

Climate Change: What's the Problem

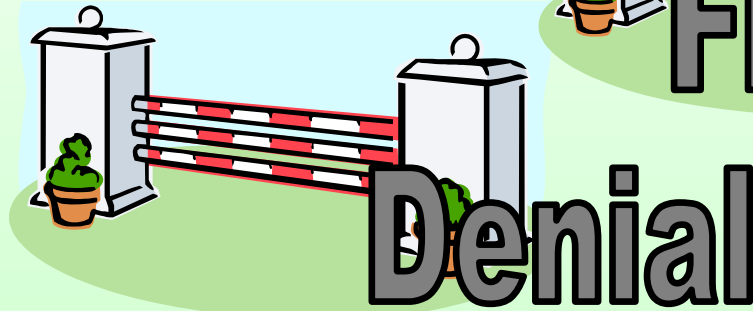
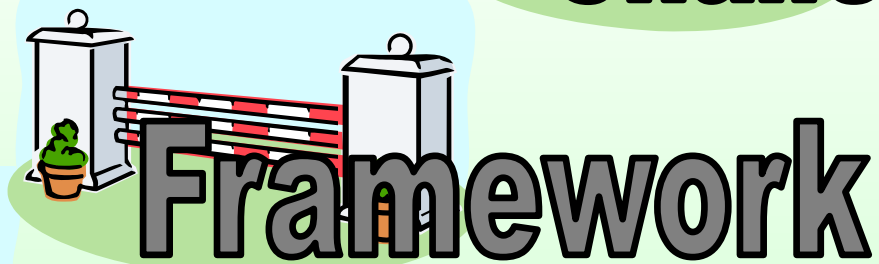
Future Maker or Future Taker?

IPS Spring Lecture Series
30 September 2008

Martin Manning

Future Maker

Humans control their influence on climate

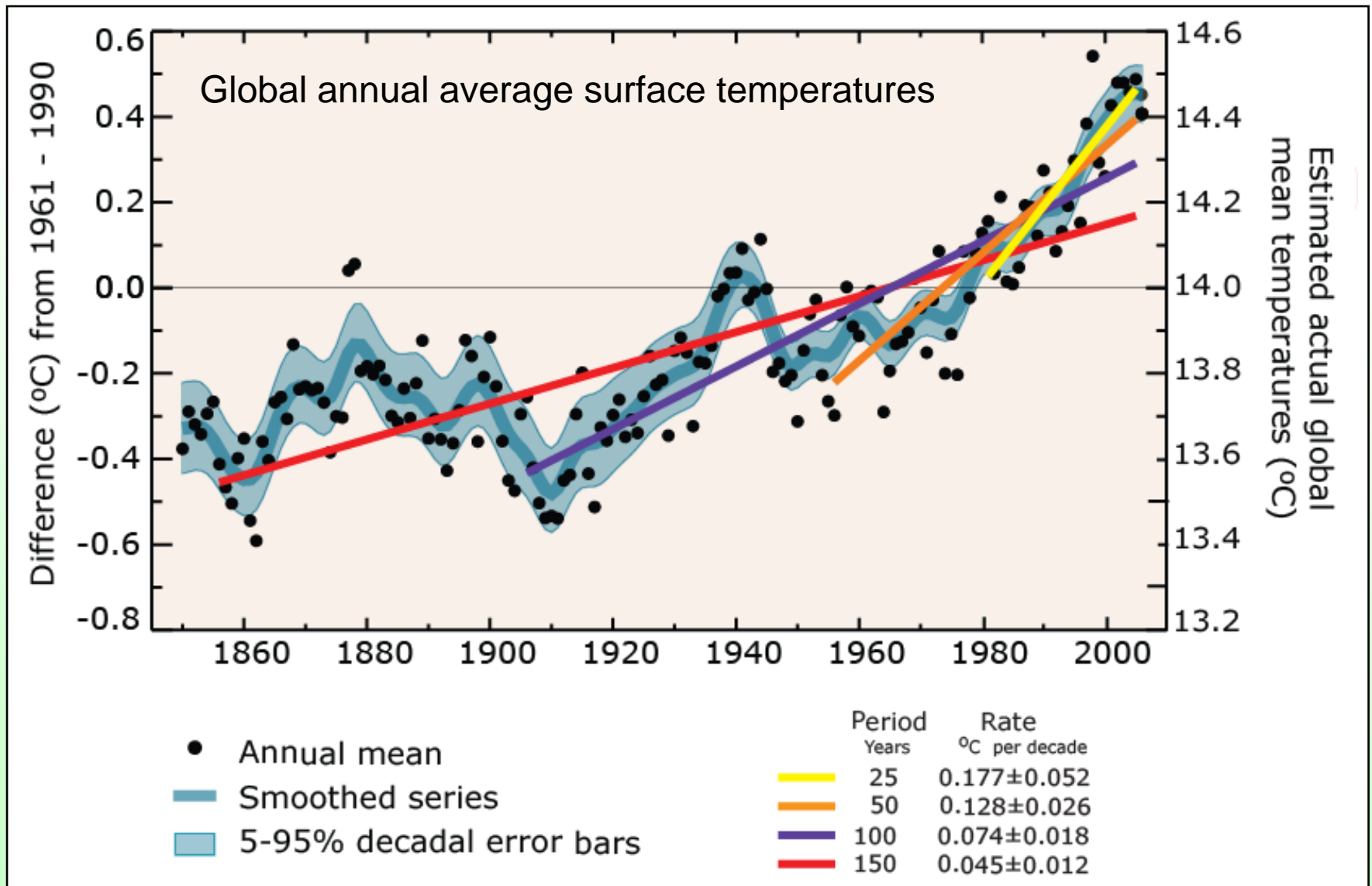


Future Taker

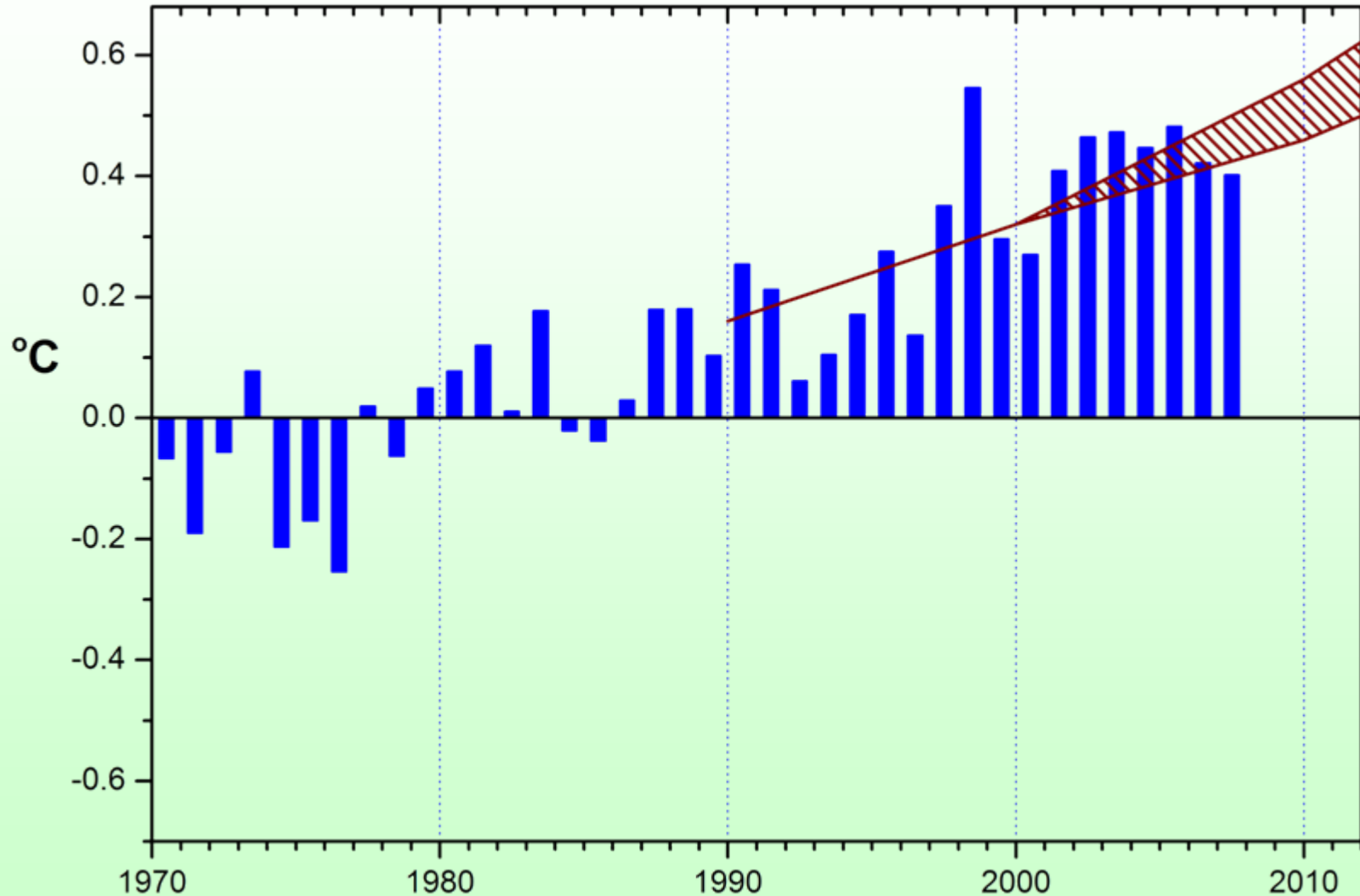
Climate limits human society

Denial - comes in many shapes

The Earth is warming



Global average surface temperature change 1970 - 2007



Scientists control IPCC reports

In response to claim that Summary for policymakers watered down...

“ ... At all stages, including at the final plenary in Paris, the authors had control over the text; all CLAs were present in Paris.”*

From Letter to New Scientist, March 2007, signed by 21 CLAs*:

Piers Forster, Richard Somerville, Nathan Bindon, Guy Brasseur, Jens Christensen, Ken Denman, Gabi Hegerl, Bruce Hewitson, Eystein Jansen, Philip Jones, Peter Lemke, Gerald Meehl, Jonathan Overpeck, V. Ramaswamy, David Randall, Thomas Stocker, Kevin Trenberth, Hervé Le Treut, Jürgen Willebrand, Richard Wood, Francis Zwiers

* Coordinating Lead Authors



Undue reticence or sticking to what we know?

IOP PUBLISHING

ENVIRONMENTAL RESEARCH LETTERS

Environ. Res. Lett. 2 (2007) 024002 (6pp)

doi:10.1088/1748-9326/2/2/024002

Scientific reticence and sea level rise

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CLIMATE CHANGE

The Limits of Consensus

Michael Oppenheimer,^{1,2*} Brian C. O'Neill,^{3,4} Mort Webster,⁵ Shardul Agrawala^{1,6}

The Intergovernmental Panel on Climate Change (IPCC) has just delivered its Fourth Assessment Report (AR4) since 1990. The IPCC was a bold

potential for increasing contributions from rapid dynamic processes in the Greenland and West Antarctic ice sheets (WAIS), which have already had a significant effect



Martin Manning is the former head of the IPCC Working Group I Technical Support Unit and a professor at Victoria University, Wellington, New Zealand.



Susan Solomon is co-chair of IPCC Working Group I and a senior scientist at the Chemical Sciences Division, Earth System Research Laboratory.

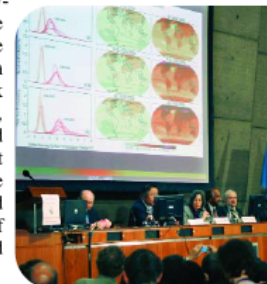
EDITORIAL

IPCC Must Maintain Rigor

LAST YEAR, THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC) WAS awarded the Nobel Peace Prize along with Albert Gore Jr., sending a strong message about the importance of the world's future climate. Indeed, for two decades, international scientists and policy-makers contributing to the IPCC process have provided assessments of climate change science, impacts, and mitigation, addressing one of the most far-reaching and complex challenges that society has ever faced. Yet this is no time for the IPCC to rest on its laurels. The climate system continues to change and science continues to improve, so policy must be kept current with our best understanding. Reformulating the science/policy interface should be considered and be open to change but must acknowledge lessons from the past. The factors that have been critical to the success of the IPCC need to be preserved if a rigorous scientific basis is to continue to inform the growing challenge of decision-making on climate change.

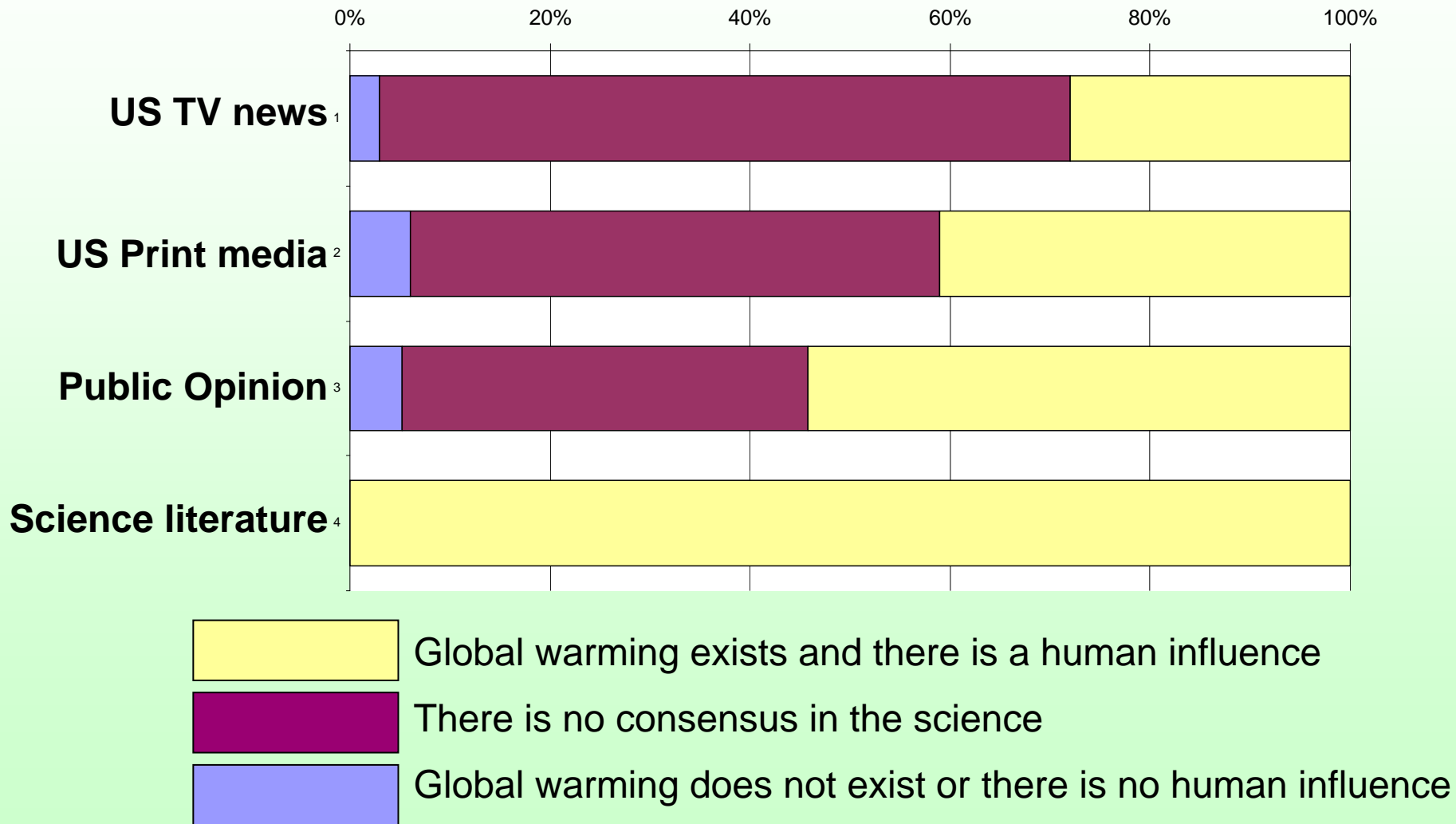
The IPCC's assessments have been highly credible to both policy-makers and scientists largely because, despite differences in language and approach between these communities, both groups recognize the importance of multiple reviews of drafts in an open process in which diverse authors, reviewers, and governments do not hide behind a cloak of anonymity. The successive reviews and revisions of complex material, with the broad inputs of many, take time. For instance, after scientists and governments defined its scope, the last Working Group I assessment took 3 years to be developed by 152 authors and then reviewed by more than 600 experts along with dozens of governments. Any move toward accelerating the process risks incomplete identification of the range of justifiable views and a consequent reduction of the rigor, clarity, and robustness of the consensus.

Moreover, completion of an IPCC assessment report requires a demanding line-by-line approval of its summary that is critical for its value to policy-makers. This process ensures that key conclusions are accepted by all governments and expressed in language



"Balance as Bias" in the media

From surveys done in the late 1990s to early 2000s



The Profile of Science in Society?

I have read the citations and I want you to know that I do not understand them, but I want you to know too, that because I do not understand them, I realise how enormously important their contributions are to this nation.

President Richard Nixon awarding the prestigious National Science Medal to a group of US scientists.

Mal-Adaptation



Since 2000, Florida's population has grown at twice the rate of US population

Southern Florida on a good day

Southern Florida on a bad day

Hurricane Wilma Eyewall
Miami Beach, Florida
October 24th, 2005



UltimateChase

Another face of denial?



Many ask is there a “tipping point” where we lose control of the system?

Or is this trying to construct a crisis – because that’s all we know how to deal with?

Put a frog in boiling water – it jumps out.

Put a frog in cold water and bring to the boil – it doesn’t know when to jump out.



Finance Sector responses

2007: Five US states, with pension funds representing \$6 trillion in investments, petition Securities Exchange Commission to request mandatory disclosure of risks from climate change

2008: New York Attorney General announces binding and enforceable agreement with Xcel energy on disclosure of financial risks due to:

- ❖ climate change regulation and legislation;
- ❖ climate change related litigation;
- ❖ physical impacts of climate change.

Getting the Framework right

The precautionary principle

UN Framework Convention on Climate Change (1992)

Article 3. Principles

...

“The Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures ...”

We do keep studying the problem



- IPCC 1990: “The size of this [observed] warming is broadly **consistent with** predictions of climate models but it is also of the same magnitude as natural climate variability.”
- IPCC 1995: “The balance of **evidence suggests** a discernible human influence on global climate.”
- IPCC 2001: “most of the observed warming over the last 50 years **is likely [66-90% chance]** to have been due to the increase in greenhouse gas concentrations.”
- IPCC 2007: “Most of the observed increase in global average temperatures since the mid-20th century is **very likely [>90% chance]** due to the observed increase in anthropogenic gre

**Are we ready to be
precautionary yet?**

The precautionary principle

UN Framework Convention on Climate Change (1992)

Article 3. Principles

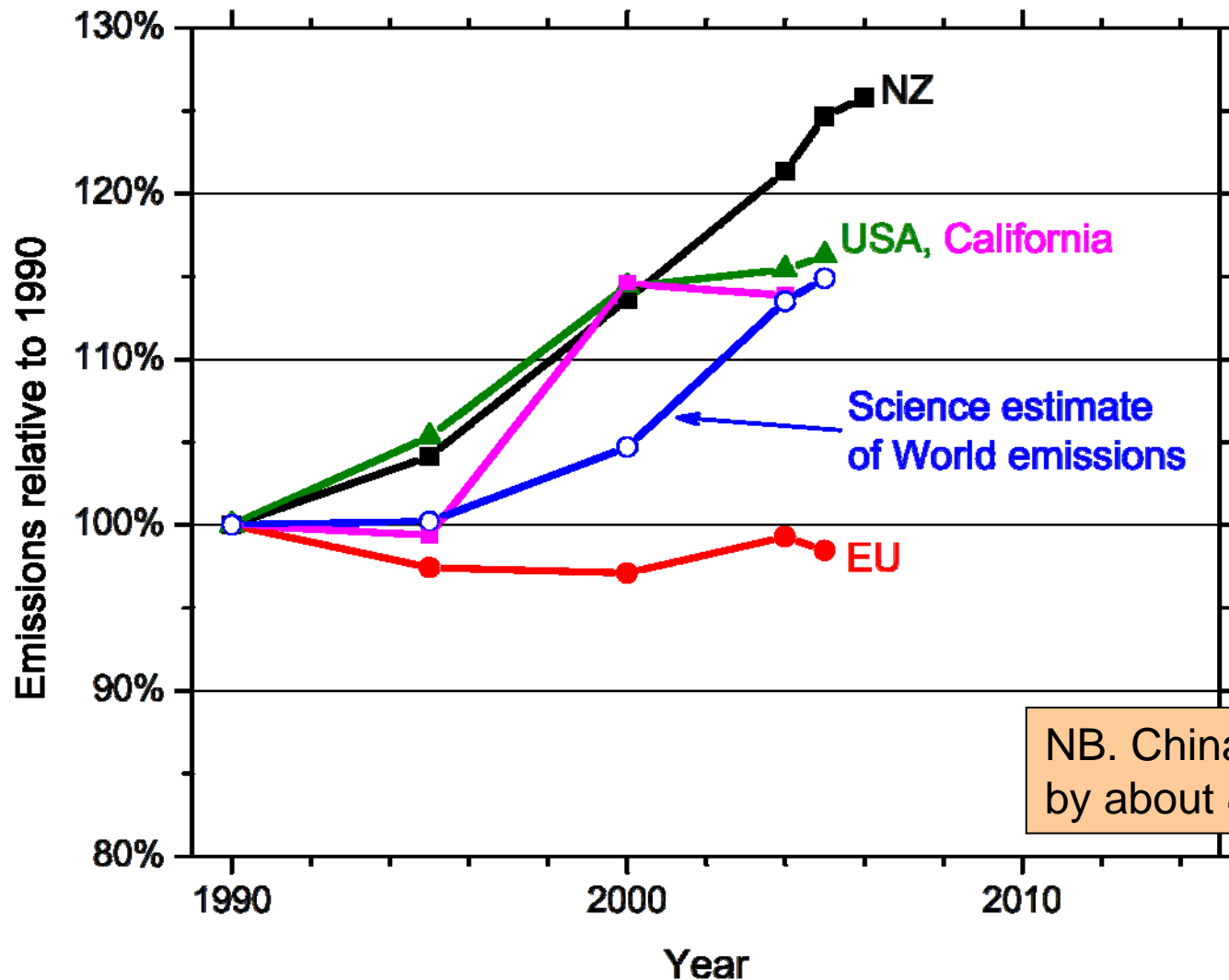
...

“The Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures ...”

A truly precautionary approach would have:

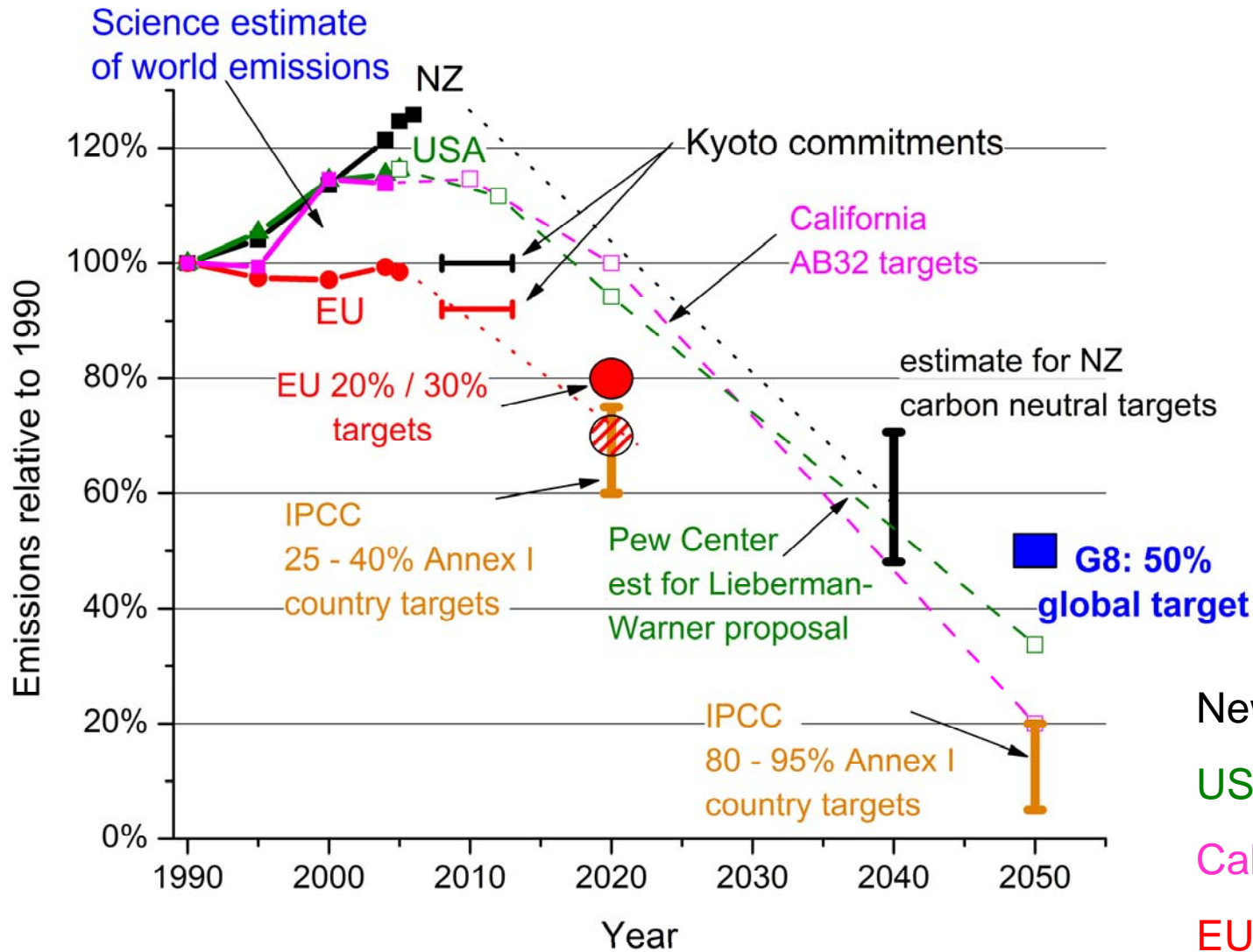
- ❖ agreed on a framework of thresholds for action
- ❖ recognised time delays to get international policy agreements
- ❖ and lags between implementing policy and realising its effects.

Actual emissions since 1990



NB. China's CO₂ emissions grew by about 80% from 2000 - 2006

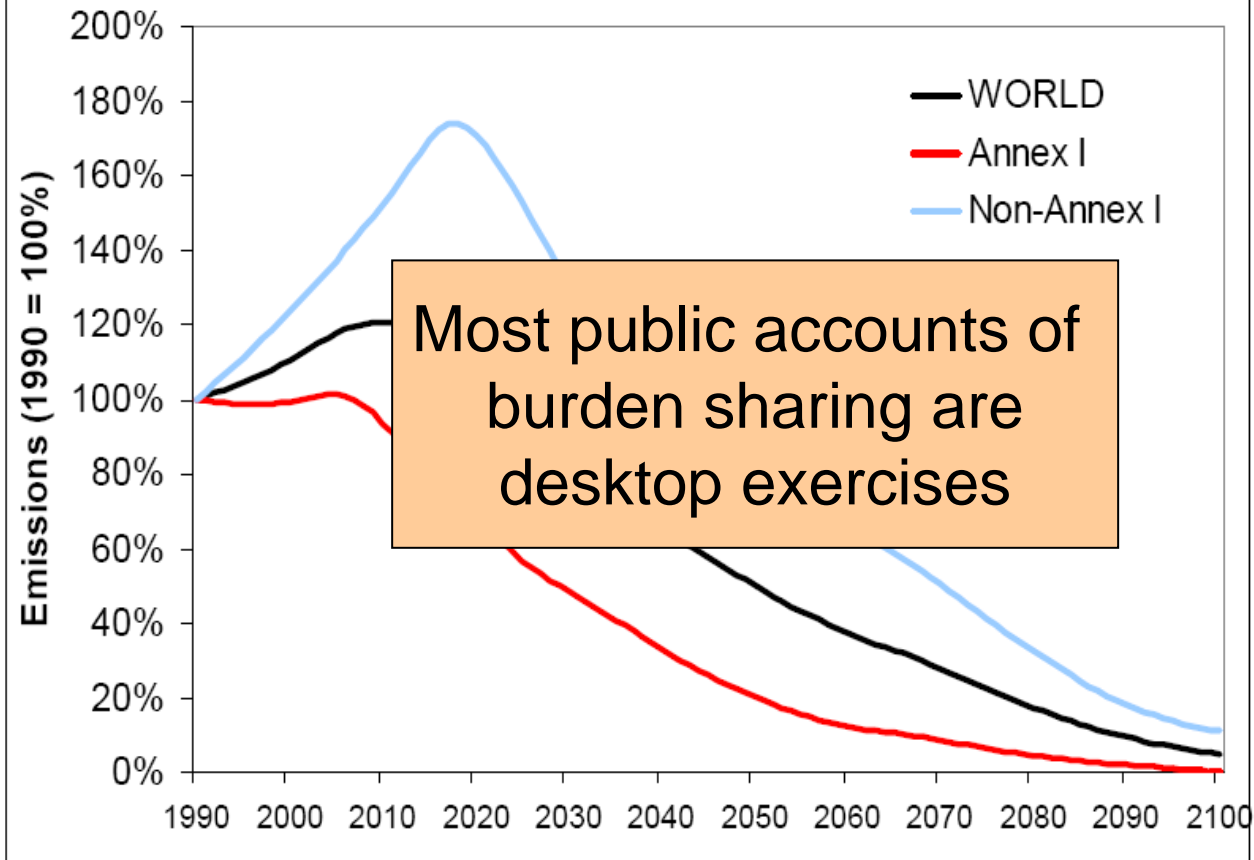
Emissions since 1990 vs Aspirations



New Zealand - black
 USA - green
 California - magenta
 EU - red

Developed vs developing countries

Relative Absolute Greenhouse Gas Emissions



Needs to be something like:

Global emissions to be halved by 2050.

Industrialized country emissions decrease by 30% at 2020 and by 80% at 2050 relative to 1990.

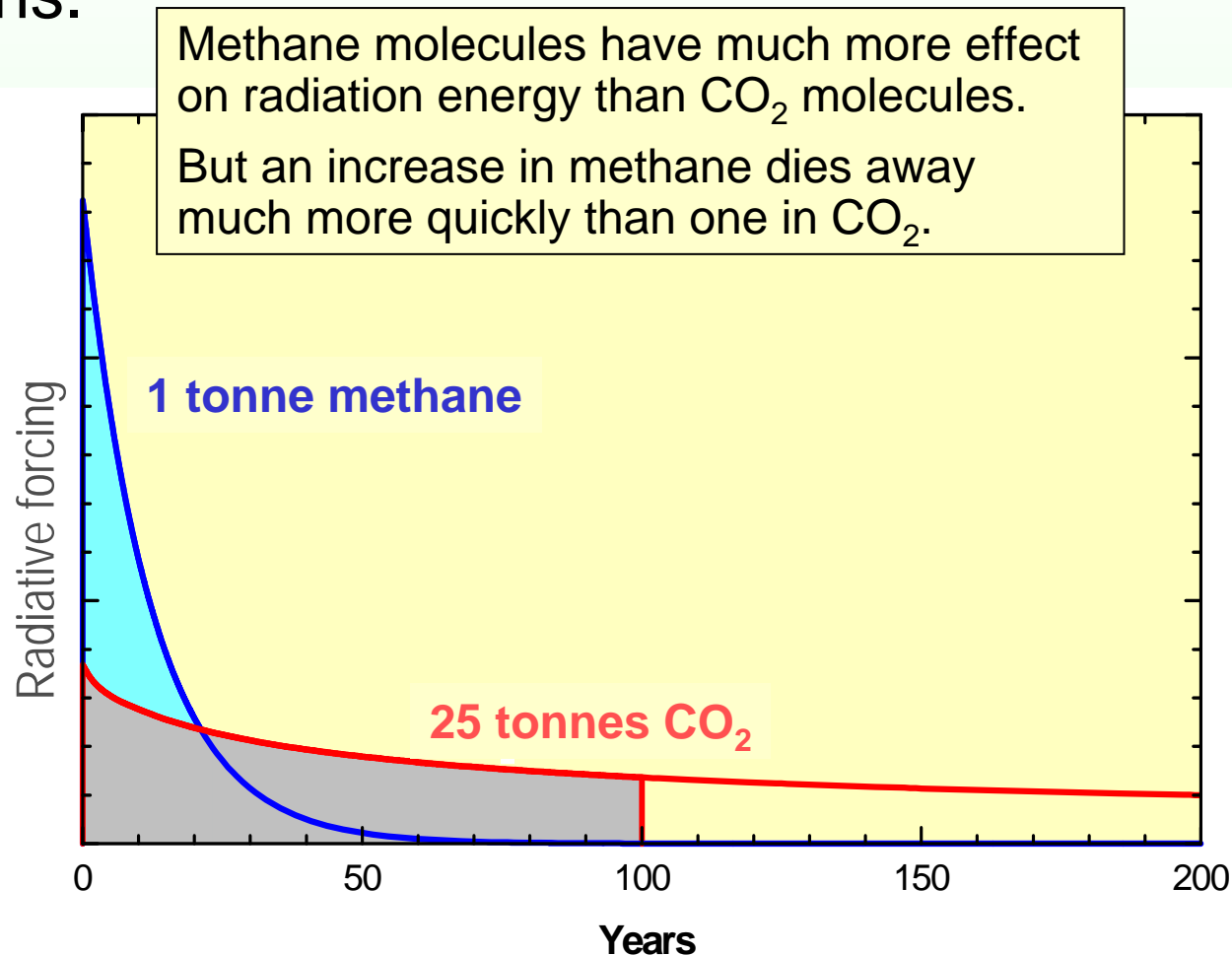
Developing country emissions increase up to 2020 with following reductions determined by the necessary global emission levels.

Short vs Long lived gases

Global Warming Potentials (GWPs) compare effects on the physical climate system, over a chosen time horizon, due to gas emissions.

Radiative forcing is a measure of change in the Earth's energy balance.

Over 100 years, 1 tonne of emitted methane causes the same accumulated effect as 25 tonnes of CO₂.



Scientists on GWPs

It is difficult to see how GWPs could be used in any practical international treaty or in trading between greenhouse gases.

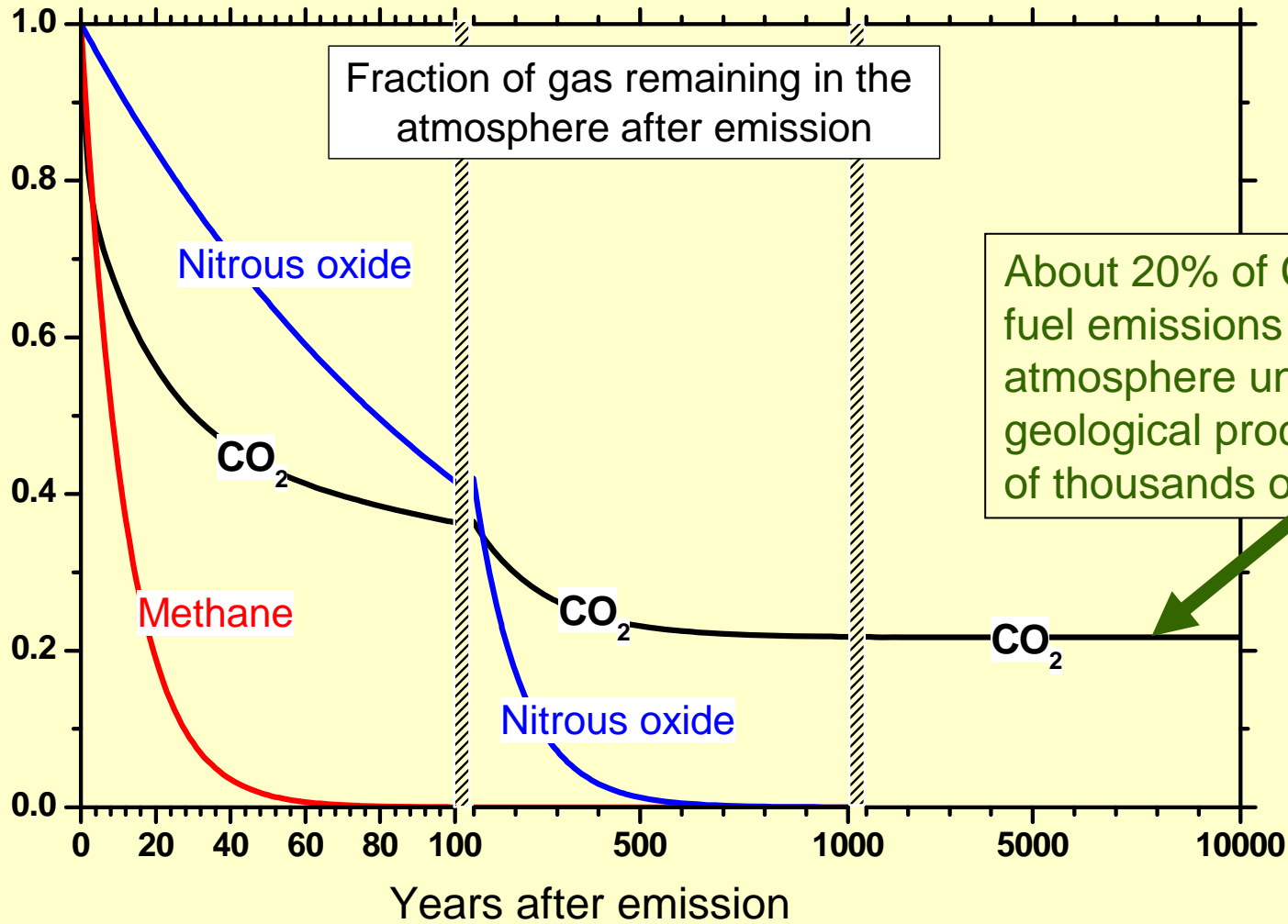
L D Harvey (1993)

In this paper, we perform straightforward tests of the GWP concept as it would be used in a policy application. Surprisingly, such a test has never been performed.

Smith and Wigley (2000)

+ Economics literature since 1998 suggesting GWPs are not the right metric and not economically efficient.

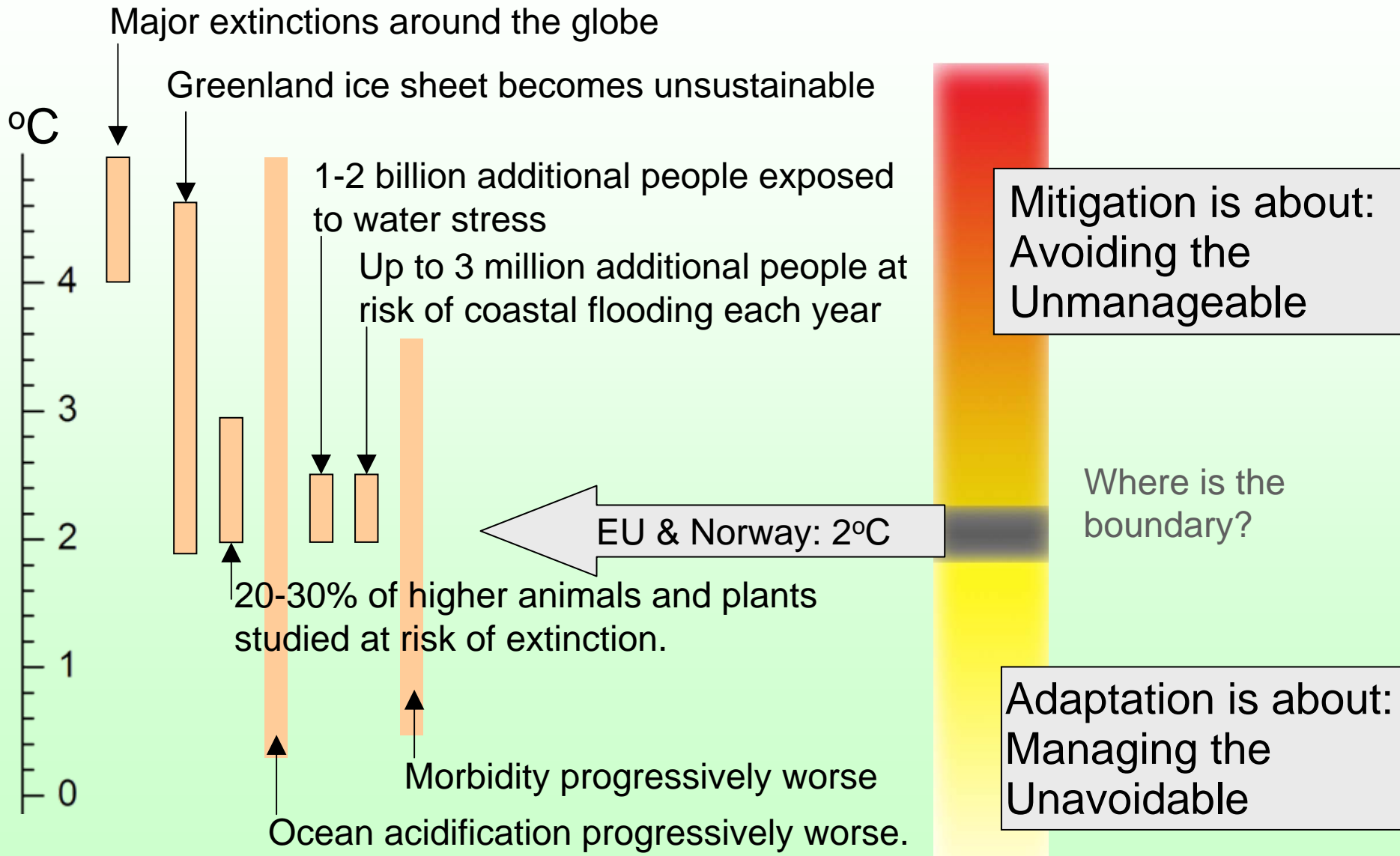
CO₂ emissions lead to irreversible change



About 20% of CO₂ from fossil fuel emissions remains in the atmosphere until removed by geological processes over tens of thousands of years.

The Challenge

Where to draw the line?



Rainfall changes are probably more important than warming



Map shows changes in water availability (runoff) by 2050, for the IPCC mid-range emissions scenario.

Colour denotes percentage change, white means trend is unclear.

Climate change is linked to security

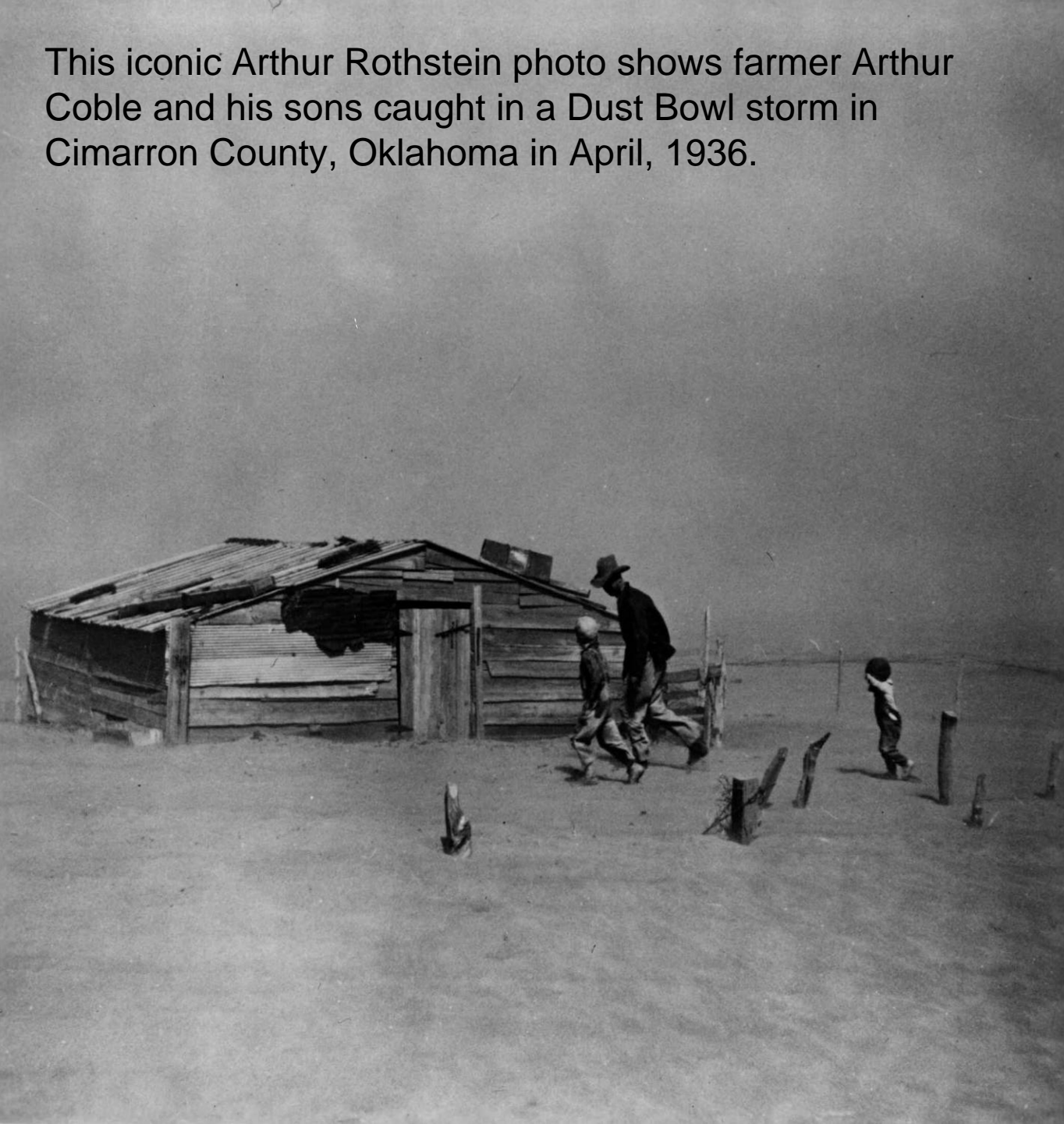
Recent scientific evidence has ... given us a picture of the physical impacts on our world that we can expect as our climate changes. And those impacts go far beyond the environmental. Their consequences reach to the very heart of the security agenda.

Margaret Beckett,
former British Foreign Secretary

We judge that the most significant impact [of climate change] for the United States will be indirect and result from climate-driven effects on many other countries and their potential to seriously affect US national security interests.

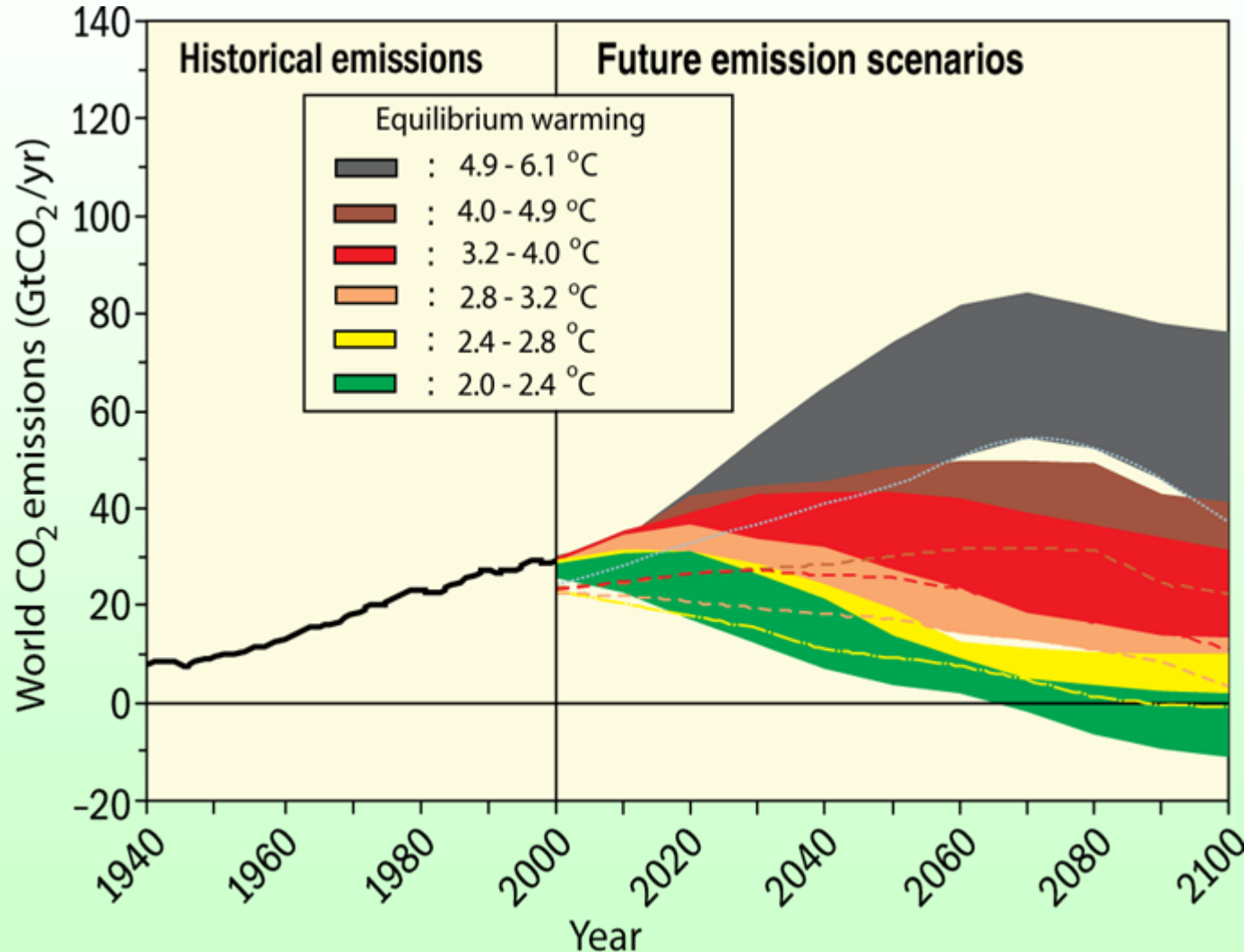
Dr. Thomas Fingar
Deputy Director of National Intelligence for Analysis
and Chairman of the National Intelligence Council
to US House Permanent Select Committee on Intelligence, June 2008

This iconic Arthur Rothstein photo shows farmer Arthur Coble and his sons caught in a Dust Bowl storm in Cimarron County, Oklahoma in April, 1936.



Dust bowl conditions in the US during the 1930s were due to a combination of poor farming practice in the depression and a **drought that reduced rainfall by about 10% for 10 to 15 years.**

The scenario we want is the lowest feasible



2°C target requires keeping to bottom end of green range

Global emissions need to peak by about 2020

And there is a catch ...

How low can we go?

In planning for the next science assessment:

- Experts said the lowest emission scenario that is well established in the literature leads to 2.4°C warming.
- Policymakers said we need to achieve 2°C!
- Science has to stick to what it knows but ...
- ... has to provide solutions rather than problems.

2.0°C warming targets assume that in the future we will have the technology and energy to remove CO₂ from the atmosphere so creating **negative** emissions.

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“Overshoot scenarios” are a polite way of saying we’ve missed the target of avoiding dangerous anthropogenic interference with the climate system and are passing the problem to our grandchildren to solve.

So where do we stand?

Kingsnorth Six:
Criminal prosecution against 6
Greenpeace volunteers for damaging a
coal fired power station in 2007.

Defense of “lawful excuse” accepted by jury.

Is this an anomaly or are the public ahead of
the government in the UK?



Thanks