

*Partly Cloudy, Warmer,
but also Fair?*

Equity in Climate Scenario Analysis

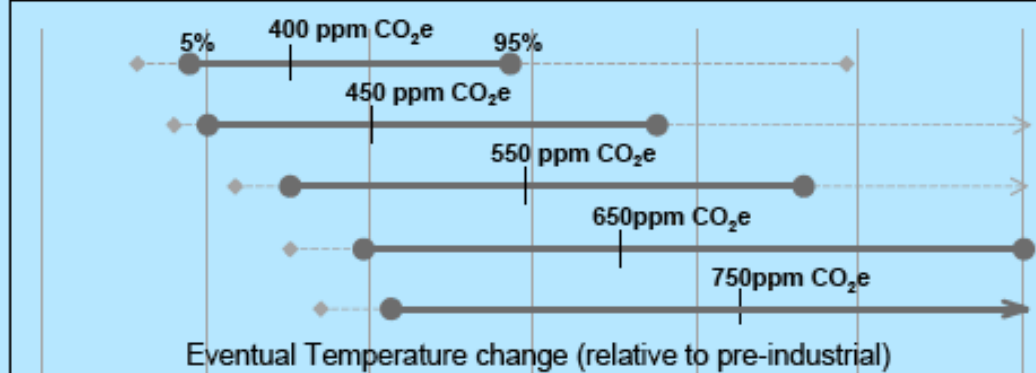
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Global Environmental Futures Workshop

Brown University

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0°C 1°C 2°C 3°C 4°C 5°C

Food

Severe impacts in marginal Sahel region

Rising number of people at risk from hunger (25 – 60% increase in the 2080s in one study with weak carbon fertilisation), with half of the increase in Africa and West Asia.

Entire regions experience major declines in crop yields (e.g. up to one third in Africa)

Rising crop yields in high-latitude developed countries if strong carbon fertilisation

Yields in many developed regions decline even if strong carbon fertilisation

Falling crop yields in many developing regions

Water

Small mountain glaciers disappear worldwide – potential threat to water supplies in several areas

Significant changes in water availability (one study projects more than a billion people suffer water shortages in the 2080s, many in Africa, while a similar number gain water)

Sea level rise threatens major world cities, including London, Shanghai, New York, Tokyo and Hong Kong

Greater than 30% decrease in runoff in Mediterranean and Southern Africa

Ecosystems

Coral reef ecosystems extensively and eventually irreversibly damaged

Possible onset of collapse of part or all of Amazonian rainforest

Large fraction of ecosystems unable to maintain current form

Many species face extinction (20 – 50% in one study)

Extreme Weather Events

Rising intensity of storms, forest fires, droughts, flooding and heat waves

Small increases in hurricane intensity lead to a doubling of damage costs in the US

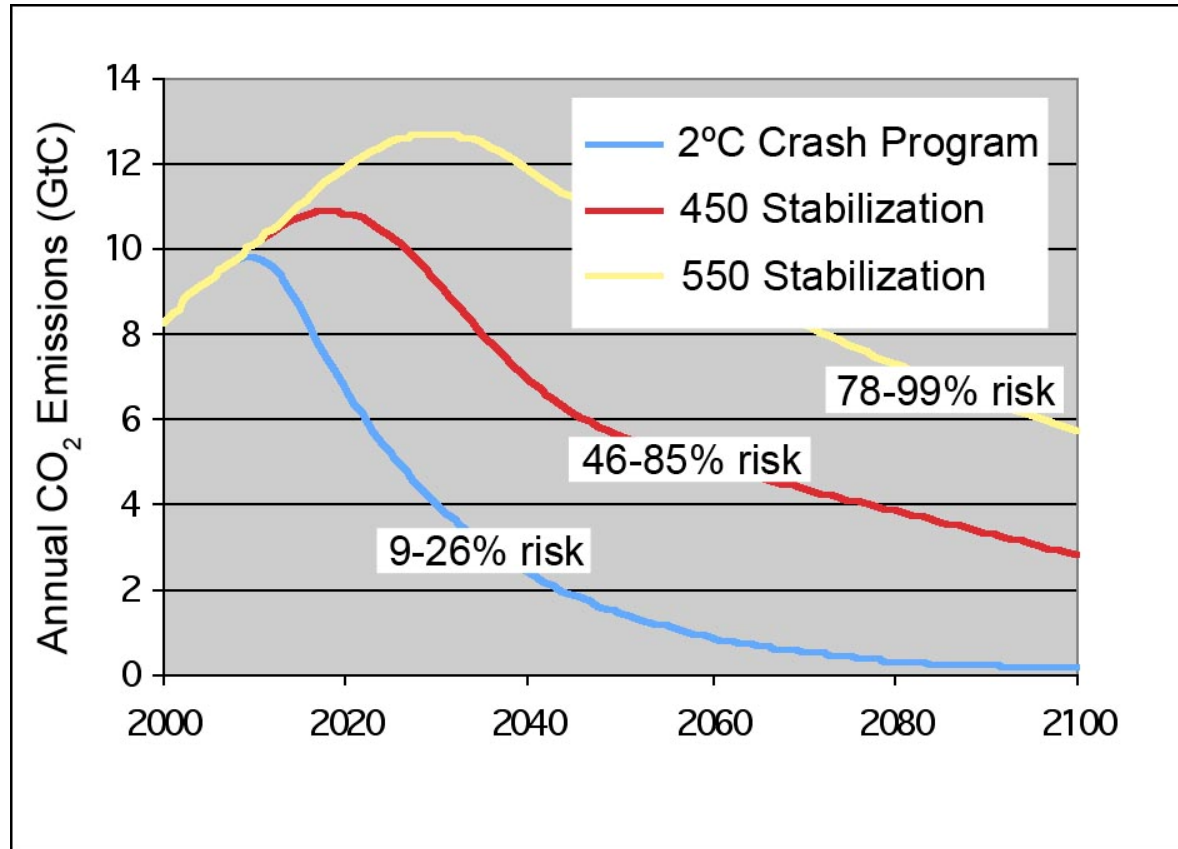
Risk of rapid climate change and major irreversible impacts

Risk of weakening of natural carbon absorption and possible increasing natural methane releases and weakening of the Atlantic THC

Onset of irreversible melting of the Greenland ice sheet

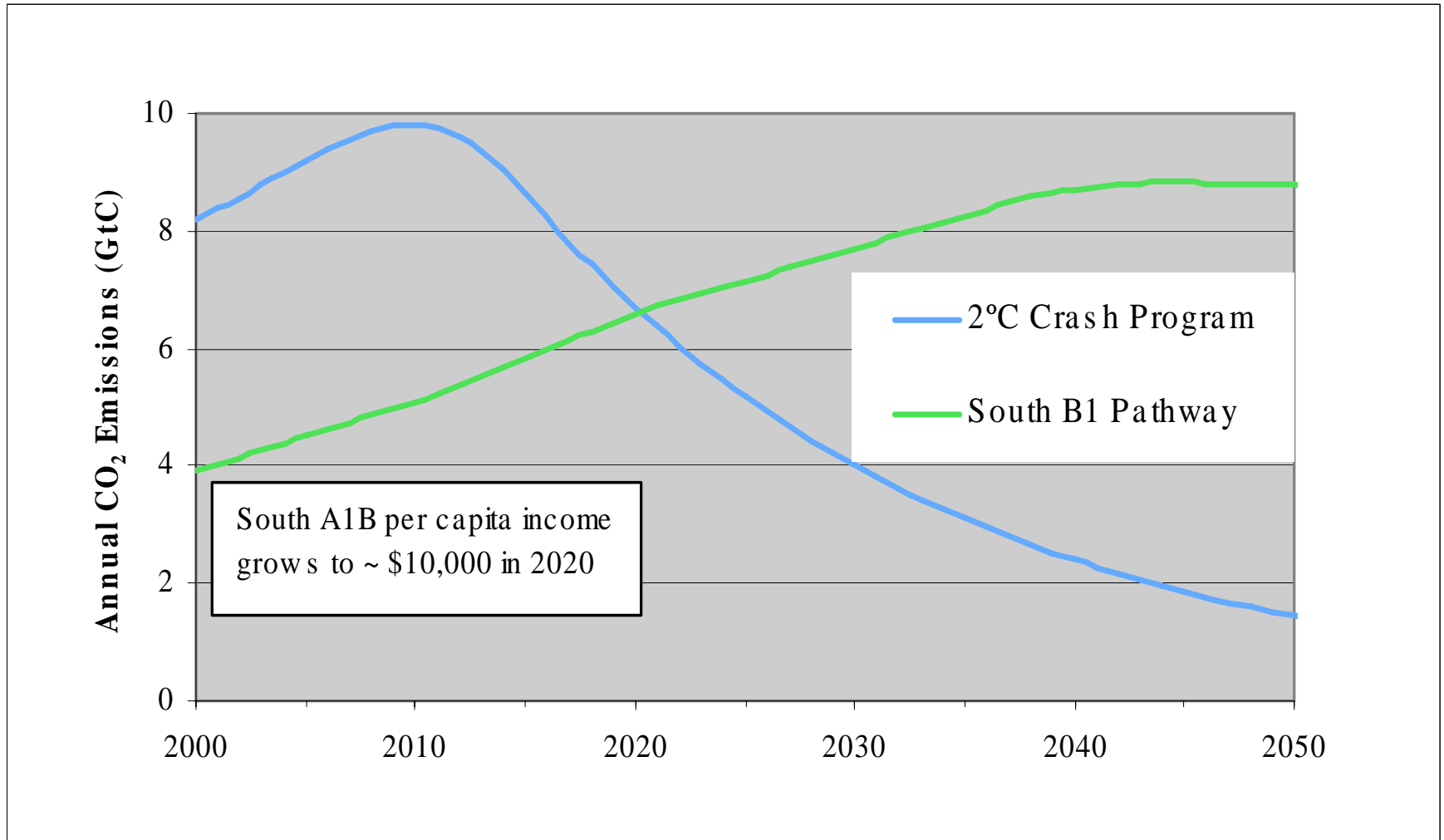
Increasing risk of abrupt, large-scale shifts in the climate system (e.g. collapse of the Atlantic THC and the West Antarctic Ice Sheet)

Pathways & the 2°C line



From Paul Baer with Michael Mastrandrea, 2006. *High Stakes: Designing emissions pathways to reduce the risk of dangerous climate change*. Institute for Public Policy Research, London. Available at www.ippr.org.

The South's Lost Opportunity



Presentation outline

- What is equity?
- Is the world equitable? Two perspectives
- How is equity actually addressed in climate scenarios (e.g., SRES)?
- Should the climate crisis affect how we do scenario analysis?

What is equity?

- “Equity” is broadly synonymous with “fairness” and “justice”
- The meaning in specific contexts is contested, but there is nonetheless a significant consensus
 - The western tradition is fundamentally egalitarian
 - Equal opportunity and equal concern (“impartiality”) are fundamental

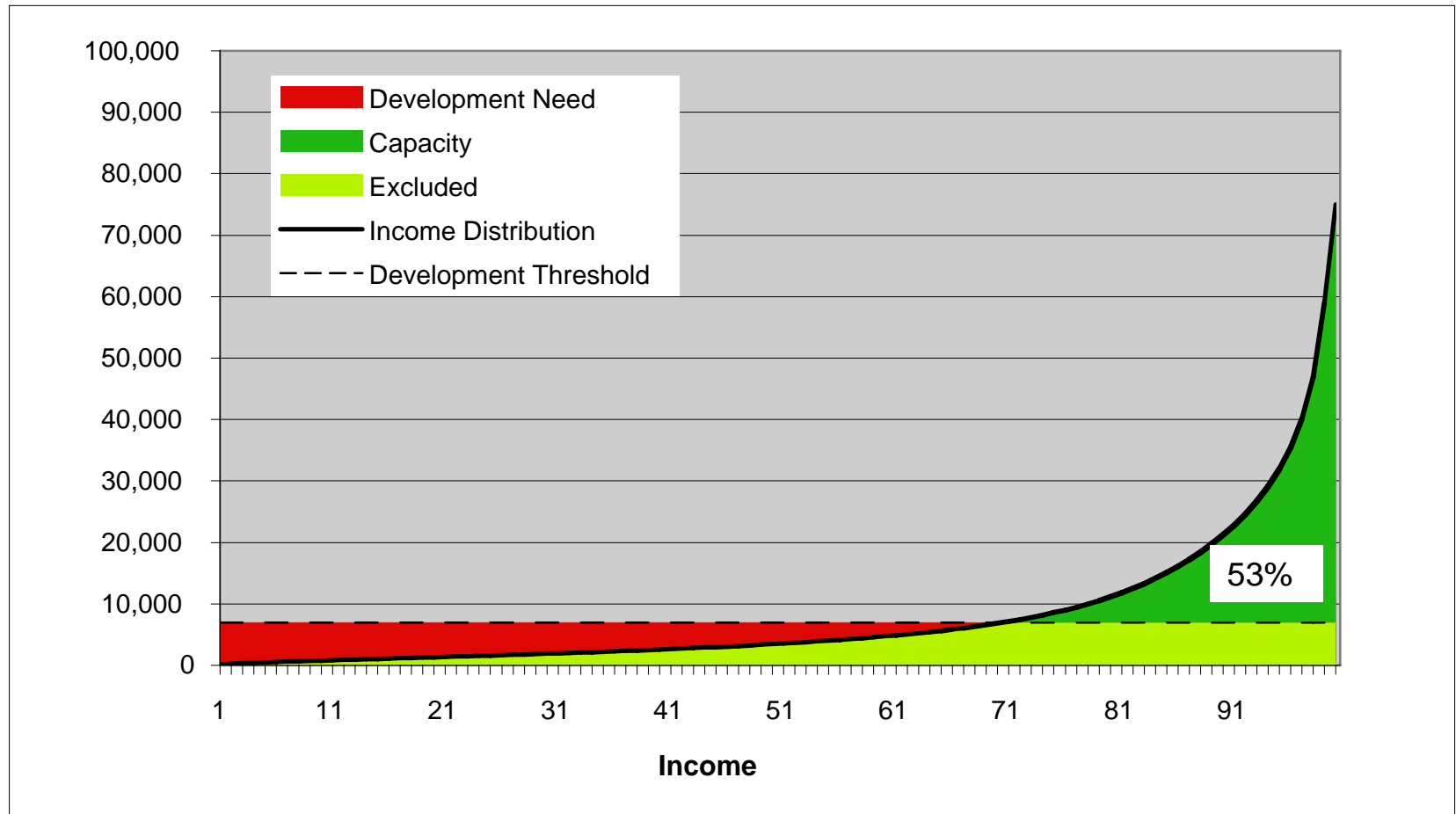
More about equity

- Much of what is disputed about equity is about *causality* rather than about ethical principles
 - Think about the Rawlsian definition
- There are unresolved issues regarding community, nationality and justice
 - But physical interdependence seems to justify a cosmopolitan egalitarianism

Is the world equitable? (and does it matter?)

- The statistics are boring and indisputable if vague
 - Is it one billion or two billion people living under \$2 a day?
- Whether this is a matter of *injustice* or merely a regrettable fact is not something easily resolved

Global income distribution



The black line (“Income Distribution”) is the per capita income for each percentile (about 64 million people) of the global population. About 70% of the global population has a 2005 per capita income below \$7000 (PPP adjusted) annually. About 53% of global income is the “capacity” of the remaining 30%.

Two views of the unequal world

- The vast disparities of (everything) are largely inevitable, and inequality is the price of capitalist innovation and growth
- Inequality and poverty are a consequence of exploitation, particularly (but not only) capitalist exploitation

The two views in the academic/policy world

- Mainstream, “positive” social sciences
 - Most economics, political science, much quantitative sociology
- “Critical” social sciences
 - Marxist and other heterodox economics, political economy, critical schools of sociology, anthropology, geography

Sustainability and “limits to growth”

- There is a perspective on environmental limits that is largely orthogonal to the mainstream/critical dichotomy
- These concerns about “limits to growth” can take a neo-malthusian or redistributionist perspective (or somewhere in between)
- Many scenario analyses draw on these perspectives

Scenario analysis in this perspective

- There is a long history of “normative” scenarios from a radical perspective, but they are largely invisible in the climate scenario world
- Climate scenarios are provided for user groups who are, or are allied with/beholden to, national and global power elites
- Therefore climate scenarios put bounds on what are “reasonably equitable” futures
- In no SRES scenarios are there any identifiable “limits to growth” - even climate!

Equity in mainstream scenario analysis

- Equity is essentially a “preference”
- The primary measure of equity is the relative distribution of per capita income
- The inequity of the global economy is tacitly recognized by the rejection of global scenarios in which income does not converge at least somewhat
- There is an assumed tradeoff between equity and “efficiency” (growth in output)
- The European welfare state is the effective limit on imaginable equality

How is equity addressed in climate scenarios?

- Equity as a “storyline element”
- Equity as measured by convergence of per capita GDP *between* countries is highlighted
- Equity (distribution of income) within countries is largely ignored quantitatively
- Non-income metrics are not reported in SRES

Some examples from SRES B1

“This is a world with high levels of economic activity (a global GDP of around US\$350 trillion by 2100) and significant and deliberate progress toward international and national income equality.”

“Massive income redistribution and presumably high taxation levels may adversely affect the economic efficiency and functioning of world markets.”

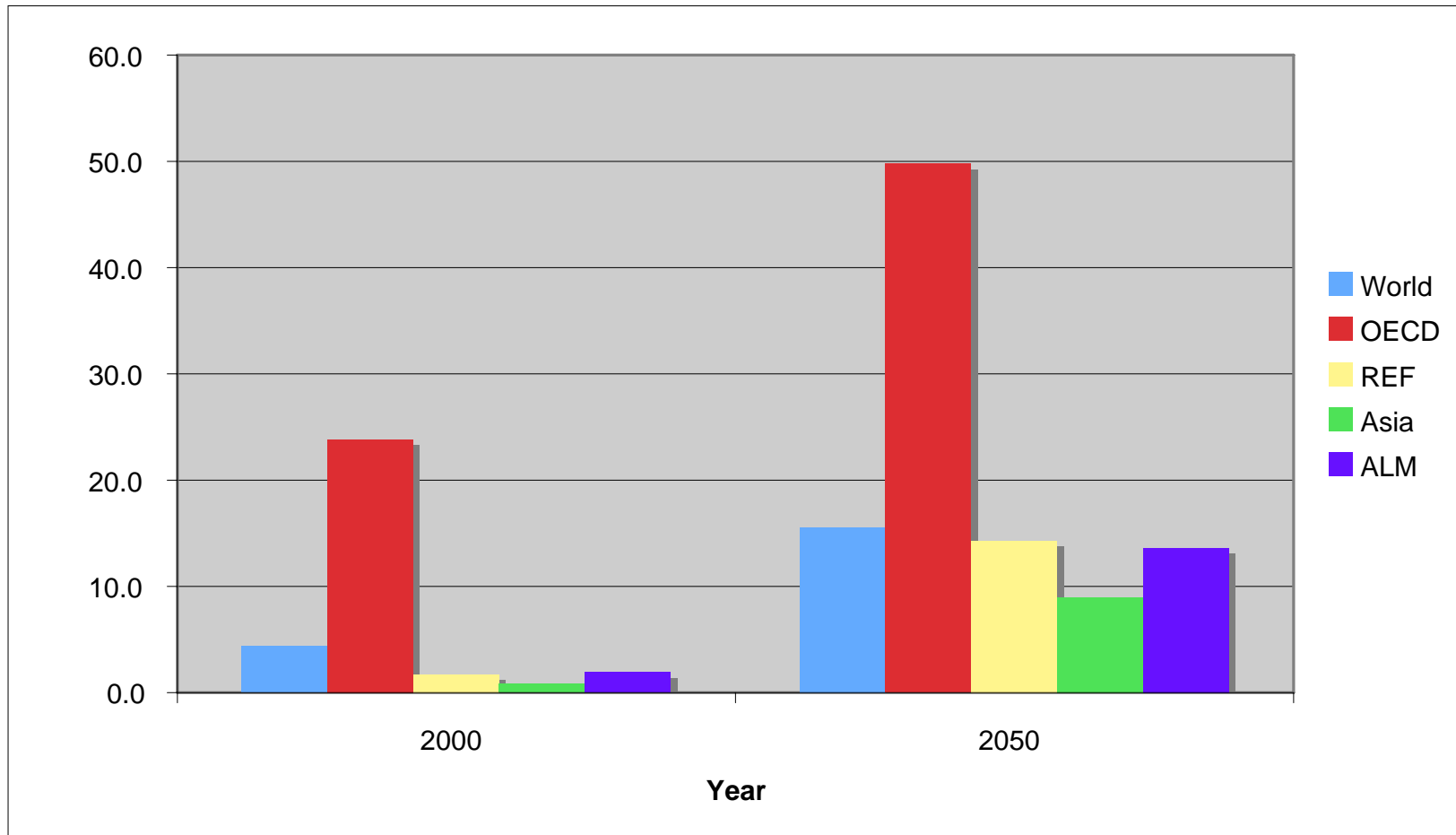
SRES Section 4.3.3

Income convergence in the SRES scenarios

	2020	2050	2100
A1F1	7.5	2.8	1.5
A1B	6.4	2.8	1.6
A1T	6.2	2.8	1.6
A2	9.4	6.6	4.2
B1	8.4	3.6	1.8
B2	7.7	4	3

Ratio of Industrialized to developing country per capita incomes (not PPP adjusted) (1990=16)

Regional per capita income in SRES B1 2000-2050



Growth rates in per capita income in SRES B1 2000-2050

	2000-2010	2010-2020	2020-2030	2030-2040	2040-2050
World	2.1%	2.4%	2.6%	2.8%	2.8%
OECD	2.0%	1.8%	1.3%	1.1%	1.2%
REF	3.3%	5.1%	4.8%	4.4%	3.9%
Asia	4.7%	5.0%	5.0%	4.8%	4.2%
ALM	3.8%	4.0%	4.1%	4.0%	3.5%

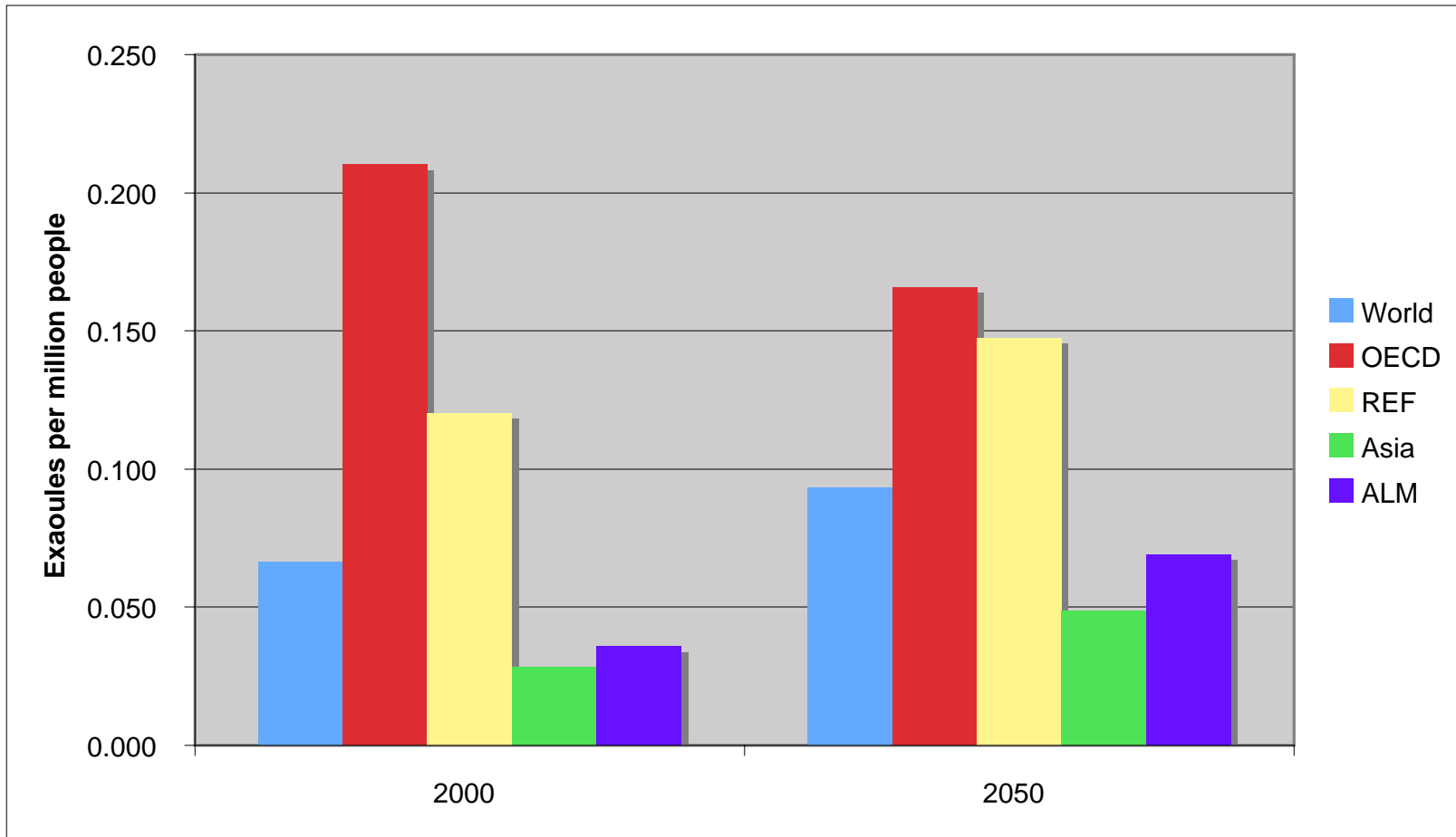
Historical growth rates in per capita income

	1870-1913	1913-1950	1950-1980	1980-1992
Western Europe	1.3	0.9	3.5	1.7
Australia, Canada, New Zealand, USA	1.8	1.6	2.2	1.3
Eastern Europe	1	1.2	2.9	-2.4
Latin America	1.5	1.5	2.5	-0.6
Asia	0.6	0.1	3.5	3.6
Africa	0.5	1	1.8	-0.8
World	1.3	0.9	2.5	1.1

Table 3.2 from IPCC SRES, data from Maddison 1995.

“Per capita GDP growth rates of individual countries have even been higher - 8% per annum in Japan over the period 1950-1973, 7% in Korea between 1965 and 1992, and 6.5% per year in China since 1980 (Maddison, 1995).” (SRES section 3.2.2.)

Regional per capita energy use in SRES B1 2000-2050



What questions does the existence of a recognized climate crisis raise?

- Is it still meaningful to model “no policy” scenarios, or should possible policy goals (e.g., stabilization targets) drive scenario selection (and if so, how)?
- If “we” are tasked to model low emissions scenarios, under what constraints will we do so?
- What does the need for cooperation imply for acceptable inequality?
- How should damages be included?

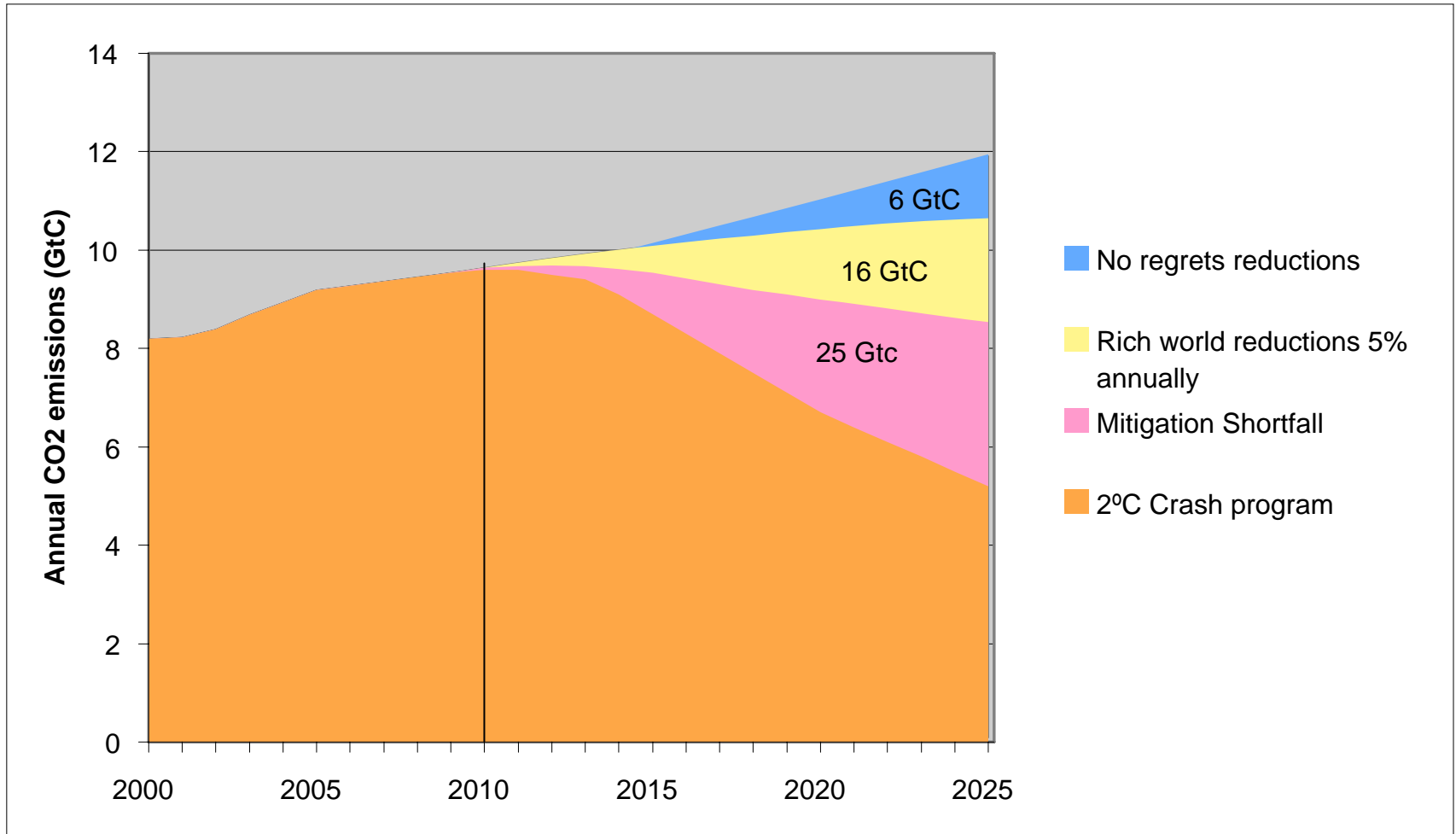
How can and should climate damages be included in scenarios?

- How can damage uncertainty be integrated into different scenarios? (A drivers/impacts matrix?)
- Remember the “value of a human life” dilemma
- How can ecosystem services be included (think about the MEA scenarios)?

What does the need for cooperation imply for acceptable inequality?

- Can even the inequalities of the B1 scenario persist if poor countries are expected to restrict their emissions and energy use?
- Can growth rates in developing countries be raised further, or do rich country growth rates need to be restrained?
- Are these real limits to growth?

The Global “Mitigation Shortfall”



Thanks...

- Watson Institute for International Studies
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