

Energy and Climate Change

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**Commission for Environmental
Cooperation of North America**

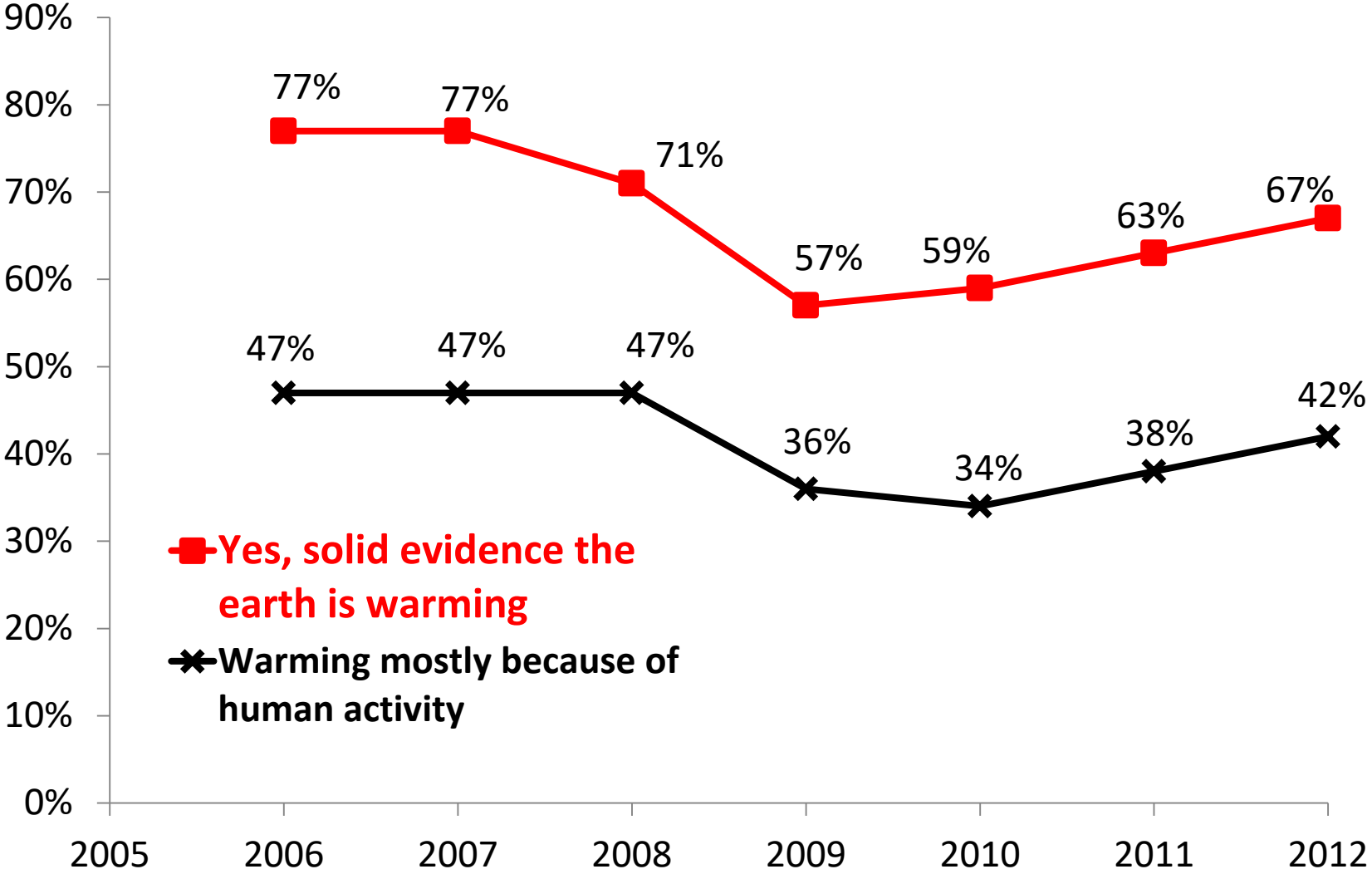
Joint Public Advisory Committee

Greening North America's Energy Economy

Calgary, Alberta

April 24, 2013

Two-Thirds Say the Earth is Warming



Source: More Say There Is Solid Evidence of Global Warming, Pew Research Center (2012)

Public Perception of Climate Change

Is the public convinced?

- Media coverage of climate change is not “balanced” and is affecting public opinion throughout the world

YES
26%

Of people believe climate change is happening and humans are causing it

NO
74%

Of people are not convinced or deny humans are causing climate change



Media Coverage

Does reporting reflect the consensus?

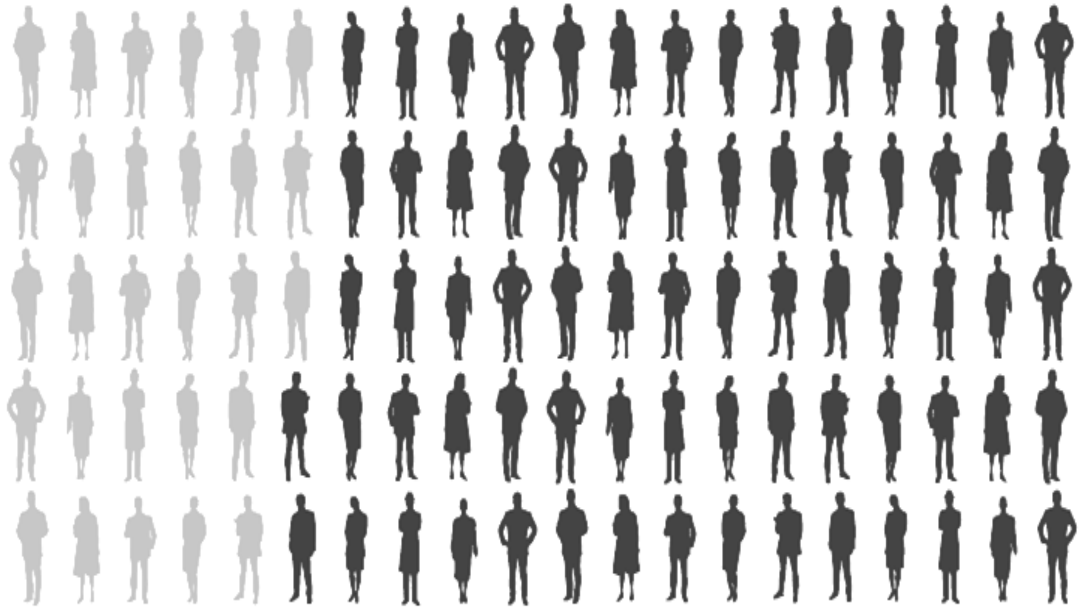
- Media coverage misrepresents scientific understanding of man-made climate change.
- Because of the institutionalized journalistic norm of balanced reporting, US television news coverage has perpetrated an informational bias by significantly diverging from the consensus view in climate science that humans contribute to climate change.

YES
28%

Of news coverage depicts human contribution to warming as significant

NO
72%

Of news coverage includes a skeptic viewpoint or denies man-made warming



Scientific Evidence

Are scientists convinced?

- There's a consensus of scientists because there's a consensus of evidence.
- Not only is there a vast difference in the number of convinced vs. unconvinced scientists there is also a considerable gap in expertise between the two groups.

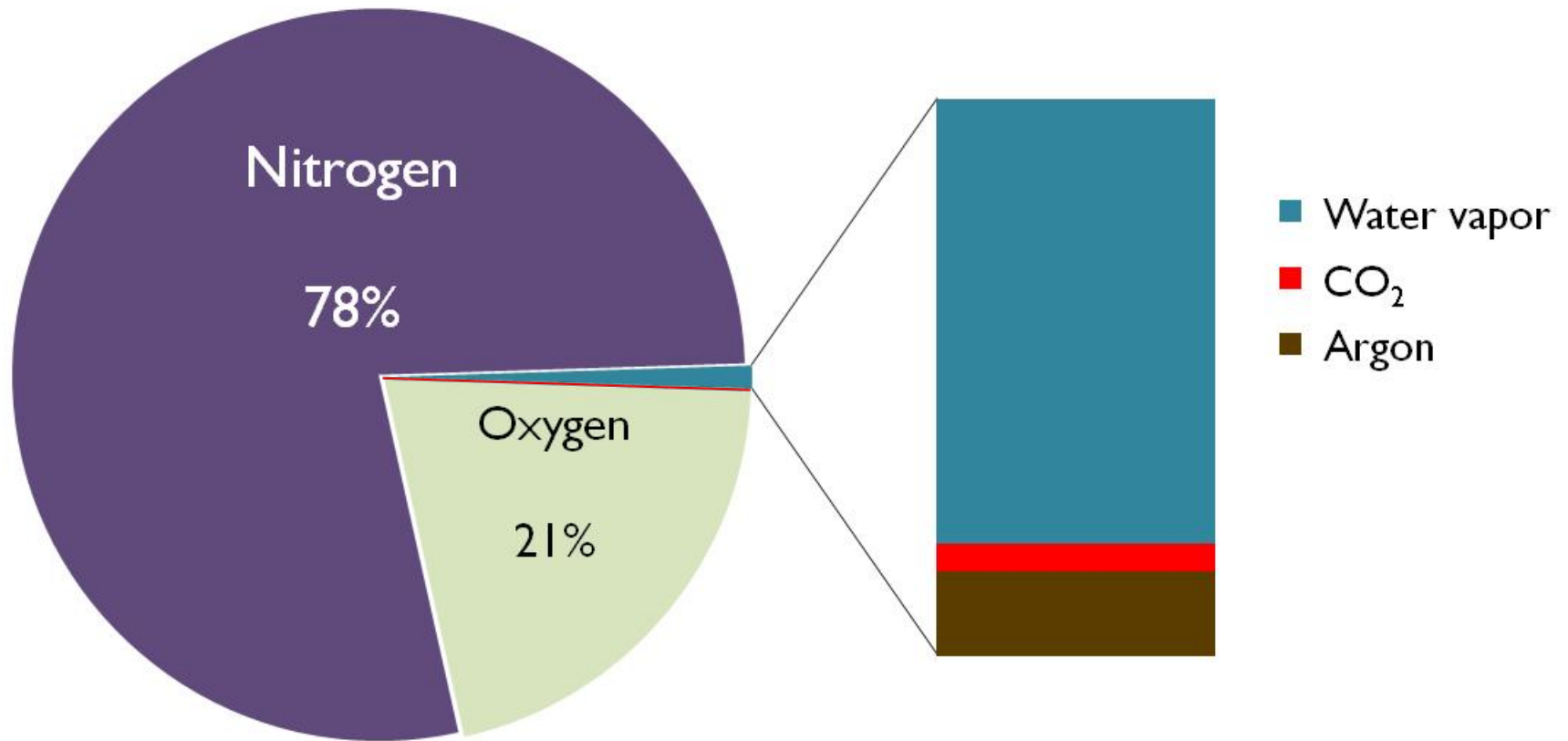
YES Of climate scientist think
97% climate change is significantly due to human activity

NO Of climate scientist do not think
3% climate change is significantly due to human activity

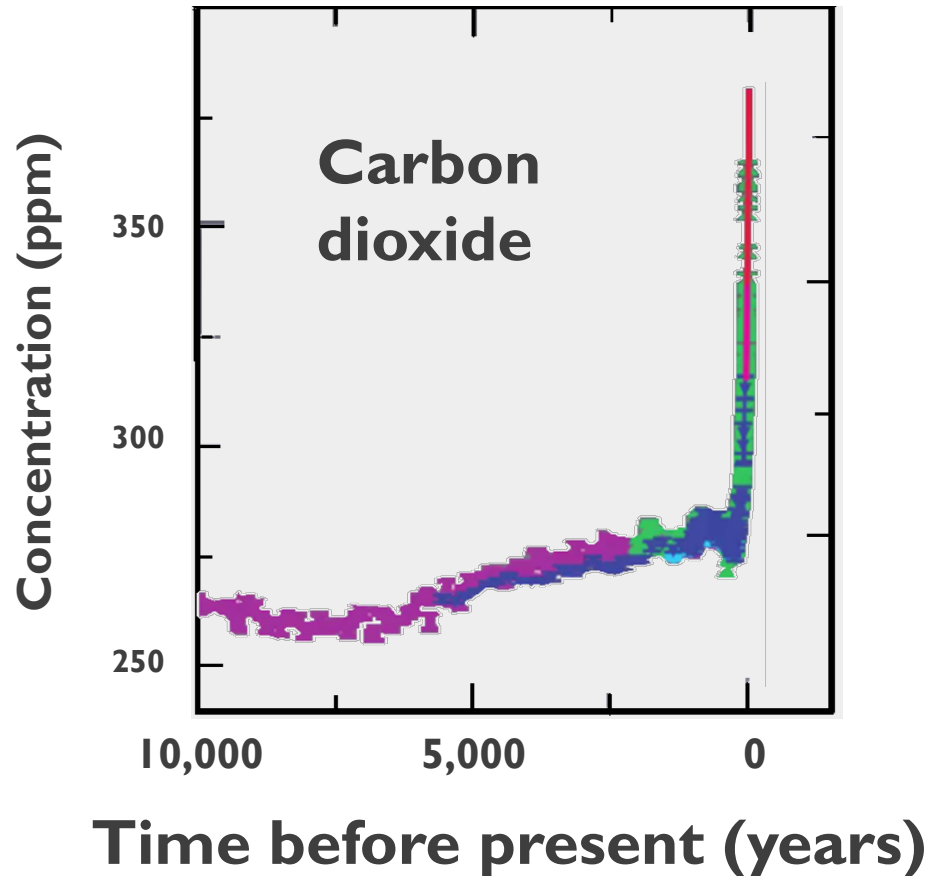




Chemical Composition of Earth's Atmosphere

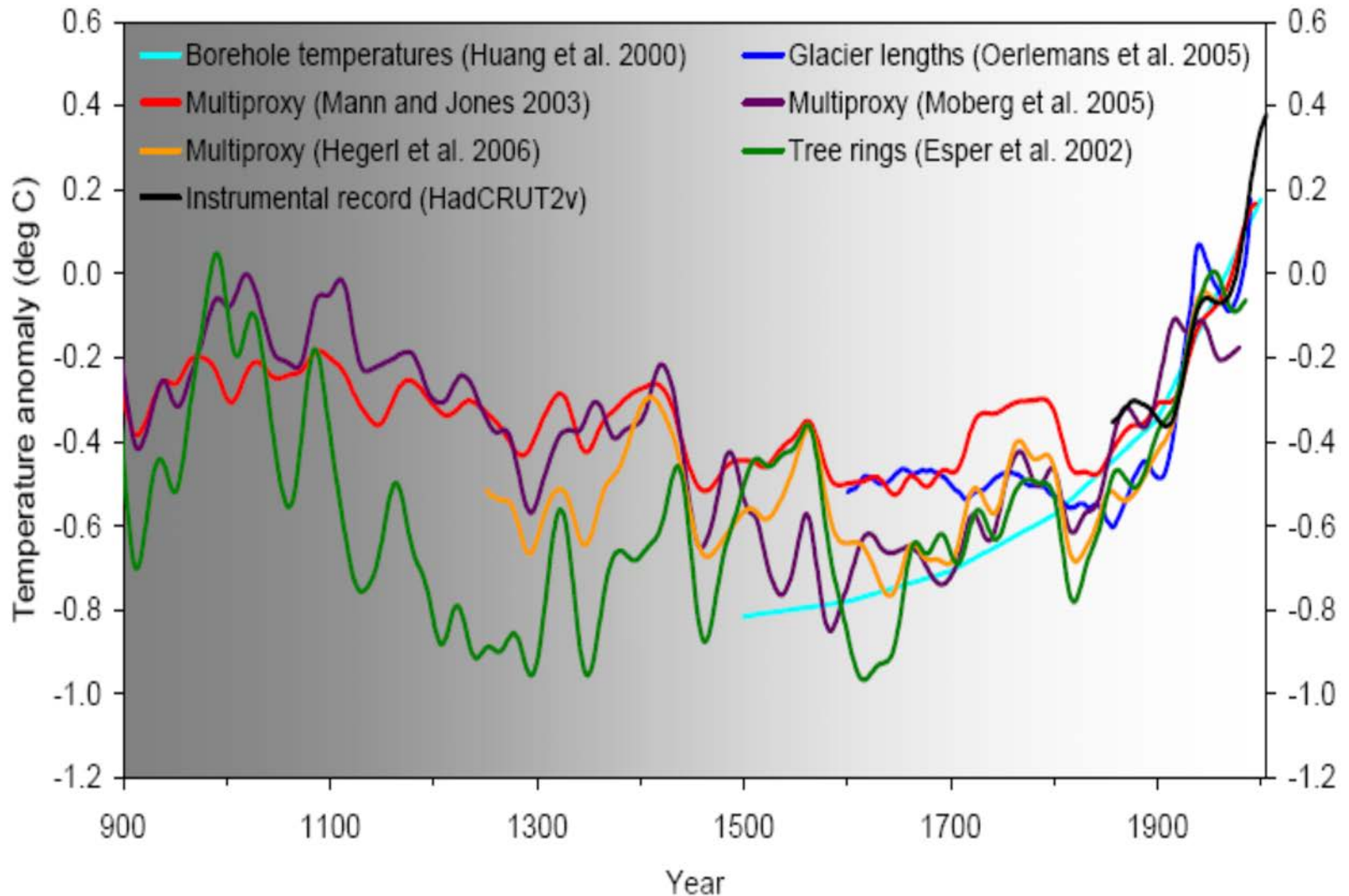


Atmospheric Concentration of CO₂ for the past 10,000 years



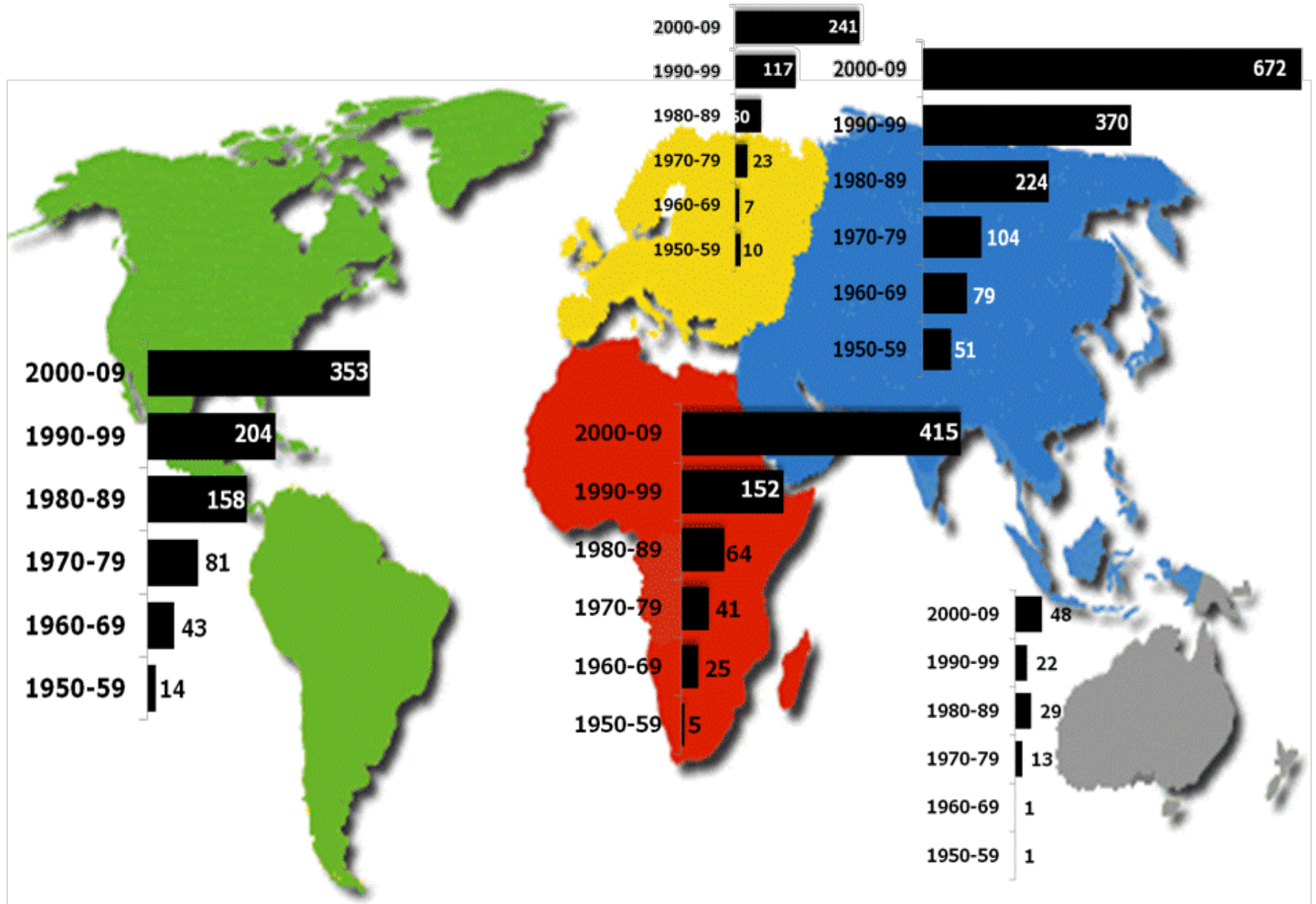
Source: IPCC, WGI-AR4, IPCC 2007

Global Mean Surface Temperature Reconstructions



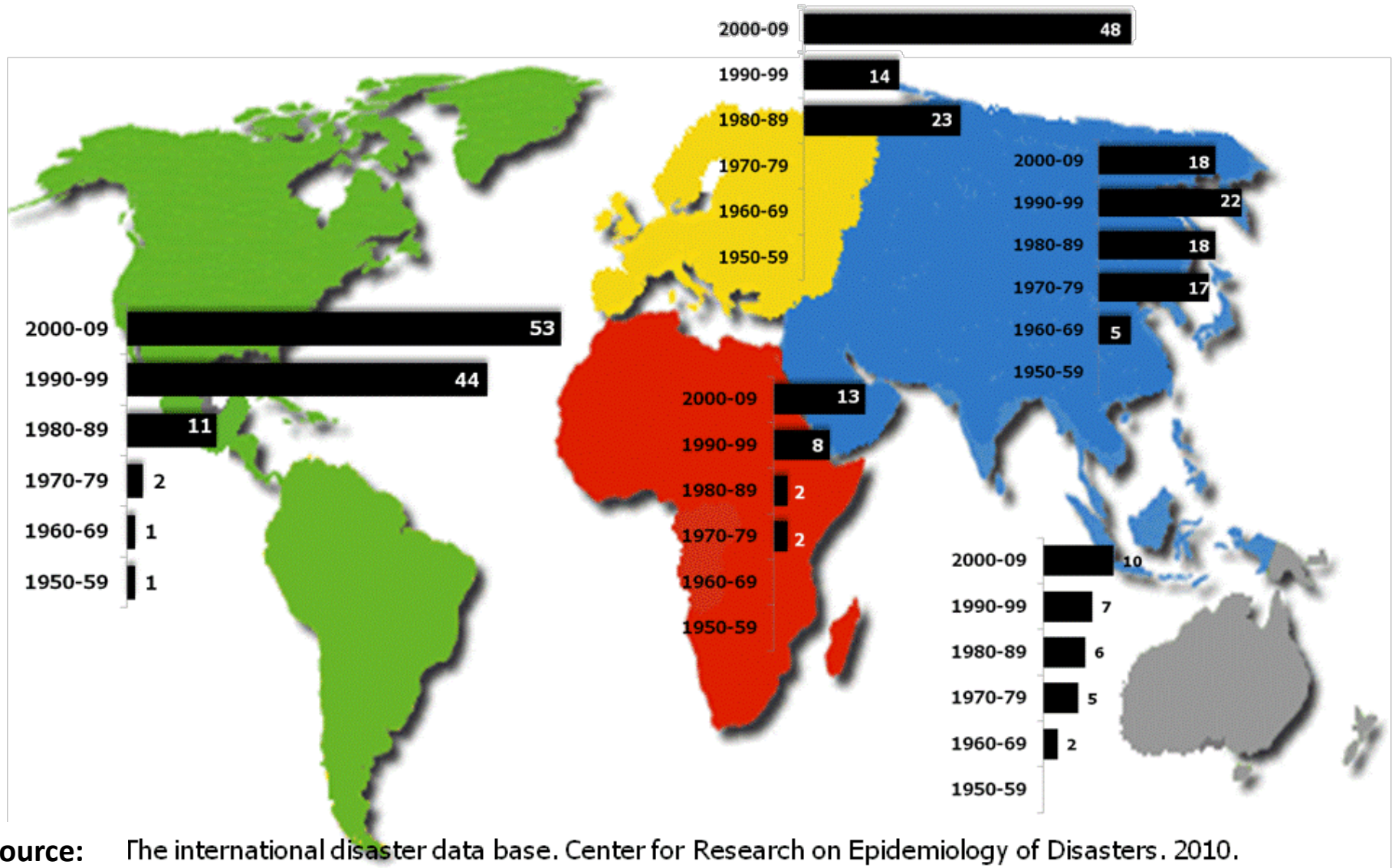


Floods 1950-2009



Source: The international disaster data base. Center for Research on Epidemiology of Disasters. 2010.

Major Wild Fires 1950-2009



Source: The international disaster data base. Center for Research on Epidemiology of Disasters. 2010.



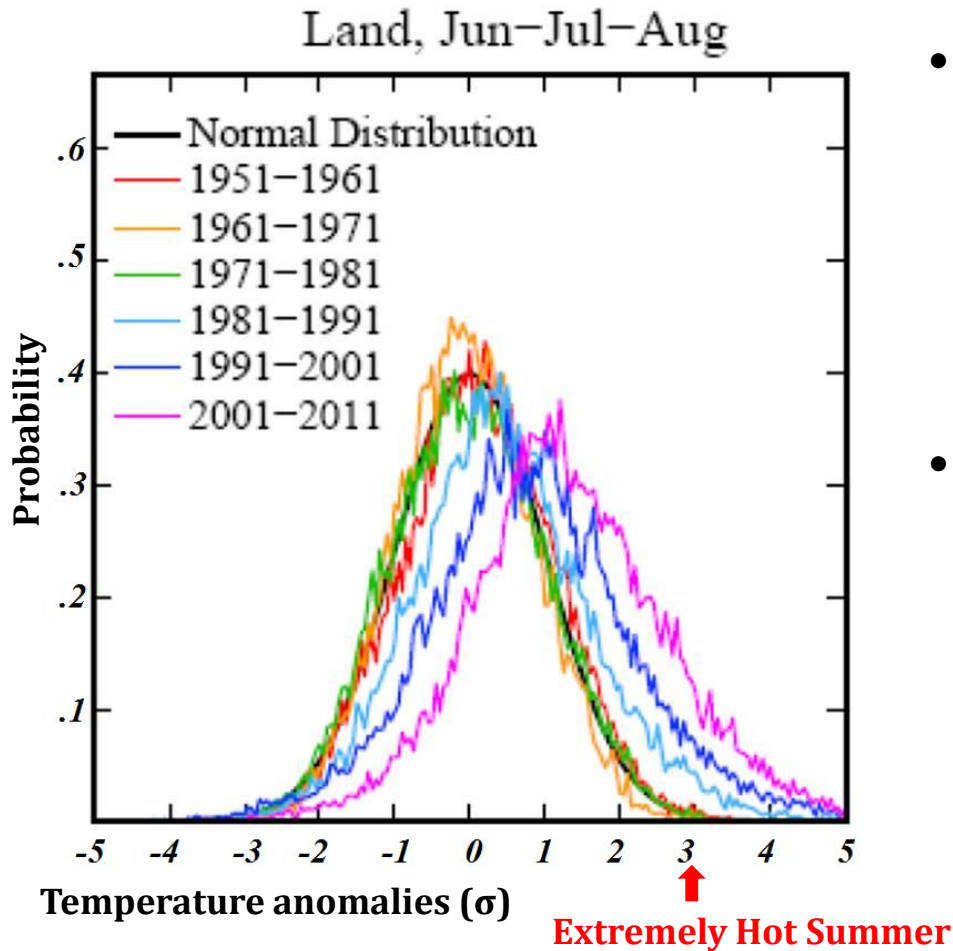
YALE ENVIRONMENT 360

02 JUN 2011: OPINION

Forum: Is Extreme Weather Linked to Global Warming?

*In the past year, the world has seen a large number of extreme weather events, from the Russian heat wave last summer, to the severe flooding in Pakistan, to the recent tornadoes in the U.S. In a **Yale Environment 360** forum, a panel of experts weighs in on whether the wild weather may be tied to increasing global temperatures.*

Temperature Anomaly Distribution in the North Hemisphere



Frequency of occurrence of local temperature anomalies in units of the local standard deviation.

- Statistical analysis of measured temperatures from 1951 to 2011
 - 1σ = “Hot” summer
 - 2σ = “Very Hot” summer
 - 3σ = “Extremely Hot” summer
- The probability of an extreme heat wave has increase by about 40 times in the last 50 years.

Recent examples of summer temperature anomalies exceeding $+3\sigma$ include the heat wave and drought in **Oklahoma, Texas and Mexico** in 2011.

Did climate change contribute to Hurricane Sandy?

**The short answer is
yes.**

A warming climate puts more energy into storms, including hurricanes, loading them with more rainfall and the stronger winds pushing more of a storm surge.

Overall, climate change has stacked the deck so that this kind of event happens more frequently.

**Source: Robert Corell, Jeff Masters and Kevin Trenberth
Politico, November 5, 2012.**



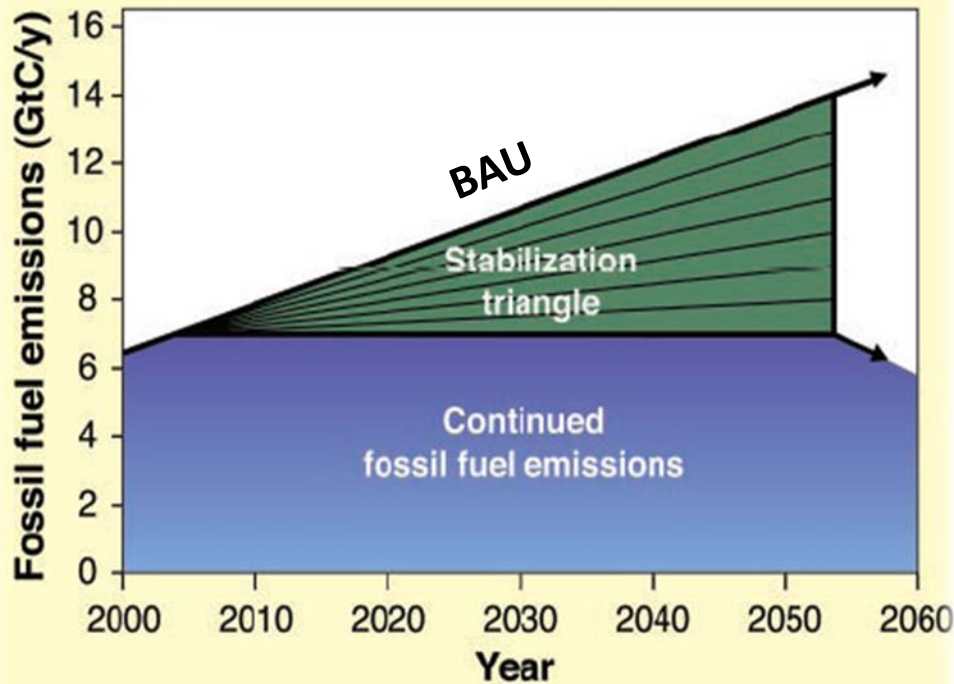
The Copenhagen Accord

The Conference of the Parties takes note of the Copenhagen Accord of 18 December 2009.

- The Heads of State, Heads of Government, Ministers, and other heads ... have agreed on this Copenhagen Accord which is operational immediately.
- We underline that climate change is one of the greatest challenges of our time.
- We agree that deep cuts in global emissions are required ... to reduce global emissions **to hold the increase in global temperature below 2 degrees Celsius ...**

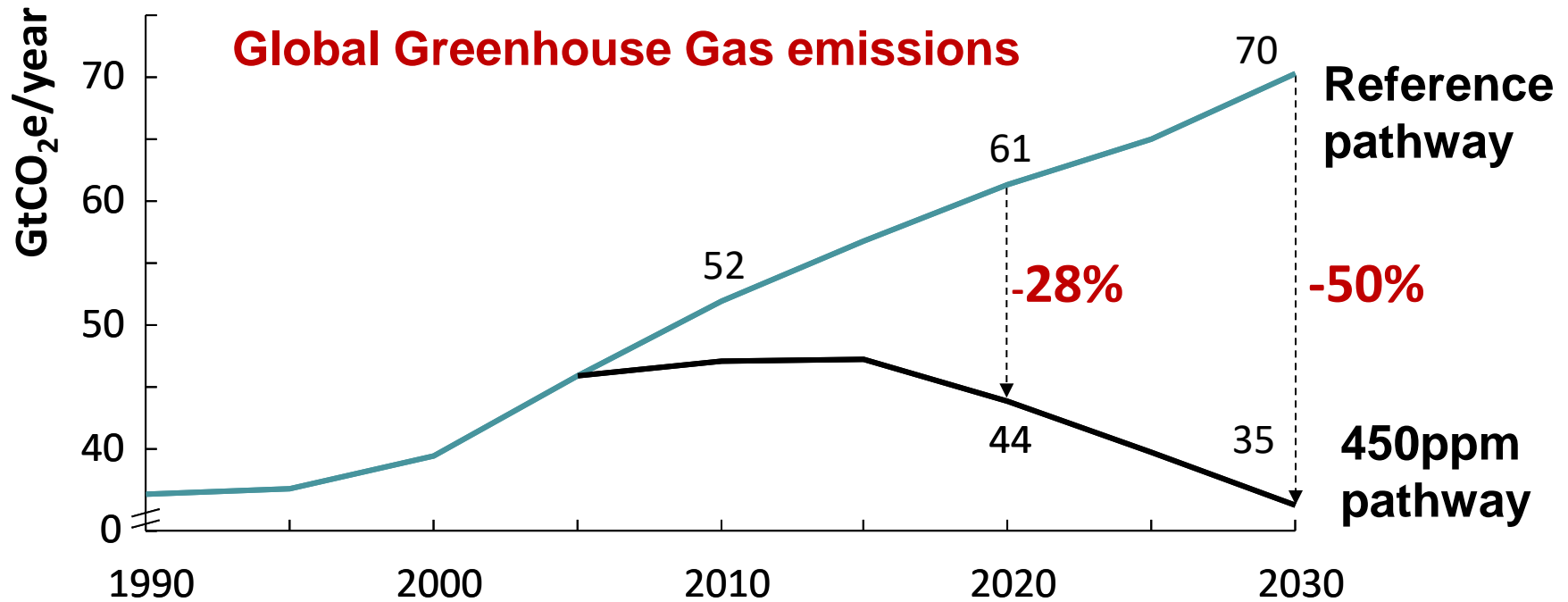
Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies

S. Pacala & R. Socolow



- *Improved fuel economy*
- *More efficient buildings*
- *Improved power plant efficiency*
- *Replacing natural gas for coal*
- *Carbon capture and storage*
- *Nuclear fission*
- *Wind electricity*
- *Solar energy*
- *Biofuels*
- *Forest management*

450 ppm Pathway: < 2 °C Temperature Increase



Source: McKinsey Global GHG Abatement Cost Curve v2.0; Den Elzen, M.G.J. and M. Meinshausen, 2006: Multi-gas emission pathways for meeting the EU 2°C climate target.; IEA World Economic Outlook 2007; Project Catalyst analysis.

New generation of nuclear power plants



CO₂ Capture and Geological Storage

The IPCC and MIT have concluded that using fossil fuels is sustainable if carbon dioxide capture and geological storage technologies, which are currently being developed, are implemented.

IPCC

Third Report on Mitigation, 2007

Massachusetts Institute of Technology

The Future of Coal. Options for a carbon-constrained world. An interdisciplinary MIT study. 2007

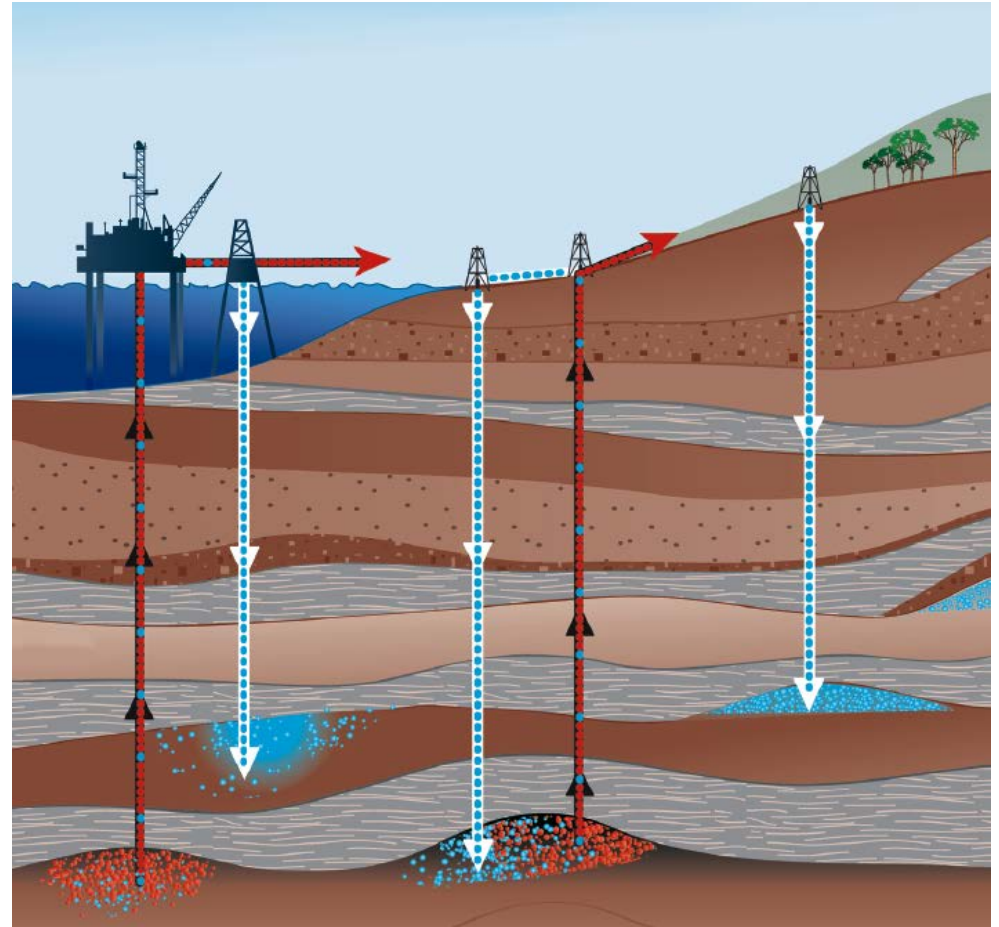


Illustration: IPCC. Carbon Dioxide Capture and Storage. 2005

Actions Needed To Address Climate Change

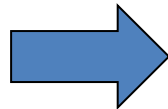
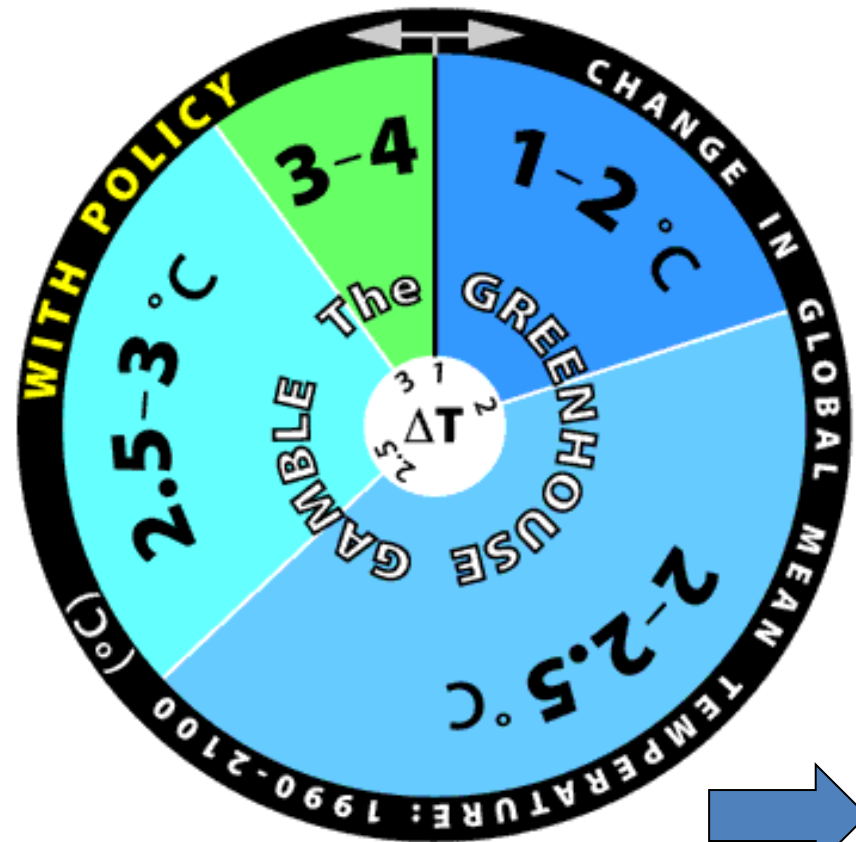
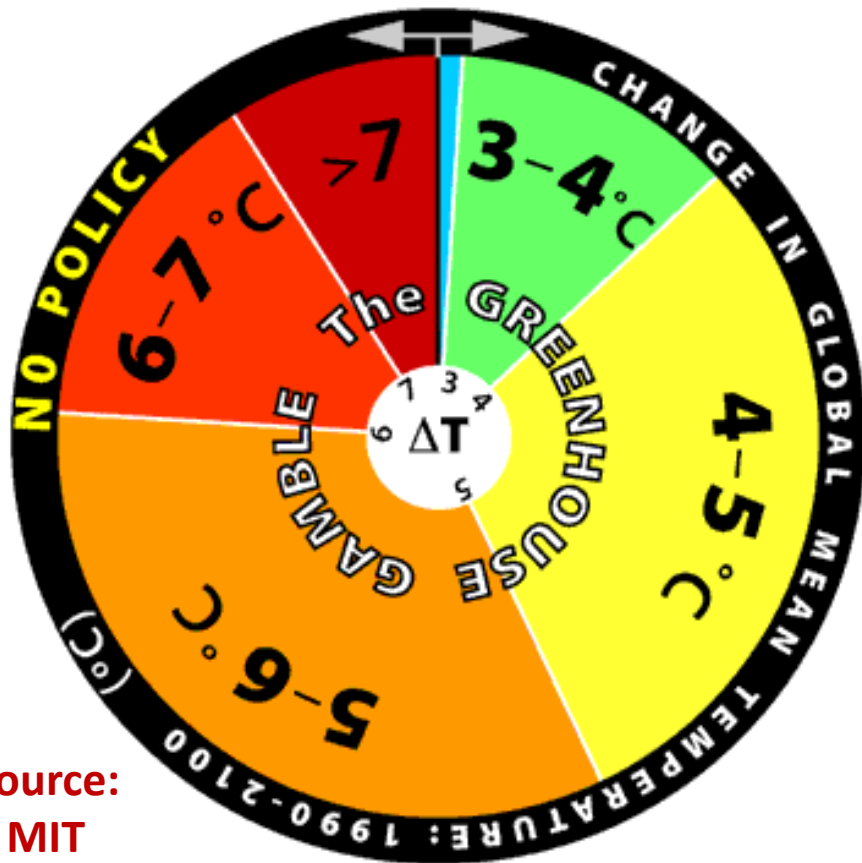
- Put a *price on carbon emissions* so marketplace can work to find cheapest reductions, through a new international agreement in the post-Kyoto period
- Increase investments in *energy-technology research*, development and demonstration
- Expand *international cooperation* on deploying advanced energy technologies
- Accelerate *“win-win” measures*

Value of a Climate Policy Under Uncertainty

NO POLICY

What would we buy with **STABILIZATION** of CO₂ at 550 ppm?

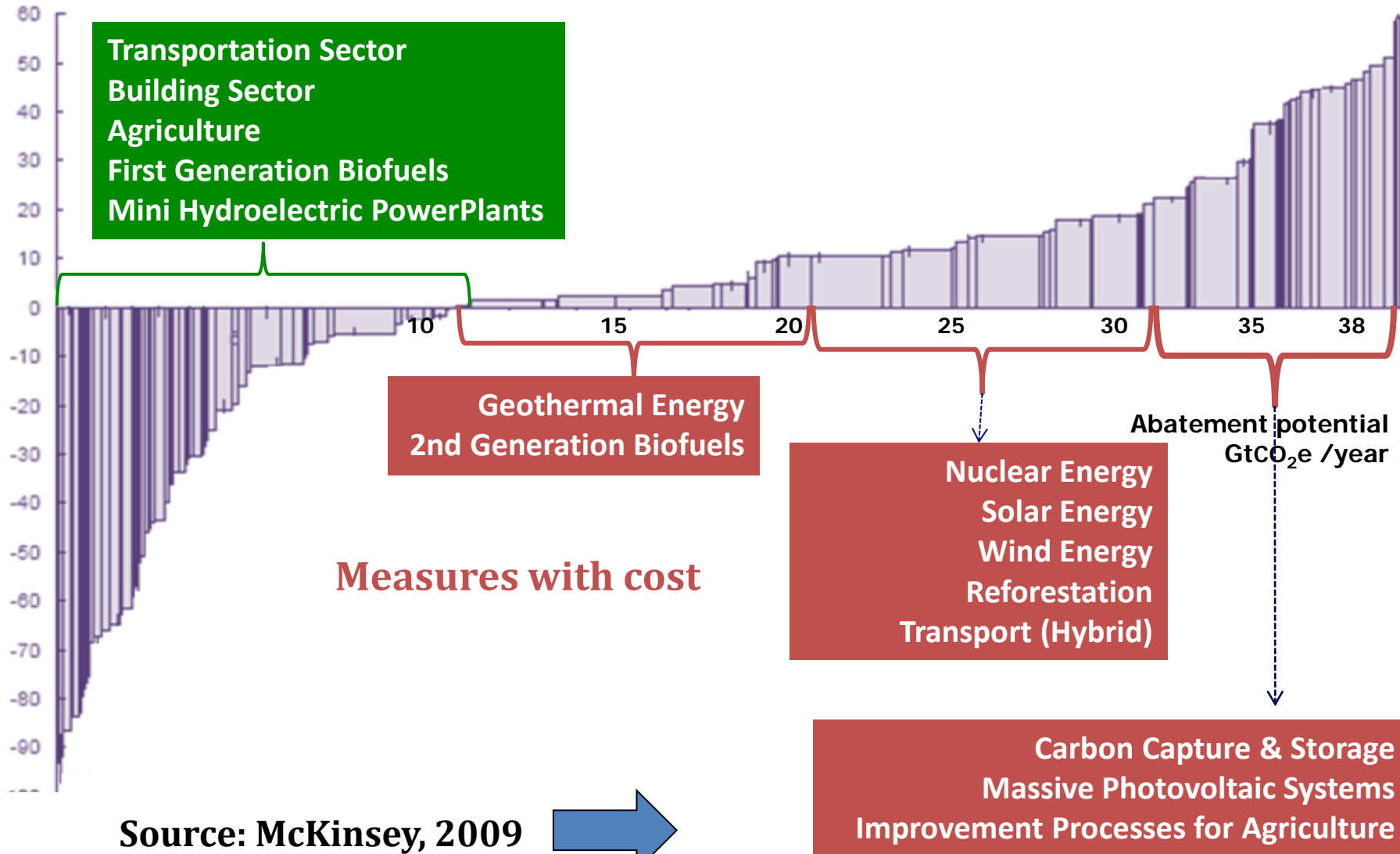
A NEW WHEEL with lower odds of **EXTREMES**



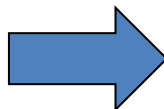
GHG Abatement Cost Curves

Abatement cost
€ / tCO₂e

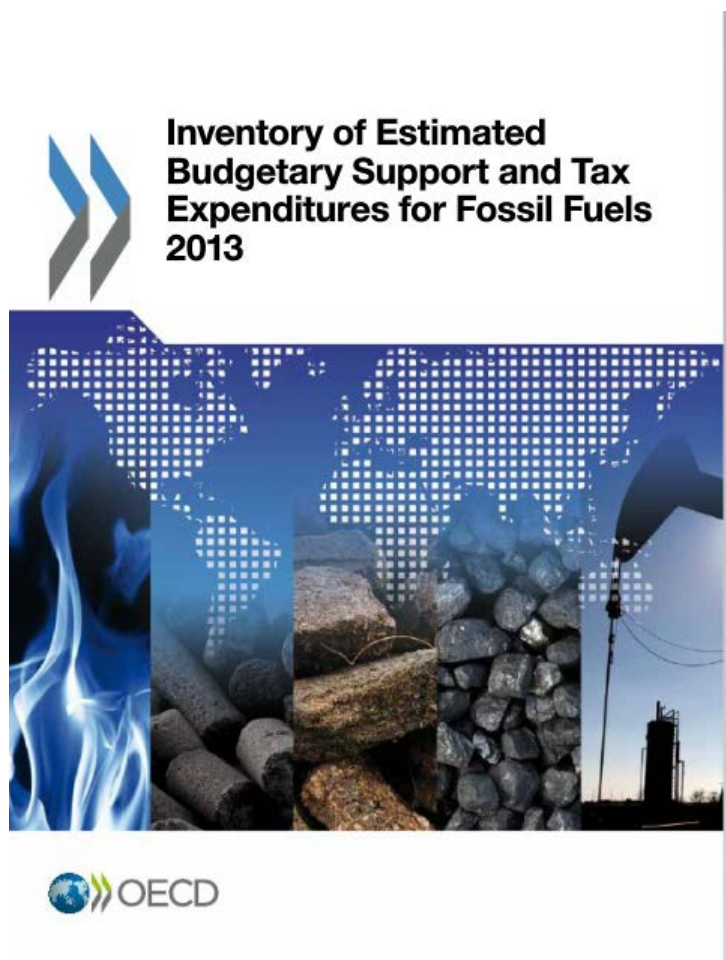
Efficiency measures



Source: McKinsey, 2009

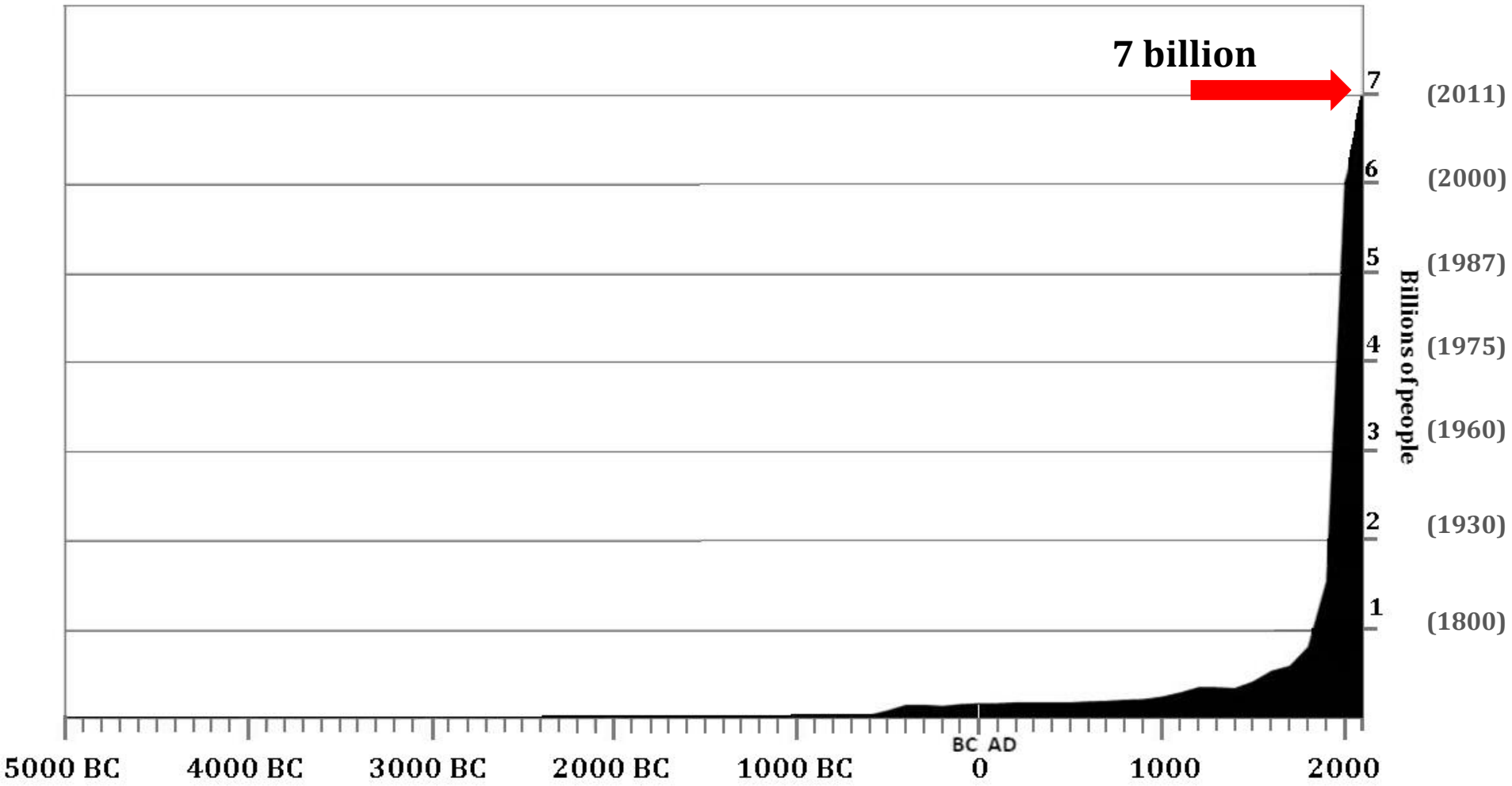


Fossil fuel subsidies and tax breaks are still rising



- Recent **OECD data reveals** a system of fossil fuel subsidies and taxes that is horribly overcomplicated and illogical.
- The principal conclusion is that **government support for oil, coal and natural gas is still increasing** across the developed world.
- The 2011 total value of **fossil fuel subsidies** for the OECD countries amounted to more than **USD\$80 billion**, **3/4** being for **petroleum**.

Human Population Growth



Source: United Nations Population Division, World Urbanization Prospects, 2010.