



# The Mitigation of Climate Change New Challenges for AR 5

CCI/IA Workshop, Snowmass, July 31<sup>st</sup>, 2009

Professor Dr. Ottmar Edenhofer

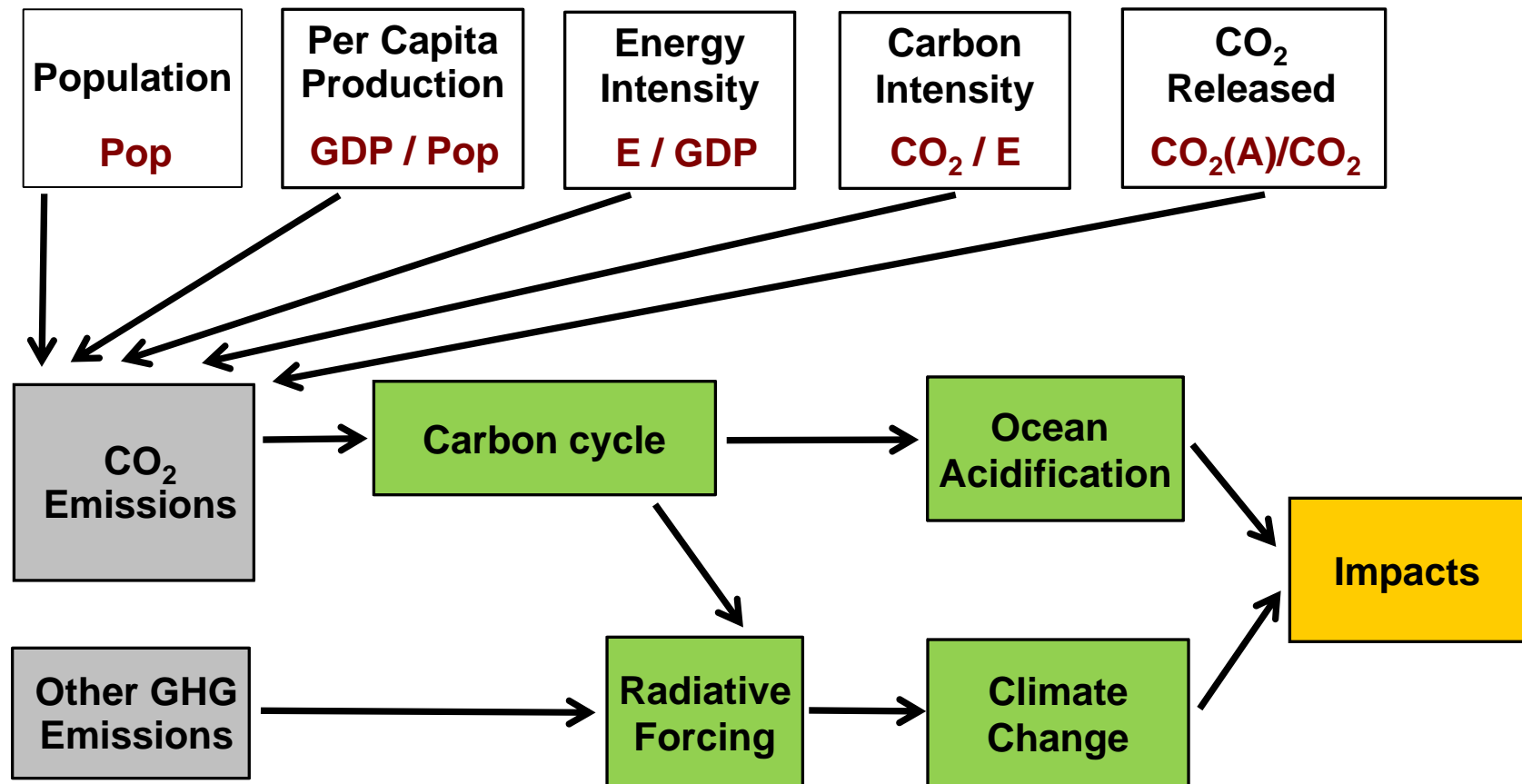
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- Technology, Sectors and Infrastructure
- Integrated Risk and Uncertainty Assessment
- Regional Sustainable Development
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- International Cooperation and Global Finance
- Possible Structure of AR5

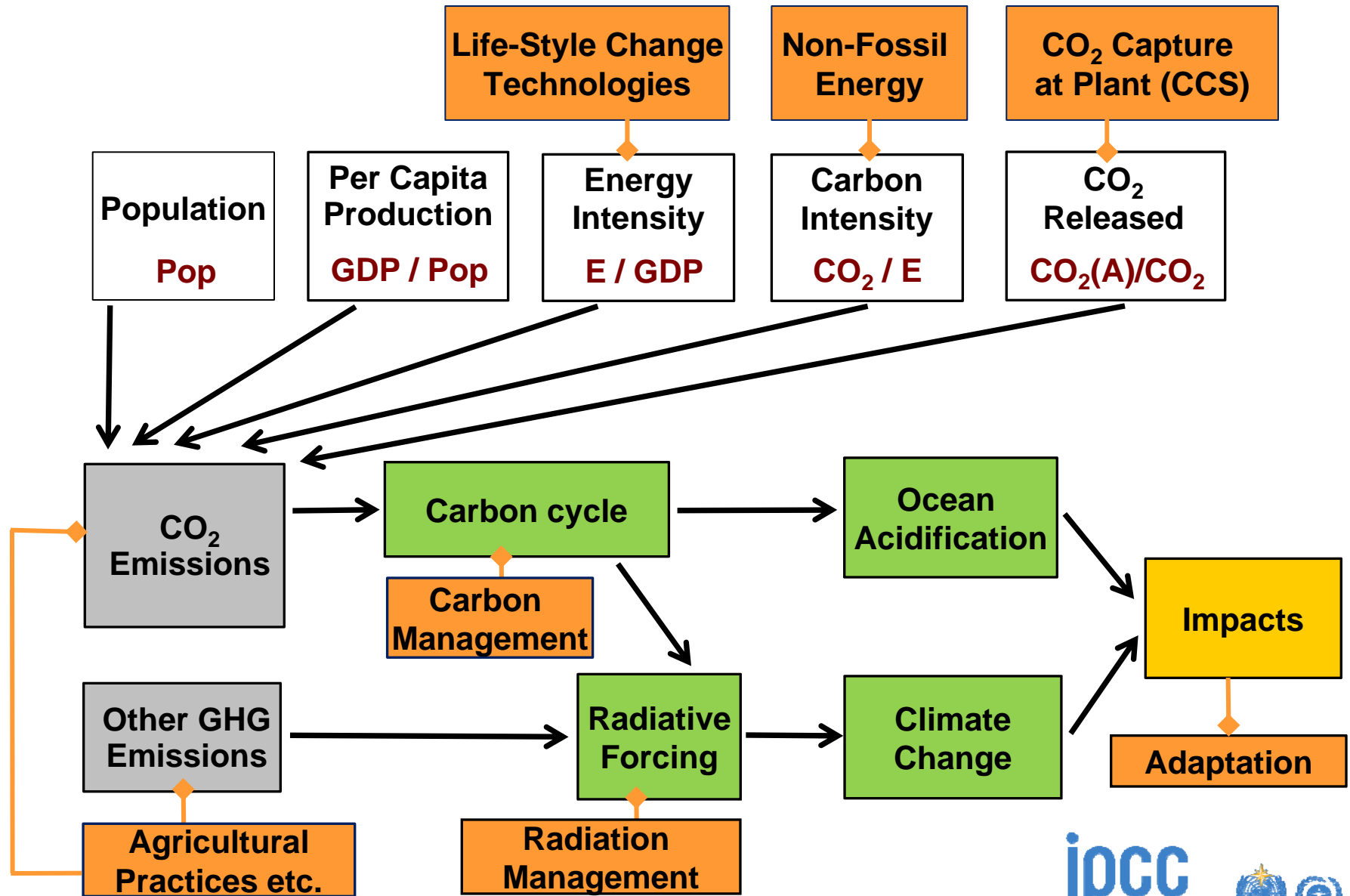
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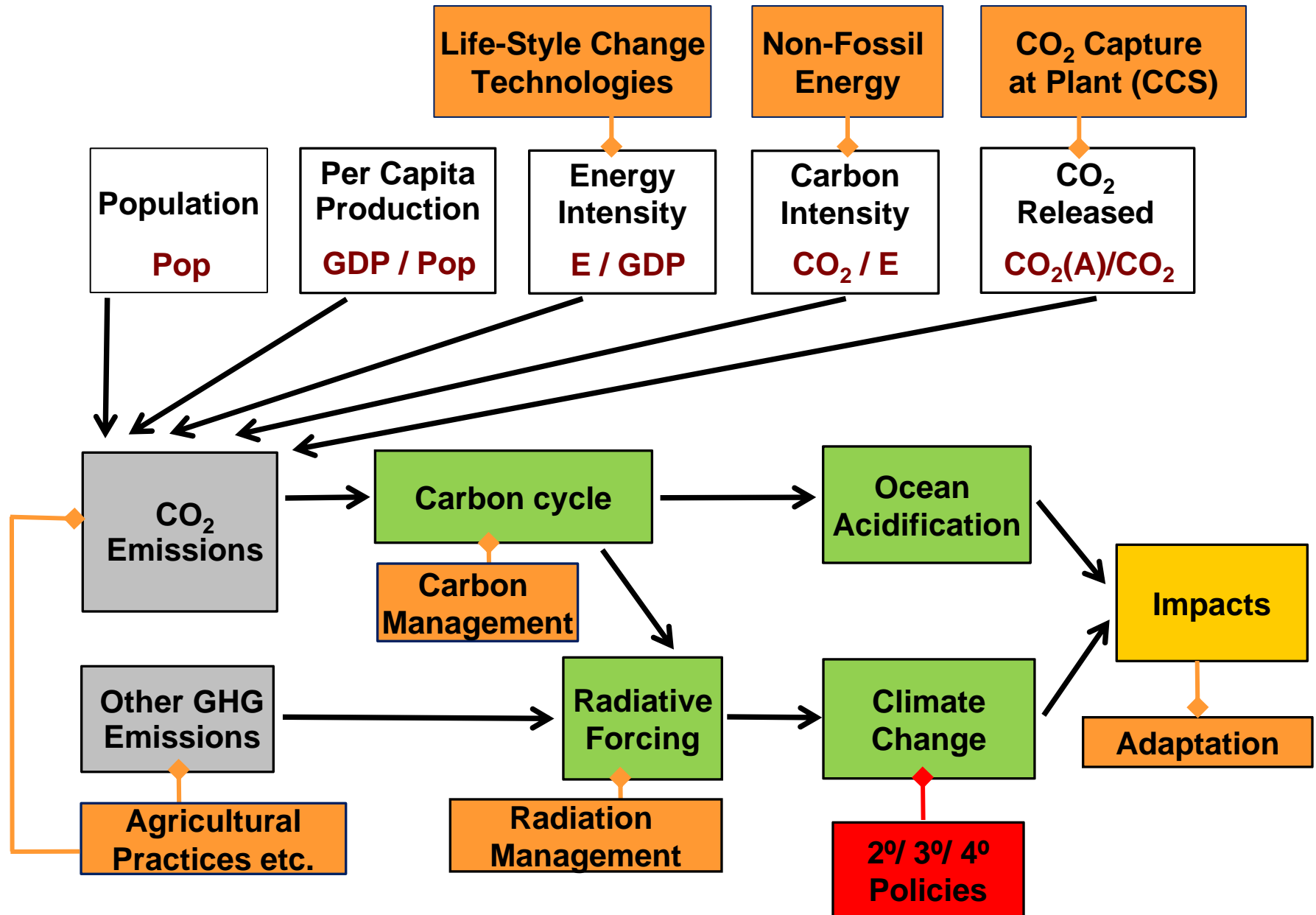
# The Task of WG III



# Assessing the Solution Space



# Interaction between WG II and III



# How to Assess the Solution Space

## Identifying Acceptable Portfolios of Options:

- Cost-Benefit Analysis
- Cost-Effectiveness Analysis
- Multi-Criteria Analysis and Sustainability

## Exploring Robust Portfolios of Options

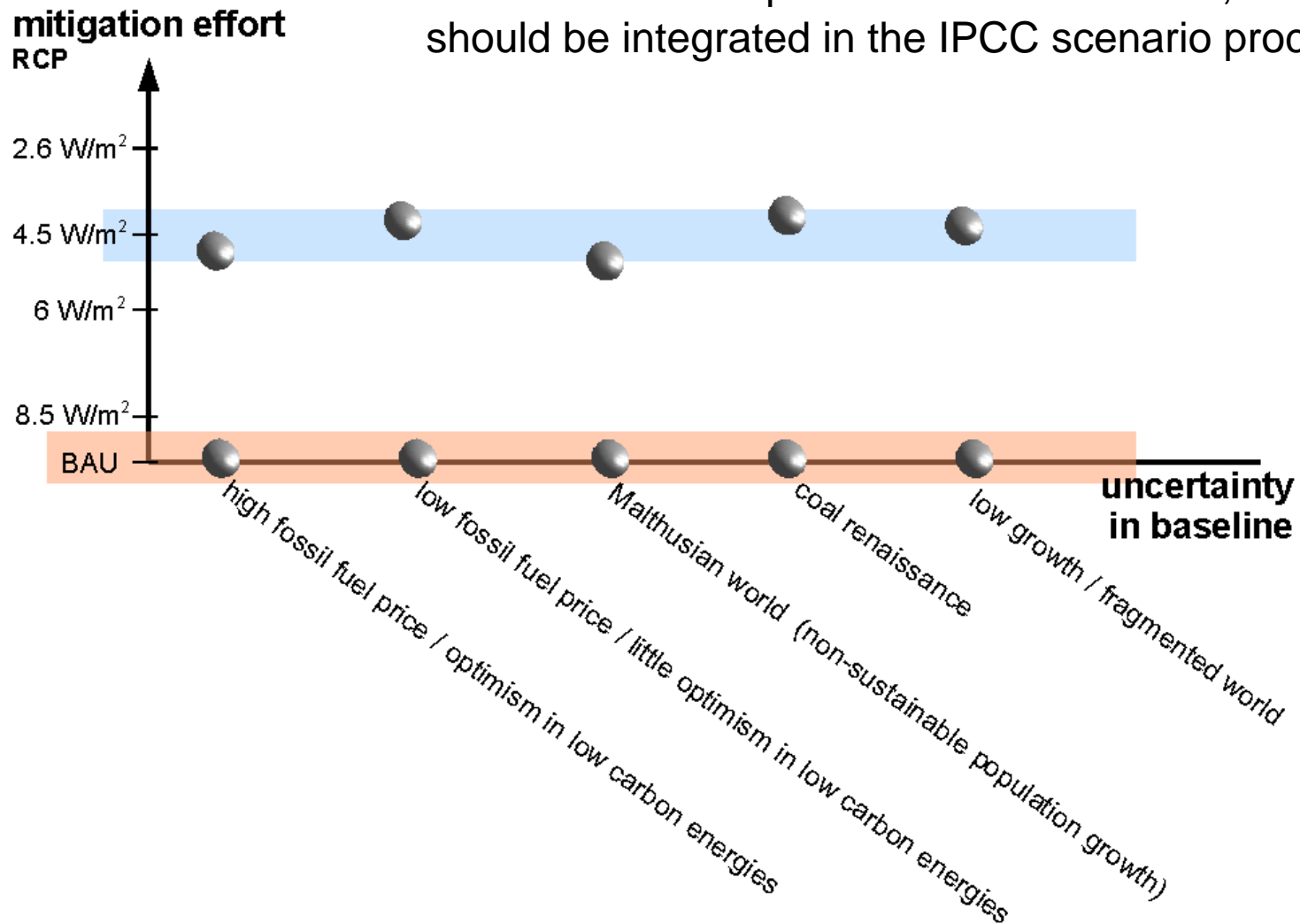
- Integrated Risk and Uncertainty Assessment
- Scenario Analysis

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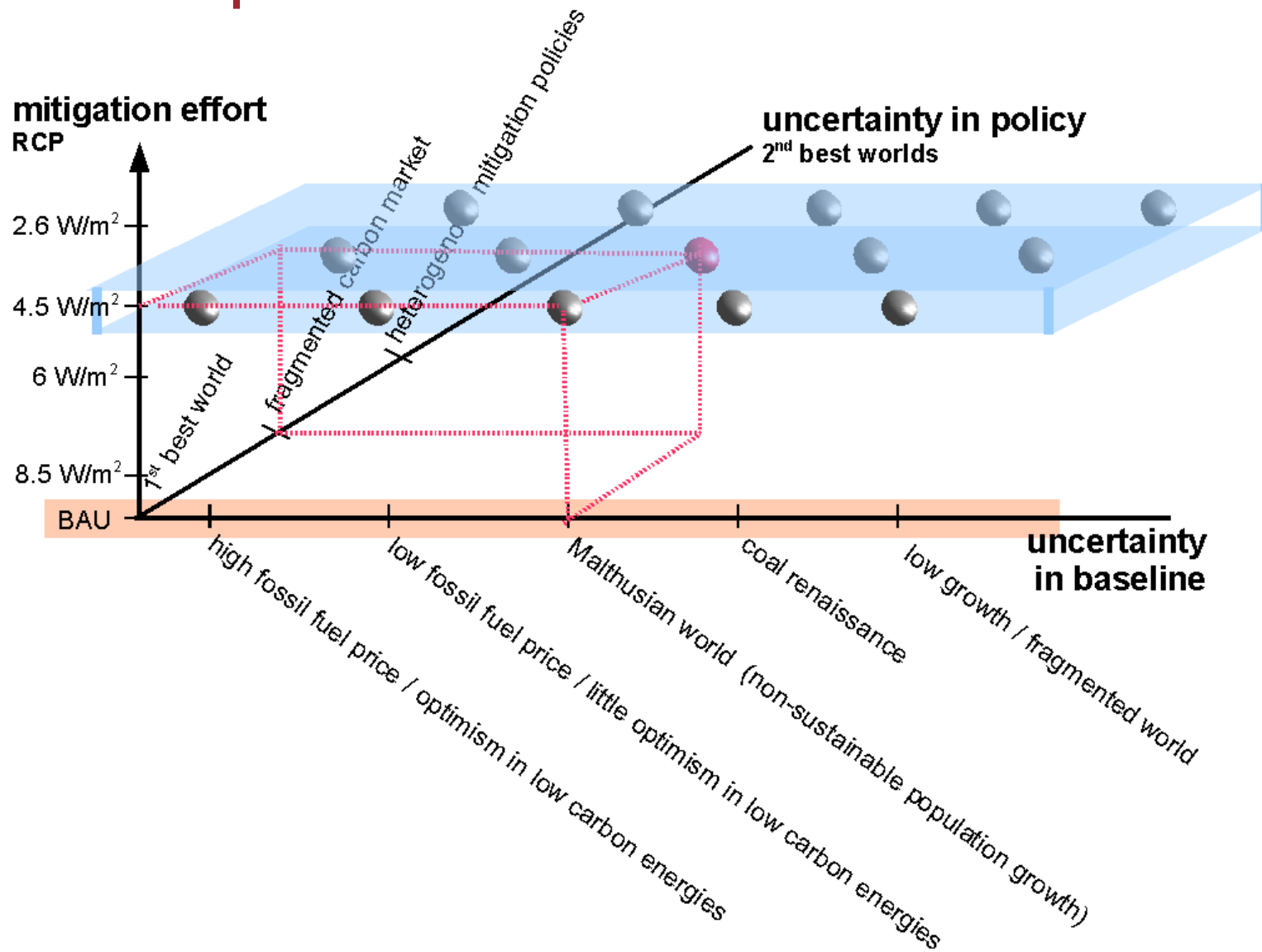
# Comparison of Scenarios in AR5

Idea for the conceptualization of scenarios, which should be integrated in the IPCC scenario process

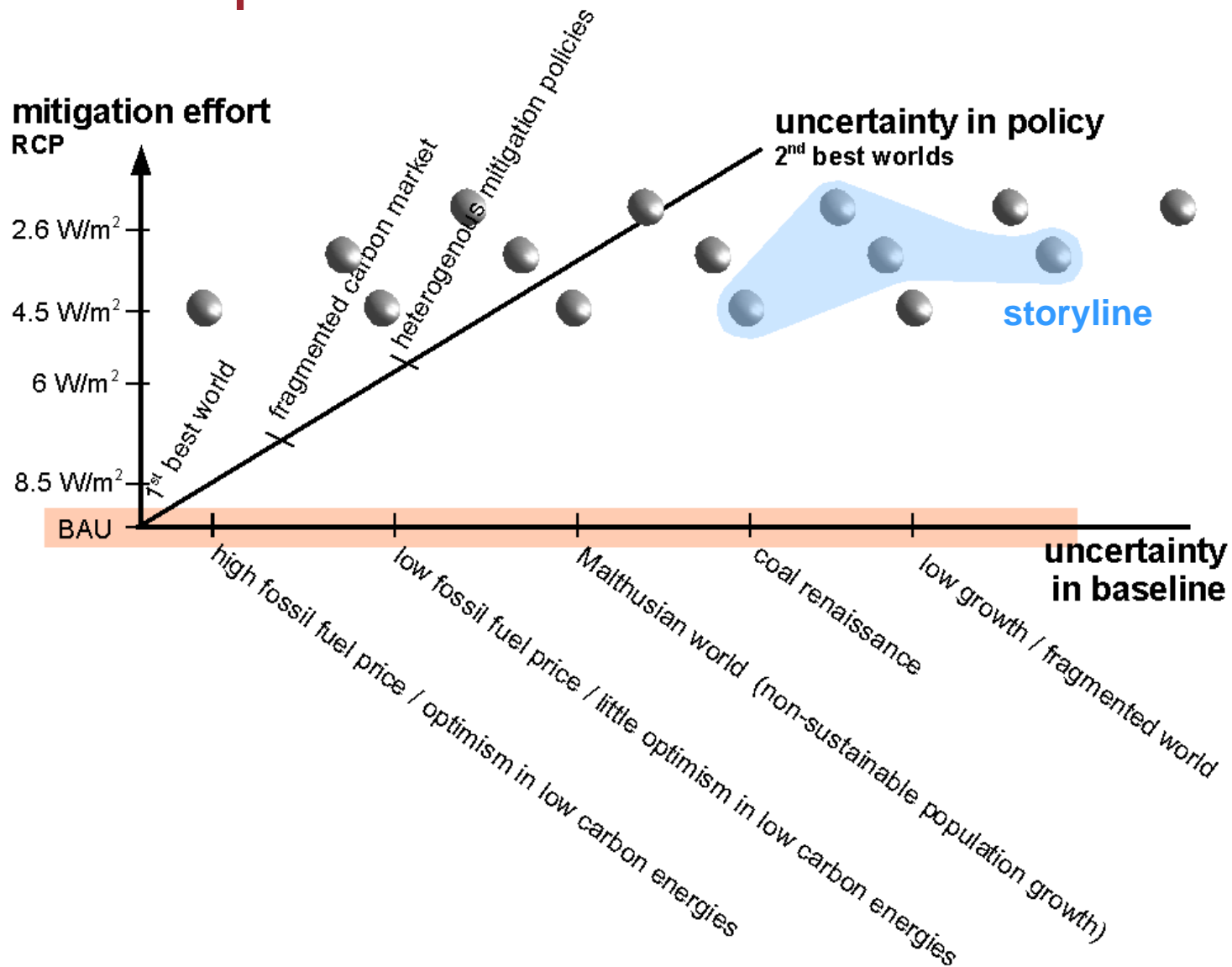


Baselines should be self-consistent

# Comparison of Scenarios in AR5



# Comparison of Scenarios in AR5

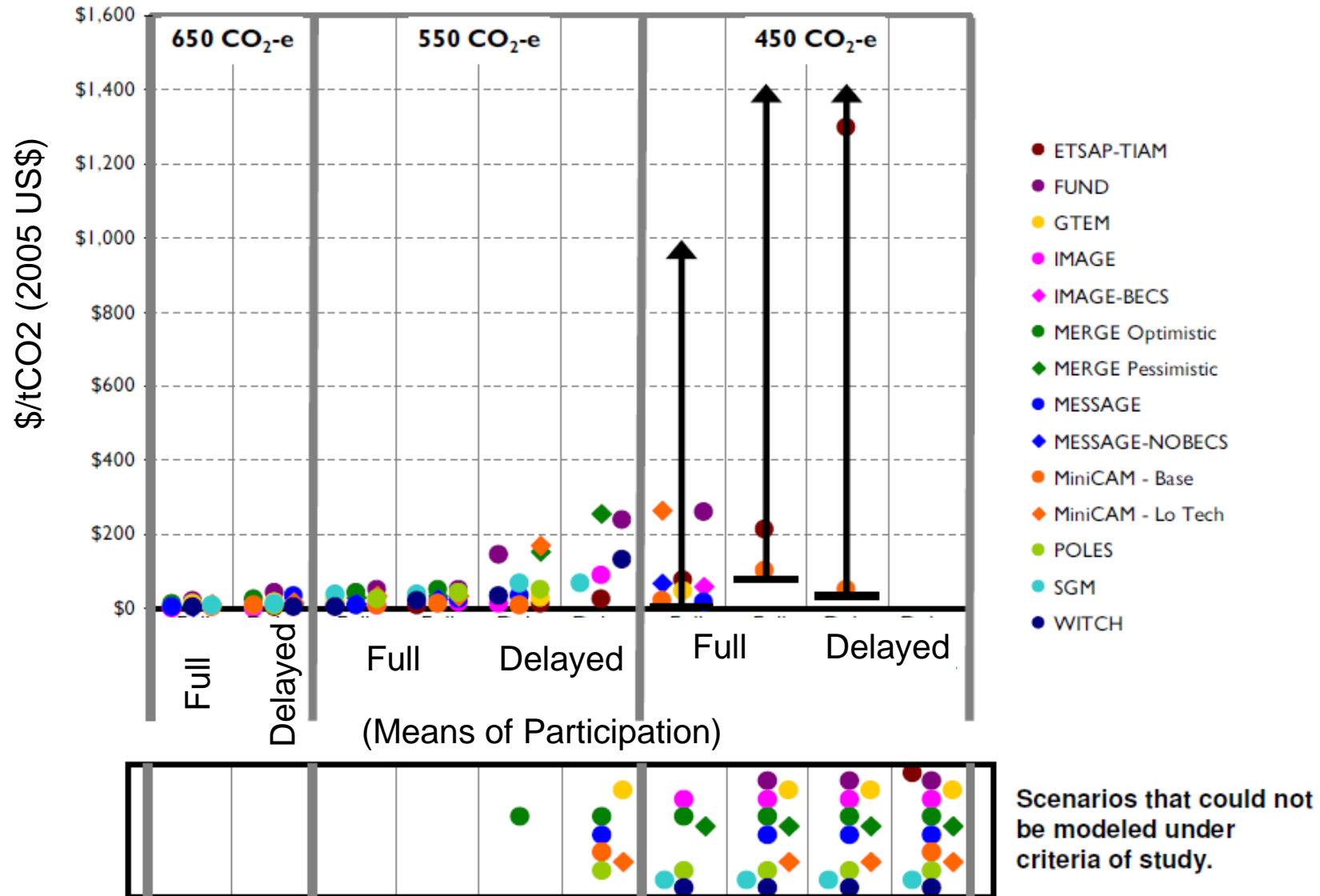


**Ex-post clustering** of scenarios defines a **storyline** for each **cluster**. Clustering is essential to derive policy relevant messages.

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# Annex I 2020 Carbon Prices



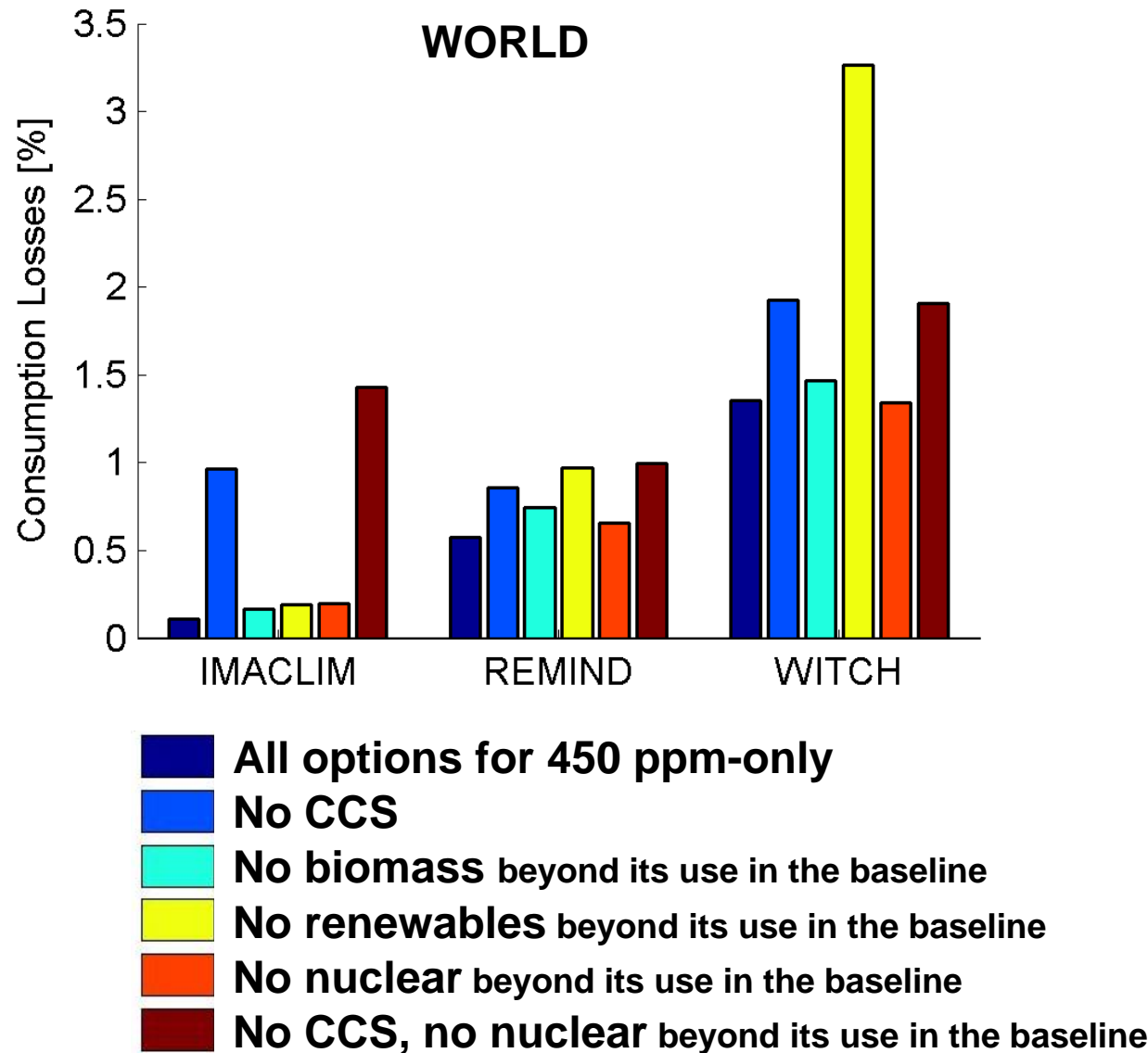
# Delay of Participation

- Incomplete participation increases the global costs of mitigation.
- Incomplete participation can increase the long-term costs not just for early entrants, but also for late entrants.
- Mechanisms to bring international action closer to full participation can decrease costs for all involved.
- Clear expectation about future targets lead to near-term reductions in preparation, and lower costs for the first mover.

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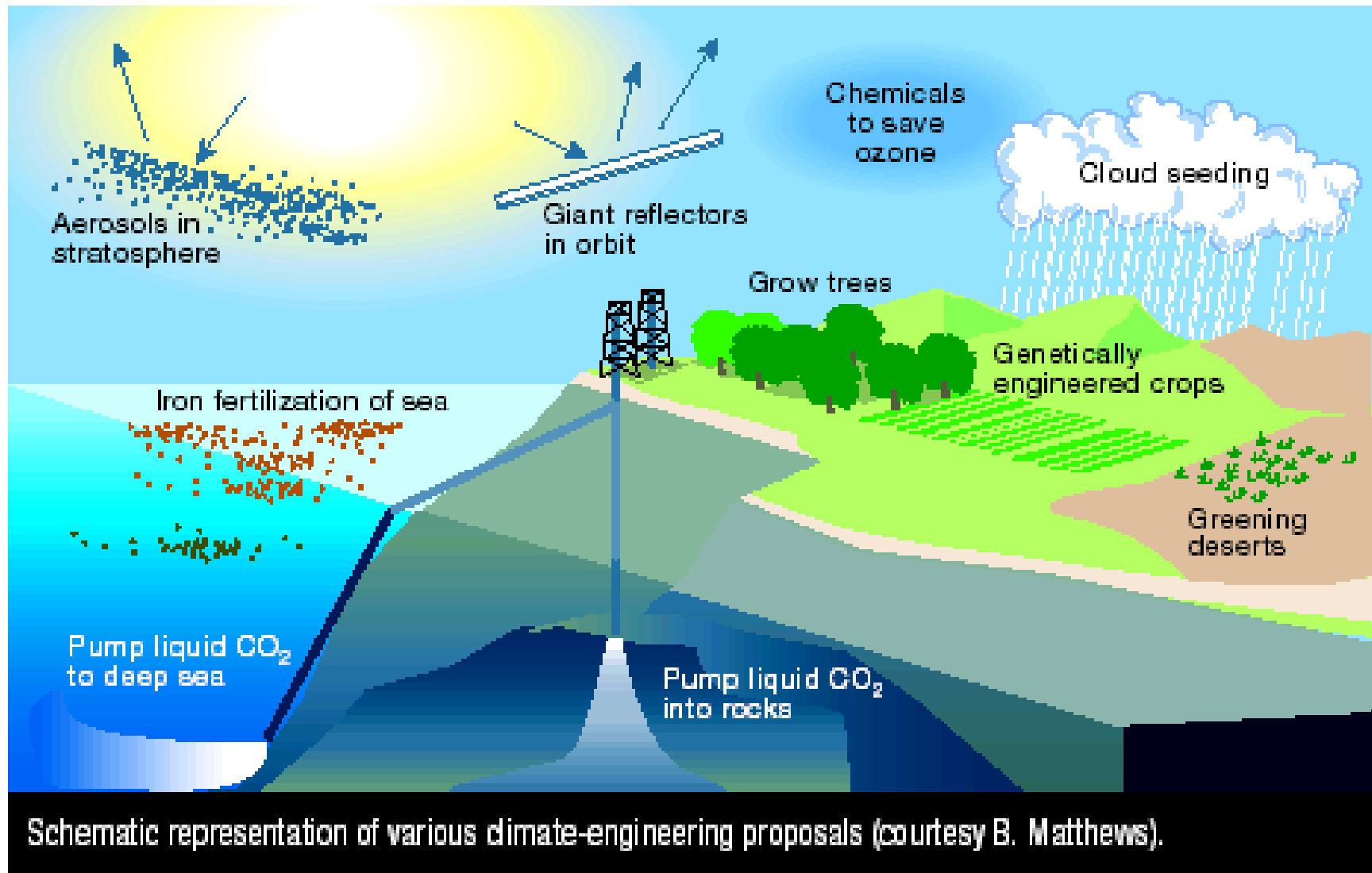
# Limited Availability of Technologies



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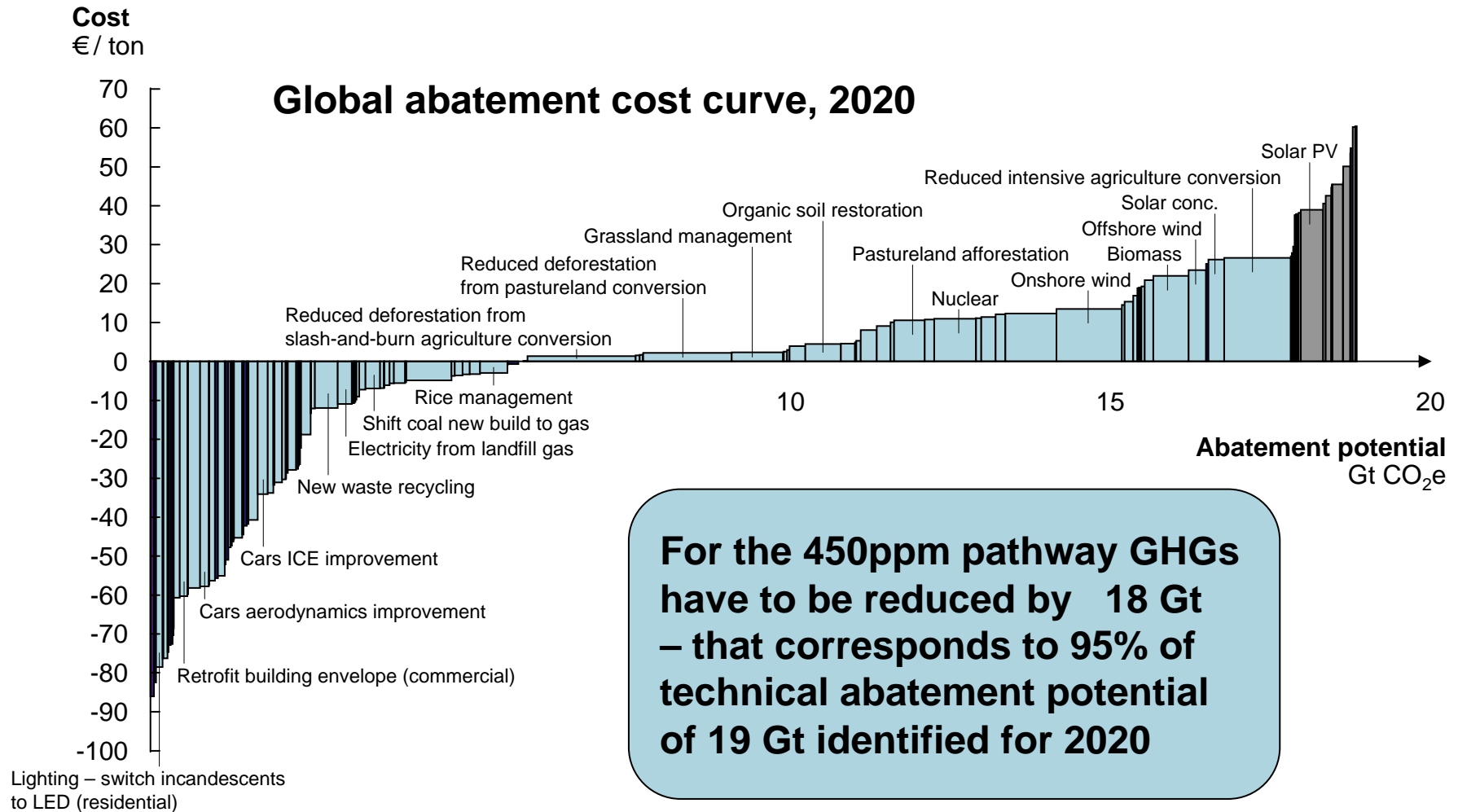
# Advanced Carbon Management & Direct Control of Radiative Balance



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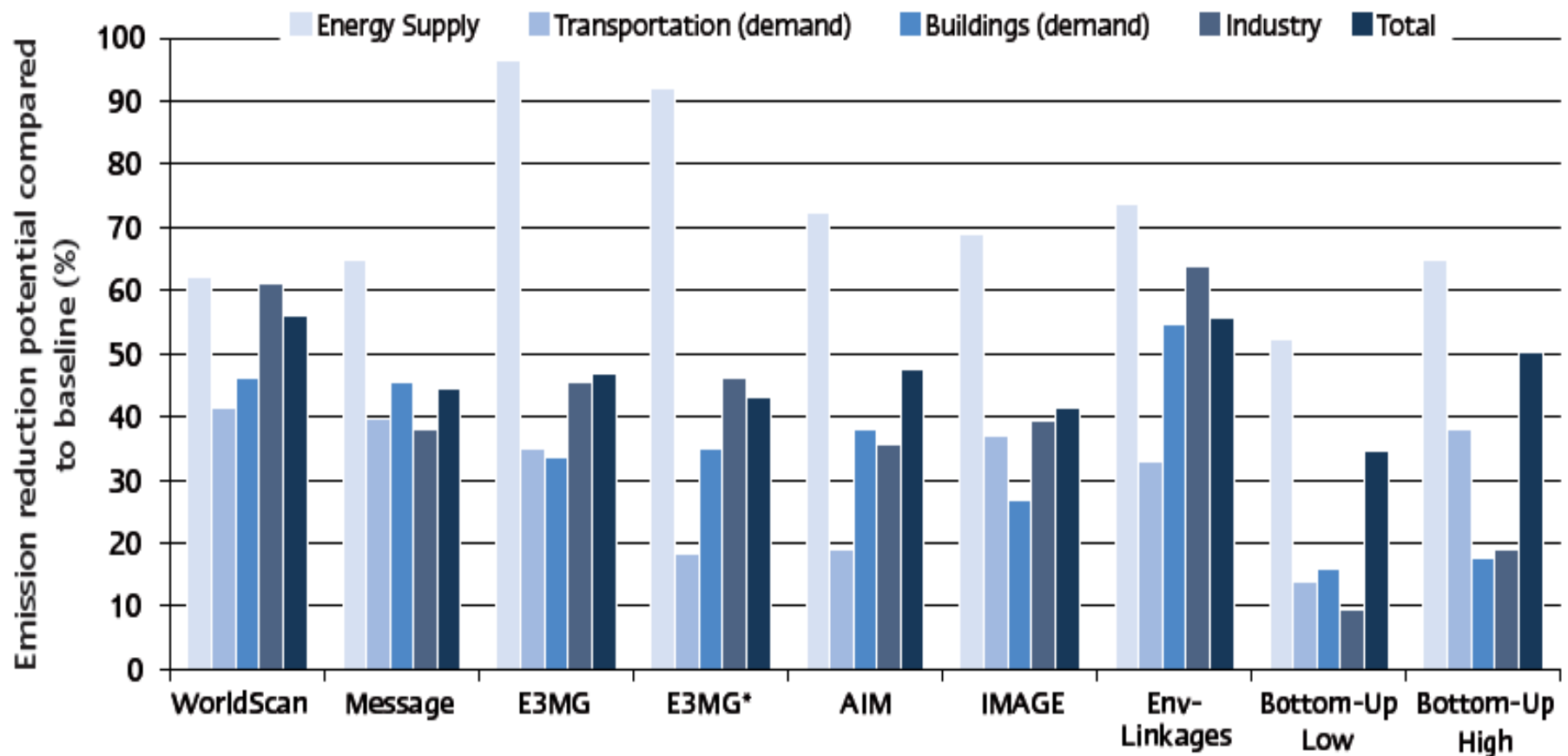
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# Assessment of Technologies



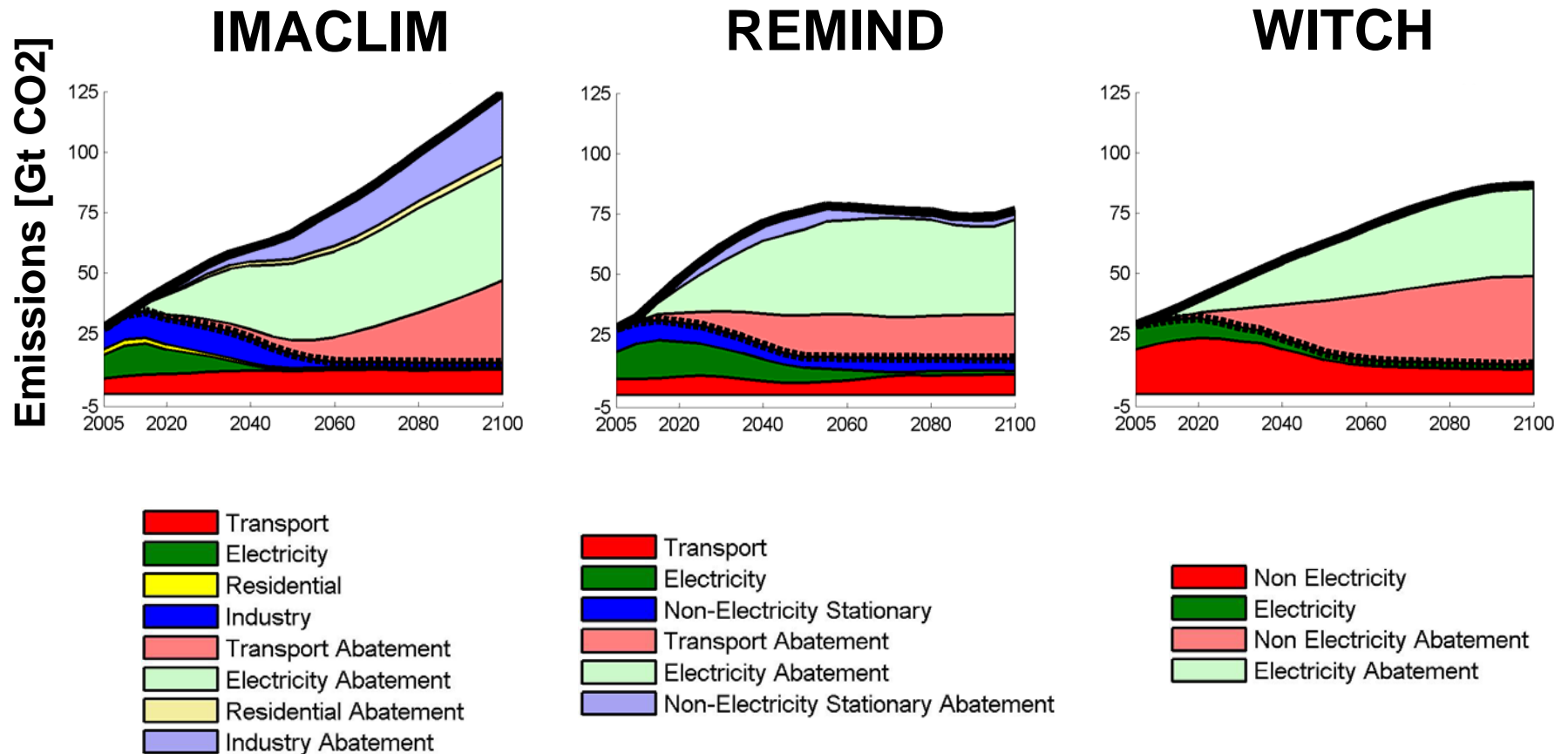
# Comparing Bottom-up and Top-down Assessments

## Relative emission mitigation potential per sector

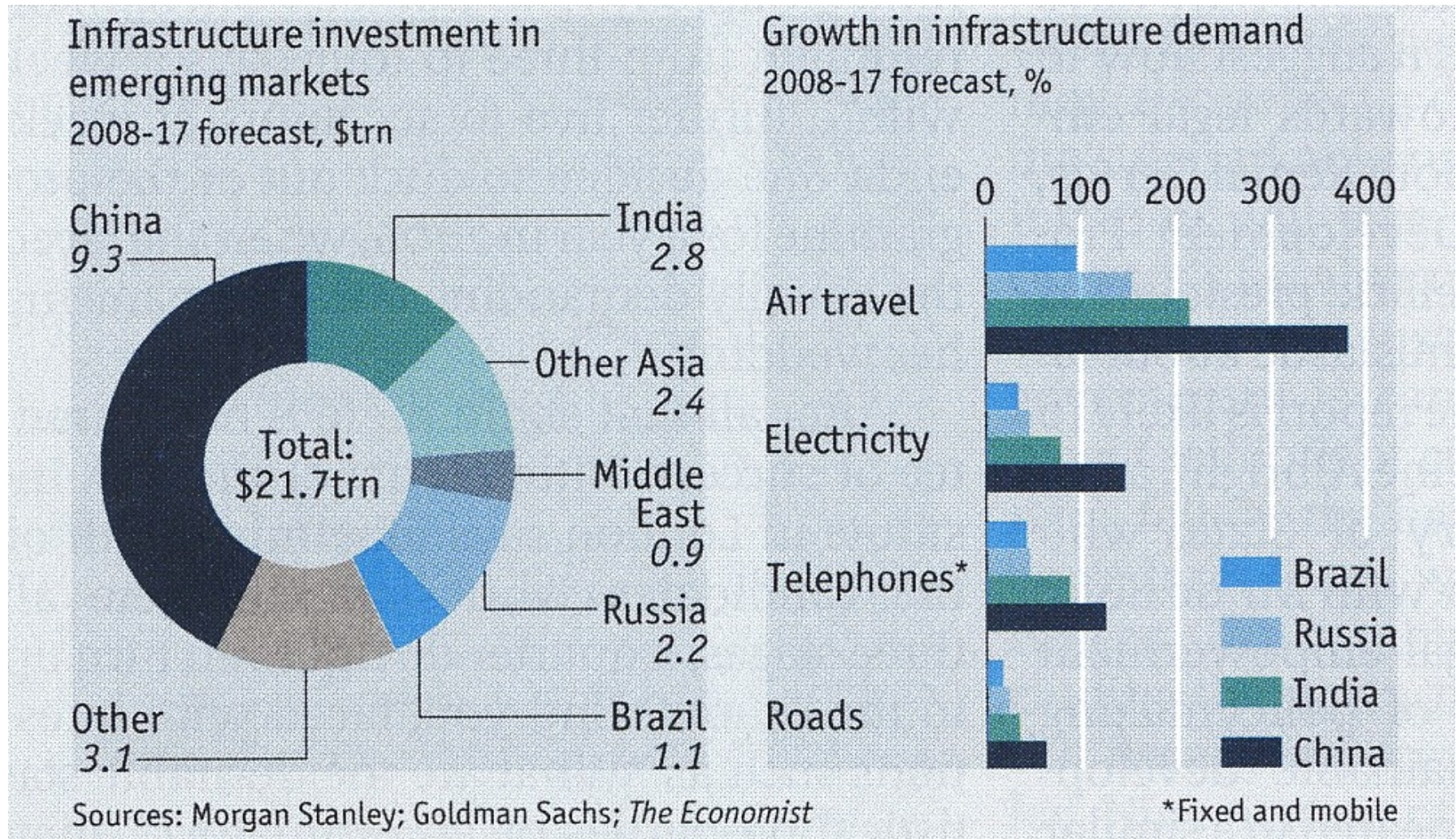


Hoogwijk (2008) Sectoral Emission Mitigation Potentials:  
Comparing Bottom-up and Top-down Approaches

# Dynamic Sectoral Wedges



# Infrastructure: a Bridge into the Future



# Expert Meeting on Human Settlements and Infrastructure

- Infrastructure investments (e.g. BRIC countries have planned \$22 Trillion in long-term investments for the next decade) will determine future emission pathways, vulnerability of cities and adaptive capacities.
- There has not yet been a comprehensive assessment on the role that urban planning and infrastructure investments can play in adaptation and mitigation.
- An expert workshop - possibly feeding into a Special Report on Human Settlements and Infrastructure - will be held in March/April 2010 with cooperation from WGII and WGIII.

# Special Report on Renewable Energy Sources (SRREN)

As called for in the AR4, the SRREN is an assessment of renewables within the context of mitigation, based on a review and synthesis of scientific literature including:

- Technological feasibility: Reliability and integration
- Economic potential: Competitiveness, costs
- Potential of renewables to reach climate targets
- Social acceptability
- Risks and Uncertainty: e.g. unintended side effects
- Financial and policy instruments

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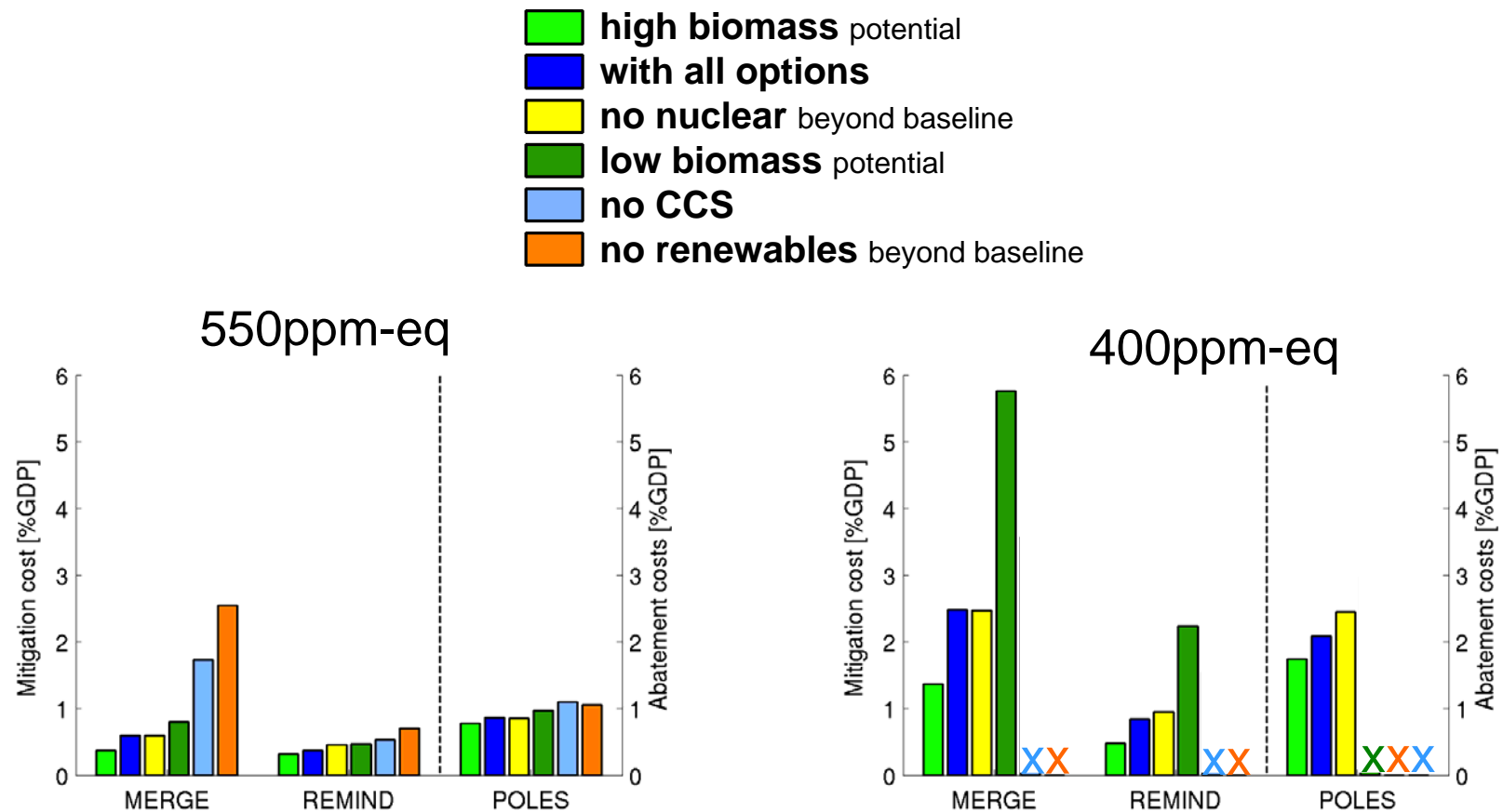
# Integrated Risk and Uncertainty Assessment

Stakeholders want the *whole range* of scenarios to be assessed.

Risk and Uncertainty need to be broadly characterized, and must comprise the following elements:

- 1) Description of the space of possible outcomes
- 2) Assessment and characterization of outcomes in terms of:
  - Cost
  - Risk profile
  - Barriers
- 3) Attachment of likelihoods

# Risk of Low Stabilization Scenarios



- ➔ 400 ppm not achievable without CCS nor without extension of renewables
- ➔ Biomass potential determines the mitigation costs of low stabilization
- ➔ nuclear is not important beyond its (high) use in the baseline

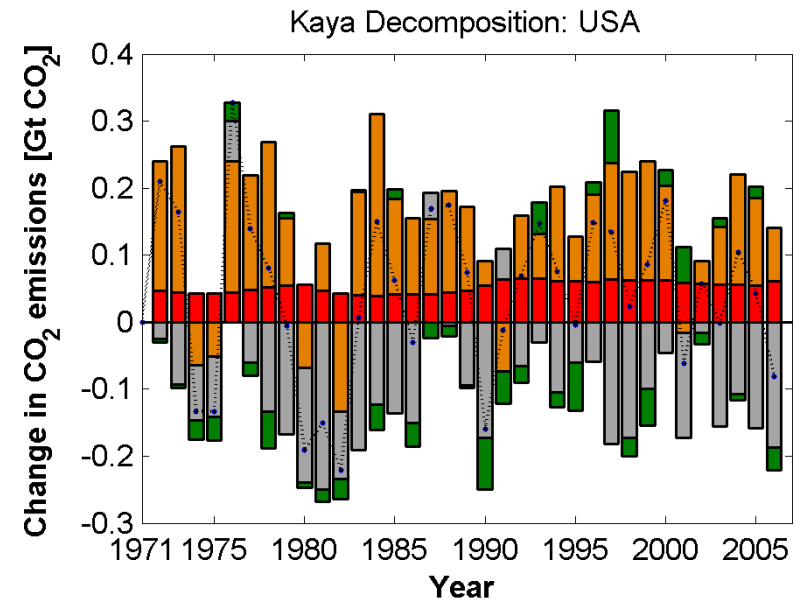
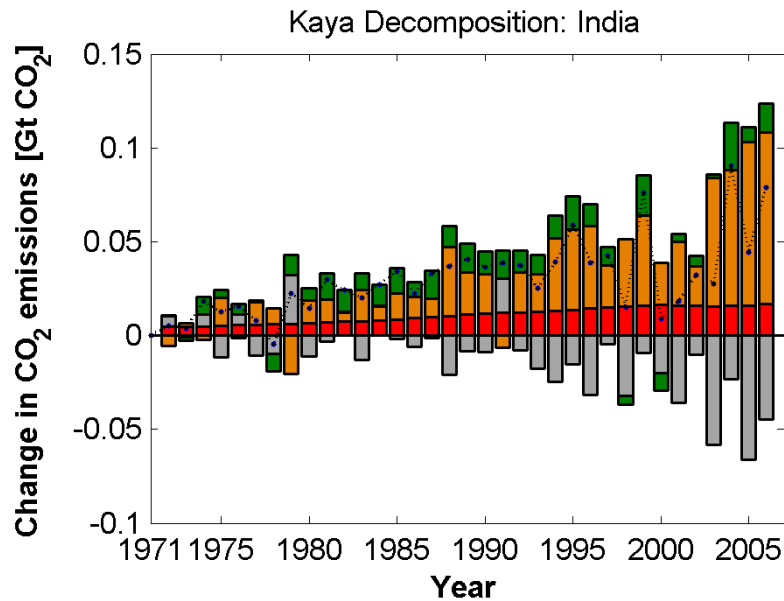
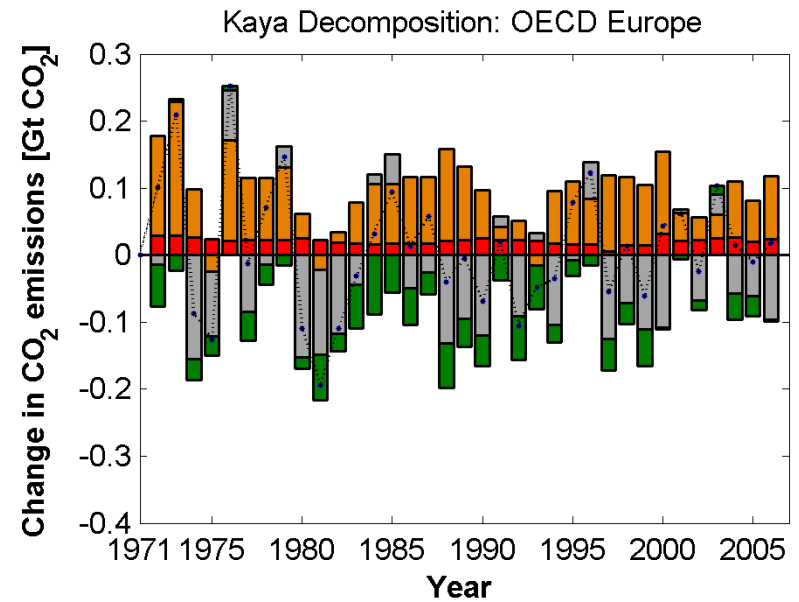
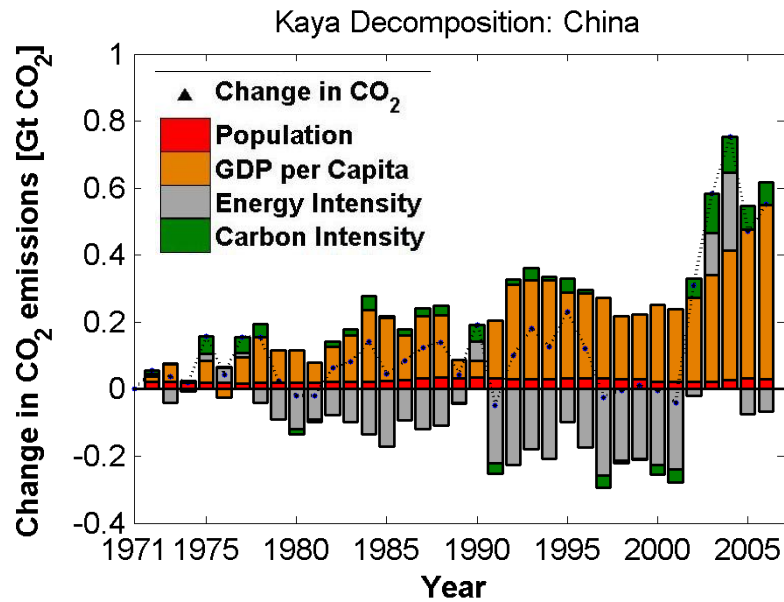
# Integrated Risk and Uncertainty Assessment

Can a framework be developed for integrating risk and uncertainty assessments, that is flexible and qualitative enough to be adopted by all IPCC Working Groups?

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# Carbonisation Pathways



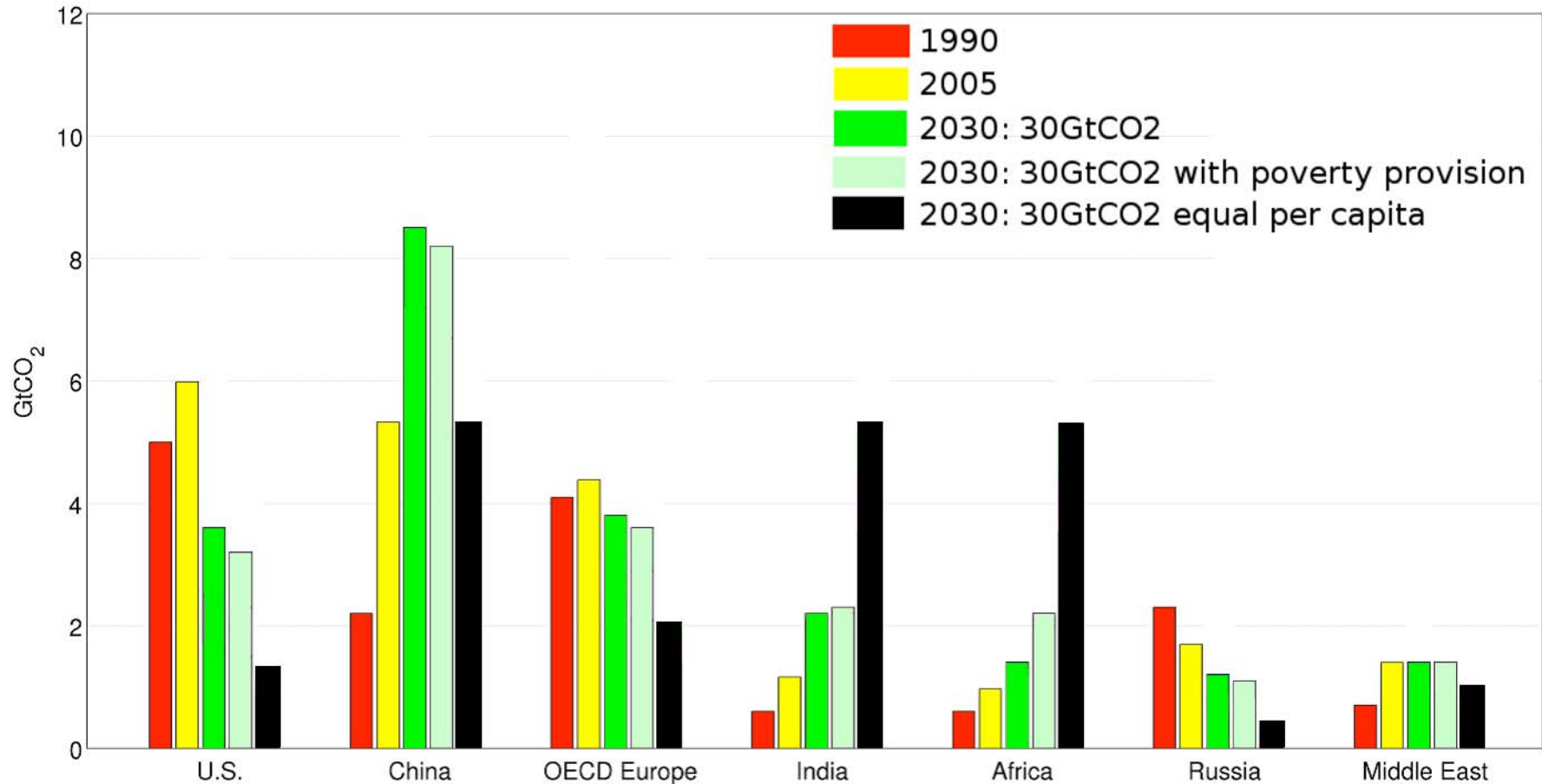
# Crucial Aspects for AR5

- Integrating Adaptation and Mitigation as response strategies to climate change
- Identifying adaptive and mitigative capacities at the regional level
- Exploring synergies and trade-offs between M&A and the Millennium Development goals
- Embedding M&A in Sustainable Development

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# Allocation of Emission Rights



When emission rights are allocated according to individuals rather than nations, countries with a larger proportion of high emitters do more, and those with similar emission profiles have similar commitments.

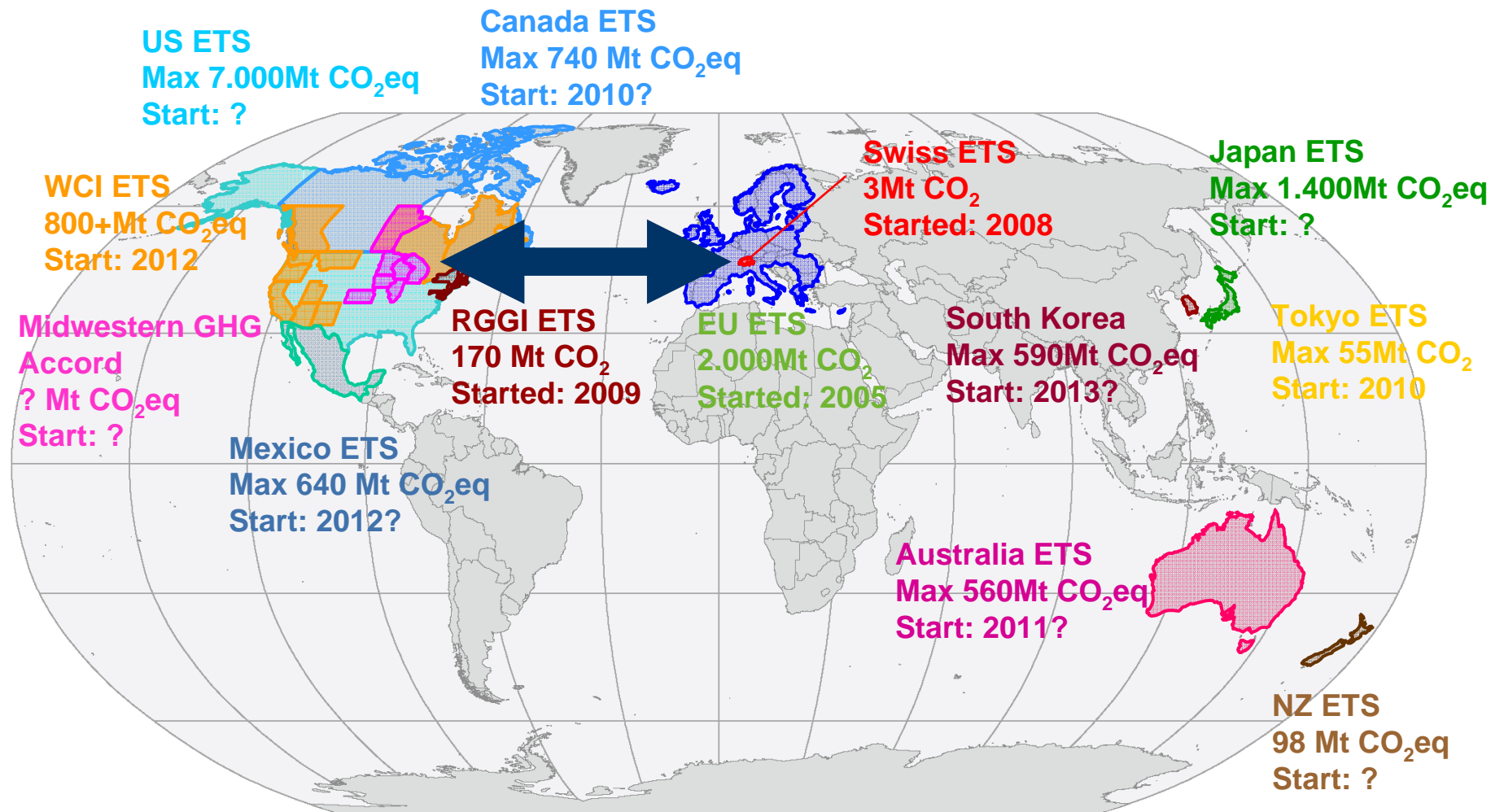
## Further Aspects that Need to be Addressed

- Life Style Changes
- Impacts of CC response strategies on income groups, countries, regions
- Inter- and intragenerational justice of mitigation and adaptation measures (e.g. distribution of mitigation and adaptation costs)

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# Domestic Cap and Trade: Linking Emerging CO<sub>2</sub>-Markets



**“The European Commission is preparing to call on the United States to create a trans-Atlantic system of carbon trading”**

## Complements to the Carbon Market

- Standards, Global Funds
- Taxes
- Lessons from the current financial crisis for designing policy instruments
- Assessment of new knowledge on the implementation of other multilateral environmental agreements, as far as it is relevant for mitigation and adaptation
- Impact of One-Sided Trade (CDM, JI) on Carbon Markets

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- **Possible Structure of AR5 WGIII**

## Cross-Cutting Issues and Their Relevance for WG III

Cross-Cutting Issues	Relevance for WG 3
Hydrological Cycle	+
Carbon cycle/ocean.acid.	++
Regional Aspects	+++
Risk/Uncertainty	+++
M&A&SD	+++
Costing	+++
Ice Sheet	-

# A Possible Structure of AR5 WGIII

## 1) Stabilization Targets, Impacts and Costs

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## 2) Technology, Sectors and Infrastructure

## 3) Integrated Risk and Uncertainty Assessment

## 4) Regional Sustainable Development

## 5) Equity and Fairness

## 6) International Cooperation and Global Finance

# Outcome of AR5 Scoping Meeting

## I. INTRODUCTION

1. Introductory Chapter

## II. FRAMING ISSUES

2. Sustainable Development – Common and Specific Regional Aspects
3. Ethics & Equity & Climate Policy
4. Integrated Risk and Uncertainty Assessment of Climate Policy
5. Economic Analyses of Climate Policy

## III. PATHWAYS FOR MITIGATING CLIMATE CHANGE

6. Mitigation Options and Pathways In Context
7. Energy Systems
8. Human Settlements - Transport and Buildings
9. Industry and Waste
10. Agriculture, Forestry and Other Land Use (AFOLU)
11. Transformation Pathways

## IV. POLICIES AND INSTITUTIONS

12. International Cooperation, Agreements & Instruments
13. National Policies
14. Sub-national Policies

## V. FINANCING TRANSFORMATIONS

15. Regional Development
16. Investment and Finance