IPCC AR5: policy relevance and overview of new elements

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Key points

- **IPCC – UNFCCC relationship: long and productive**
- **IPCC reports up to AR4 & SRREN distilled very policy-relevant information**
- **AR5: we cannot speculate on content, but…**
- **The IPCC will do its best to help the UNFCCC review process**

IPCC – UNFCCC relationship: long and productive

The assessments carried out by the IPCC have influenced global action on an unprecedented scale

1. First Assessment Report (1990) had a major impact in defining the content of the **UNFCCC**

2. The Second Assessment Report (1996) was largely influential in defining the provisions of the **Kyoto Protocol**

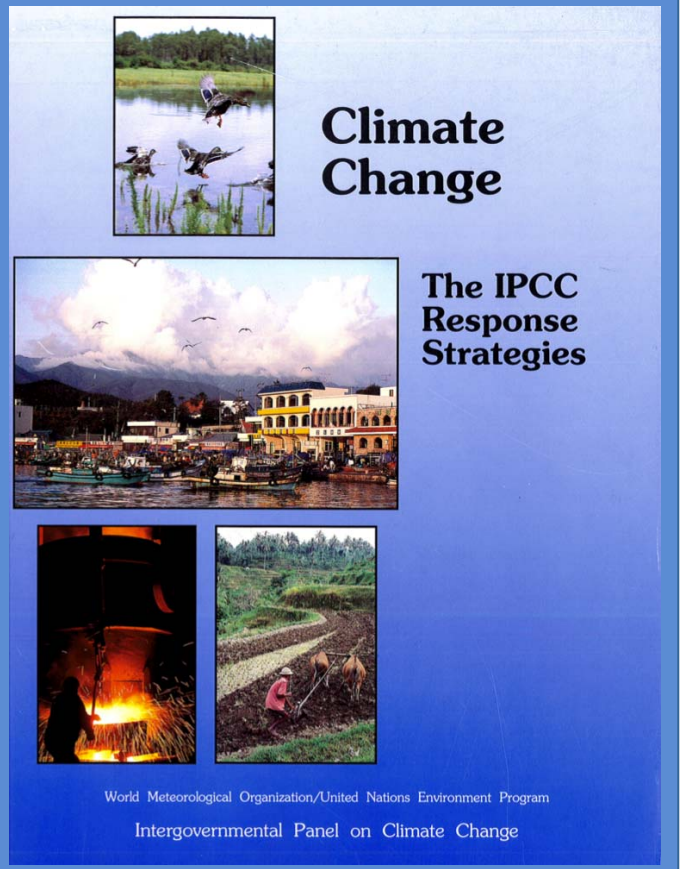
3. The Third Assessment Report (2001) focused attention on the **impacts** of climate change and the need for **adaptation**

4. The Fourth Assessment Report (2007) is creating a strong basis for a **post-2012** agreement

The IPCC is older than the UNFCCC!

First Assessment Report (FAR, 1990)

The IPCC Response Strategies



IPCC FAR (1990): Possible elements for inclusion in a Framework Convention on Climate Change (1)

An article would set out the general obligations agreed to by the parties to the Convention, for example:

- The adoption of appropriate measures to protect against the adverse effects of climate change, to limit, reduce, adapt to, and, as far as possible, prevent climate change in accordance with the means at the disposal of individual countries and their scientific and technical capabilities; and to avoid creating other environmental problems in taking such measures

IPCC, FAR, 1990, p. 264

IPCC FAR (1990): Possible elements for inclusion in a framework Convention on Climate Change (2)

- The protection, stabilization, and improvement of the composition of the atmosphere in order to conserve climate for the benefit of present and future generations;

- Taking steps having the effect of limiting climate change but that are already justified on other grounds

IPCC, FAR, 1990, p. 264

UN Framework Convention on Climate Change Article 2 (*Ultimate objective):*

'...stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

Such a level should be achieved within a time frame sufficient

- to allow ecosystems to adapt naturally to climate change,
- to ensure that food production is not threatened and
- to enable economic development to proceed in a sustainable manner.'

Emissions scenarios (WGIII)

Critical climate change levels (WG I, WGII, WGIII)

Key vulnerabilities (WGI, WG II, WGIII)

Dangerous anthropogenic interference (or « How the IPCC is policy-relevant w/o being prescriptive »)

« The identification of potential key vulnerabilities is intended to provide guidance to decision-makers for identifying levels and rates of climate change that may be associated with 'dangerous anthropogenic interference' (DAI) with the climate system, in the terminology of the UNFCCC Article 2. **Ultimately, the determination of DAI** cannot be based on scientific arguments alone, but **involves other judgements informed by the state of scientific knowledge** »

IPCC, AR4, WGII, 2007, p. 781

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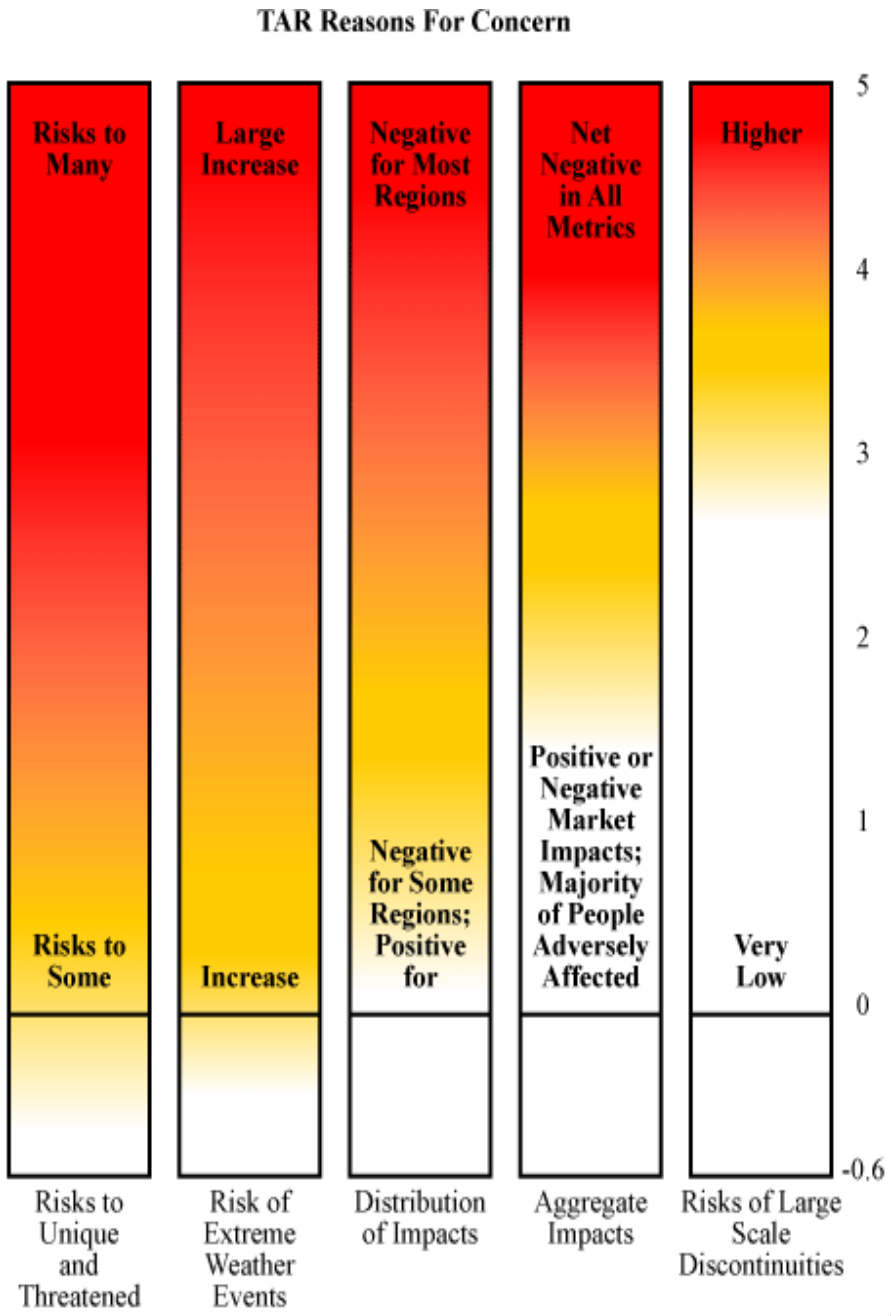
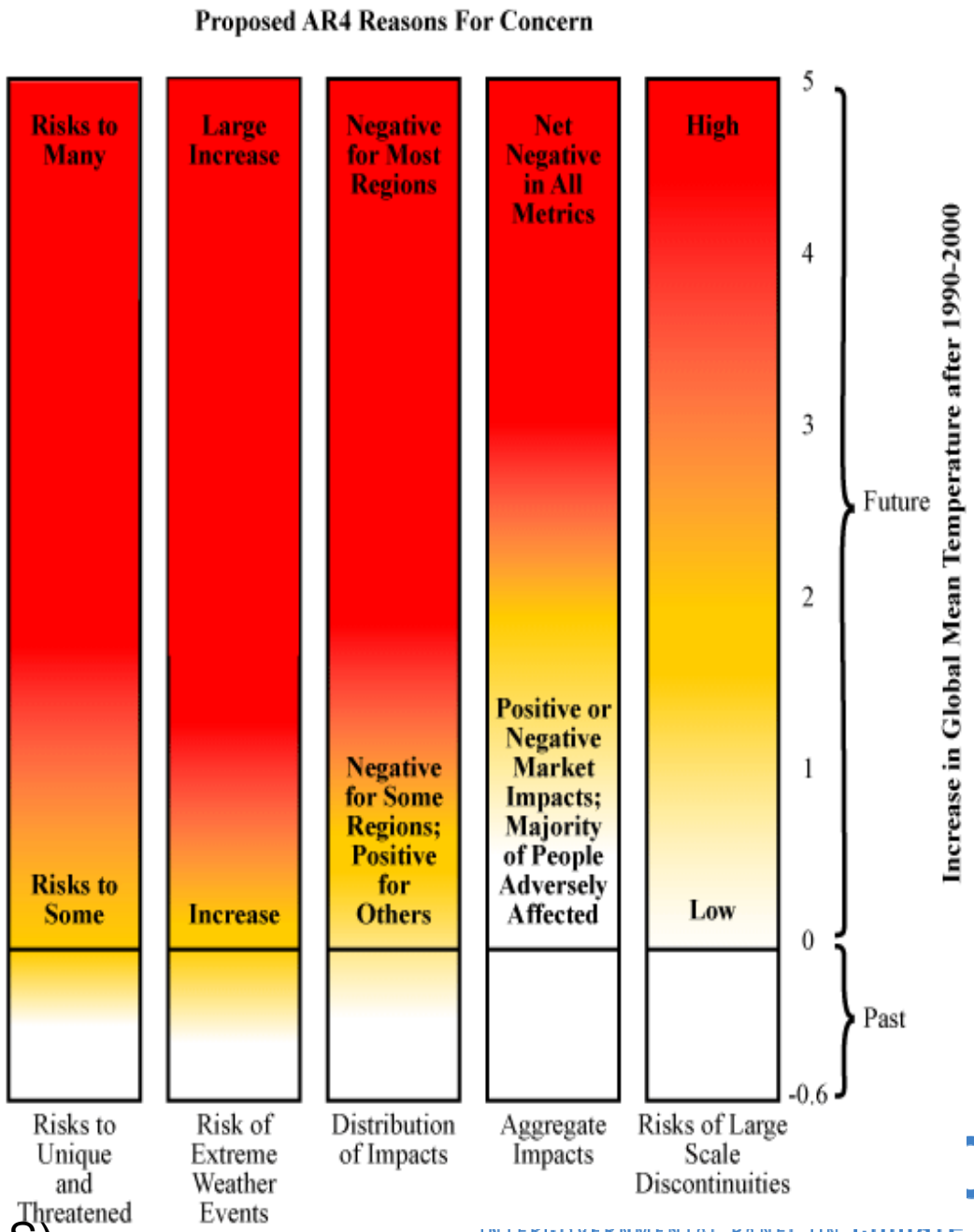
IPCC reports up to AR4 & SRREN distilled very policy-relevant information

TAR (2001)

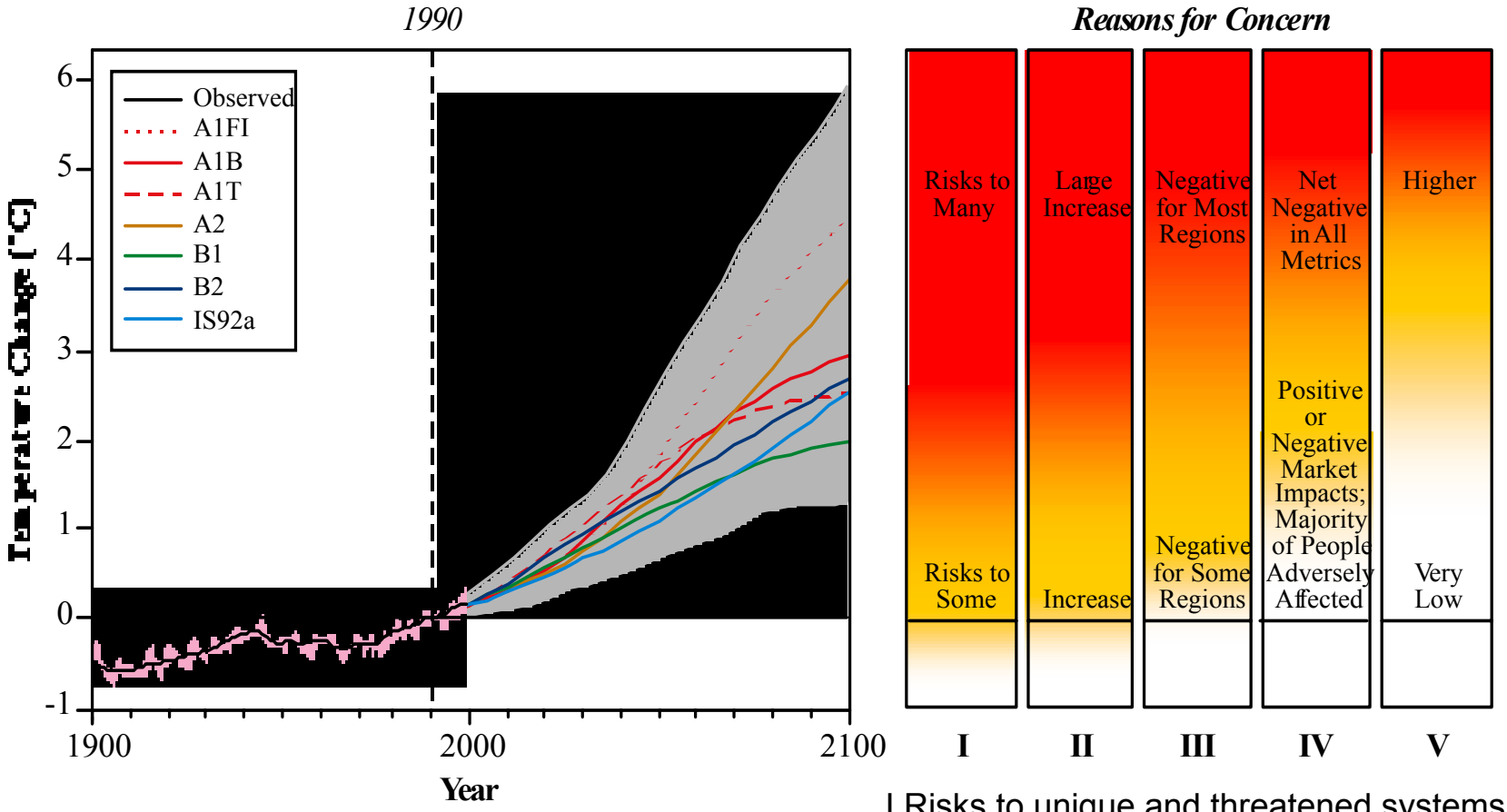


(Based on)
AR4, 2007



Smith et al, 2009 (PNAS)

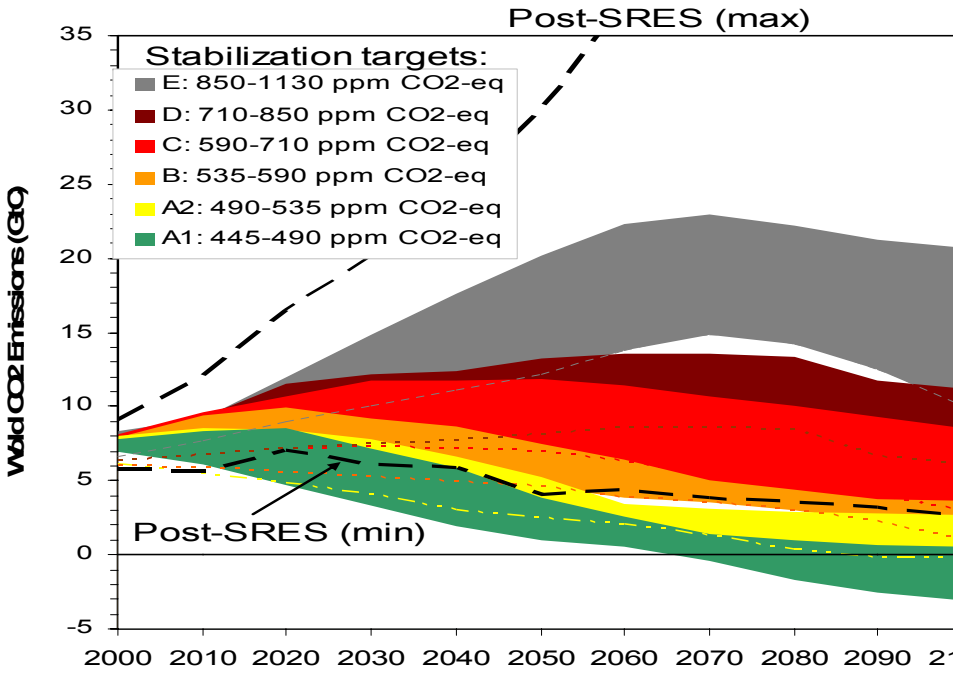
Reasons for Concern



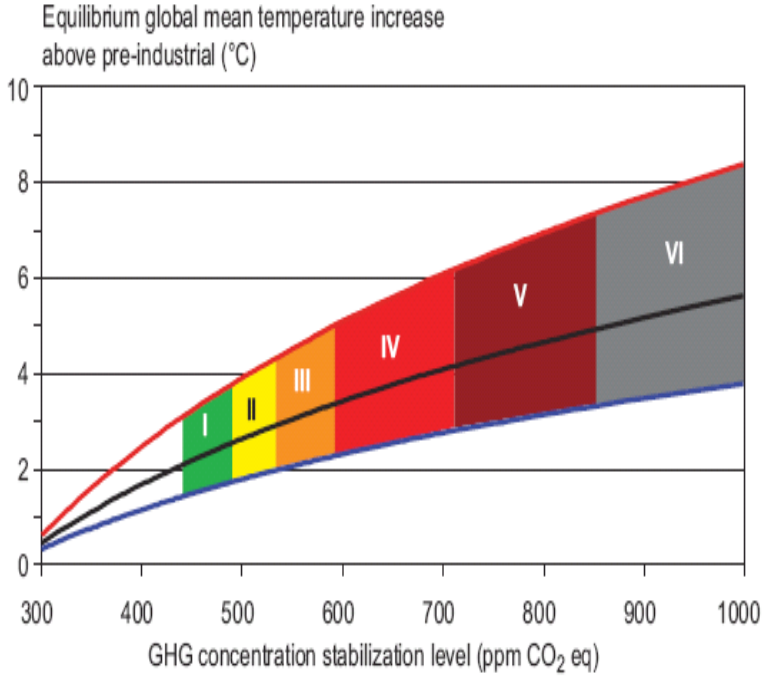
I Risks to unique and threatened systems
II Risks from extreme climate events
III Distribution of Impacts
IV Aggregate Impacts
V Risks from large-scale discontinuities

Source: IPCC TAR WG2 (2001)

AR4: The lower the stabilisation level the earlier global emissions have to go down



Multigas and CO2 only studies combined



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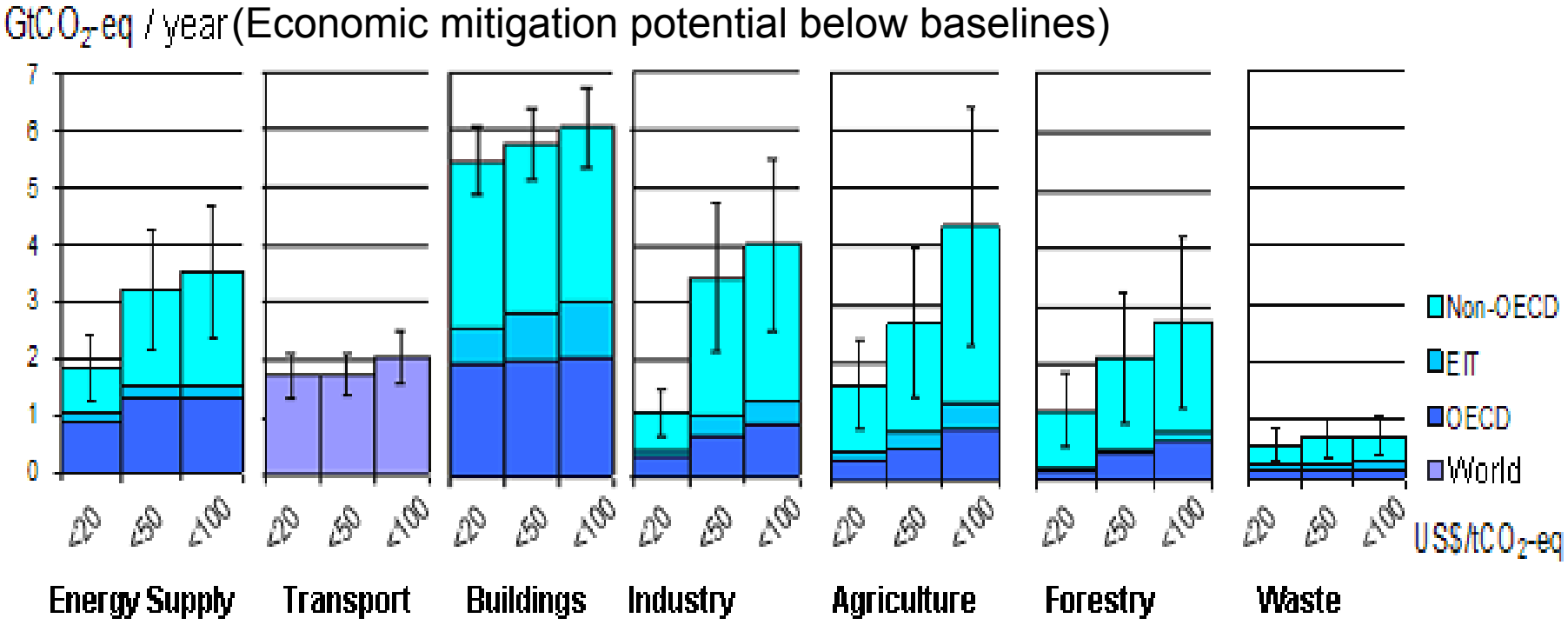
AR4: Emission peaking & reductions, concentrations, temperature, & sea-level rise due to thermal expansion

Category	CO_2 concentration at stabilisation (2005 = 379 ppm)[b]	CO_2-equivalent concentration at stabilisation including GHGs and aerosols (2005=375 ppm)[b]	Peaking year for CO_2 emissions[a,c]	Change in global CO_2 emissions in 2050 (percent of 2000 emissions)[a,c]	Global average temperature increase above pre-industrial at equilibrium, using 'best estimate' climate sensitivity[d,e]	Global average sea level rise above pre-industrial at equilibrium from thermal expansion only[f]
	ppm	ppm	year	percent	°C	metres
I	350 – 400	445 – 490	2000 – 2015	-85 to -50	2.0 – 2.4	0.4 – 1.4
II	400 – 440	490 – 535	2000 – 2020	-60 to -30	2.4 – 2.8	0.5 – 1.7
III	440 – 485	535 – 590	2010 – 2030	-30 to +5	2.8 – 3.2	0.6 – 1.9
IV	485 – 570	590 – 710	2020 – 2060	+10 to +60	3.2 – 4.0	0.6 – 2.4
V	570 – 660	710 – 855	2050 – 2080	+25 to +85	4.0 – 4.9	0.8 – 2.9
VI	660 – 790	855 – 1130	2060 – 2090	+90 to +140	4.9 – 6.1	1.0 – 3.7

AR4 SYR Table 5,1

All sectors and regions have the potential to contribute by 2030



Note: estimates do not include non-technical options, such as lifestyle changes.

Source: AR4 SYR Figure 4.2

SRREN: Special Report on Renewable Energy Sources and Climate Change Mitigation

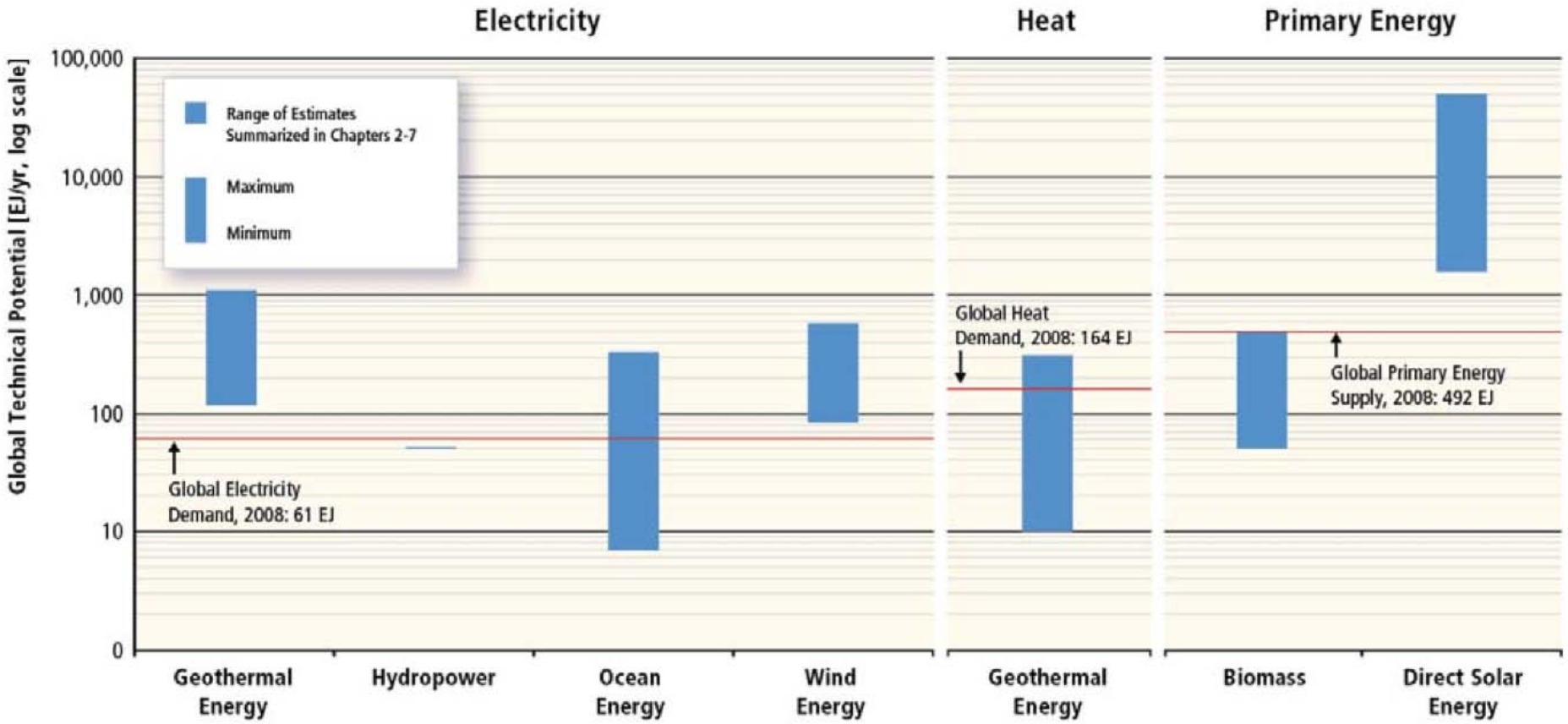
- 1. Renewable Energy and Climate Change
- 2. Bioenergy
- 3. Direct Solar Energy
- 4. Geothermal Energy
- 5. Hydropower
- 6. Ocean Energy
- 7. Wind Energy

Technology Chapters

- 8. Integration of Renewable Energy into Present and Future Energy Systems
- 9. Renewable Energy in the Context of Sustainable Development
- 10. Mitigation Potential and Costs
- 11. Policy, Financing and Implementation

Luderer et al. (2009)

SRREN: The potential fo renewable energy technologies to supply energy services exceeds current demand



Range of Estimates of Global Technical Potentials

Max (in EJ/yr)	1109	52	331	580	312	500	49837
Min (in EJ/yr)	118	50	7	85	10	50	1575

IPCC, 2011, SRREN, SPM, Fig. SPM. 4, p. 8

IPCC - Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX): Approved Outline

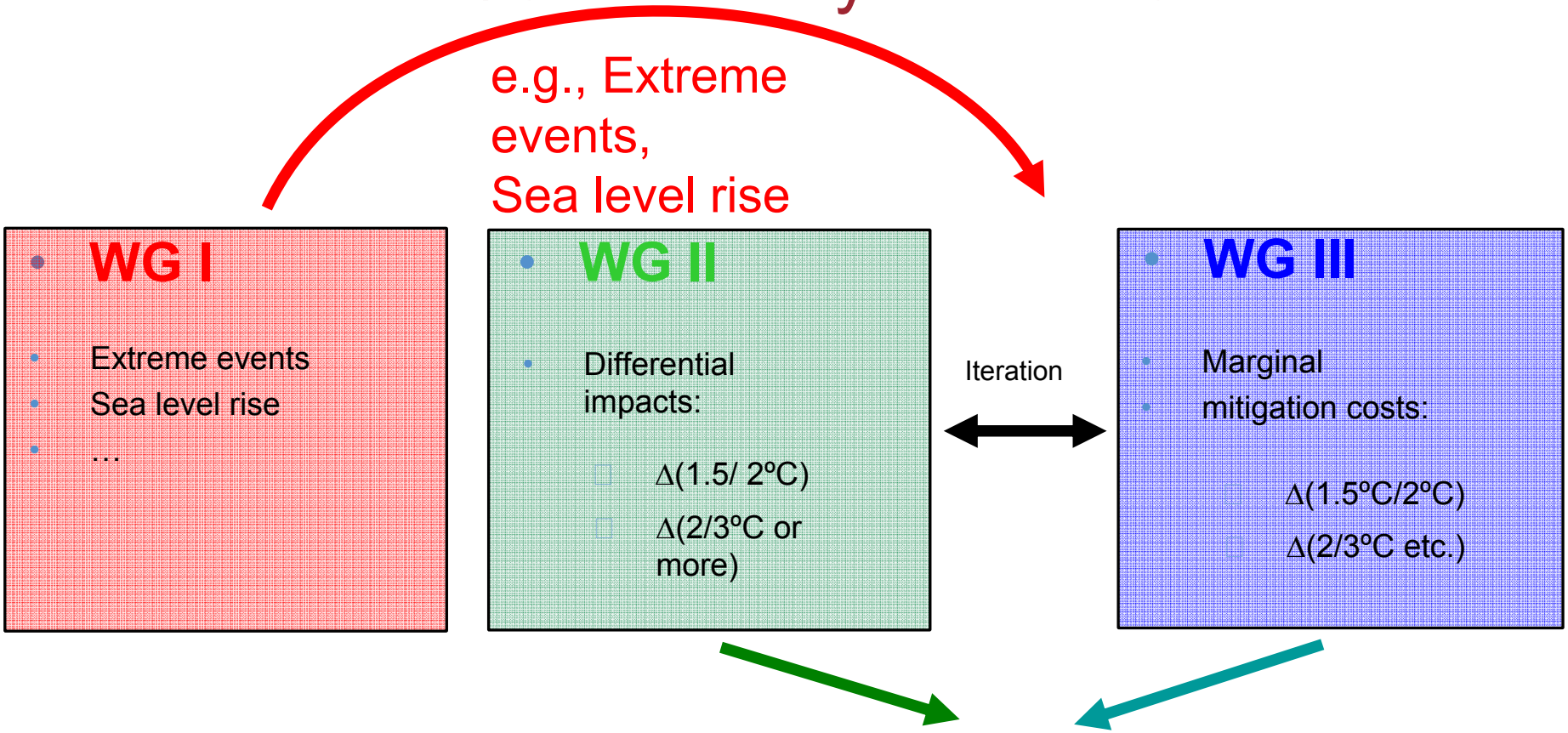
1. Climate change: new dimensions in disaster risk, exposure, vulnerability, and resilience
2. Determinants of risks: exposure and vulnerability
3. Changes in climate extremes and their impacts on the natural physical environment
4. Changes in impacts of climate extremes: human systems and ecosystems
5. Managing the risks from climate extremes at the local level
6. National systems for managing the risk from climate extremes
7. Managing the risks: international level and integration across scales
8. Towards a resilient and sustainable future
9. Case studies

AR5: we cannot speculate on content, but…

AR5 will be the best ever

- Better integration of Mitigation and Adaptation
- Improved risk-management approach
- Evolving away from the non-mitigation SRES scenarios (SRES= Special Report on Emission Scenarios, 2000)
- Special effort to provide regional information when available
- Sustainable development & equity aspects
- More comprehensive treatment of economic aspects, and of cross-cutting issues
- Emerging issues handled (geo-engineering, …)
- Better handling & communication of uncertainties

AR5 Innovation: Considering Risk/Uncertainty in all WGs



WG II Major Themes

- Building from the structure of the AR4.
- Better integration of climate science with climate impacts.
- Broader range of assessed impacts.
- Climate change in the context of other stresses.
- Better treatment of extremes and disasters.
- Framing to support good decisions, including information on risk.
- More comprehensive treatment of regional aspects of climate change.
- Expanded treatment of adaptation.
- Better integration of adaptation, mitigation, and development.

Major Sections or "Superchapters"

- Part A: GLOBAL & SECTORAL ASPECTS
  - Context for the AR5
  - Natural and managed resources and systems, and their uses
  - Human settlements, industry, and infrastructure
  - Human health, well-being, and security
  - Adaptation
  - Multi-sector impacts, risks, vulnerabilities, and opportunities
- Part B: REGIONAL ASPECTS
  - With WG I and WG III input and collaboration

AR5 WG III Outline

I: Introduction	1. Introductory Chapter
II: Framing Issues	2. Integrated Risk and Uncertainty Assessment of Climate Change Response Policies 3. Social, Economic and Ethical Concepts and Methods 4. Sustainable Development and Equity
III: Pathways for Mitigating Climate Change	5. Drivers, Trends and Mitigation 6. Assessing Transformation Pathways 7. Energy Systems 8. Transport 9. Buildings 10. Industry 11. Agriculture, Forestry and Other Land Use (AFOLU) 12. Human Settlements, Infrastructure and Spatial Planning
IV: Assessment of Policies, Institutions and Finance	13. International Cooperation: Agreements and Instruments 14. Regional Development and Cooperation 15. National and Sub-national Policies and Institutions 16. Cross-cutting Investment and Finance Issues

Added Value of WG III Outline Compared to AR4

- Exploration of different transformation pathways.
- Improved treatment of risk, economic and ethical issues, and a discussion on their application in the context of sustainable development.
- Iterative top-down and bottom-up approach.
- Integration of adaptation and mitigation.
- Integrated risk and uncertainty assessment of climate change response policies on the global, regional, national and sub-national level.
- Integrated assessment of investment and finance issues.

Scenarios : from AR4 to AR5

- Before AR4:
  - Few “low emission” scenarios potentially compatible with a limitation of global warming to 2°C or less were published
  - The analysis of their consequences on climate was limited: no in-depth analysis with 3D (general circulation) climate models was performed
- For the AR5 (IPCC only has “catalytic role”):
  - Many climate simulations are conducted in the framework of new «representative concentration pathways» (RCPs) selected to allow investigating a wide range of possible futures
  - In parallel, studies on the associated socio-economic conditions are encouraged, and will be linked to the RCPs within AR5

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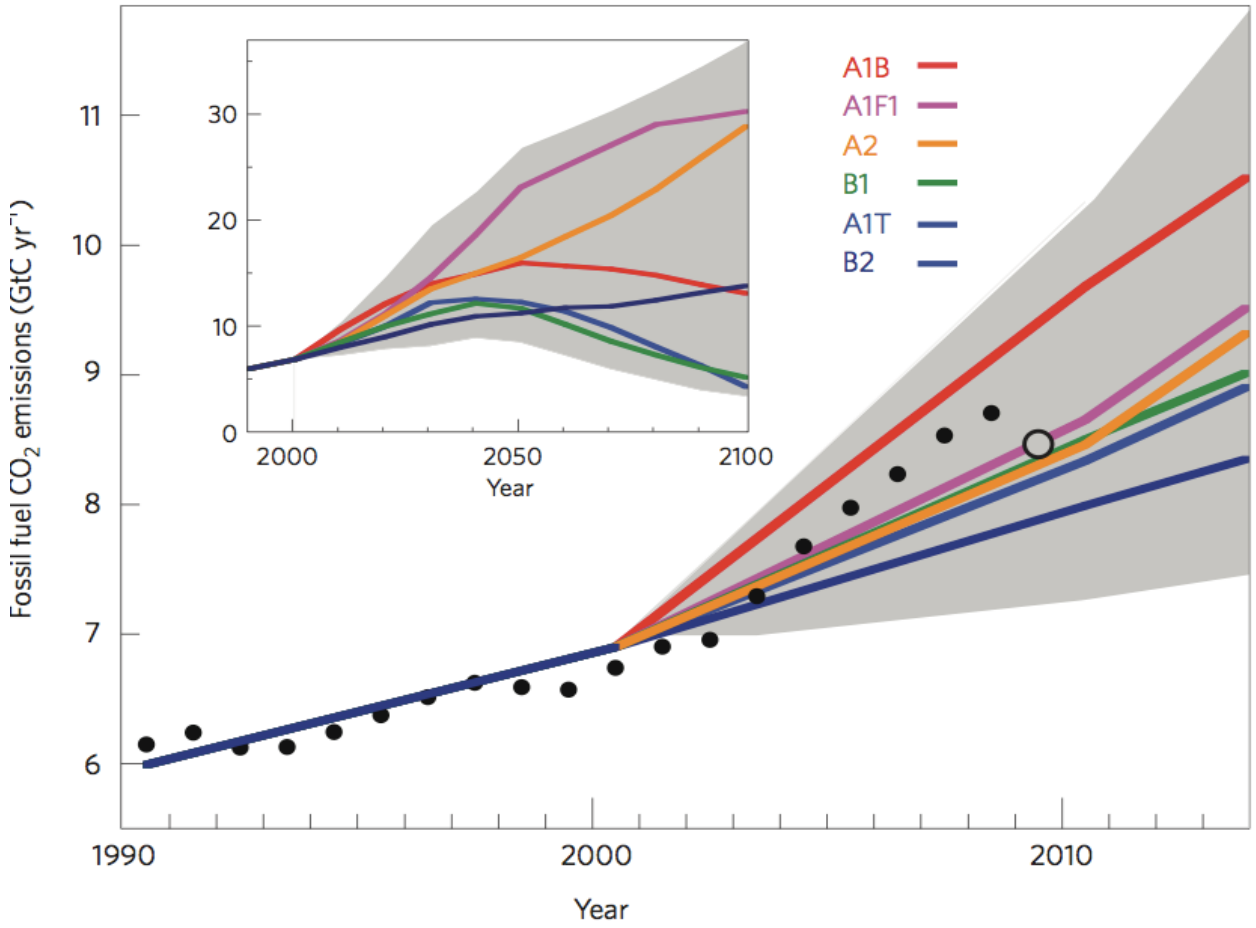
Observed emissions are within the range of the assessed IPCC scenario range (SRES)



Source:
Manning et al.,
Nature Geos.,
2010

- short-term changes cannot be extrapolated (van Vuuren et al., 2010), but IEA preliminary figure for 2010 emissions > 2008

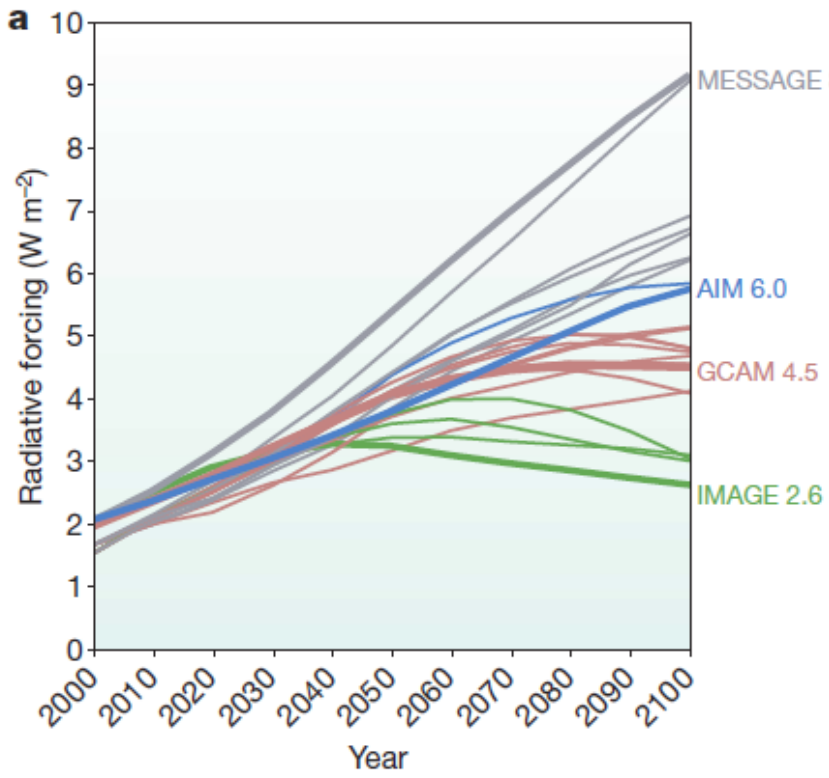
What the RCPs (Representative Concentration Pathways) are:

- **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.

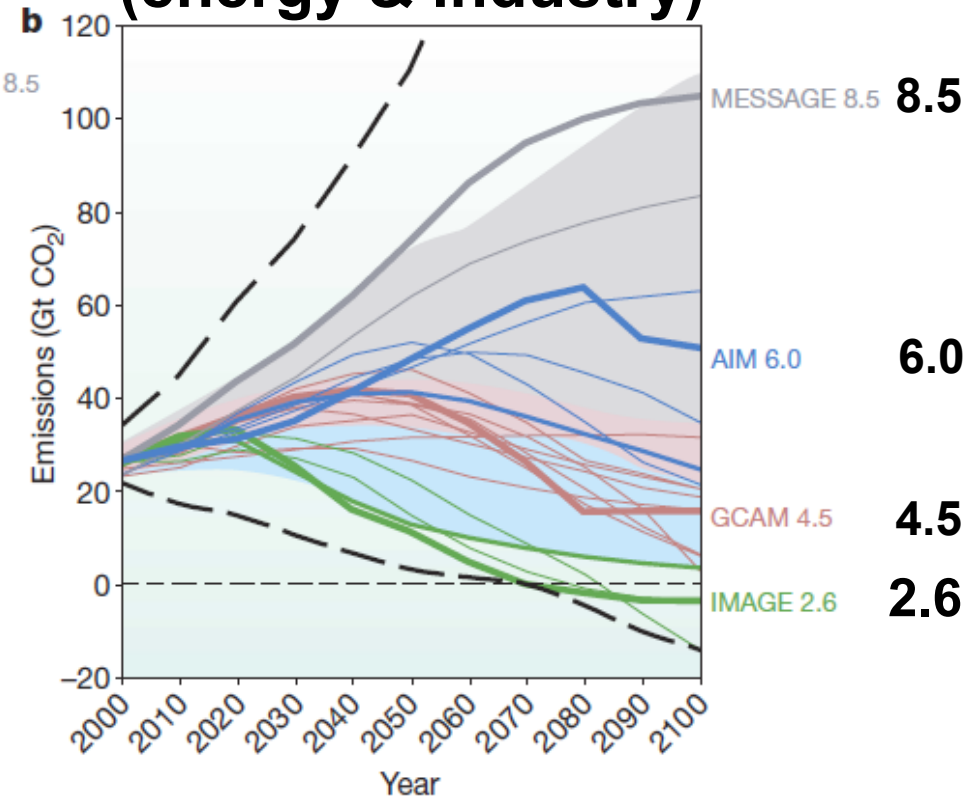
Adapted from the RCP database on www.IIASA.ac.at
JPvY

RCP: Radiative forcing and emissions

Radiative Forcing



CO_2 emissions (energy & industry)



Moss et al, 2010, Nature

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Towards emission & socio-economic scenarios

IPCC workshop on Socioeconomic Scenarios for Climate Change Impact and Response Assessment (November 2010, Berlin)

Following this workshop, a group of experts is preparing a "Framework Paper for a New Generation of Socioeconomic Scenarios » (draft circulated among workshop participants in August 2011)

The considered framework allows consideration for

- a range of socio-economic, conditions (Shared Socioeconomic Pathways, SSP) (*)
- a range of mitigation and adaptation policies (Shared Policy Assumptions, SPA)

(*) concept first presented in Kriegler et al. 2010, CIRED Working Paper

Towards emission & socio-economic scenarios (II)

Next steps:

- *(…) a small group of experts has begun the preparation of quantitative socioeconomic scenarios (e.g., including GDP and population projections). These initial scenarios will be circulated to the scientific community for review and comment.*
- *they will be further discussed and refined at a workshop on the formulation of shared socioeconomic pathways and their use in the new scenario matrix architecture that is being organized by the community* ***without IPCC involvement*** *[Boulder, November 2011]*
  Note : principle of coordination outside IPCC decided by IPCC Plenary 25, in 2006
- *More intensive scenario development will follow the workshop.*

Source : report on scenario development and coordination with the scientific community to IPCC P33

Cross-Cutting Issues in AR5

During the AR5 scoping process cross-cutting issues were identified and grouped in two clusters:

- **Cross-Cutting Methodologies (CCMs)**
  (comprise methodology issues that apply to the presentation or content of the report)
- **Cross-Cutting Themes (CCTs)**
  (cover subjects that require adequate emphasis and need to be considered by more than one Working Group)

Cross-Cutting Issues in AR5: CCMs (Cross-Cutting Methodologies)

- Consistent Evaluation of Uncertainties and Risks
- Costing and Economic Analysis
- Regional Aspects

Cross-Cutting Issues in AR5: CCTs (Cross-Cutting Themes)

- Water and the Earth system: changes, impacts and responses
- Carbon Cycle including ocean acidification
- Ice Sheets and Sea-Level Rise
- Mitigation, Adaptation, and Sustainable Development
- **Issues related to Article 2 of the UNFCCC**

Lessons from AR4: How to improve the handling of Cross-Cutting Themes in AR5?

- CCTs should be carefully handled (using guidance papers/meeting reports for every CCT)
- WGs need to be fully involved, (implication of key WGs members and improved cross WG coordination)
- CCTs development should be closely linked to the SYR development process

Coming IPCC Products

- ***2011: Special report on Renewable Energy Sources and Climate Change Mitigation (available now on www.ipcc.ch)***
- ***2011(November): Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation***
- ***2013: AR5 WGI report (physical science)***
- ***2014: AR5 WGII (Impacts & Adaptation); WGIII (Mitigation), Synthesis Report***
- ***All available on www.ipcc.ch***

Conclusion:

IPCC is eager to continue serving the UNFCCC process…

… with your help and collaboration

Thank you!