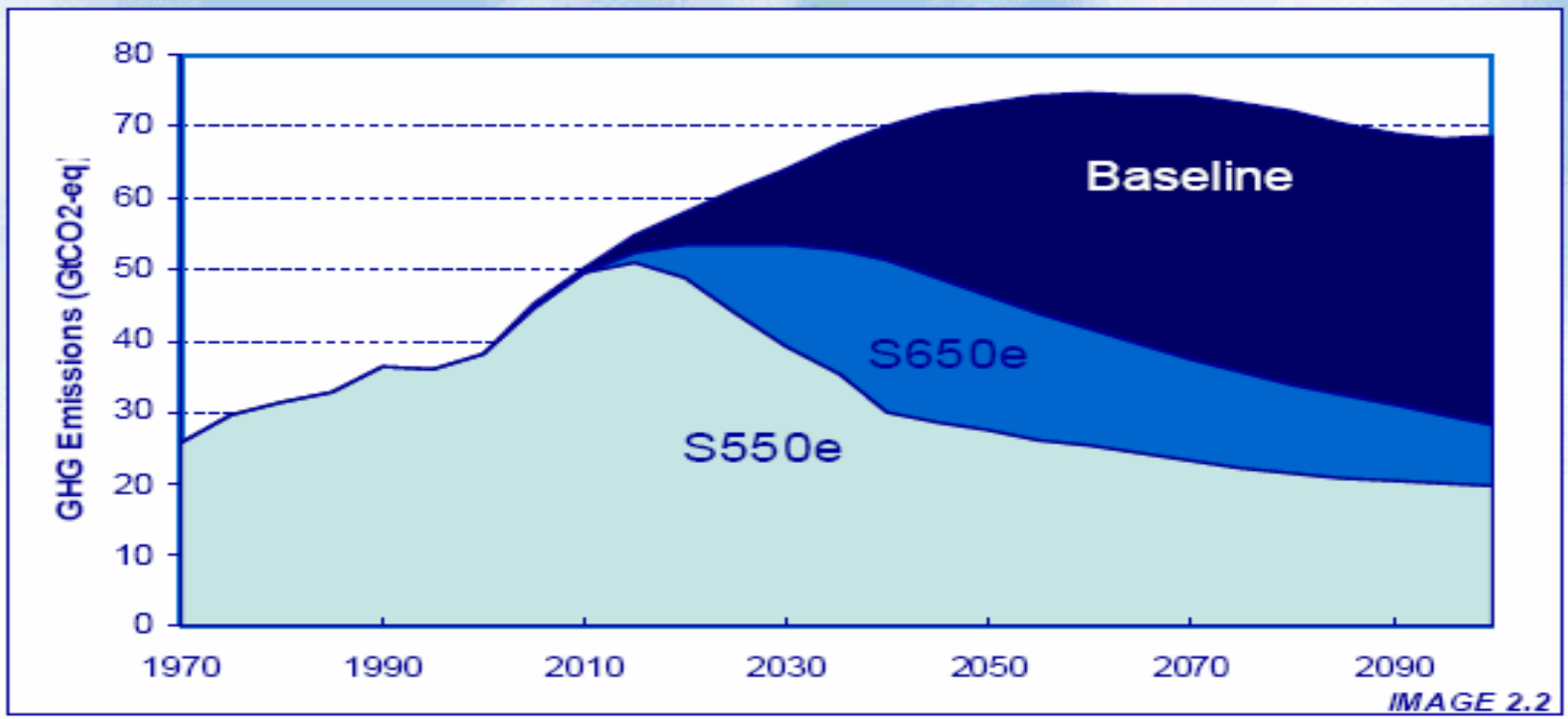
Why is the handling of man-made global warming such a big challenge?

- A long-term problem
- A number of important uncertainties: rate of change, scale of changes, abrupt changes, impacts on ecosystems, impacts on societies
- Long delays in the climate system. Energy system, political and cultural inertia
- It is a global problem that requires global participation to solve; incentives for countries to shirk from efforts
- Fossil fuels vital, but need to de-carbonize our economies
- The interests of countries vary substantially according to national circumstances; anticipated emission mitigation costs and impacts-related costs
- What is a "fair" contribution from a country, e.g. Norway, the USA and India?
- Most costs today and most benefits in the future (next generations)

A major challenge to achieve deep emission cuts globally

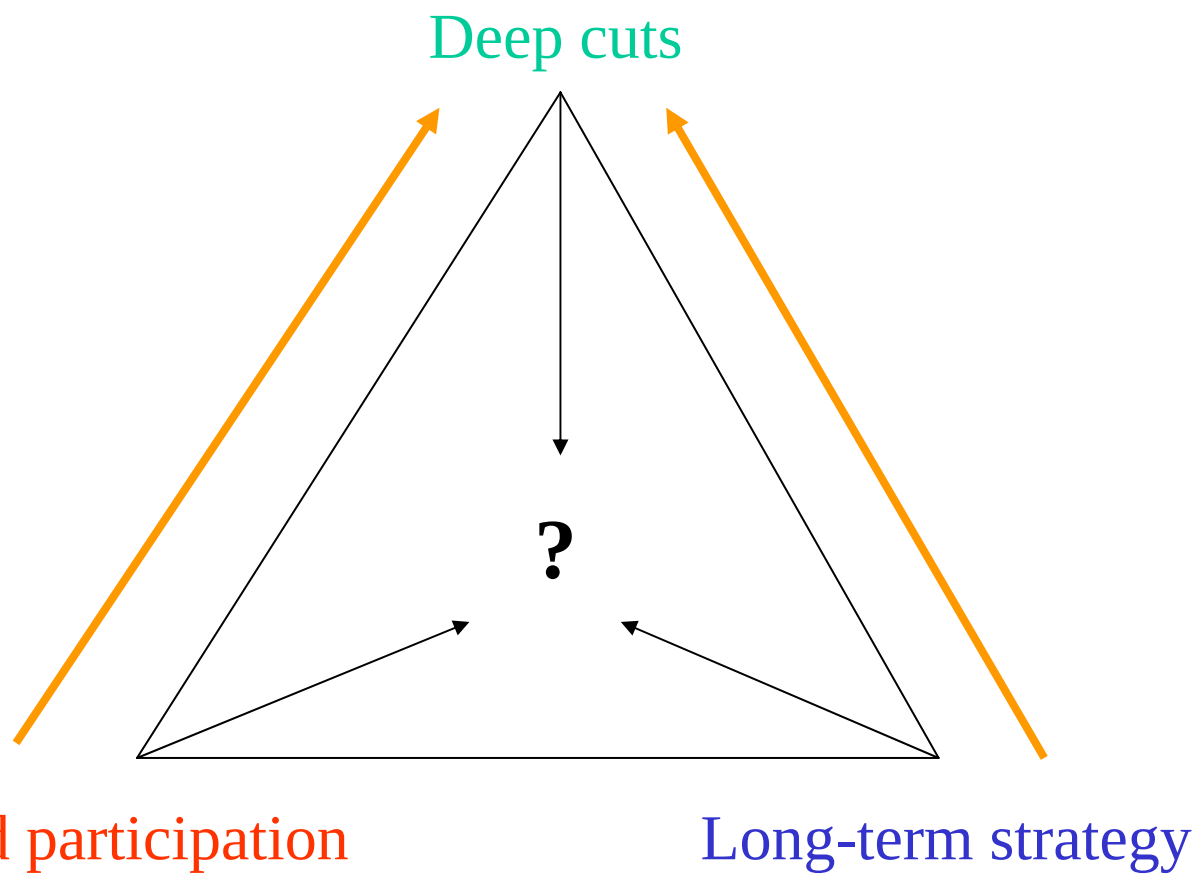
GRP: the S550e and S650e profiles



- By 2025, global reductions of 15 to 30 % from baseline are required, respectively in S650e and S550e
- By 2050, these reductions reach 35 to 65 %

LEPII-EPE, RIVM-MNP, ICCS-NTUA, CES-KUL: GHGs Reduction Pathways study for DG ENV

How can broad and long-term collaboration be combined to achieve deep emission cuts?



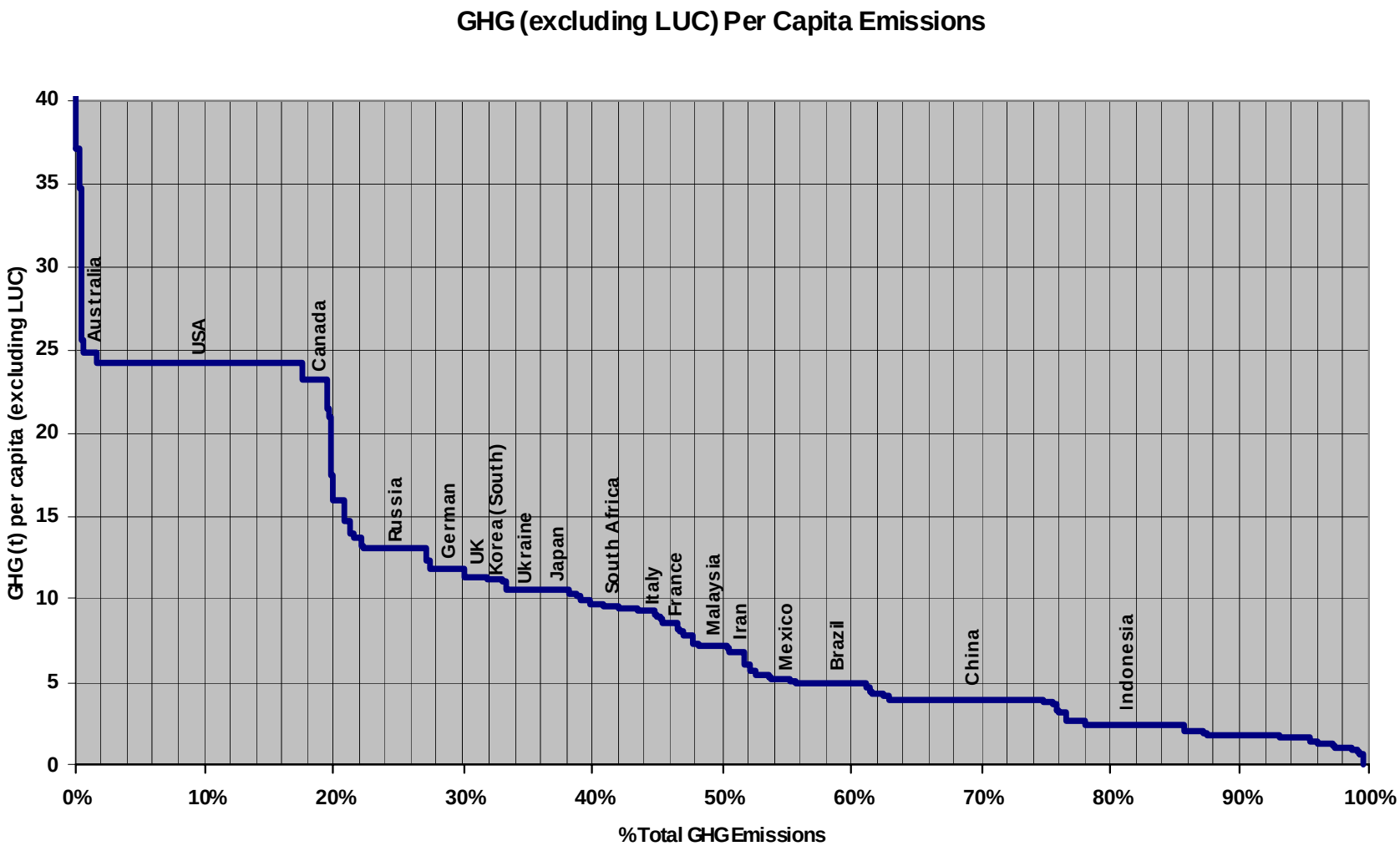


Figure 3: GHG (excluding LULUCF) per capita emissions highlighting the twenty most GHG emitting countries

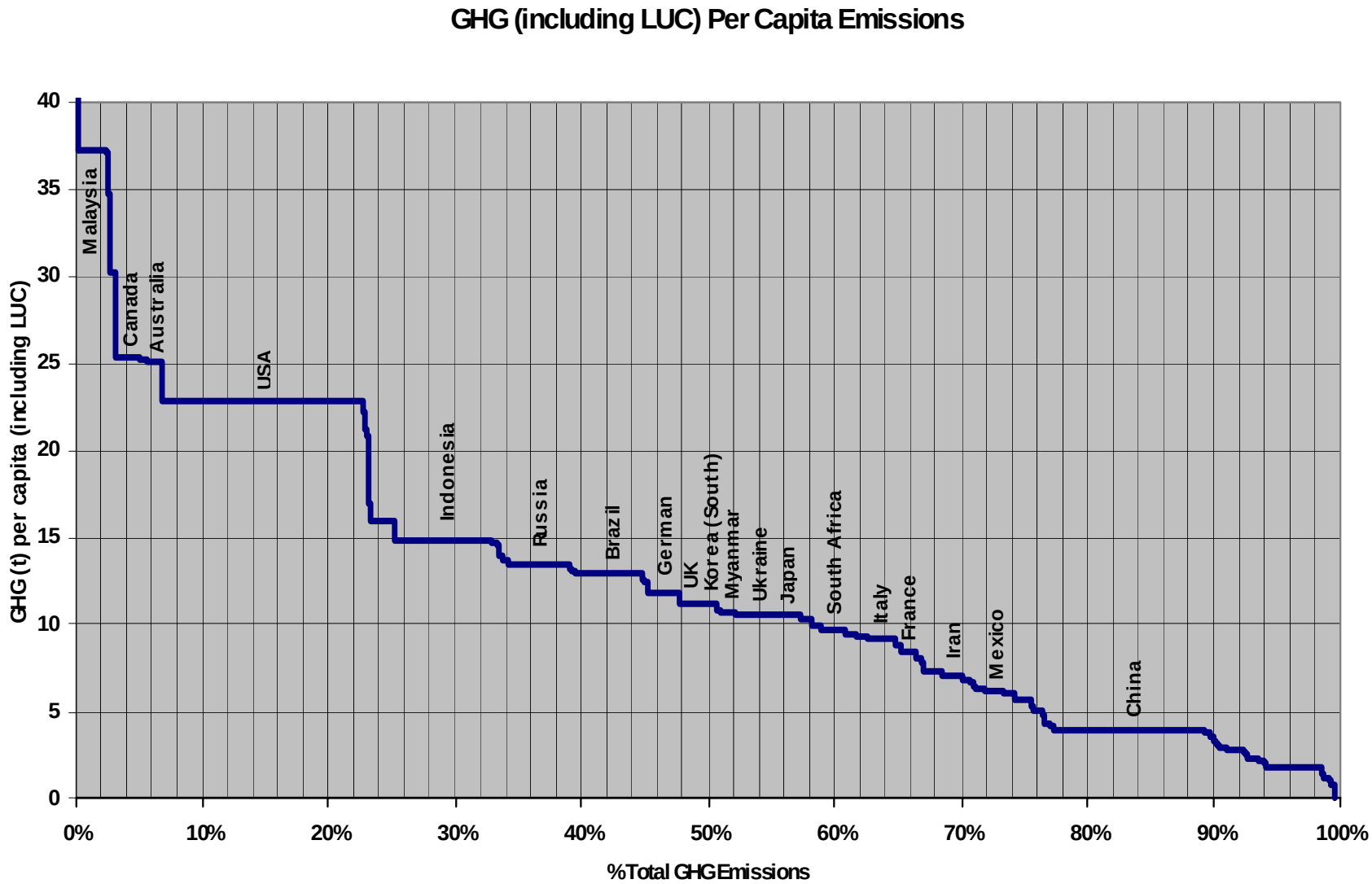
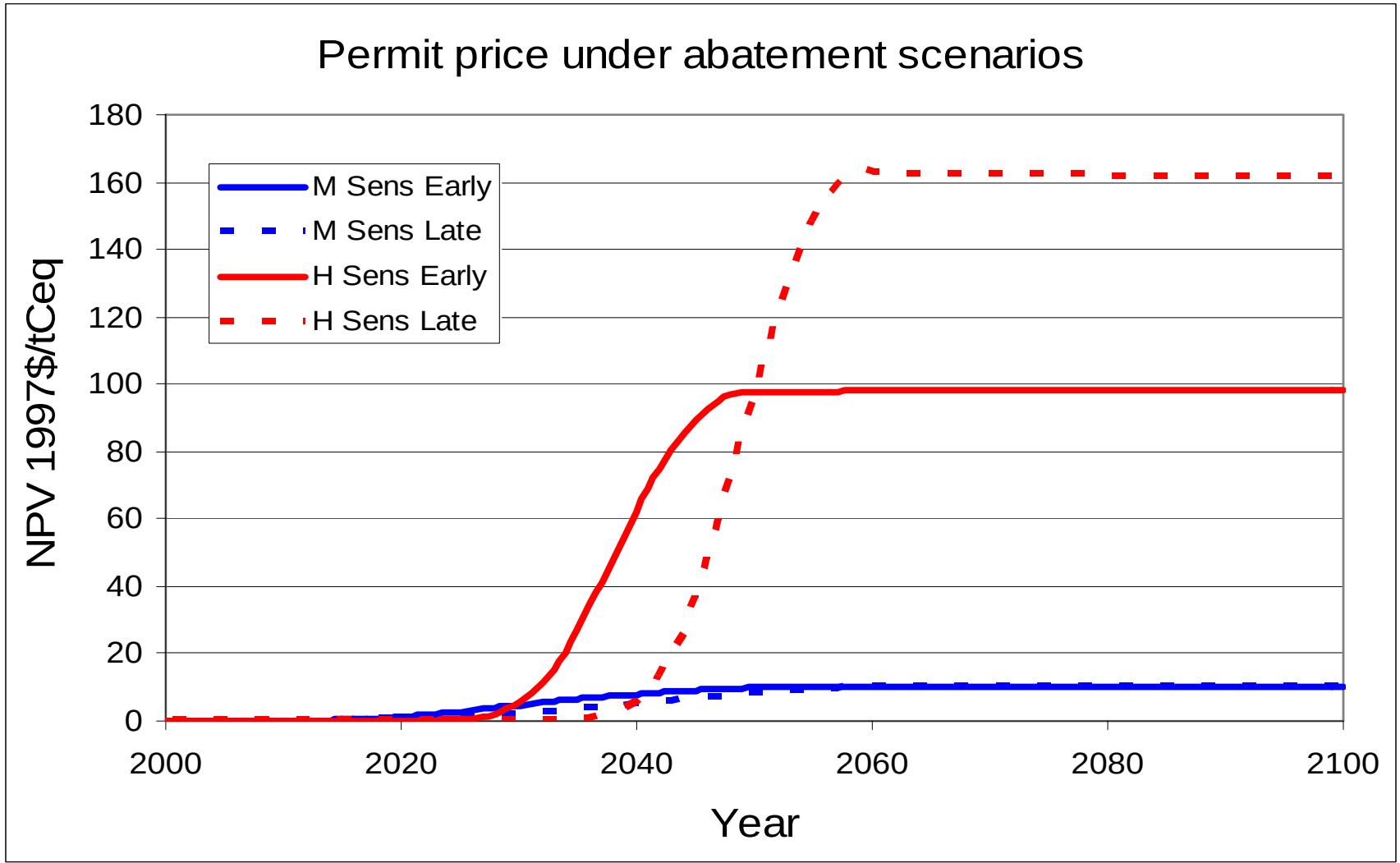
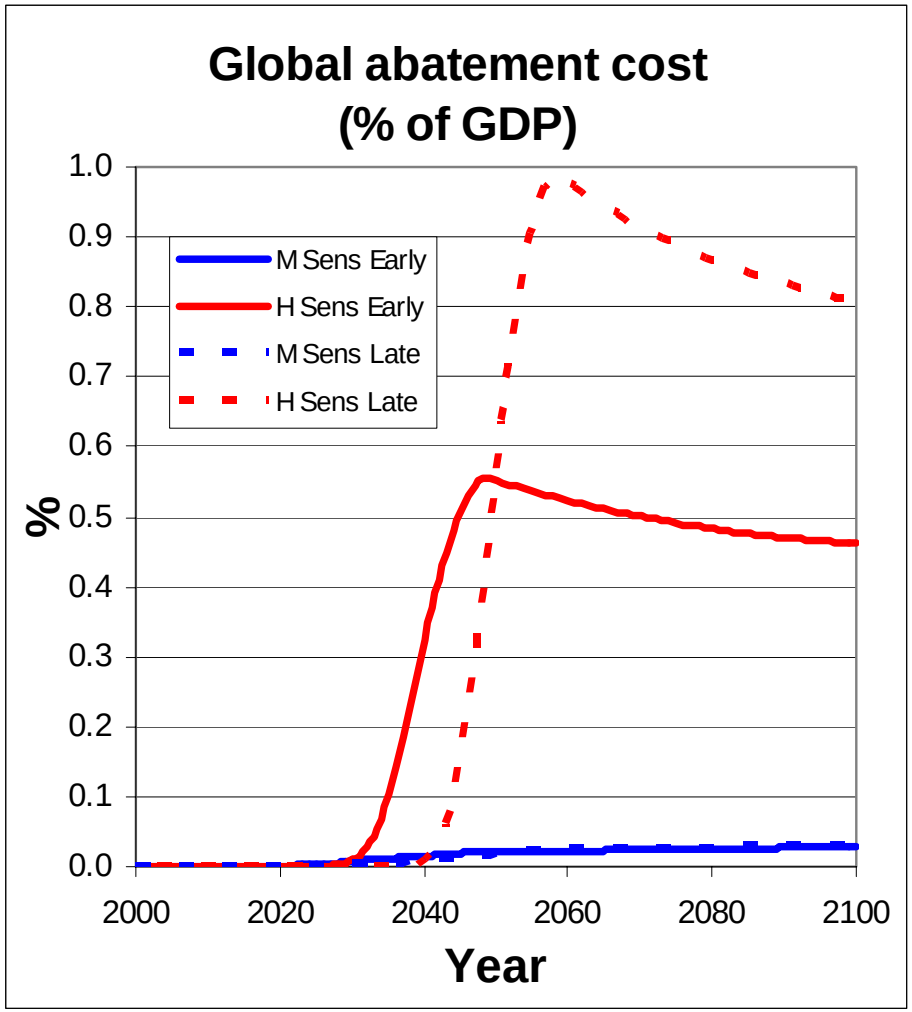


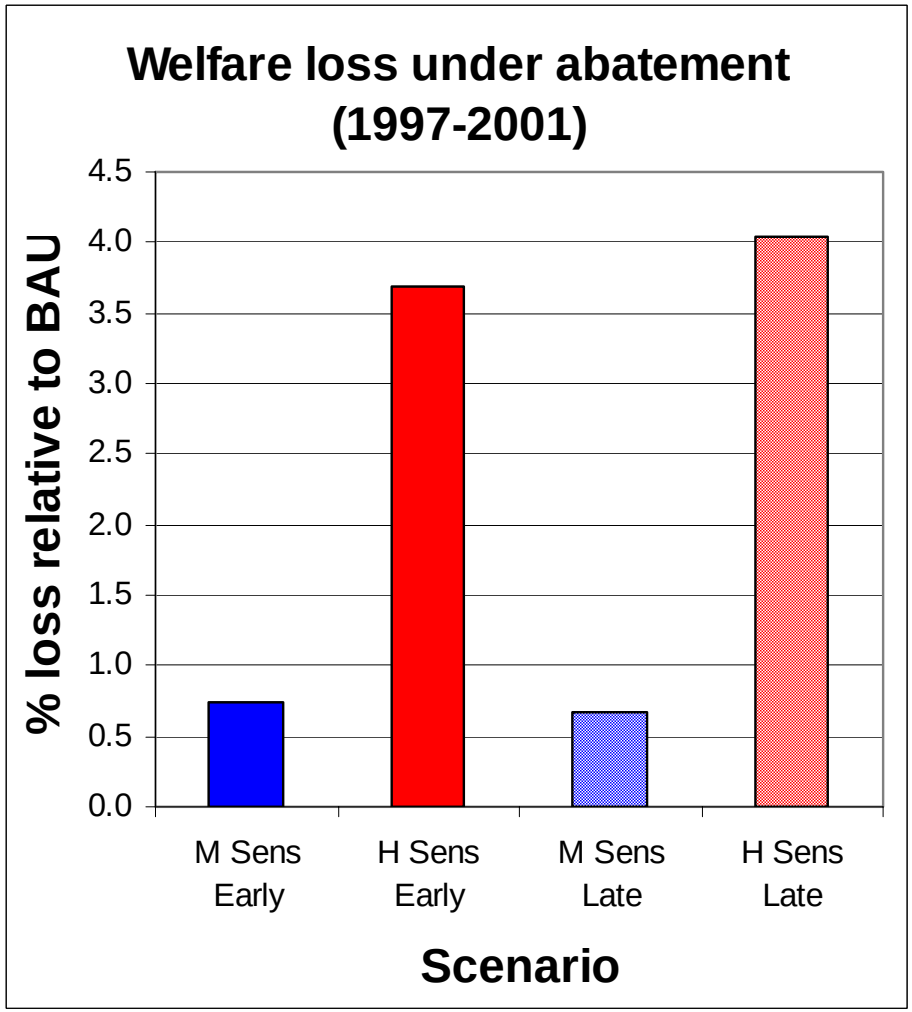
Figure 4: GHG (including LULUCF) per capita emissions highlighting the twenty most GHG emitting countries

Permit price to reach max 2.5 °C warming target by 2100



Global abatement cost and welfare loss to reach max 2.5 °C warming target by 2100

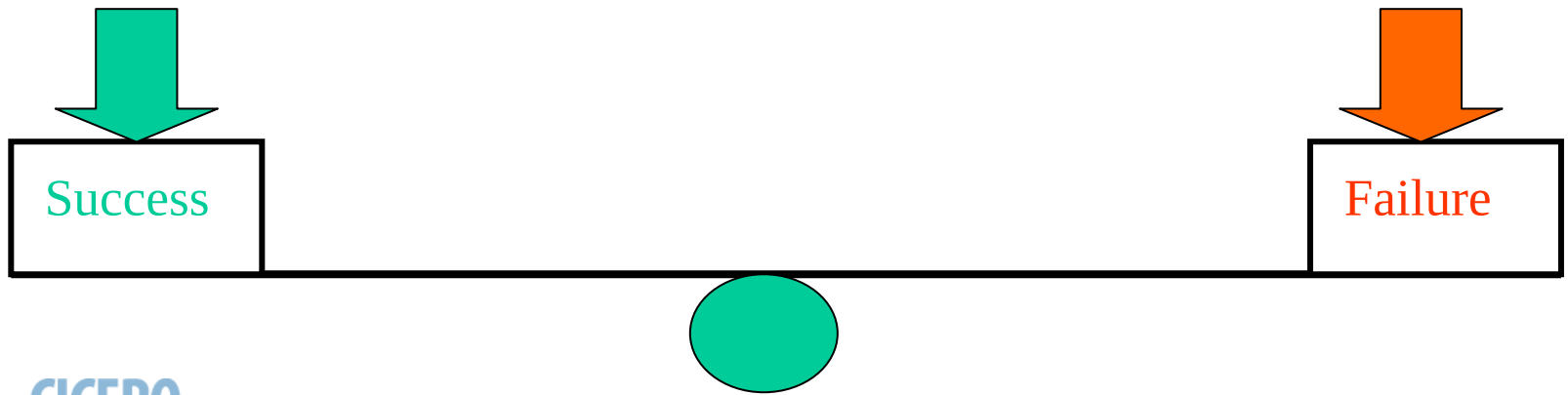




Factors that increase/decrease the probability of climate policy success (deep cuts)

- Clearer indications of change: large impacts; costly consequences; extreme events
- Reduced mitigation costs: clear, long-term incentives; better technology
- "Fair" distribution of costs across countries and sectors
- Convergence with other policy areas: energy supply/security; development

- Higher than expected inertia: capital stock; political; cultural
- High mitigation costs
- Delayed signs of global warming; abrubt change
- "Unfair" distribution of efforts
- Conflict with other policy areas
- Uncertainty? Emphasis on adaptation?



A long-term climate strategy

- Agreement on long-term (medium-term) target can provide important guidance for short-term policies – but difficult to reach
- More emphasis on moving in right direction than on meeting short-term emission targets
- Establish clear and long-term incentives for countries, industries and households to reduce emissions (e.g. quota obligation or tax)
- Ascertain flexibility to adjust strategy according to new scientific knowledge, etc.
- Emphasis on R&D to develop GHG-free/lean technologies
- Gradual involvement of developing countries according to capacity to participate. Climate-friendly development strategies
- Combine adaptation and mitigation policies

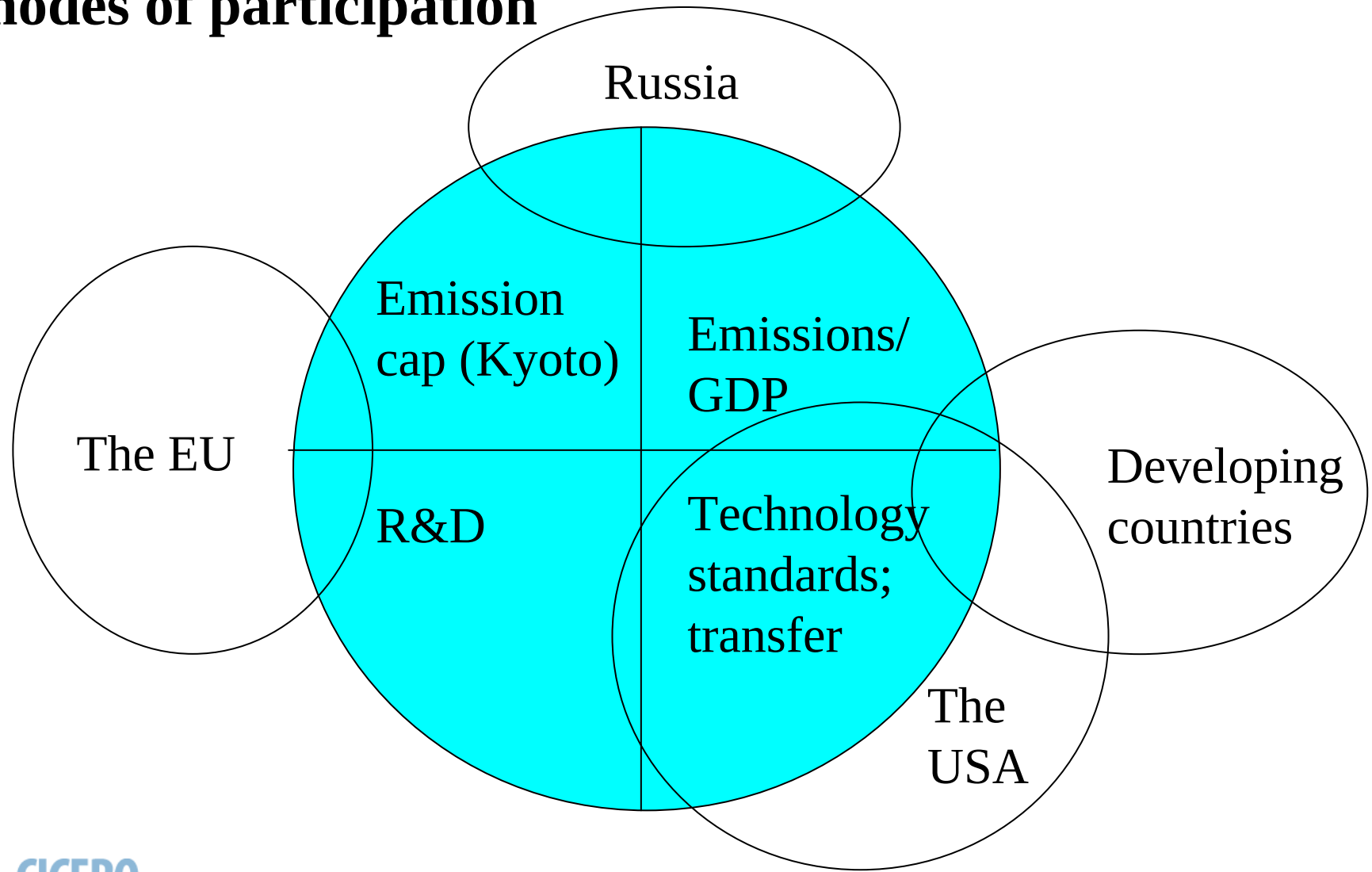
Broad participation in emission mitigation

- Flexible modes of participation according to national circumstances: e.g. absolute cap (Kyoto), indexed cap, investments in R&D
- Go for linked issues of joint interest and climate policy relevance, e.g.: technology development and energy supply concerns for the USA and for China
- Use emissions trading and other flexibility mechanisms to reduce costs
- Sector-based policies, e.g. (e.g. for aviation and marine transport)
- Bottom-up (national) policies as a supplement to a coordinated international policy
- Companies: share-holders influence company policy through concerns for future profits due to climate-related costs (GHG liability)

Participation modes	Advantages	Weaknesses
Absolute cap	• Certainty meeting the emission cap (and contribution towards long-term climate goal) • Straightforward linking to emission trading	• Uncertain costs • Not acceptable to some ICs and most DCs
Indexed cap	• Reduced implementation cost • No constraint on economic growth • Acceptable to the USA and many DCs?	• Uncertain emission reduction effect • Problematic in case of economic recession • Linking to emission trading not straightforward
Technology standard	• Incentives for technological upgrading and reduced emission intensity	• Not a cost-effective solution • Possible linking to emission trading (emission intensity) • Sizeable cost to establish and manage
Research & development	• Important for long-term abilities to reduce emissions • Acceptable to most countries	• Uncertain outcome w.r.t. emission reduction, cost saving, and timing • No short-term effect
Policies and measures	• Flexible tools - adaptable to circumstances of different sectors and sources	• Not a cost-effective solution (with the exception of a tax) • No linking to emission trading • Uncertain emission reduction effect

Table 1 Advantages and weaknesses of different modes of participation

Illustration of regions/countries choosing different modes of participation



Different modes of participation: use a common metric?

Benefits:

- Comparison of efforts among negotiators
- Assess the contribution to meeting a climate policy target

Disadvantages:

- Is this really needed – qualitative indicators sufficient?
- Too complicated in technical terms and negotiation terms?

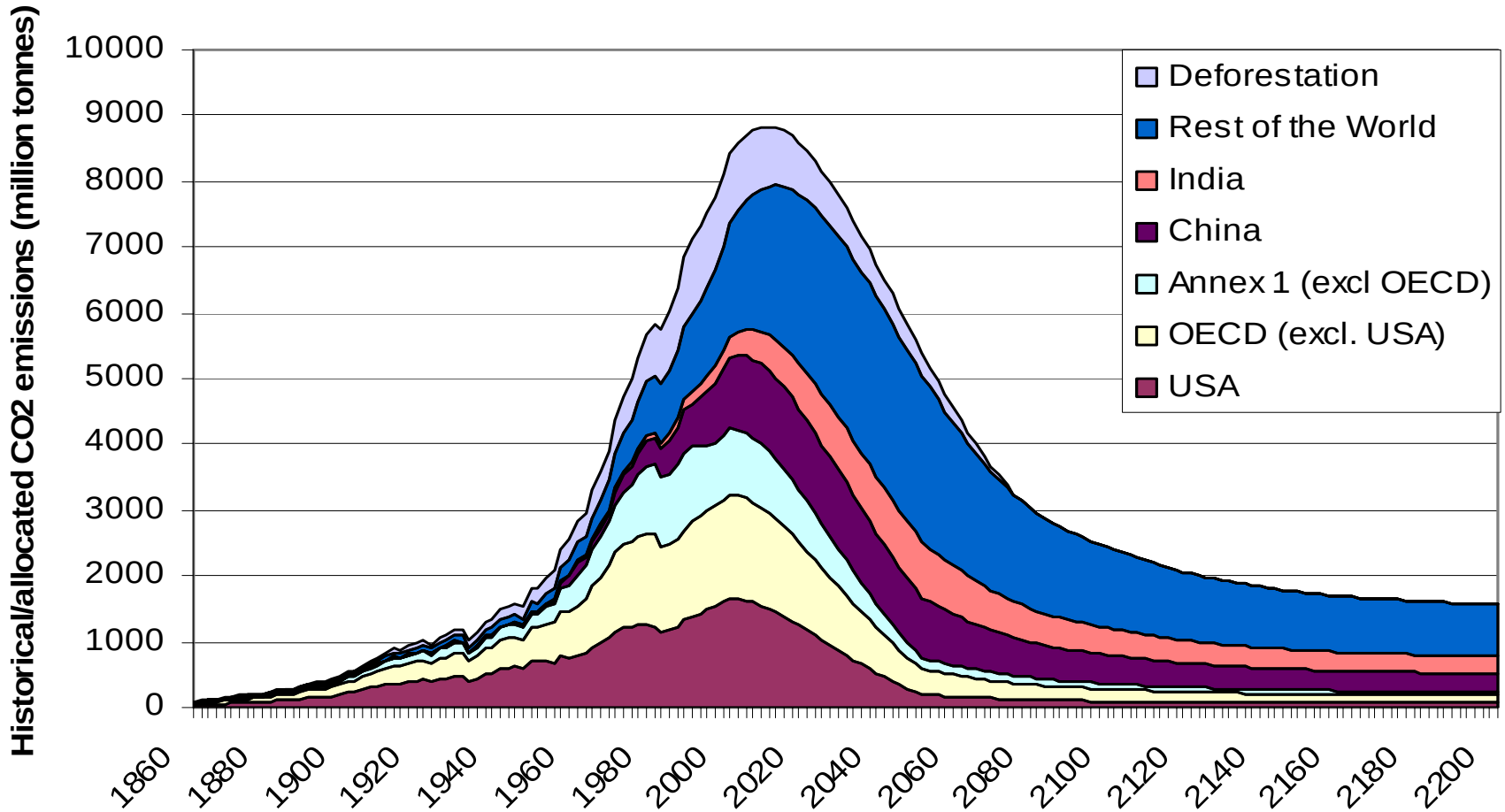
Metric candidates

- ❑ Reduction in absolute emissions
- ❑ Reduction in emission intensity of GDP
- ❑ Compliance cost
- ❑ Contribution to institution and capacity building

Broad participation in emission mitigation - Developing countries

- Reach compromise on what a “fair” involvement of developing countries means
- Gradual involvement of developing countries according to capacity, such as a staged approach
- More emphasis on adaptation as part of a comprehensive climate policy
- Seek development strategies that are 4 x win: development, energy supply, local/regional air pollution, and climate

CO_2 emissions by region 1860-2000. Future emission paths to stabilize concentration at 450 ppmv given per capita convergence by 2050



Responsibility approach: differentiate commitments based on blame for climate change

- **Period**:

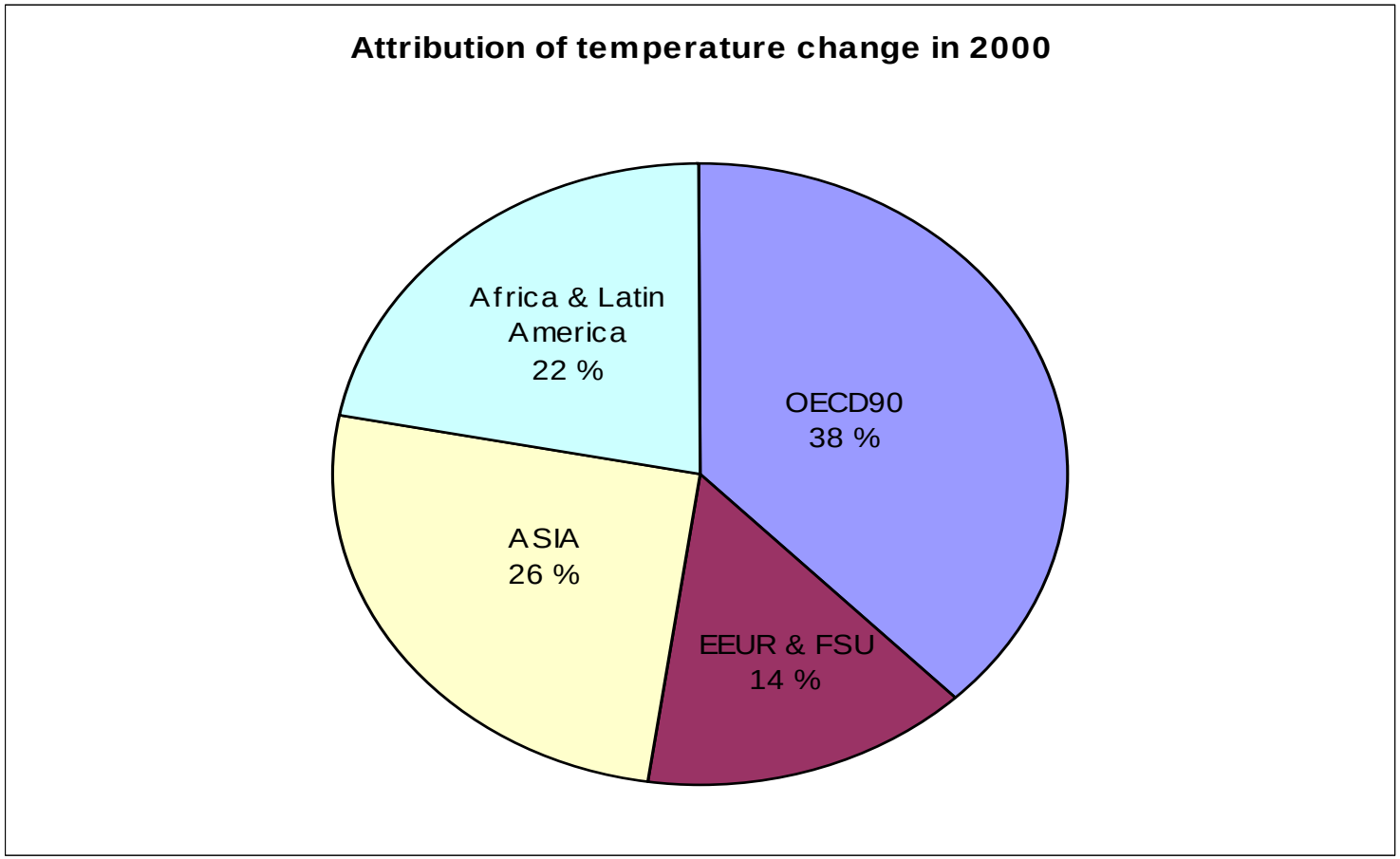
  1890-2000

- **Evaluation year**:

  2000

- **Gases:**

  CO_2, CH_4, N_2O



MATCH
Modelling and assessment of contributions to climate change

CICERO
Center for International Climate and Environmental Research – Oslo
Senter for klimaforskning

Analysing countries' contribution to climate change: Scientific uncertainties and methodological choices (submitted)

den Elzen, Fuglestvedt, Höhne, Trudinger, Lowe, Matthews, Romstad, de Campos, Andronova

“Pull and push” policies for deep emission cuts

- Pulling emission reductions:
  - A long-term strategy with clear incentives to reduce emissions. Gradual replacement of capital equipment keeps costs down
  - Reduce costs through broad national participation in mitigation efforts, and through use of market-based policy instruments (e.g. emissions trading and tax)
  - Broad international participation – reduce danger of loss in competitiveness (and “leakage” of emissions)
- Pushing emission reductions:
  - Emphasis on technology development through long-term R&D programs: renewable energy; more efficient technologies
  - International collaboration on technology development and deployment: public good features; economics of scale; technology spill-over reduce costs
  - Possible benefits of first movers in mitigation and technology development: new products and industries - future markets
  - CO_2 capture and geological storage

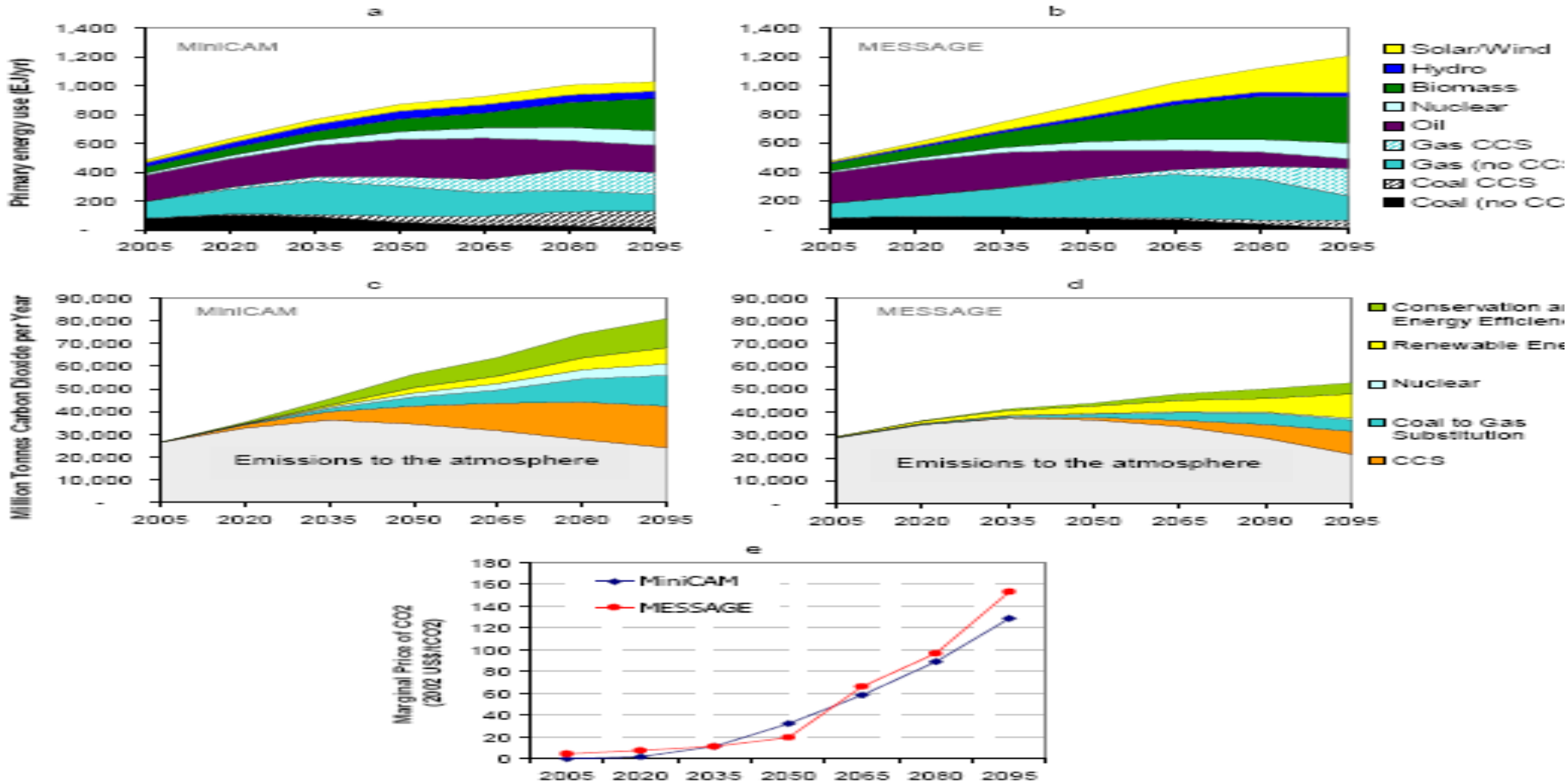


Figure S.7. These figures are an illustrative example of the global potential contribution of CCS as part of a mitigation portfolio. They are based on two alternative integrated assessment models (MESSAGE and MiniCAM) adopting the same assumptions for the main emissions drivers. The results would vary considerably on regional scales. This example is based on a single scenario and, therefore does not convey the full range of uncertainties. Panels a) and b) show global primary energy use, including the deployment of CCS. Panels c) and d) show the global CO_2 emissions in grey and corresponding contributions of main emissions reduction measures in colour. Panel e) shows the calculated marginal price of CO_2 reductions (8.3.3, Box 8.3).