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Office of Climate Change, UK Government

Main conclusions:

1. Cost of inaction: between 5 and 20% of GDP, now and forever
2. Cost of action to go to 550ppm CO_2e: 1% of GDP in 2050
3. There is a case for urgent action
4. Carbon market + technology policy + shared understanding
5. A global deal based on markets is desirable and in reach

Structure of the presentation

- Cost of inaction – risk, uncertainty and ethics
- Cost of action – mitigation and technology
- Towards a global deal? The European experience

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How to estimate cost of inaction

Analytic foundations:

Climate change is an externality with a difference:

- Global
- Long-term
- Uncertain
- Potentially large and irreversible

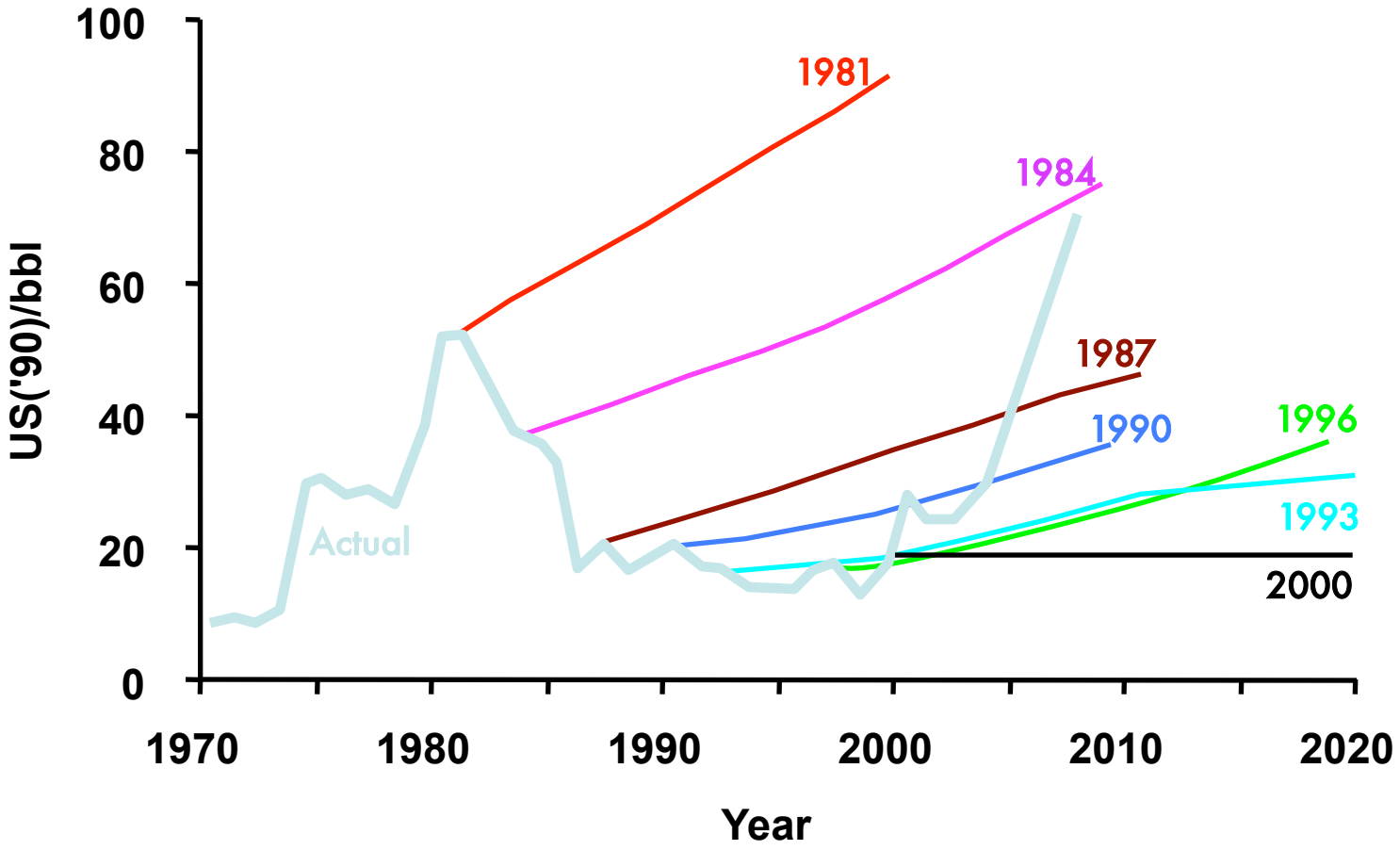
Hence key roles in the analysis of:

- Economics of Risk
- Ethics

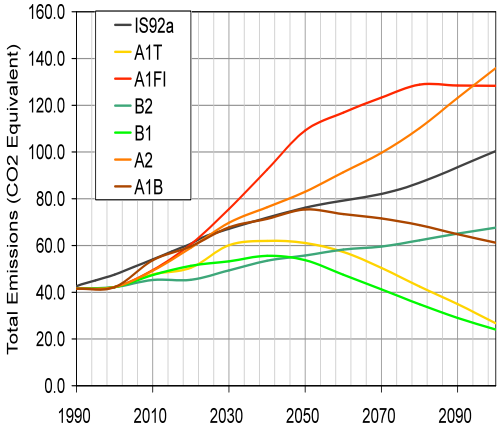
How to estimate cost of inaction

- Stream of **future damages** from inaction taking **risk** into account
- **consumption** as the ‘common denominator’
- **BGE** as a way of taking into account all streams of cost
- Decide on **discount factors** on the basis **of ethics**

Expert forecasts can be wrong…



Working with Uncertainty



Population, technology, production, consumption

Emissions

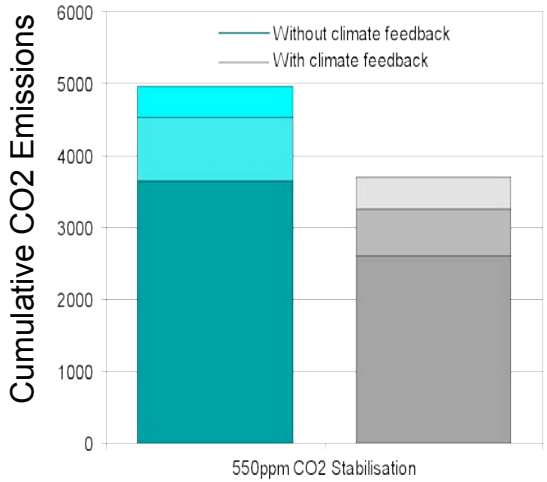
Atmospheric concentrations

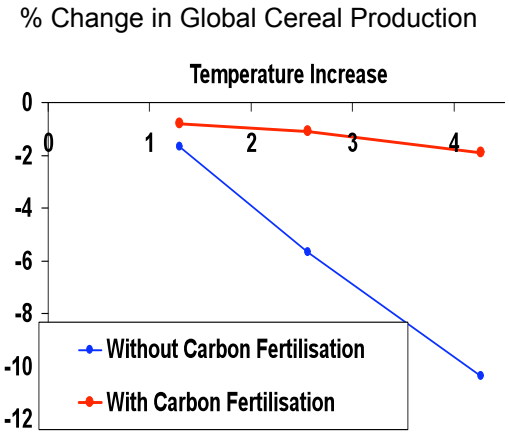
Radiative forcing

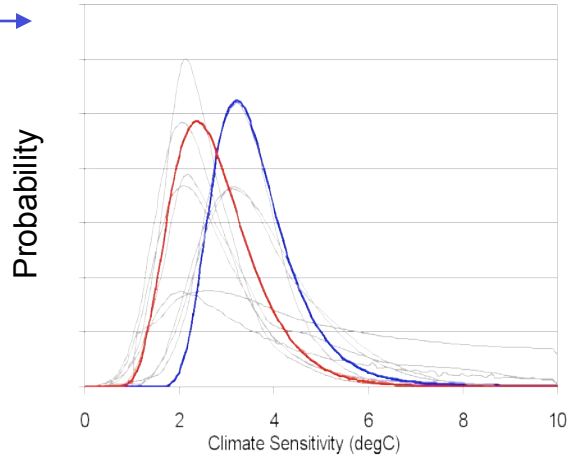
Temperature rise and global climate change

Direct impacts (e.g. crops, forests, ecosystems)

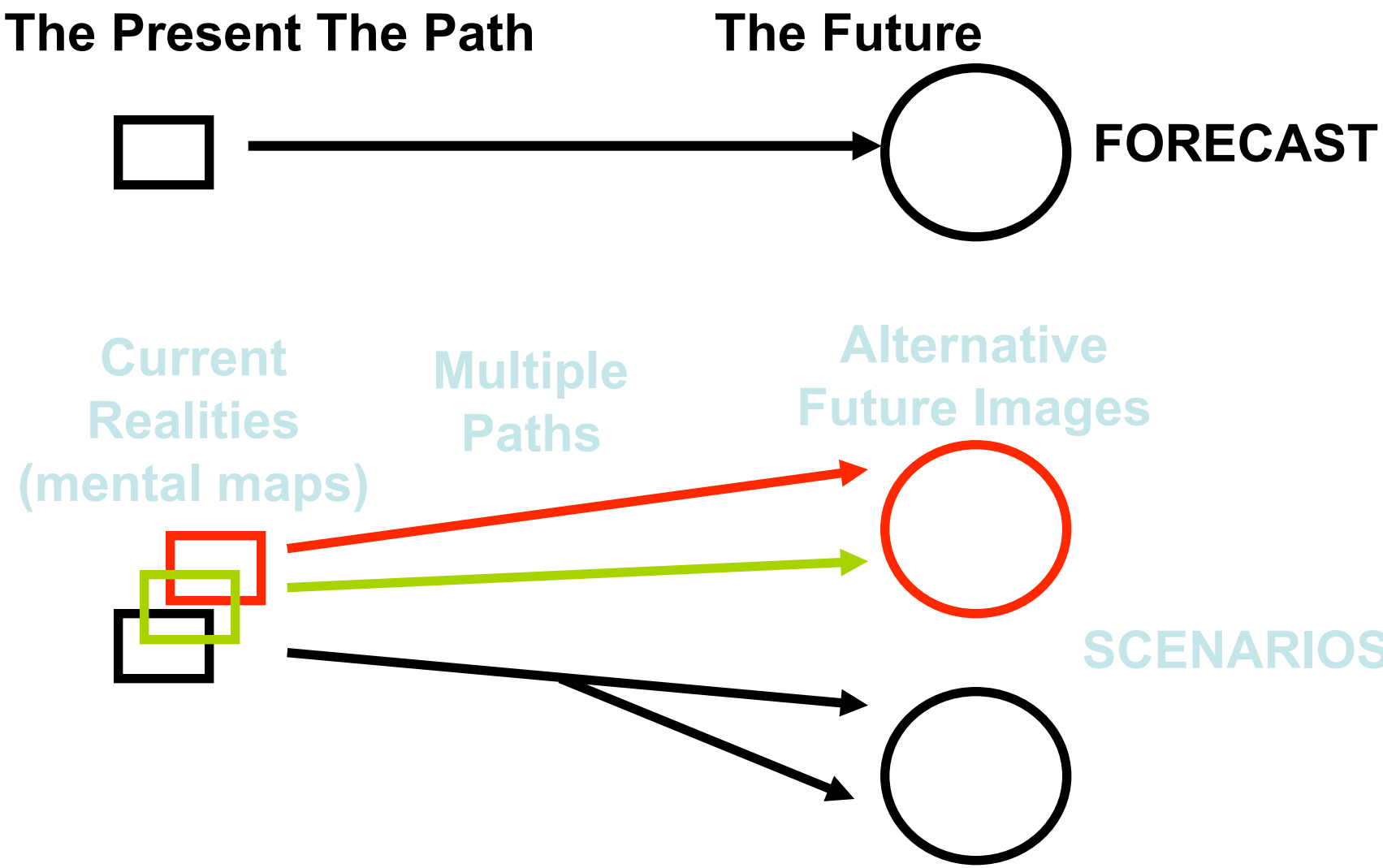
Socio-economic impacts







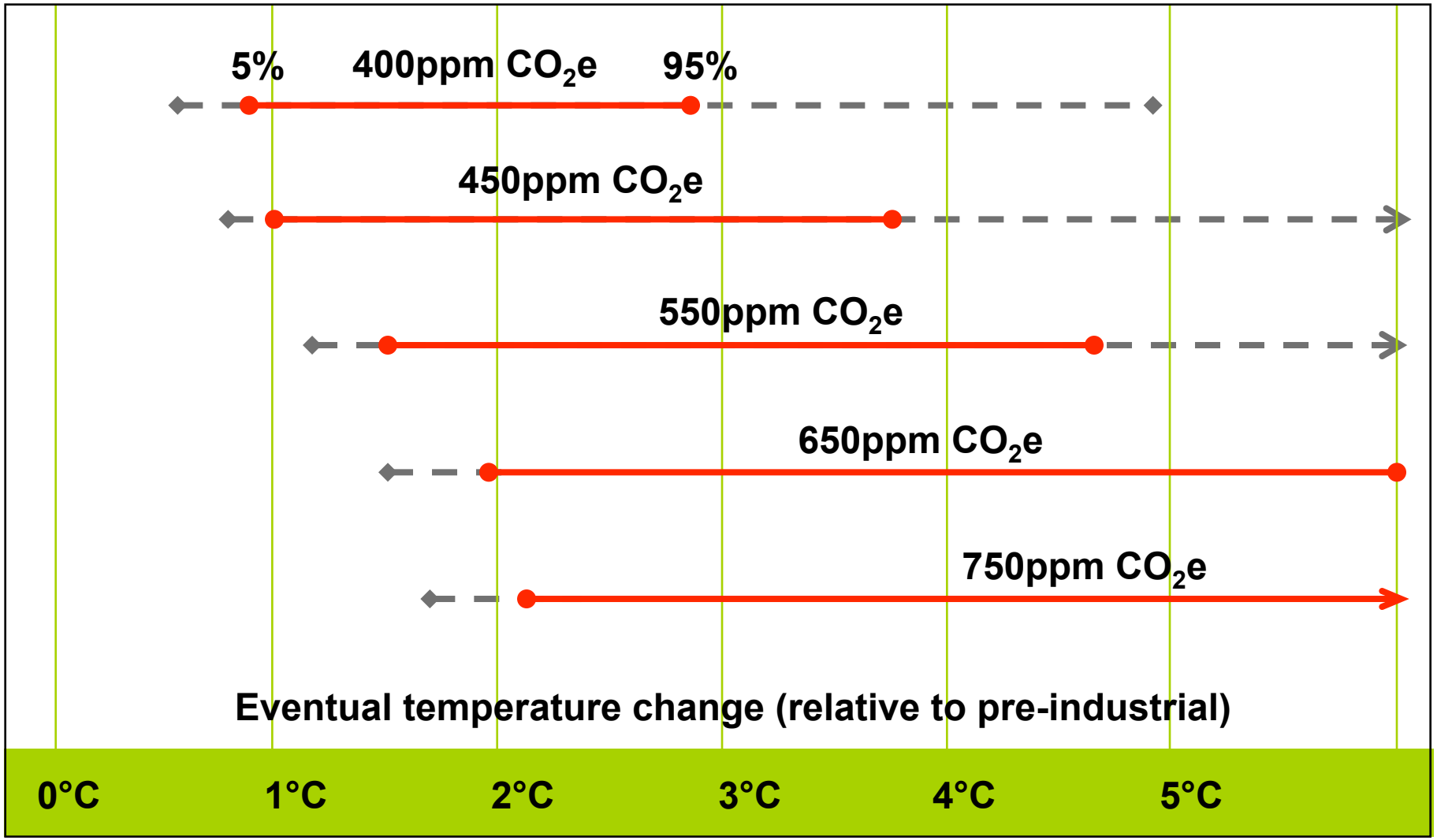
Scenarios versus Forecasts



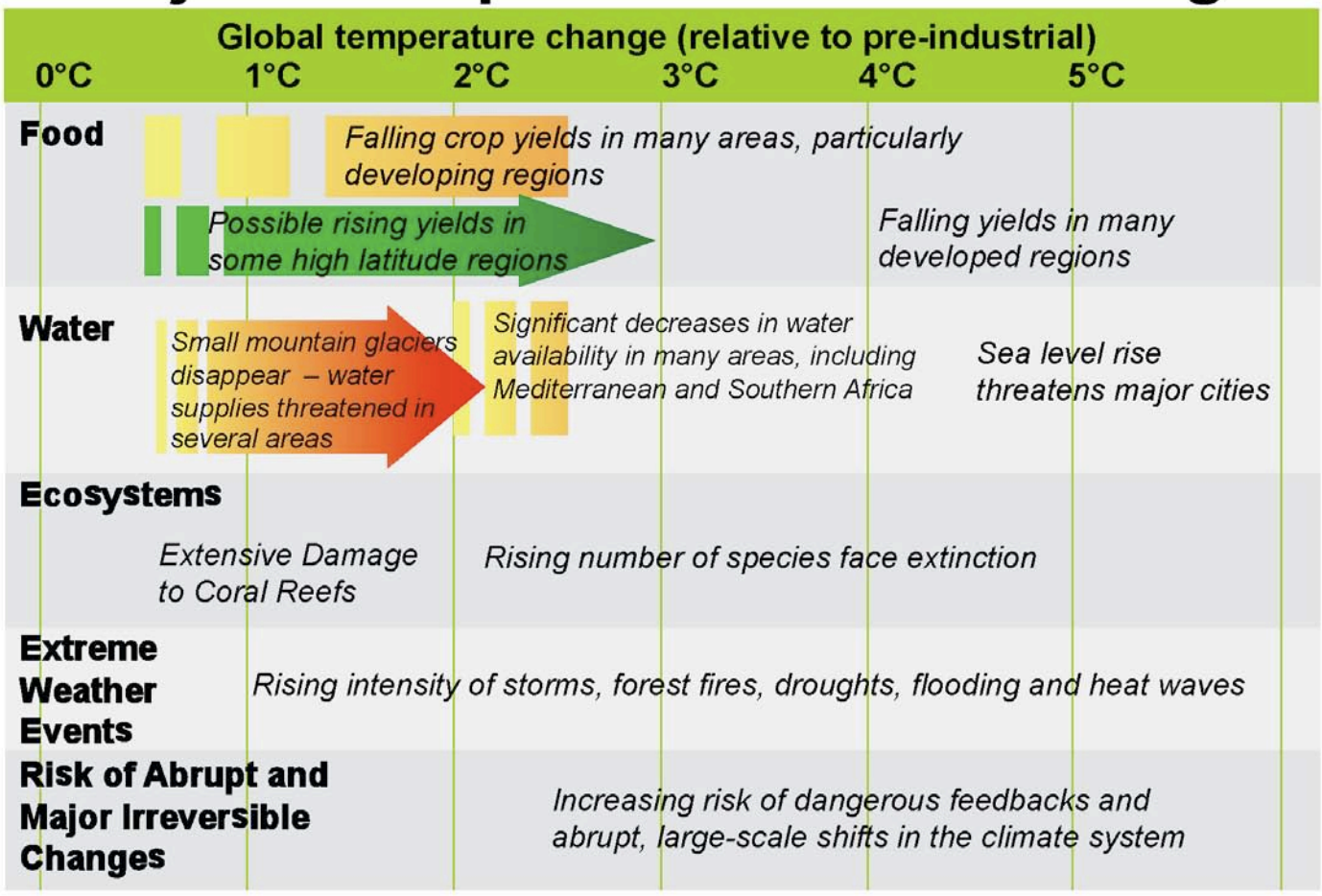
Uncertainty, risk and action

- **Uncertainty does not excuse inaction**
- When stakes are large, decisions are taken under uncertainty, and **insurance** is obtained
- Example of large scale insurance:
  - Nuclear technology for power sector (Price Anderson Act)
  - Avian Flu ($2 billion worth of Tamilflu in the US)
  - Defence
  - Fire insurance
  - Etc…

Stabilisation and eventual change in temperature



Projected impacts of climate change



Likelihood (in %) of exceeding a temperature increase at equilibrium

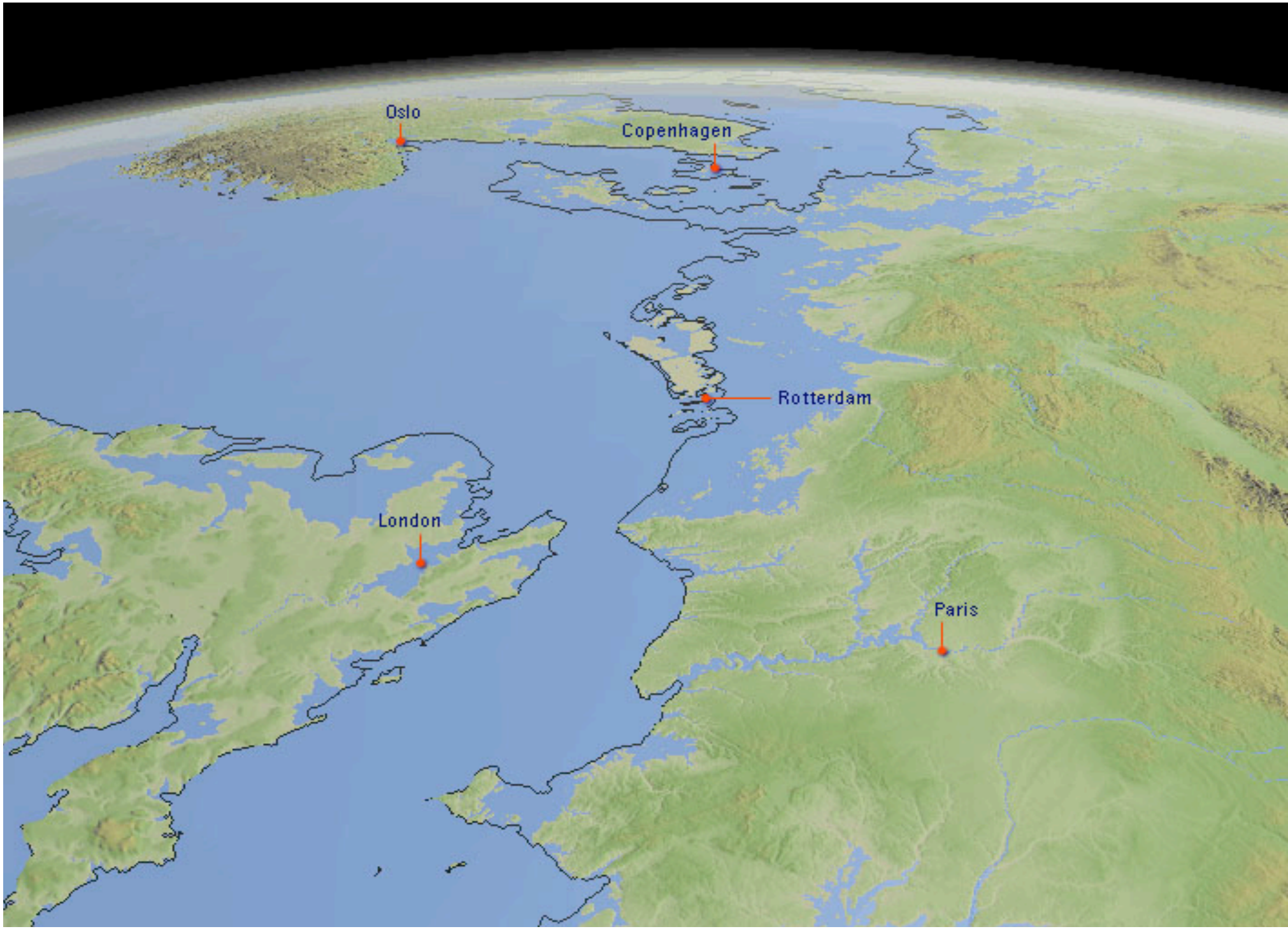
Stabilisation Level (ppm $C0_2e$)	2°C	3°C	4°C	5°C	6°C	7°C
450	78	50	34	21	0	0
500	96	61	45	32	1	0
550	99	69	53	41	2	1
650	100	94	66	53	9	4
750	100	99	82	62	22	9

Source: Hadley Centre: From Murphy et al. 2004

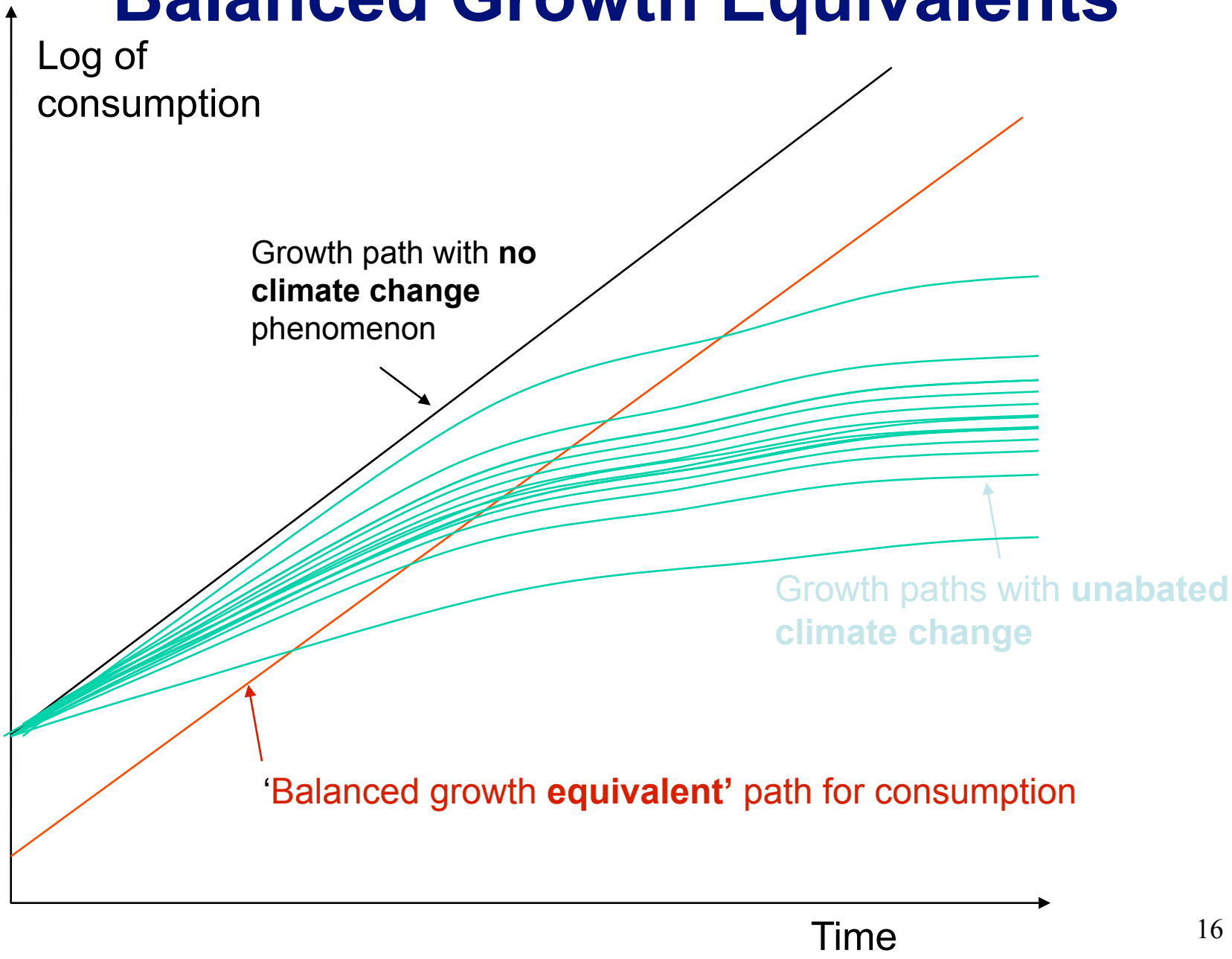
- Those who argue e.g. for stabilisation levels of 650ppm $CO2_e$ and above are accepting very big risks of a transformation of the planet
- Figures similar to IPCC AR4 (no probabilities in TAR) and show greater risk than Stern Review
- Important omitted risks

Total cost of inaction

- 5 to 20% now and forever
- **Central prediction is 10%**
- Now and forever involves an **ethical judgment** on discounting future flows
- Changing the ethics and damages weights strengthens the case for action


Oslo
Copenhagen
Rotterdam
London
Paris

‘Balanced Growth Equivalents’



Sensitivity of total cost of climate change to key model assumptions (I)

Damage function exponent (γ suppressed of)	*Consumption elasticity of social marginal utility (η)*		
	1	*1.5*	*2*
2	10.4 (2.2-22.8)	6.0 (1.7-14.1)	3.3 (0.9-7.8)
2.5	16.5 (3.2-37.8)	10.0 (2.3-24.5)	5.2 (1.1-13.2)
3	33.3 (4.5-73.0)	29.3 (3.0-57.2)	29.1 (1.7-35.1)

Sensitivity of total cost of climate change to damage function exponent and consumption elasticity of social marginal utility in baseline-climate scenario (mean BGE loss, 5-95% confidence interval).

Costs measured in terms of Balanced Growth Equivalent (Mirrlees and Stern, 1972, JET)

Reflections on costs and damages in Stern Review analysis after one year

- ethics and risk
- under-estimated emission growth
- under-estimated risks and damages of high-temperatures
- Changing the ethics and damages weights strengthens the case for action

Structure of the presentation

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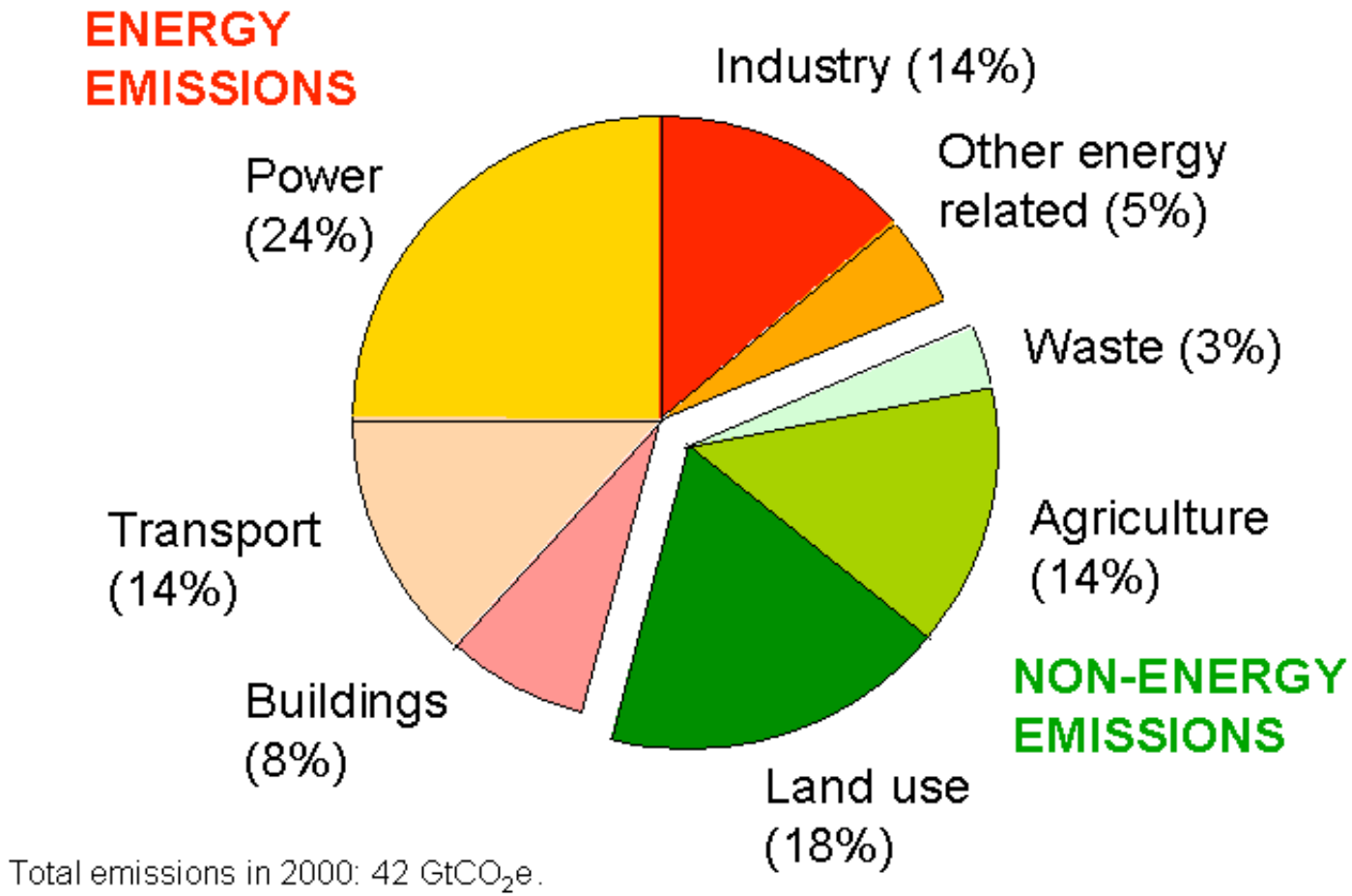
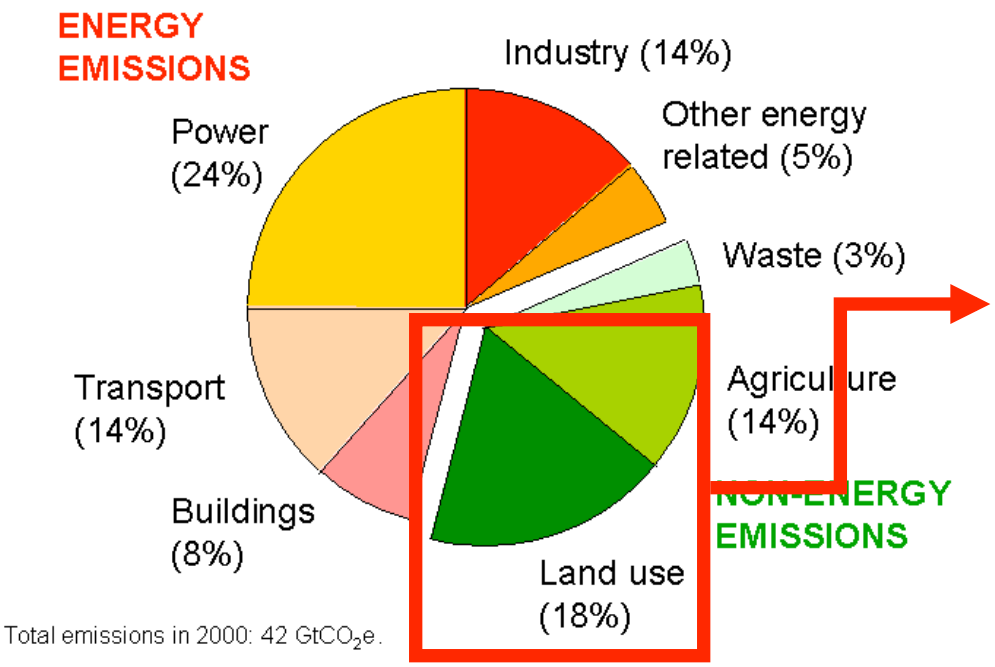
Reducing emissions requires action across many sectors



Total emissions in 2000: 42 $GtCO_2e$.

Avoiding deforestation



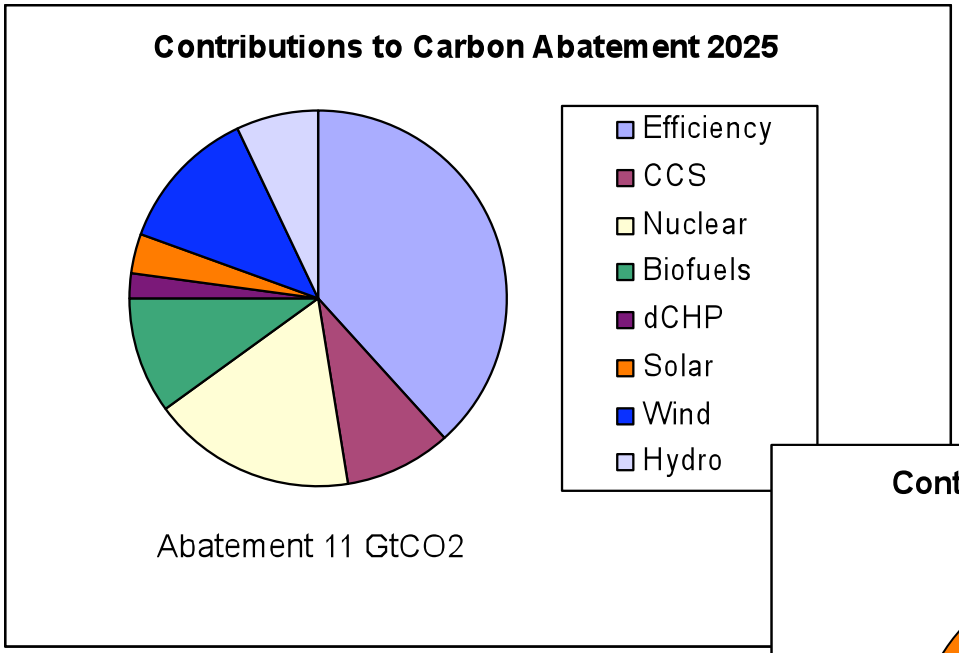
- Curbing deforestation is highly cost-effective, and significant
- Forest management led by nation where the forest stands
- Large-scale pilot schemes with effective international support

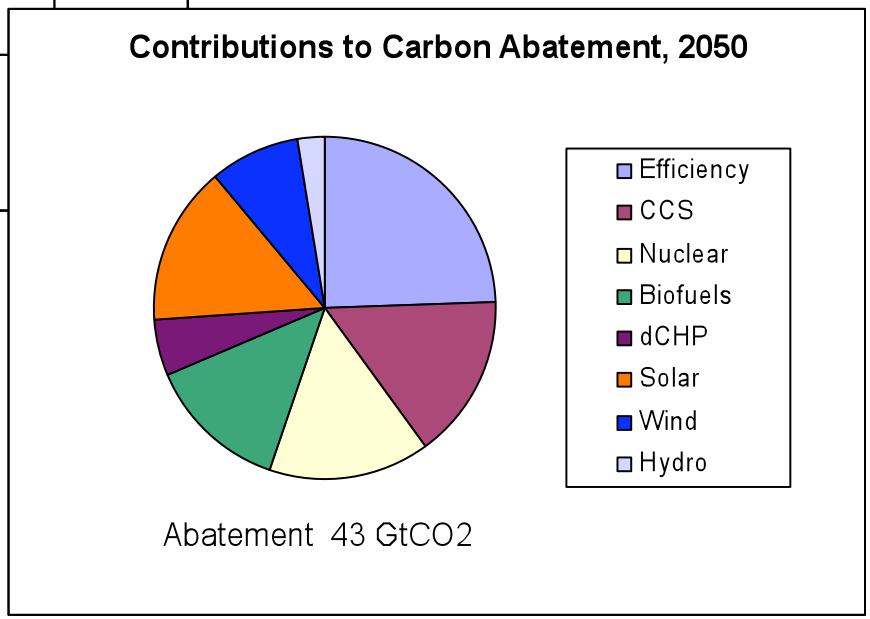
Substantial capital flows to forest management

Growth, change and opportunity

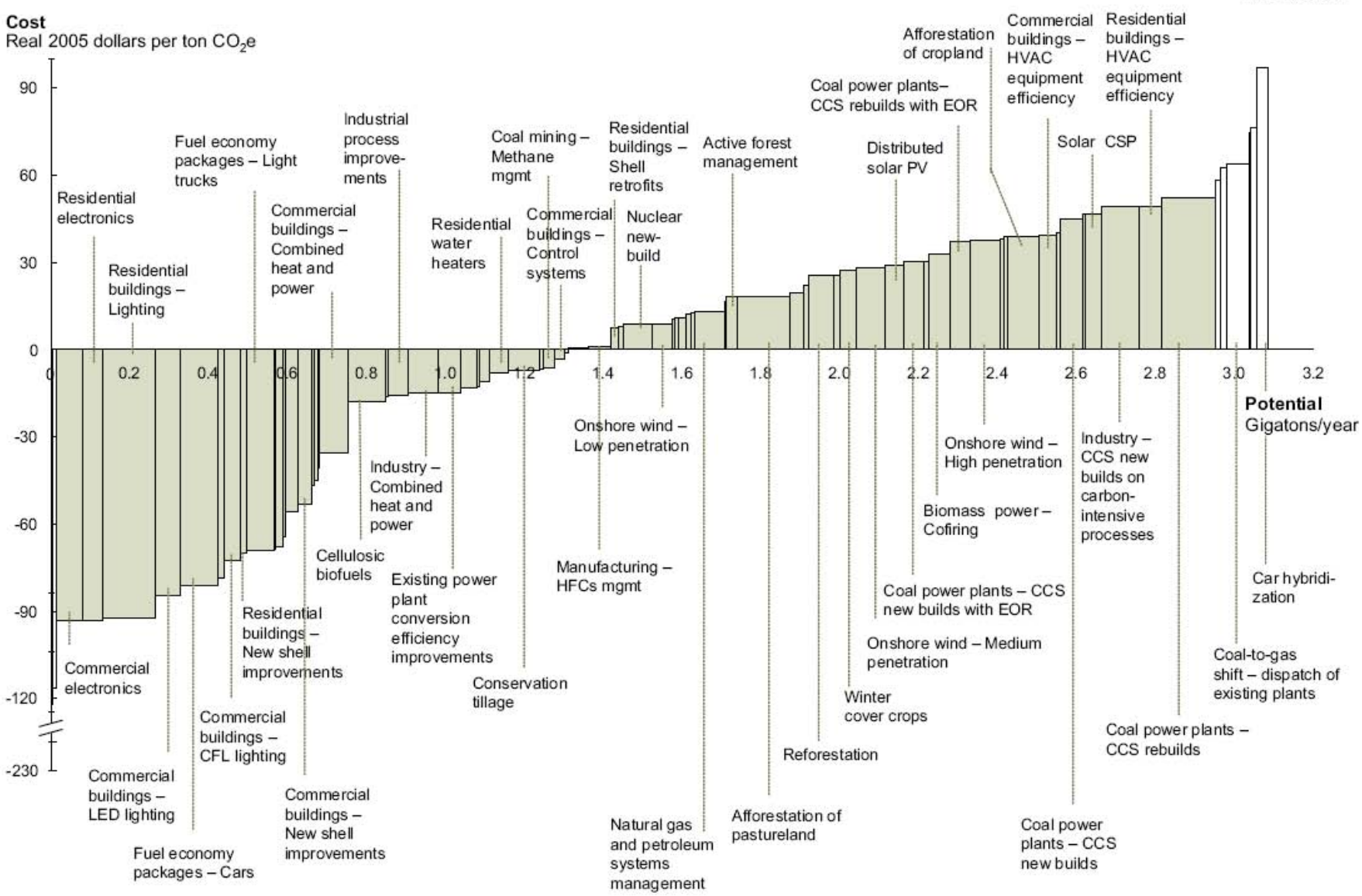
- Mitigation costs around 1% p.a. worldwide
- Mitigation fully consistent the aspirations for growth and development in poor and rich countries.
- **Business as usual is not.**
- Costs will not be evenly distributed:
  - Competitiveness
  - New markets will be created
- Mitigation policy and potential win-wins:
  - energy - air quality, energy security and energy access
  - forestry - watershed protection, biodiversity, rural livelihoods

Illustrative Distribution of Emission Savings by Technology



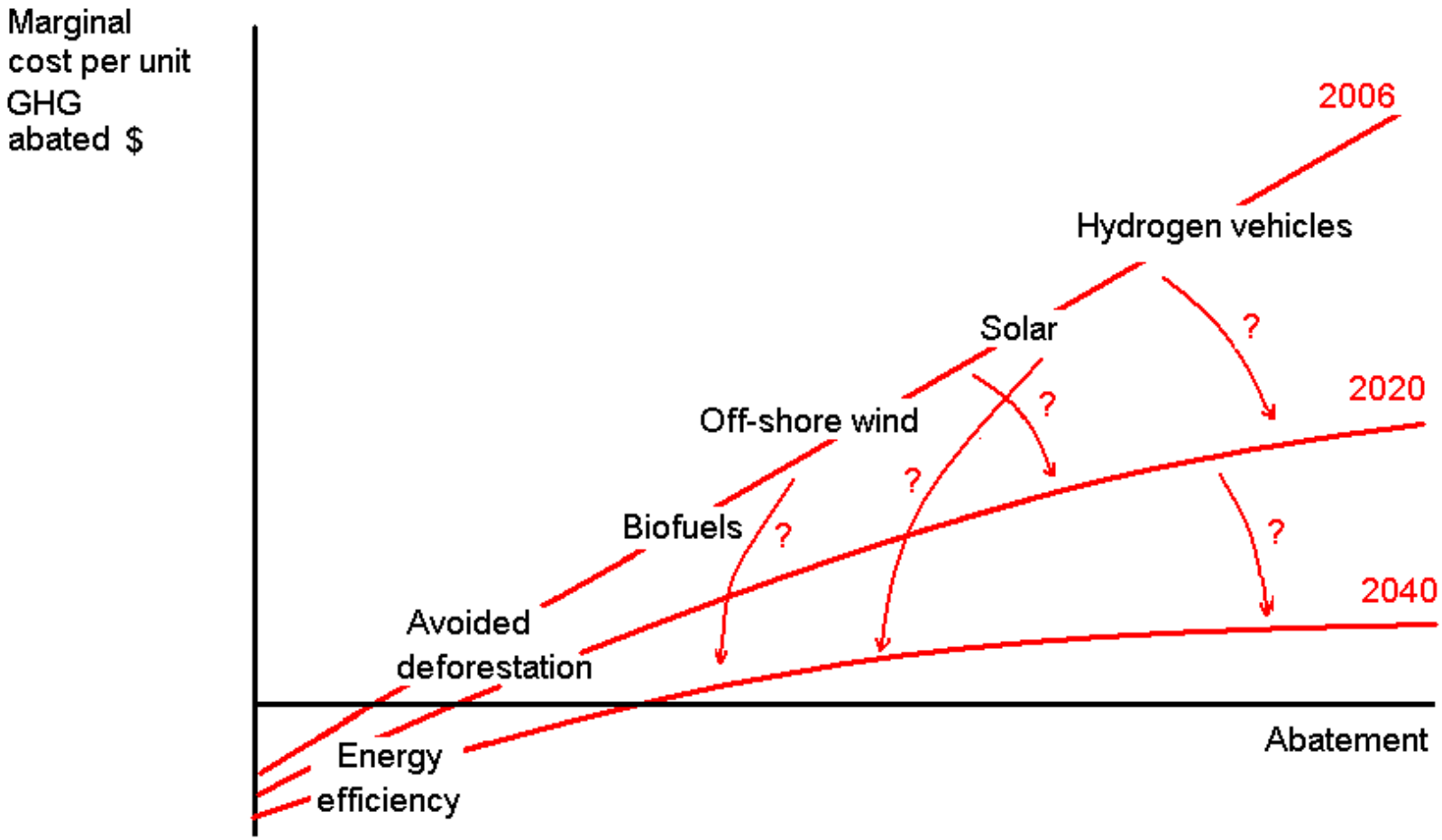


If we act now, the economic benefits from efficiency could pay for necessary supply-side measures



Source: McKinsey

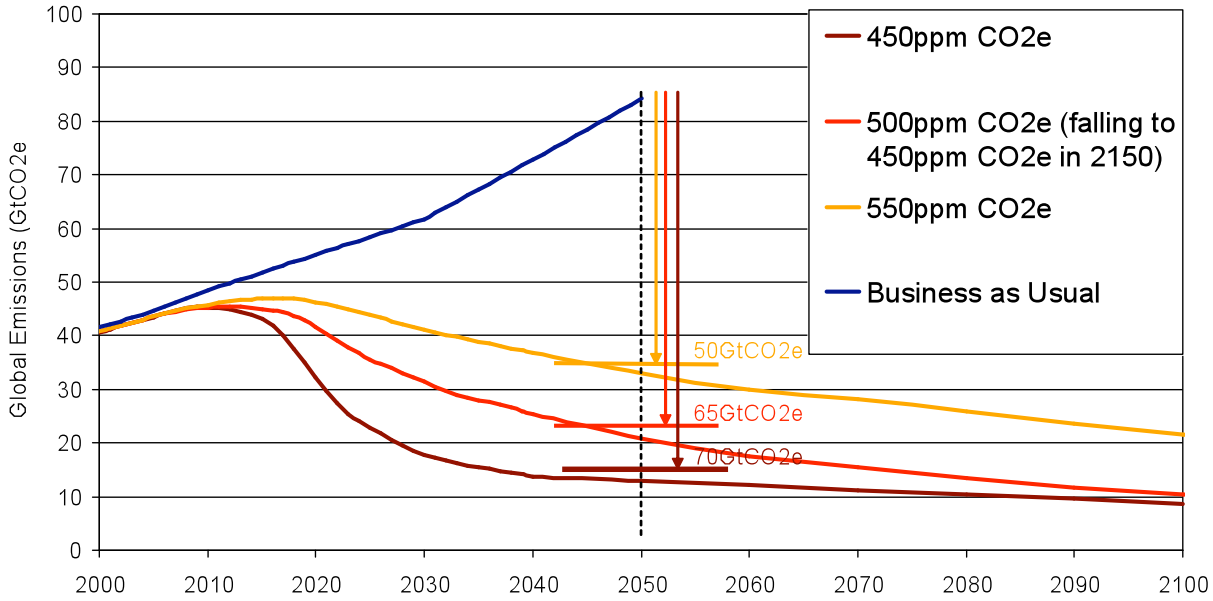
Illustrative Marginal Abatement Option Cost Curve



Target: stocks, history, flows

- **US and the EU** countries accounted for over half of cumulative global emissions from 1900 to 2005
- Total current emissions: **40-45 GtCO2e p.a**.
- **50% reduction by 2050** implies 20-25 Gt, which means per capita global GHG emissions of 2-3T /capita (20-25 Gt divided by 9 billion population)
- Currently **US ~ 20+, Europe ~10+, China ~5+, India ~2**+ T/capita
- Thus 80% reductions would bring Europe, but not US, down to world average. Many developing countries would have to cut strongly too if world average of **2-3 T/capita is to be achieved**

Delaying mitigation is dangerous and costly



Stabilising below 450ppm CO_2e would require emissions to peak by 2010 with **6-10% p.a**. decline thereafter

If emissions peak in 2020, we can stabilise below 550ppm CO_2e if we achieve annual declines of **1 – 2.5% afterwards**.

A **10 year delay** almost doubles the annual rate of decline required

Structure of the presentation

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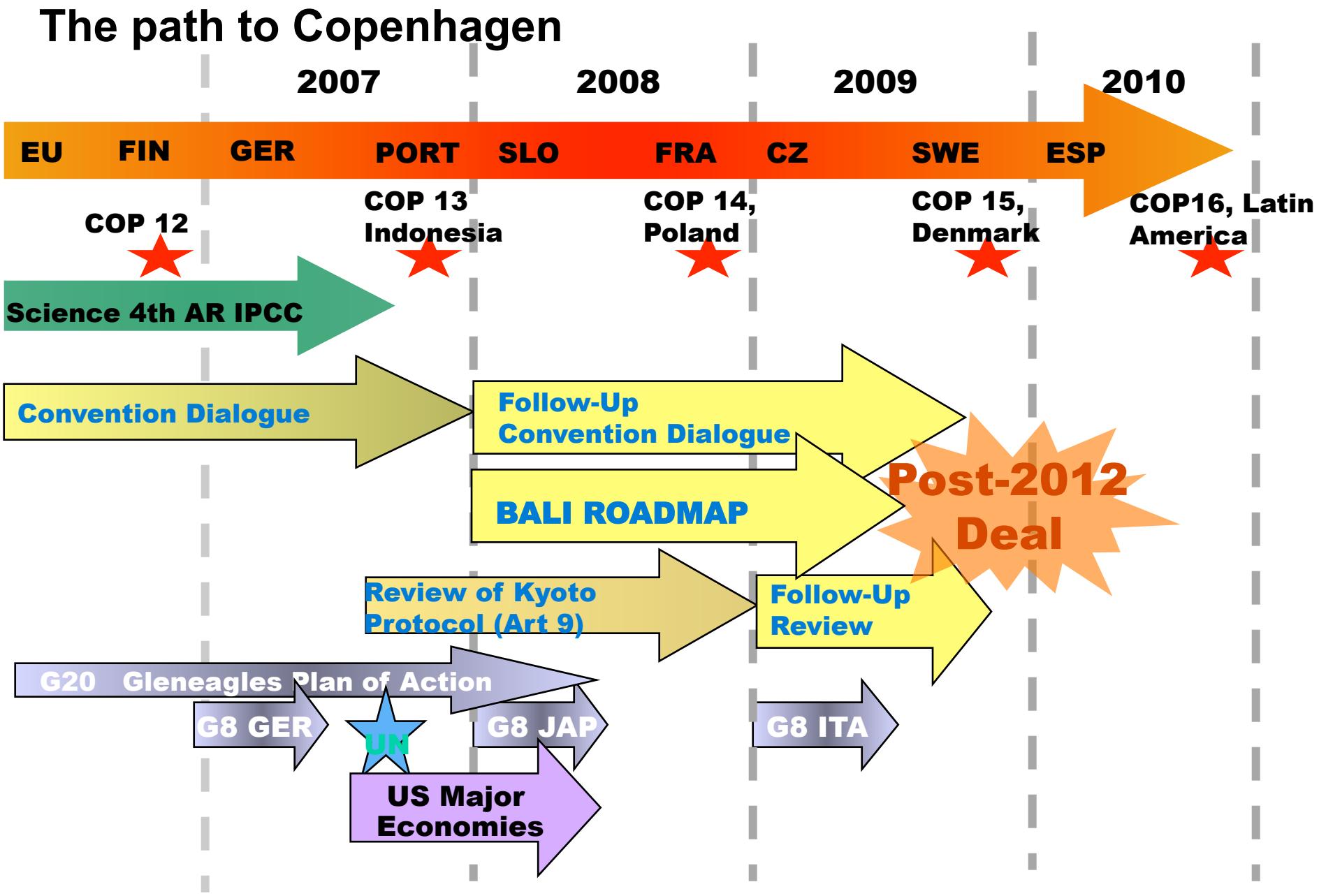
Four Policy principles

- **Pricing the externality**- carbon pricing via tax or trading
- **Bringing forward lower carbon technology**- research, development and deployment
- **Overcoming information barriers and transaction costs**– regulation, standards
- Promoting a **shared understanding** of responsible behaviour across all societies – beyond sticks and carrots


The path to Copenhagen
2007
2008
2009
2010
EU
FIN
GER
PORT
SLO
FRA
CZ
SWE
ESP
COP 12
COP 13
Indonesia
COP 14,
Poland
COP 15,
Denmark
COP16, Latin
America
Science 4th AR IPCC
Convention Dialogue
Follow-Up
Convention Dialogue
BALI ROADMAP
Post-2012
Deal
Review of Kyoto
Protocol (Art 9)
Follow-Up
Review
G20 Gleneagles Plan of Action
G8 GER
UN
G8 JAP
G8 ITA
US Major
Economies


united nations
climate change conference

Bracketing text

- ‘The Parties [are urged to] [shall] [must] [should] [may] submit their reports to the Secretariat [before] [no later than] [January 1, 2005] [June 30, 2005] [the Xth session of the Subsidiary Bodies].’
- Text adopted once brackets are cleared.

Key elements of a global deal

Targets and Trade

- Confirm Heiligendamm 50% cuts in world emissions by 2050 with rich country cuts at least 75%
- trading schemes **open to trade with other countries, with special supply side from developing countries**
- Funding schemes for **deforestation, CCS, ODA**
- **incentives for developing countries** to play strong role in global deal, eventually taking on **their own targets.**
- Main way forward: **domestic action**

Commitments: percentages

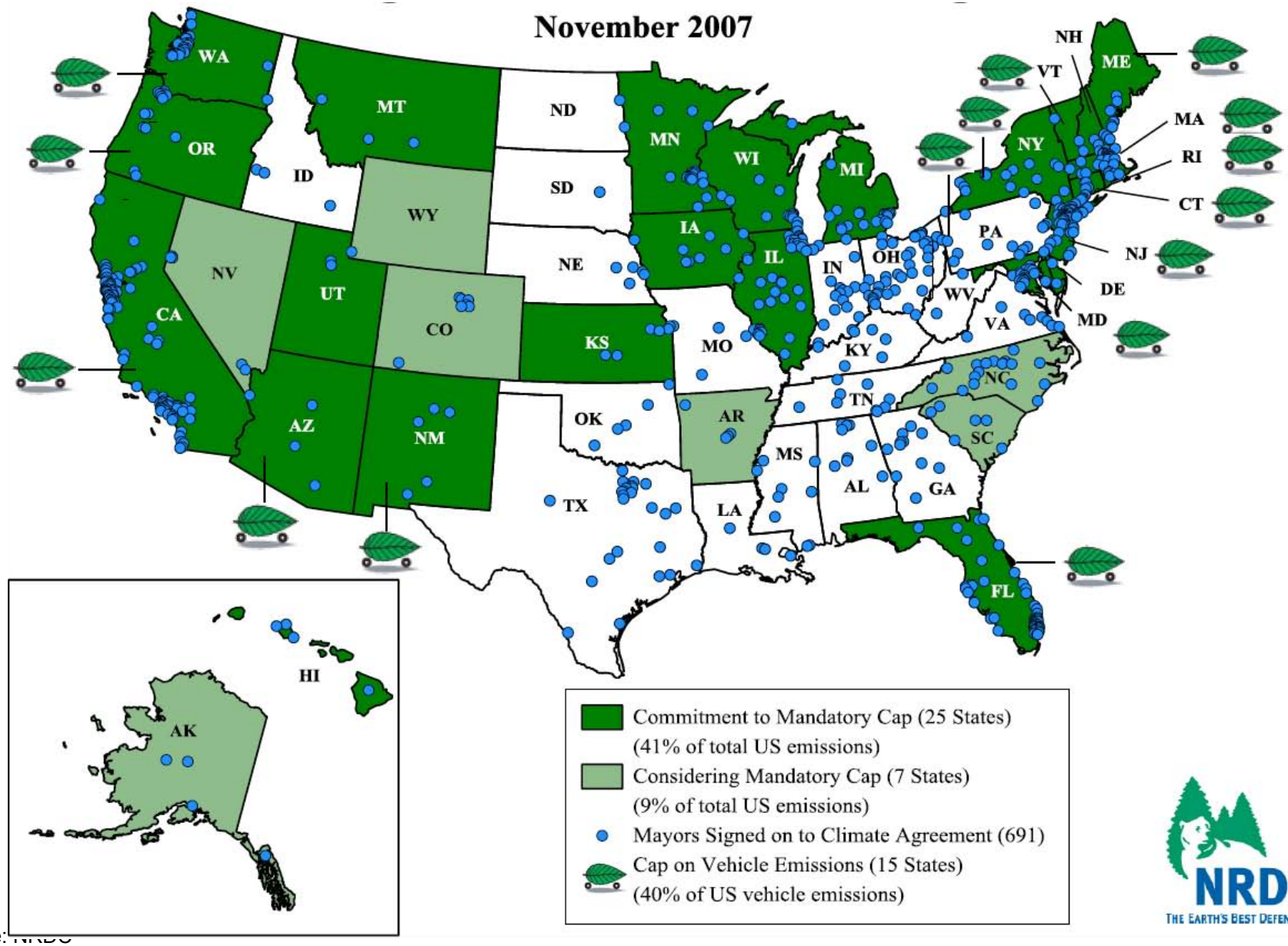
- G8 Heiligendamm – 50% by 2050 (consistent with stabilisation around 500ppm $C0_2e$)
- California (and US under most presidential candidates) - 80% from 1990 levels by 2050
- France – 75% by 2050 (Factor 4), relative to 1990
- EU Spring Council: 60-80% by 2050 and 20-30% by 2020, relative to 1990
- Germany – 40% by 2020, relative to 1990

Key issues of a global deal

Key Issues

- Regional deals vs global deal
- Potential for leakage
- Lock in of competitiveness positions
- Potential for trade war

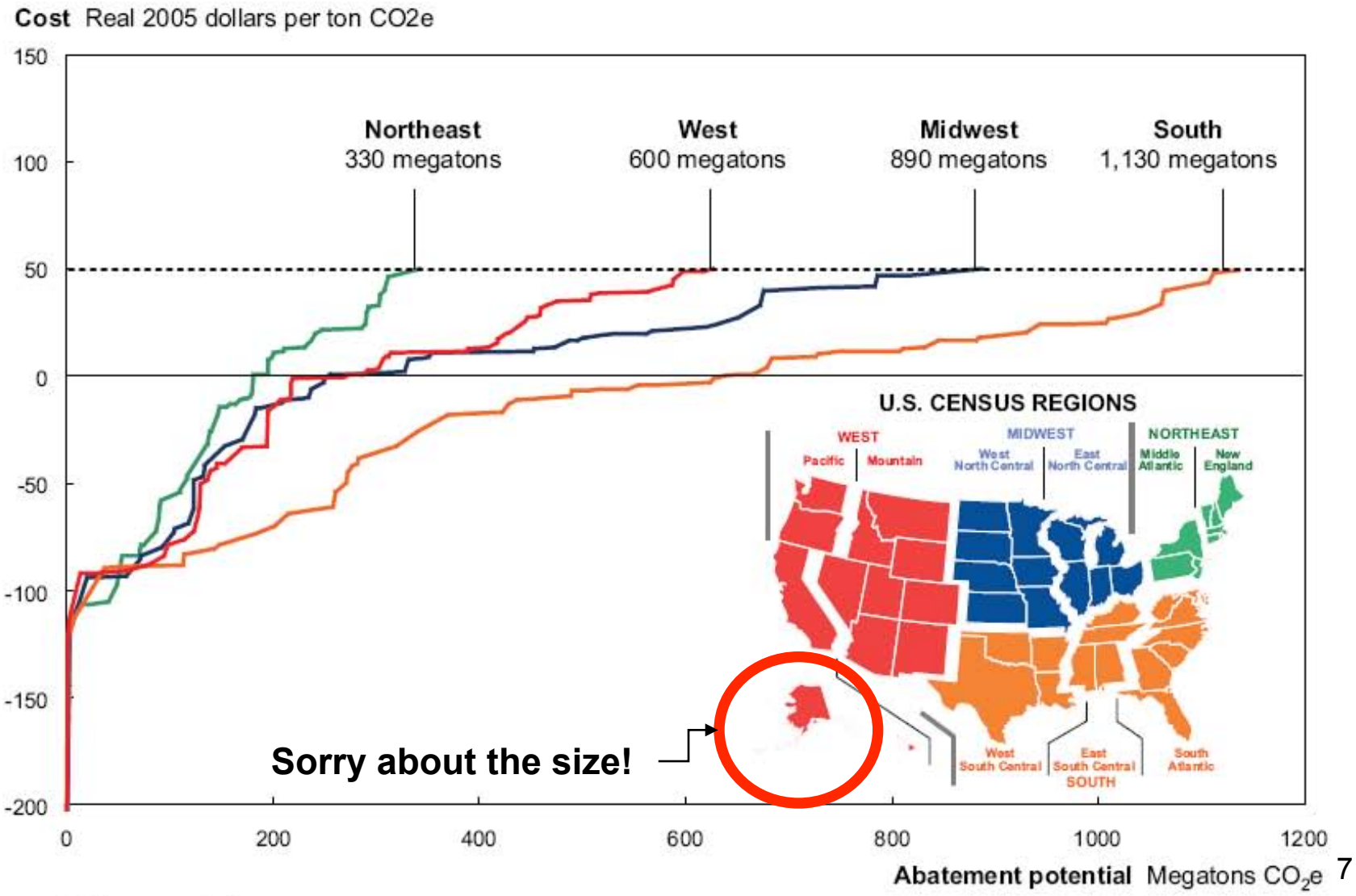
There is a rising tide for action to combat global warming within the US



NRDC
THE EARTH'S BEST DEFENSE

Source: NRDC

Potential varies by region: value of a federal system



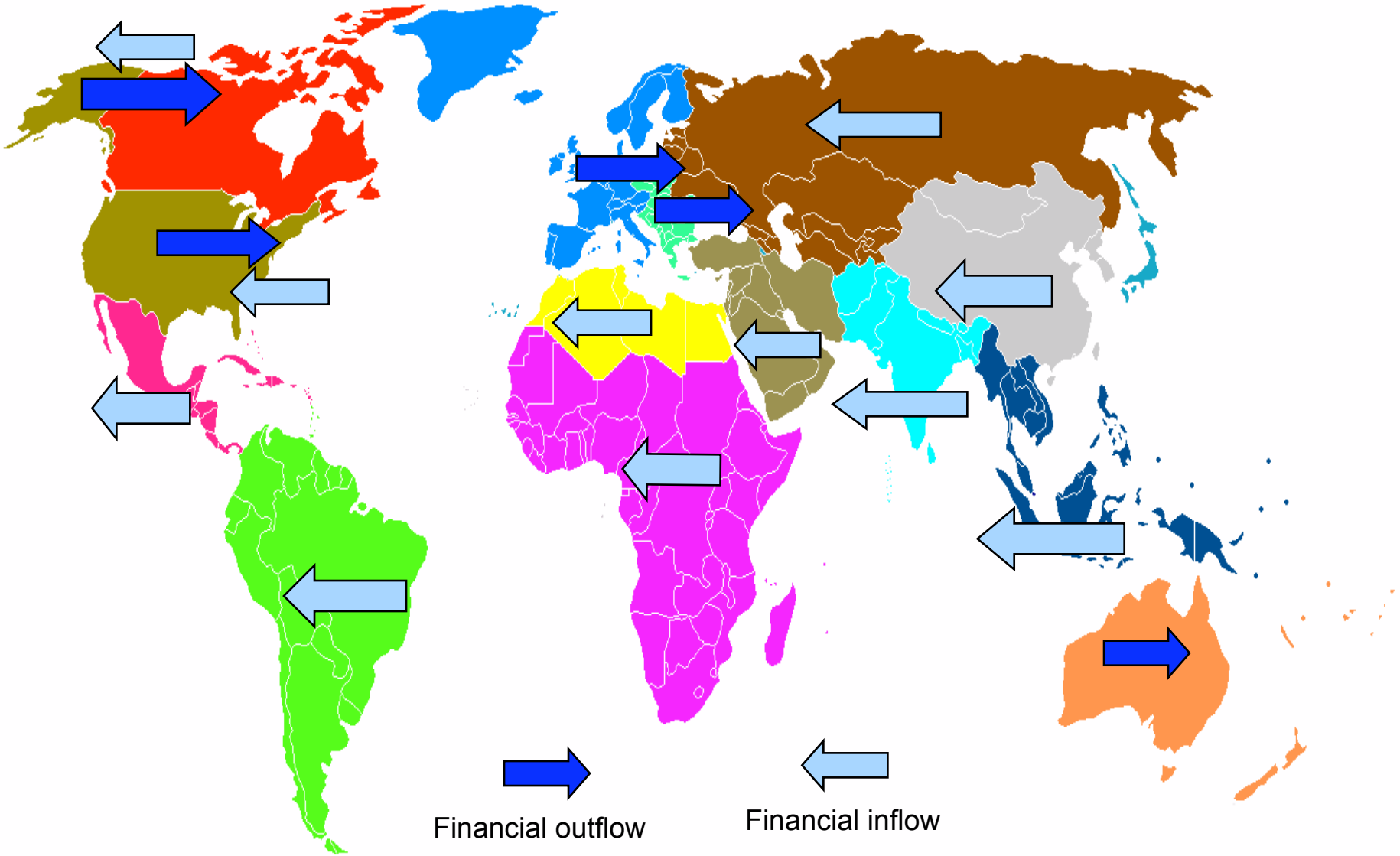
Source: McKinsey Analysis

Coal to gas switch potential in the US

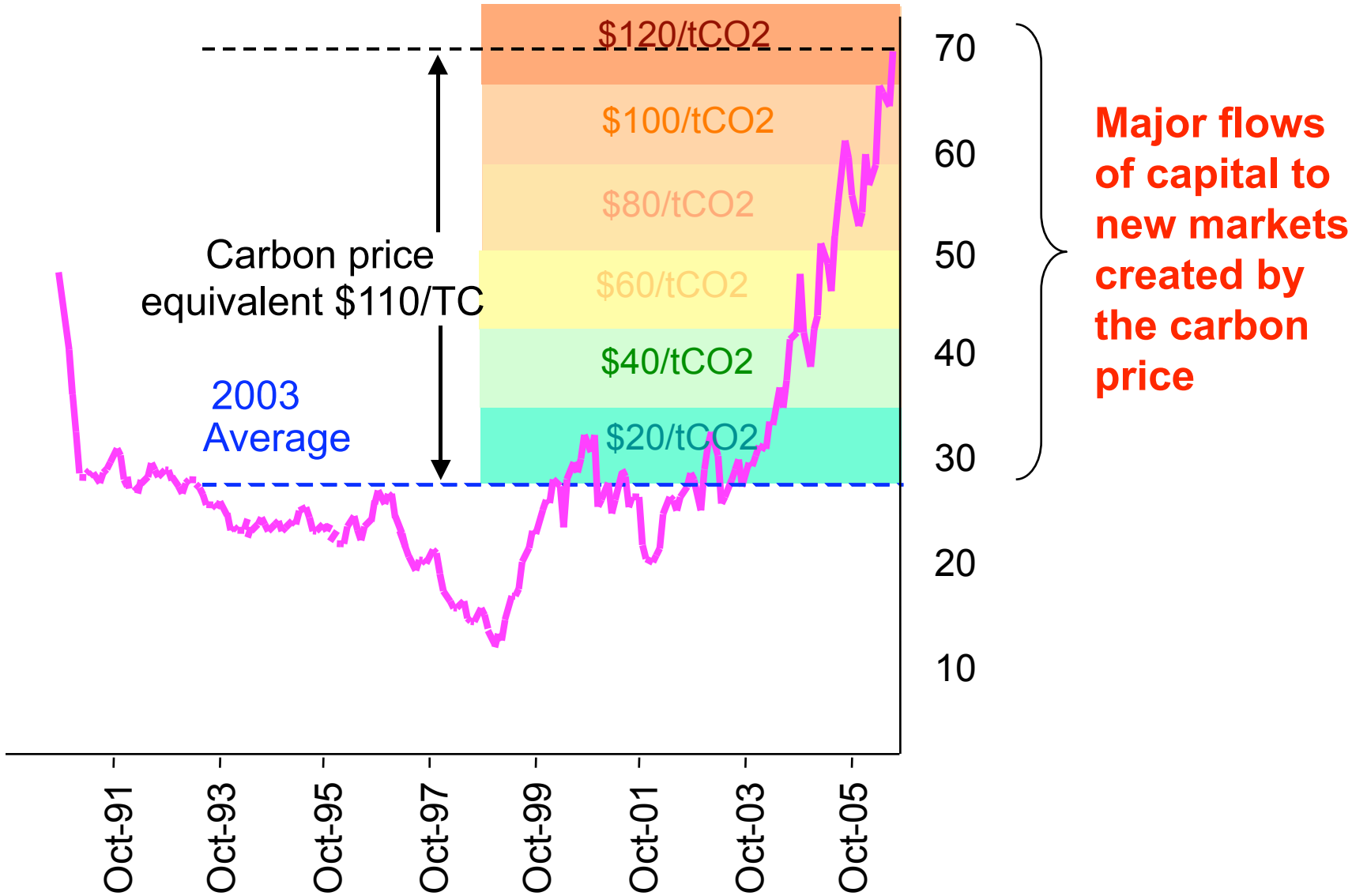
- **Coal accounts for 43% of power production in the US and ~ 60% of emissions** (which is currently ~ 1.5bn CO2 tonnes/year)
- **Gas fired power plants emit 45% less CO2 than coal fired ones** (same heat). Substantial gains from switching to clean coal.
- Under a cap and trade scheme, at a price of $50/tonne of CO2, the yearly liability of coal power plants is $75bn
- **Switching to gas would decrease the liability of 34bn/year . Clean coal would also create big savings in carbon fees.**

POTENTIAL OPORTUNITY FOR ALASKA?

GLOCAF model flows from 15 World Regions
Total flows ~ US$100bn/year



The recent rise in the Brent spot price, US $ per barrel (2003 prices)



Main conclusions:

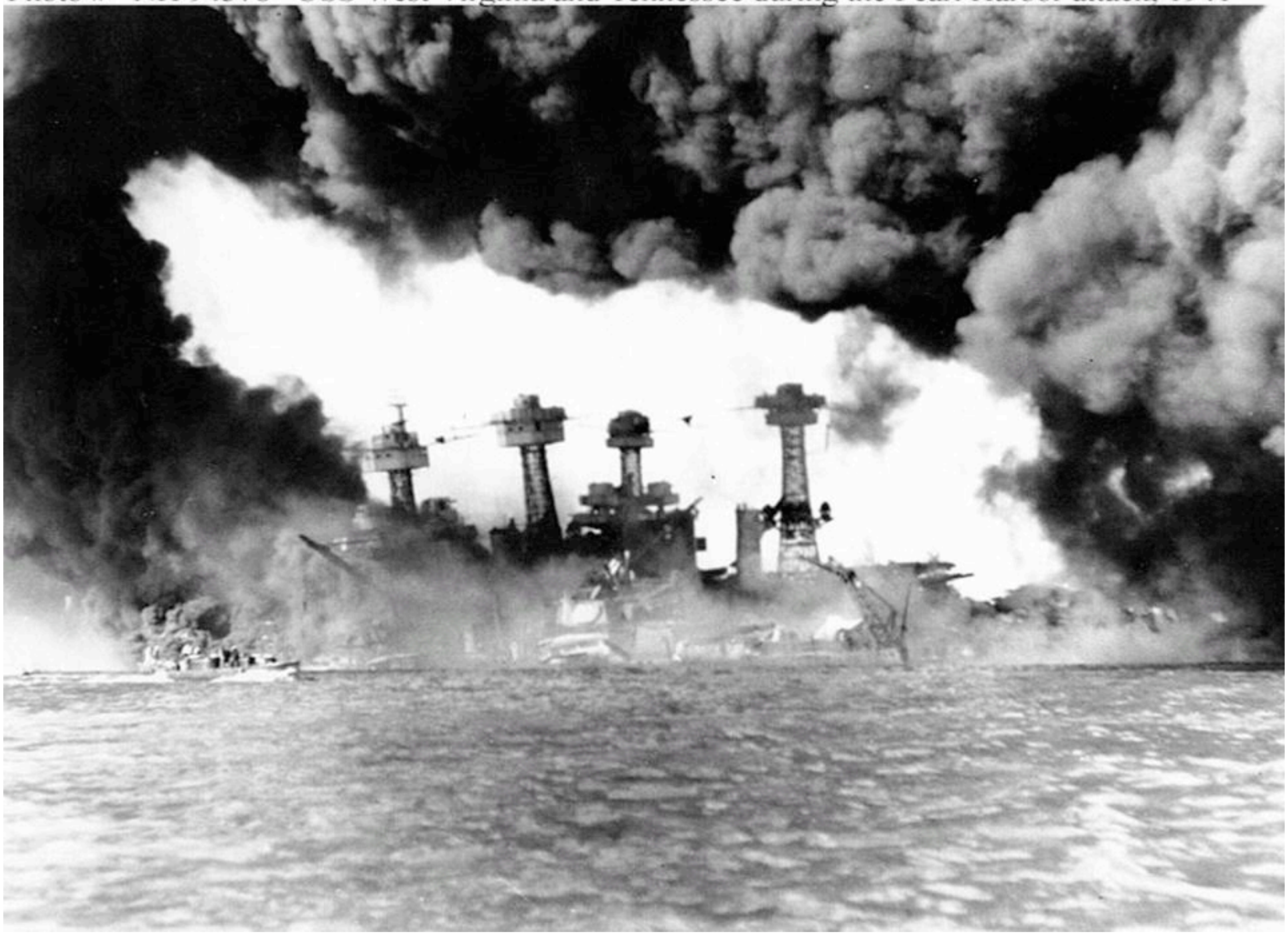
1. **Cost of inaction**: between 5 and 20% of GDP, now and forever
2. **Cost of action** to stabilize at 550ppm CO_2e: 1% of GDP in 2050
3. There is a **case for urgent action, waiting is costly**
4. **Carbon market + technology policy + shared understanding**
5. A global deal based on markets and incentives is **desirable** and offers **opportunities. It won't stop the world economy.**

“No matter what happens, the US Navy is not going to be caught napping”

Frank Knox, U.S. Secretary of the Navy

4th December 1941

Photo # NH 94378 USS West Virginia and Tennessee during the Pearl Harbor attack, 1941



www.sternreview.org.uk