Update on Scenario Development: from SRES to RCPs

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Thanks to Richard Moss, Malte Meinshausen, and Kathy Hibbard for some slides

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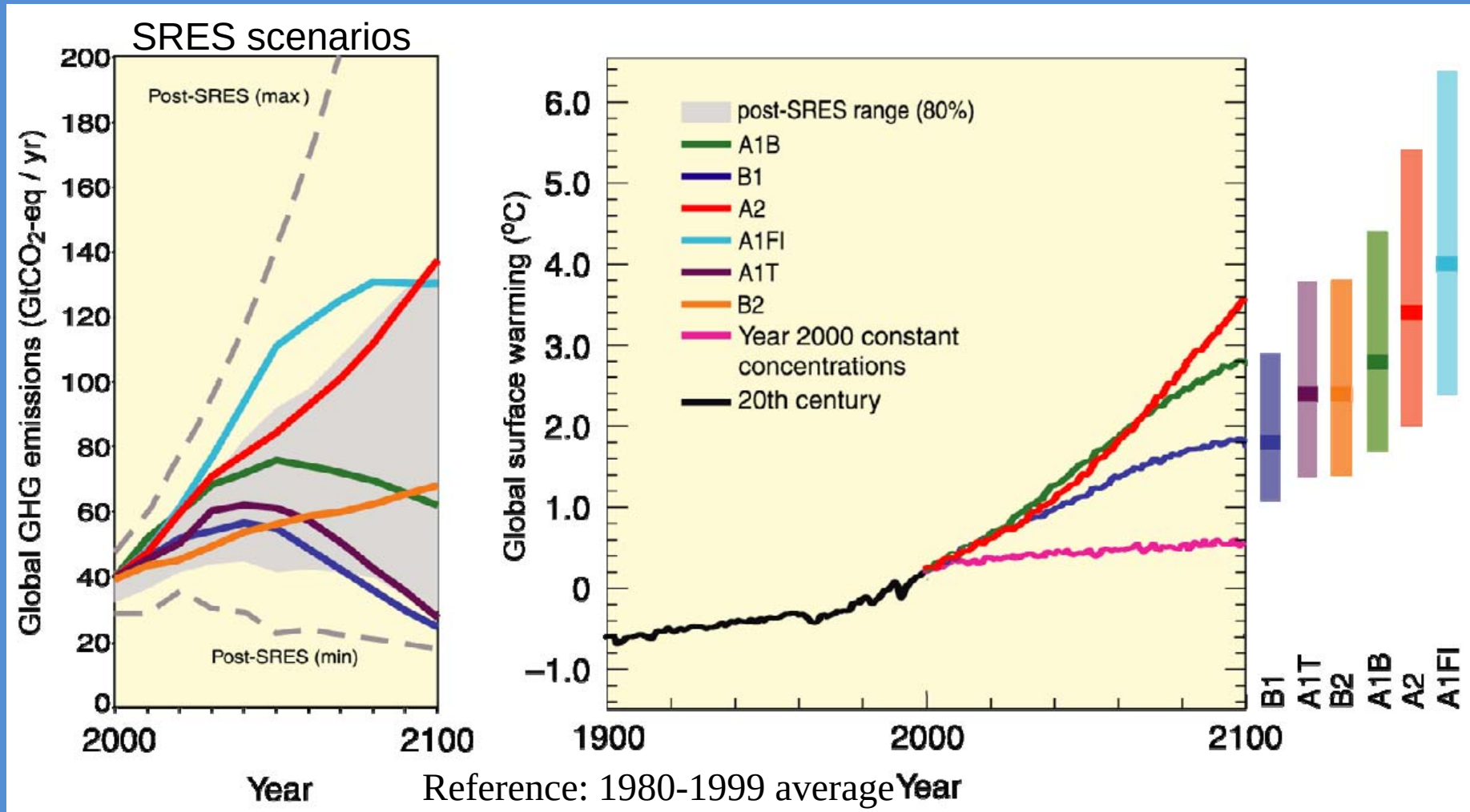
Key points

- **Starting point: non-mitigation SRES scenarios**
  (SRES= Special Report on Emission Scenarios, 2000)
- **Decisions taken by IPCC about development of scenarios for AR5**
- **Parallel approach with fast-track RCPs**
- **RCPs: Representative Concentration Pathways**
- **NB: Socio-economic aspects covered in Ramon Pichs talk**

Source: IPCC, AR4 (2007)

Climate projections without mitigation



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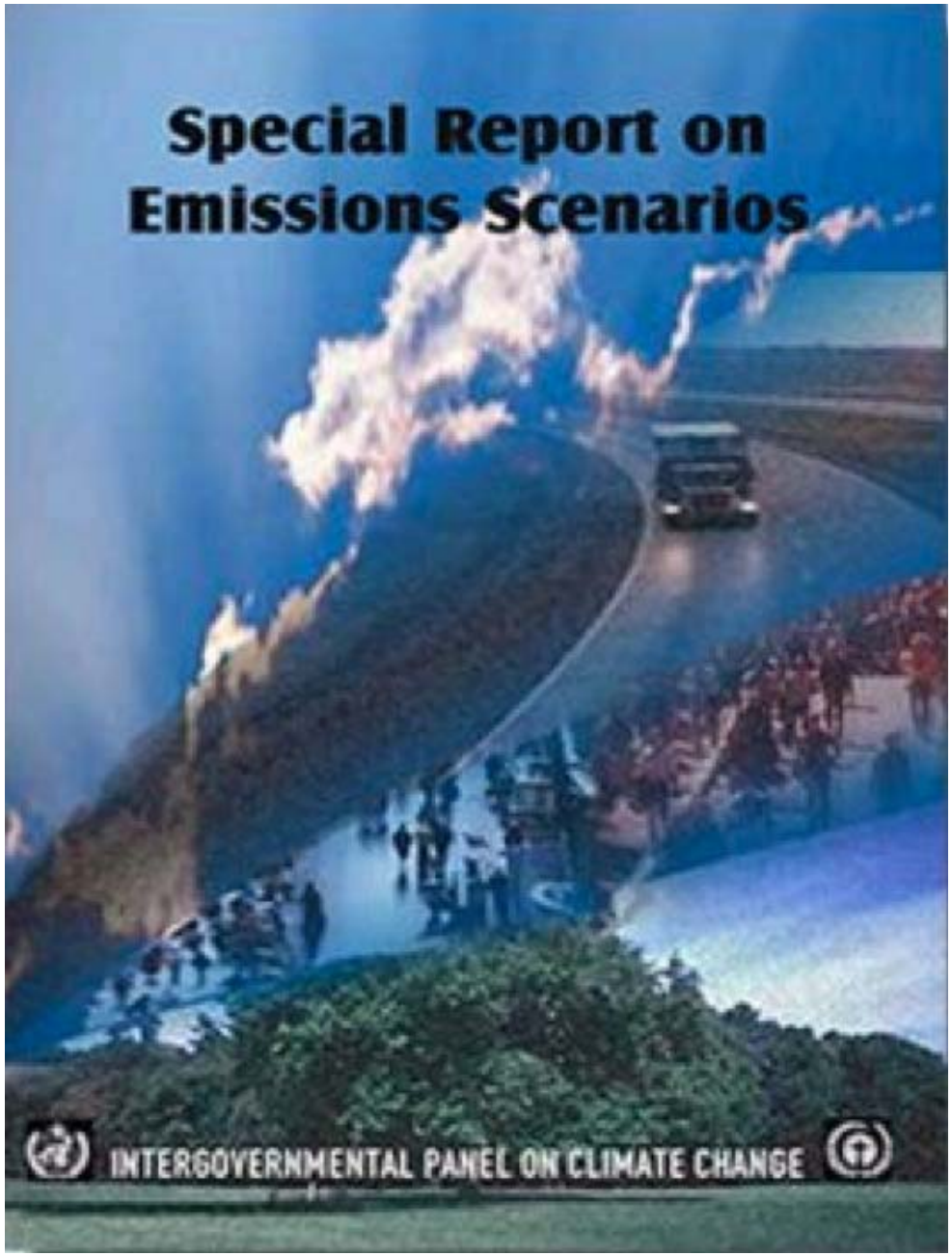

N. Nakicenovic & R. Swart (Eds), 2000

Remark: ***No mitigation policies implied in any SRES scenario***

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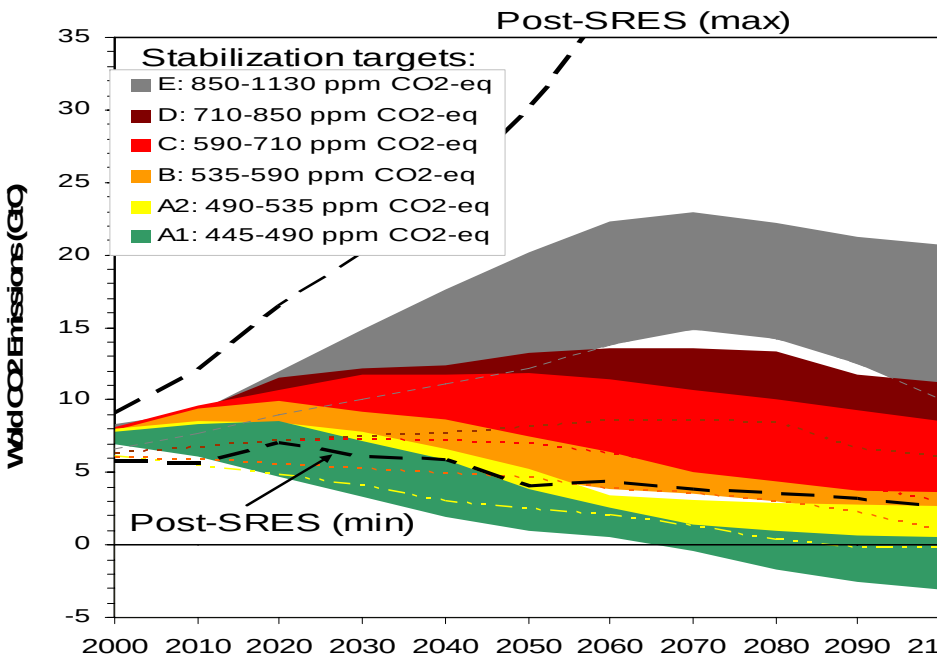
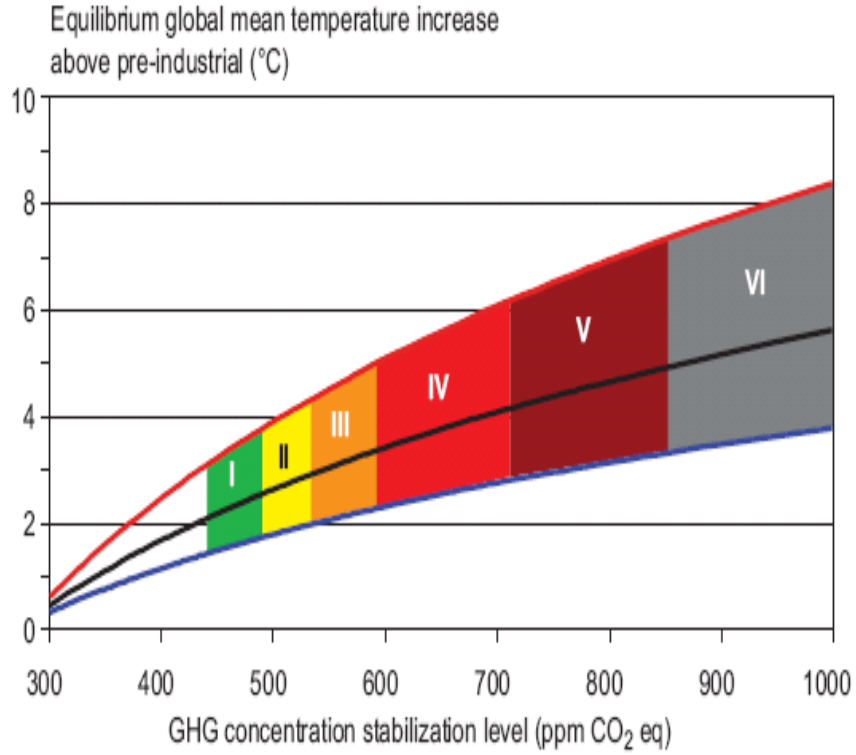
Stabilization in AR4: From equilibrium global temperature to concentrations to emissions without using SRES



Multigas and CO2 only studies combined



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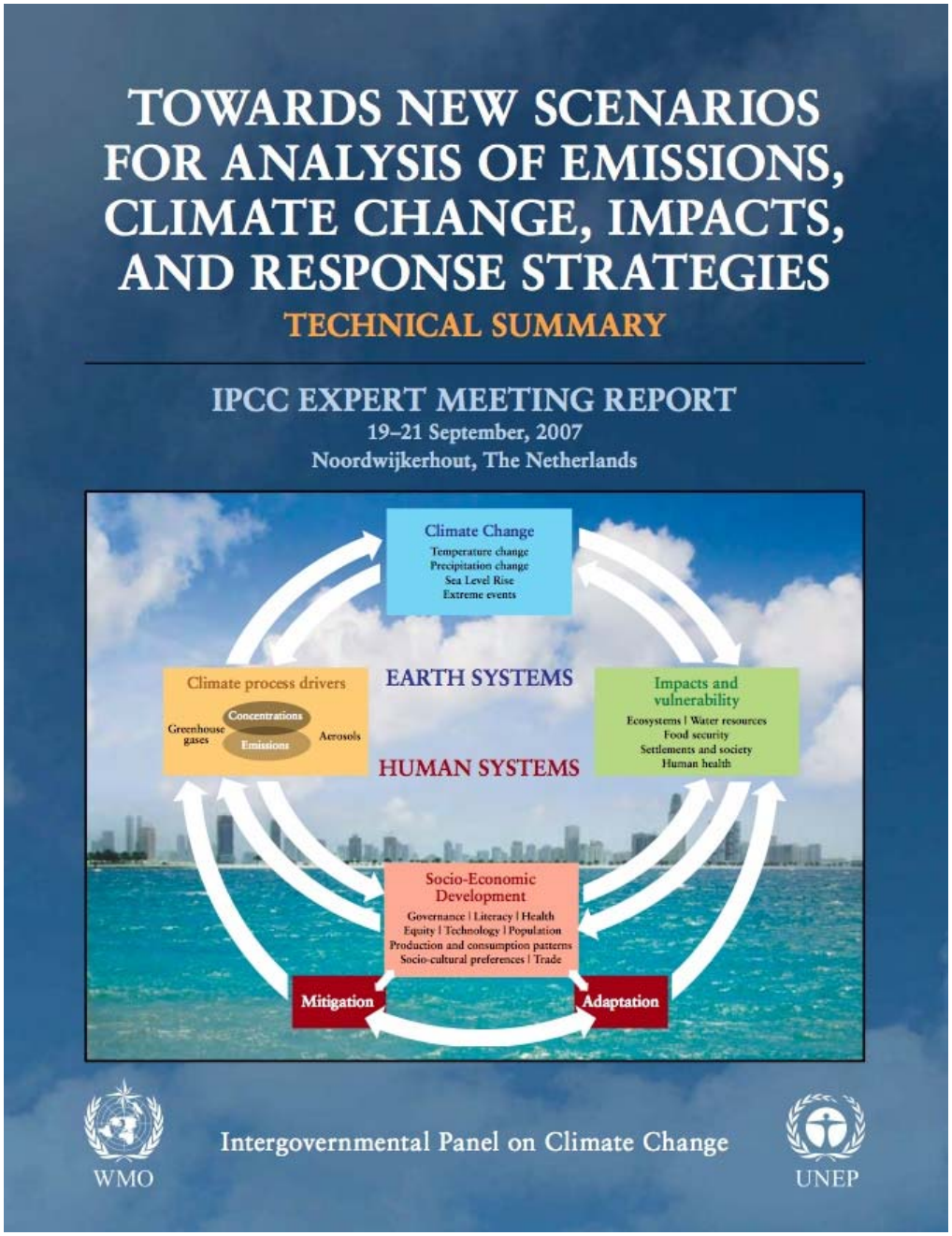
IPCC Decision (Mauritius, April 2006)

- IPCC expressed in 2005 the **need for new emission scenarios**, to be available well before completion of a possible AR5.
- The Panel recognized that the **development of scenarios for AR5 would be undertaken by the scientific community**.
- The **IPCC may catalyze such work** so as to promote its readiness in time for the AR5 cycle.

IPCC Decision (Bangkok, May 2007)

- Recalls its **support for decoupling** the climate modeling work from the emission scenario development work, in order to allow climate modelers a quick start.
- IPCC now requests the Steering Committee on New Scenarios to **prepare a few benchmark concentration scenarios** through the IPCC Expert Meeting in Noordwijkerhout (NL)
- These benchmark concentration **scenarios should be compatible with the full range** of stabilization, mitigation and baseline emission scenarios available **in** the current scientific **literature**.



IPCC Expert Meeting Report, Noordwijkerhout, 2008

R. Moss & al., Noordwijkerhout, 2008

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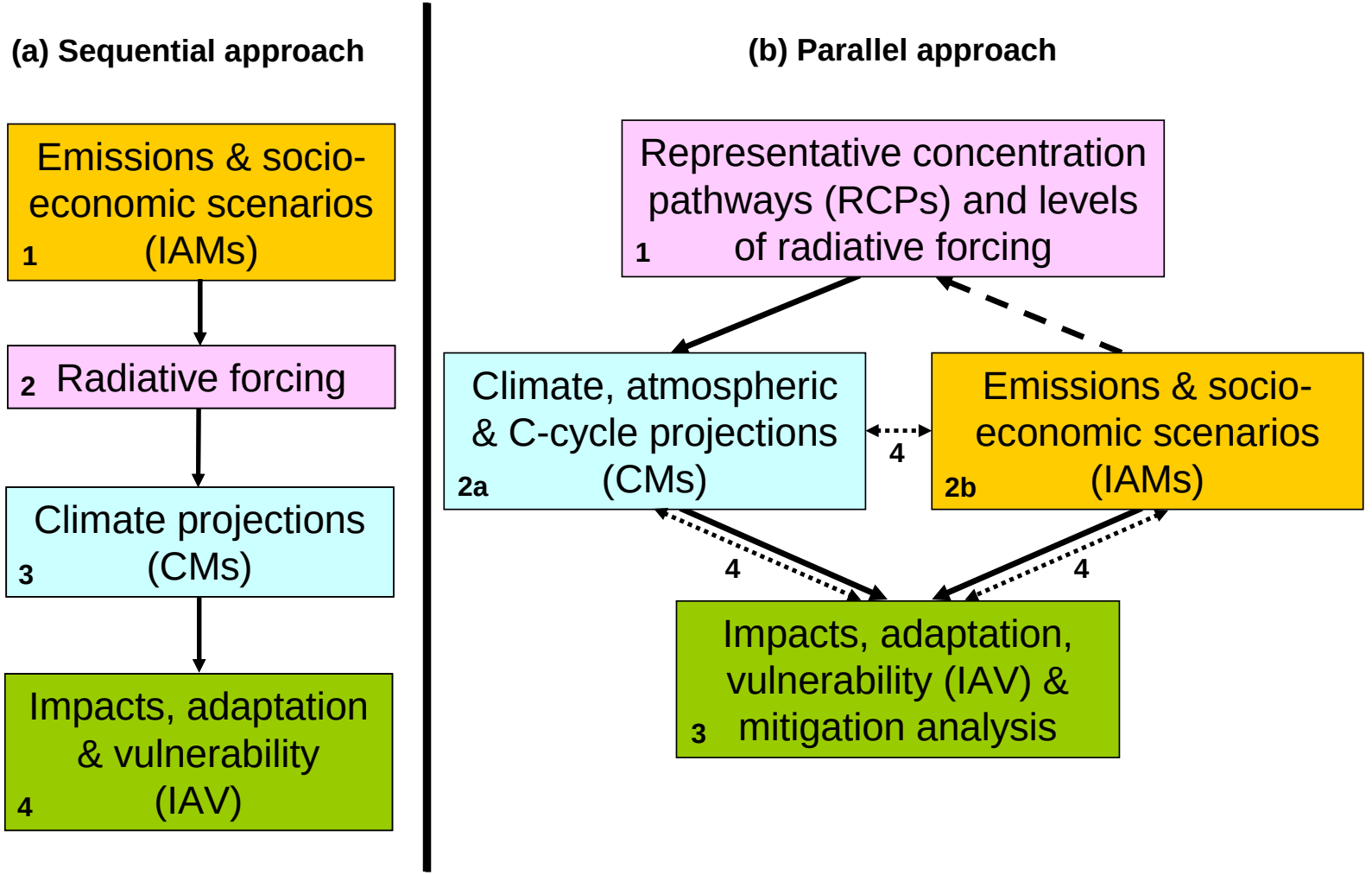
From Kathy Hibbard

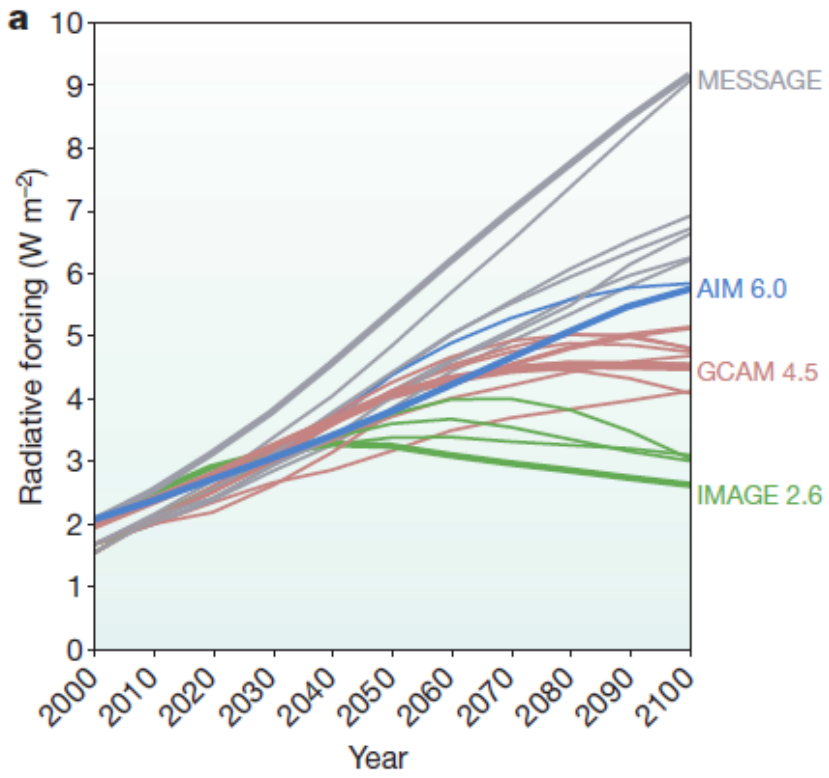
Scenarios selected to span climate space. (and new scenario development process with scientific communities as responsible party)

A “Parallel Approach” Implies Much More Interaction Between the IAV, IAM and CM communities

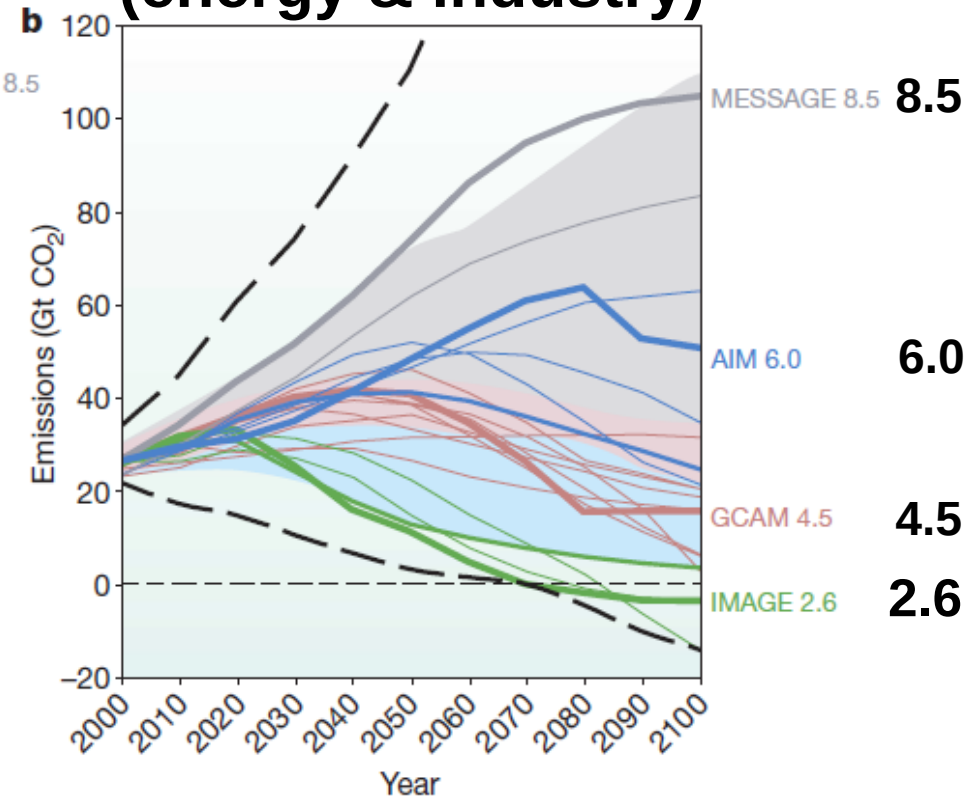


RCP: Radiative forcing and emissions

Radiative Forcing



CO_2 emissions (energy & industry)



Moss et al, 2010, Nature

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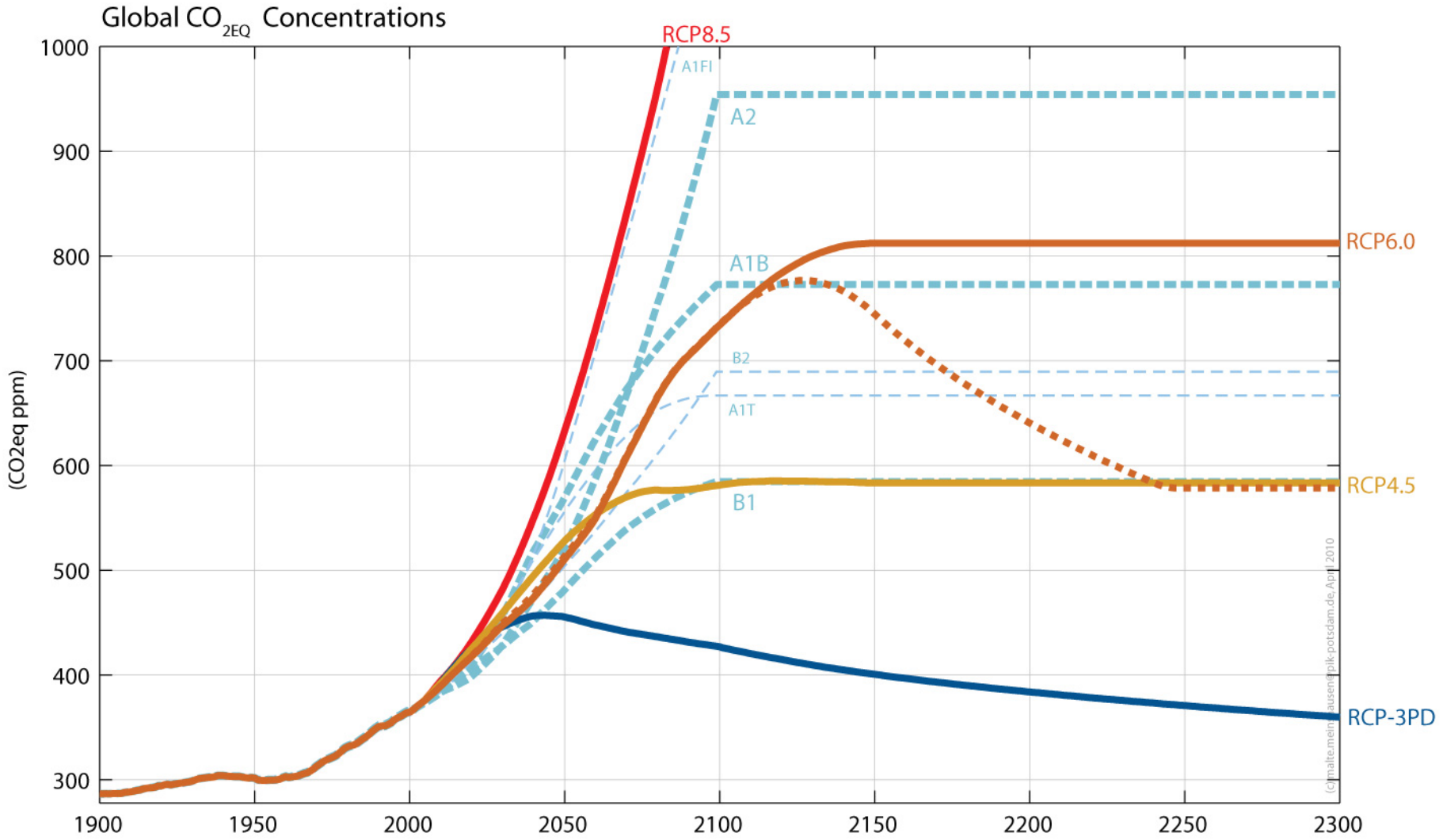
CO_2-eq Concentrations for the RCPs



From Malte Meinshausen

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What the RCPs (Representative Concentration Pathways) are:

- **Consistent sets of projections** of only the components of radiative forcing that are meant **to serve as input for** climate **modelling**, pattern scaling, and atmospheric chemistry modelling.
- **Named according** to their 2100 **radiative forcing** level (based on the forcing of greenhouse gases and other forcing agents)**.**
- Chosen for scientific purposes to represent the **span of the radiative forcing literature at the time** of their selection and thus facilitate the mapping of a broad climate space.

Adapted from the RCP database on www.IIASA.ac.at
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What the RCPs (Representative Concentration Pathways) are:

- They **jump-start the scenario development** across research communities from which uncertainties about socioeconomic, climate, and impact futures can be explored.
- They constitute **just the beginning of the parallel process of developing new scenarios** for the IPCC's fifth Assessment Report.
- The RCPs aim at providing a **consistent** analytical thread **across scientific communities**.

Adapted from the RCP database on www.IIASA.ac.at
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What the RCPs (Representative Concentration Pathways) are NOT:

- The RCPs are not new, fully integrated scenarios (i.e., they are **not a complete package of socioeconomic, emissions, and climate projections**).
- The radiative forcing estimates on which they are based do not include direct impacts of land use (albedo) or the forcing of mineral dust.
- The RCPs are **not forecasts or boundaries for potential emissions, land-use, or climate change**.
- They are **not policy prescriptive** in that they **do not represent specific futures with respect to climate policy** action (or no action) or technological, economic, or political viability of specific future pathways or climates.

Adapted from the RCP database on www.IIASA.ac.at

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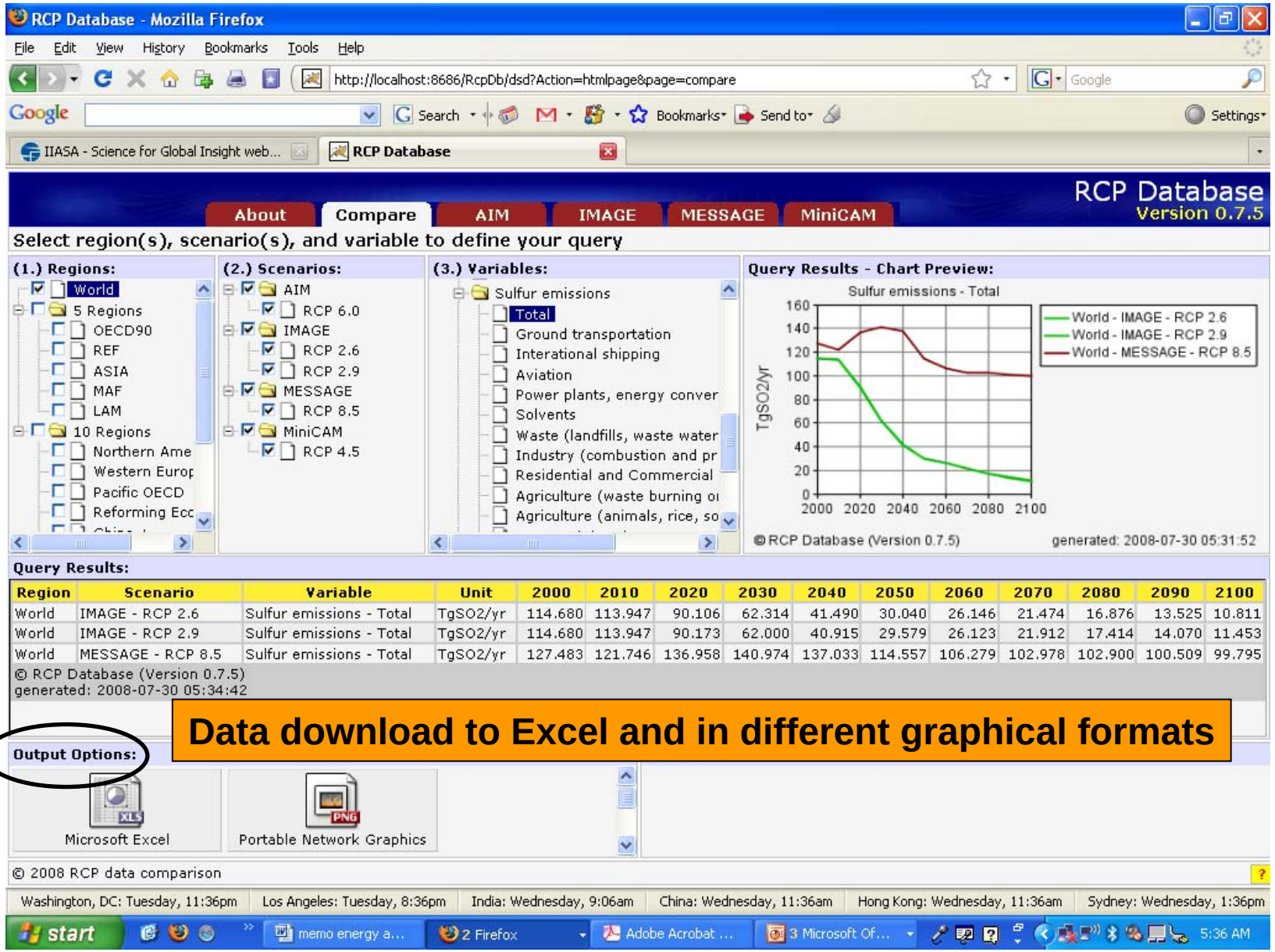
The IPCC has a catalytic role, and the Integrated Assessment Modeling Consortium (IAMC) delivers the scenario work

International Institute for Applied Systems Analysis (IIASA)	Energy Modeling Forum (EMF) Stanford University	National Institute for Environmental Studies (NIES)
➢Australian Bureau of Agricultural and Resource Economics (ABARE) - *Hom Pant* ➢Business Council for Sustainable Development – Argentina - *Virginia Vilariño* ➢CEA-LERNA, University of Social Sciences - *Marc Vielle* ➢Centre for International Climate and Energy Research (CICERO), University of Oslo - *H.Asbjorn Aaheim* ➢Argonne National Laboratory - *Donald Hanson* ➢Centre International de Recherche sur l'Environnement et le Developpement, EHESS - U.A. CNRS 940 (CIRED) - *Jean-Charles Hourcade* ➢CRA International - *Brian Fischer* ➢Dept. of Energy, Transport, Environment, DIW Berlin - *Claudia Kemfert* ➢Electric Power Research Institute (EPRI) - *Richard Richels* ➢Energy Research Institute, National Development and Reform Commission (NDRC) - *Kejun Jiang*	➢Freelance Professional Economist - *Thomas Rutherford* ➢Hamburg University and Economic and Social Research Institute (ESRI) - *Richard Tol* ➢Indian Institute of Management - *Priyadarshi Shukla* ➢Institut d'Economie et de Politique de l'Energie, IEPE-CNRS - *Patrick Criqui* ➢International Institute for Applied Systems Analysis (IIASA) - *Nebojsa Nakicenovic, Keywan Riahi* ➢IPCC and San Marcos University - *Eduardo Calvo* ➢National Institute for Environment Studies (NIES) - Mikiko Kainuma ➢Ohio State University - Brent Sohngen ➢Pacific Northwest National Laboratory, Joint Global Change Research Institute at the University of Maryland - *Jae Edmonds, Hugh Pitcher, Ronald Sands, Steve Smith* ➢Programa de Planejamento Energético - PPE/COPPE/UFRJ - *Emilio Lèbre La Rovere*	➢Purdue University - *Thomas Hertel* ➢RAND - *Rob Lempert* ➢Research Institute of Innovative Technology for the Earth (RITE) - *Keigo Akimoto* ➢Stanford University - *John Weyant* ➢Texas A&M University - *Bruce McCarl* ➢The Institute of Applied Energy - *Atsushi Kurosawa* ➢The Netherlands Environmental Assessment Agency (MNP) - *Detlef van Vuuren* ➢Universidad de Los Andes / Universidad Nacional de Colombia - *Jose Eddy Torres* ➢Universidad Iberoamericana Puebla - *Maria Eugenia Ibarraran Viniegra* ➢US Environmental Protection Agency - *Francisco de la Chesnaye, Allen Fawcett, Steven Rose*

RCP Database (Google: IIASA RCP)

From Kathy Hibbard



Key points

- **Evolving away from the non-mitigation SRES scenarios (SRES= Special Report on Emission Scenarios, 2000)**
- **Development of scenarios for AR5 to be undertaken by the scientific community.**
- **The IPCC has "catalytic" role here**
- **Parallel approach with fast-track process allowing modellers (e.g., CMIP5) to work with RCPs**
- **RCPs: Representative Concentration Pathways spanning full range in literature**
- **Socio-economic driving forces, narratives, storylines developed later (See Ramon Pichs talk)**

The RCP and the new scenarios:

- **Essential building blocks in order for the IPCC to produce the best, most policy-relevant, but not policy-prescriptive, 5th Assessment Report (AR5)**