Oregon Global Warming Commission

Portland May 27 2008

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British Consulate General

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. Winners and losers, but the impact on competitiveness is limited
6. A global deal based on effectiveness, efficiency and equity

Structure of the presentation

- Cost of inaction – risk, uncertainty and ethics
- Cost of action – cost of mitigation and competitiveness
- Towards a global deal?

How to estimate cost of inaction

Analytic foundations:

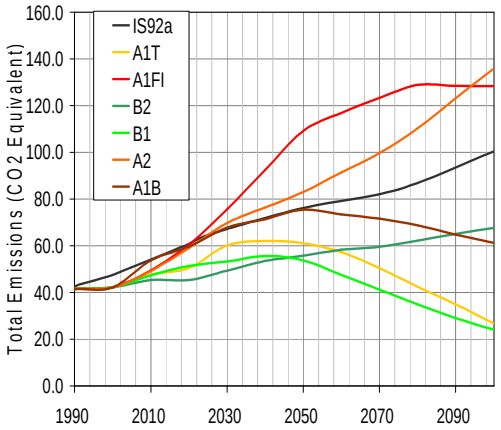
Climate change is an externality with a difference:

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

Hence key roles in the analysis of:

- Economics of Risk
- Ethics

Working with Uncertainty



Population, technology, production, consumption

Emissions

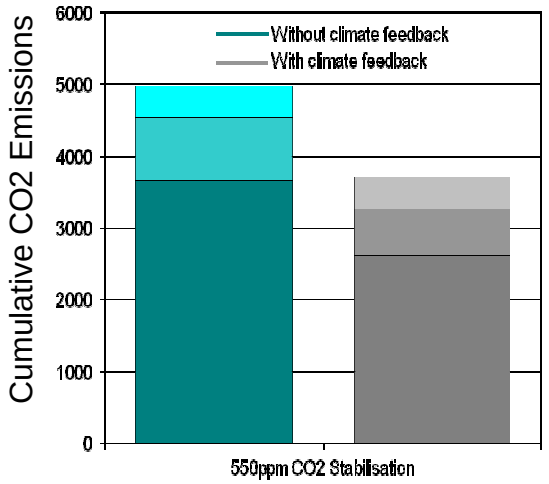
Atmospheric concentrations

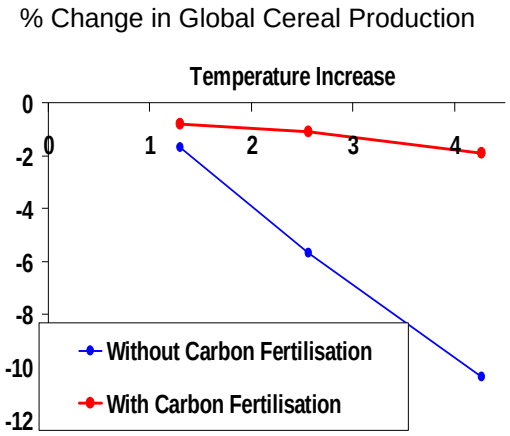
Radiative forcing

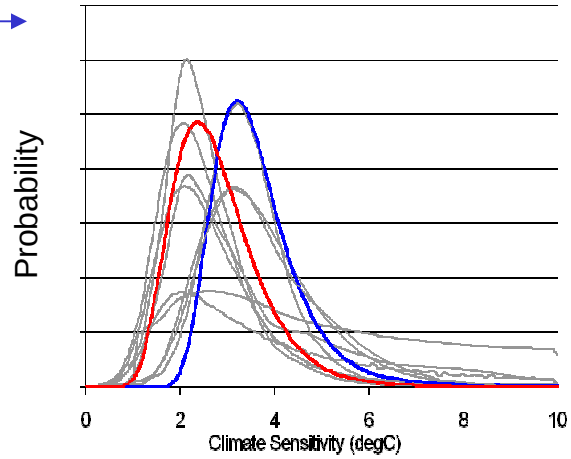
Temperature rise and global climate change

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

Socio-economic impacts



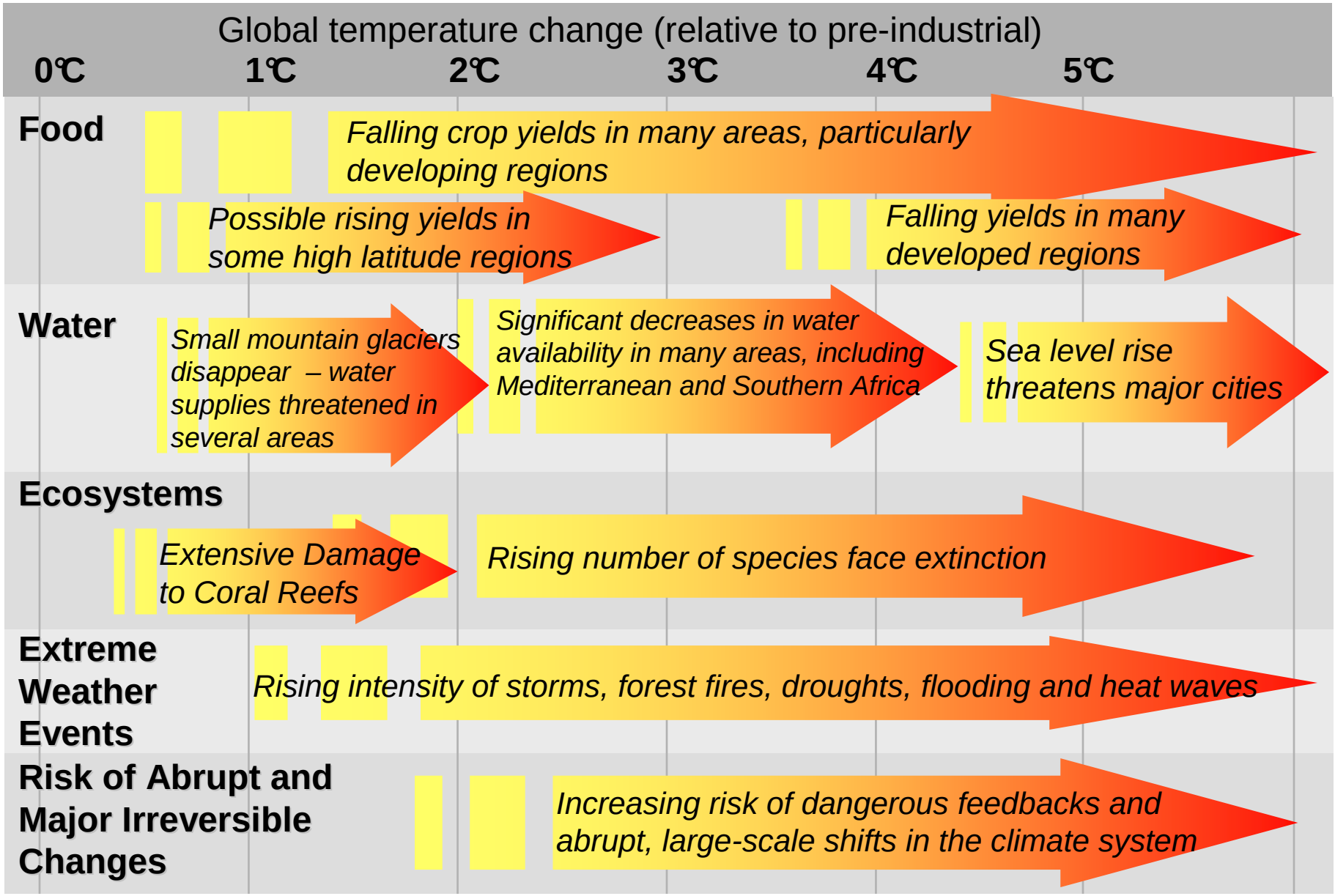




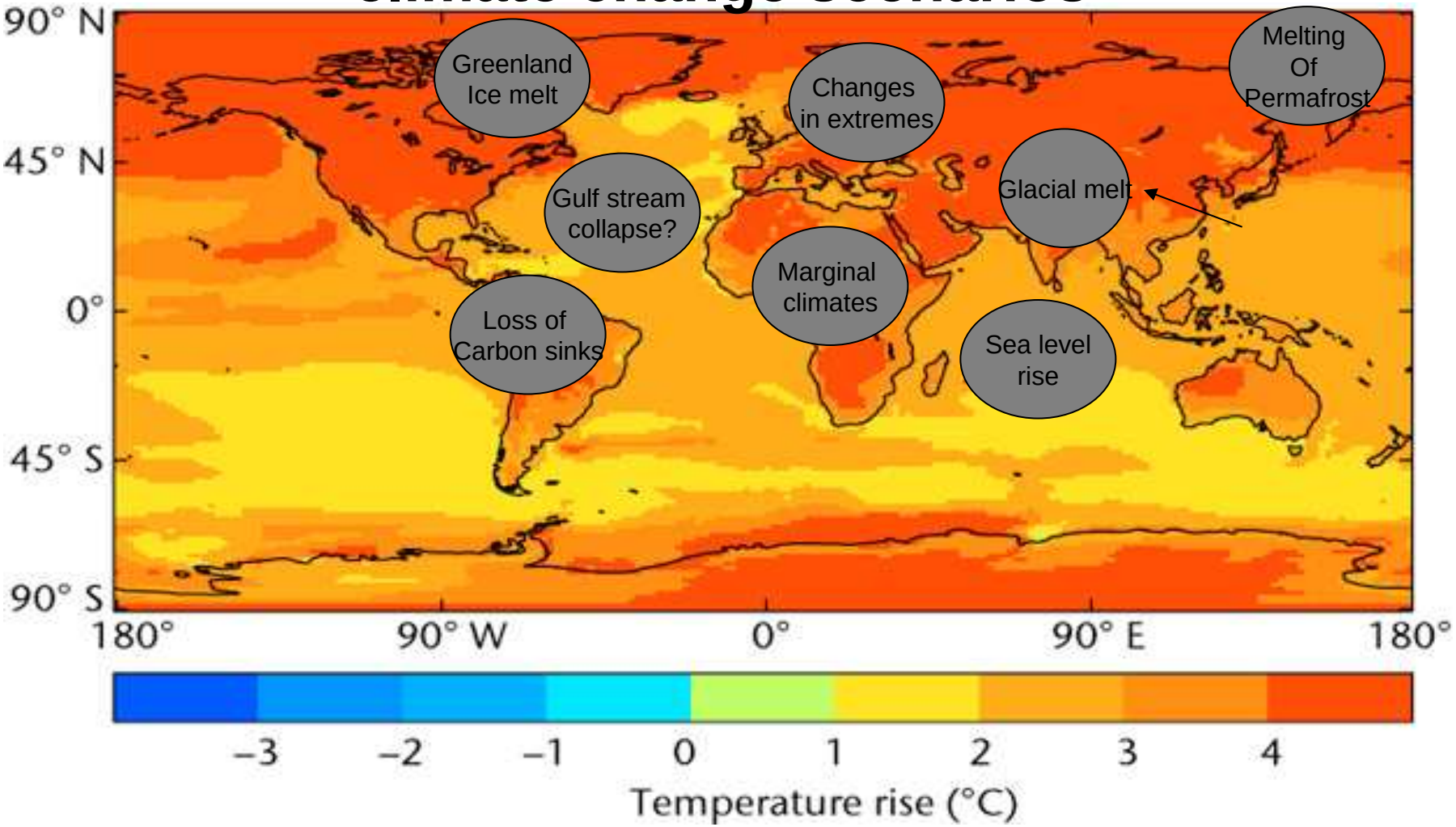
Uncertainty, risk and action

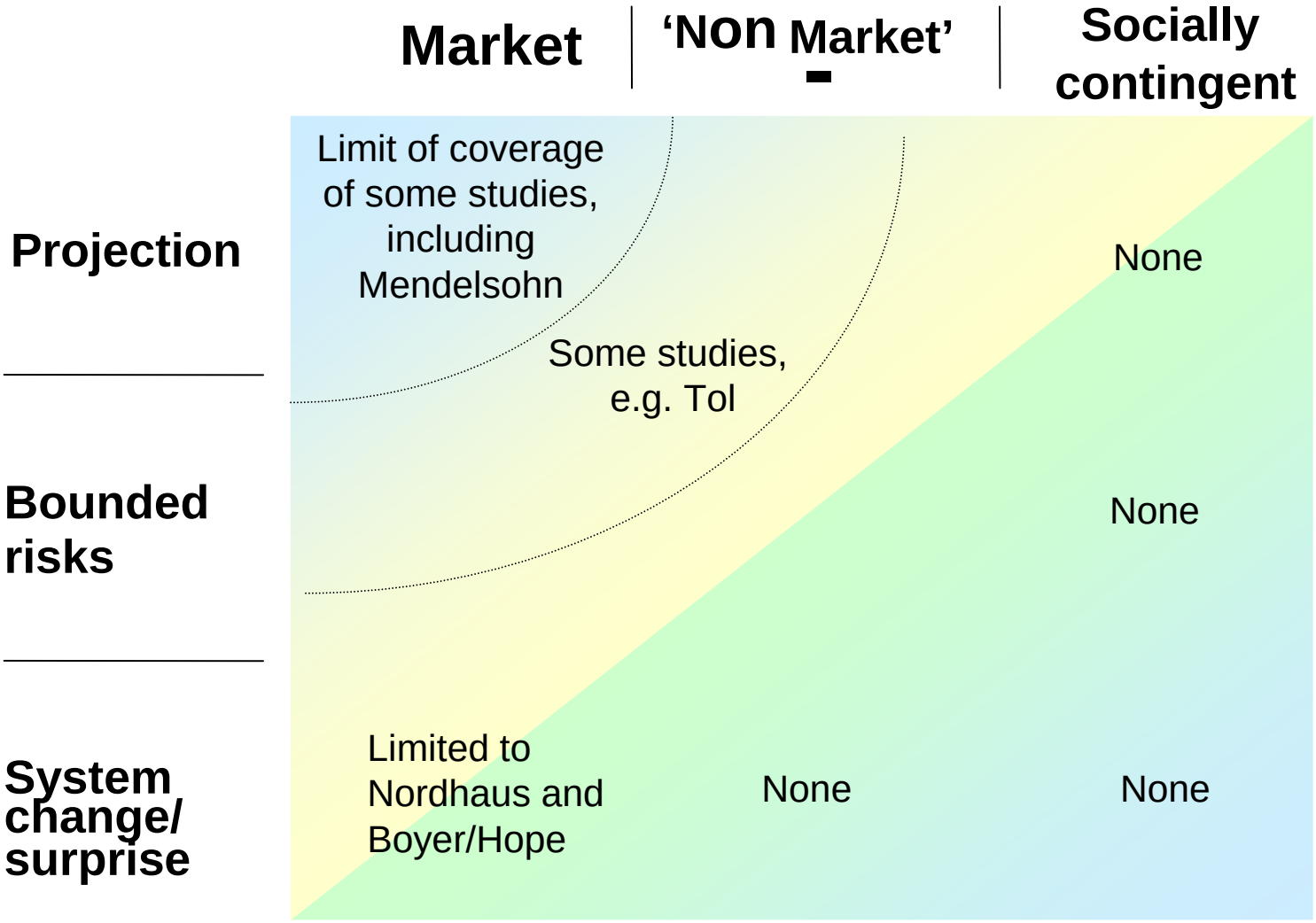
- **Uncertainty does not excuse inaction**
- When stakes are large, decisions are taken under uncertainty, and **insurance** is obtained
- Example of large scale insurance:
  - Nuclear technology for power sector (Price Anderson Act)
  - Avian Flu ($2 billion worth of Tamilflu in the US)
  - Defence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

Projected Impacts of Climate Change



Impacts of climate change: *The sting is in the tail*…possible severe climate change scenarios





Models only have partial coverage of impacts

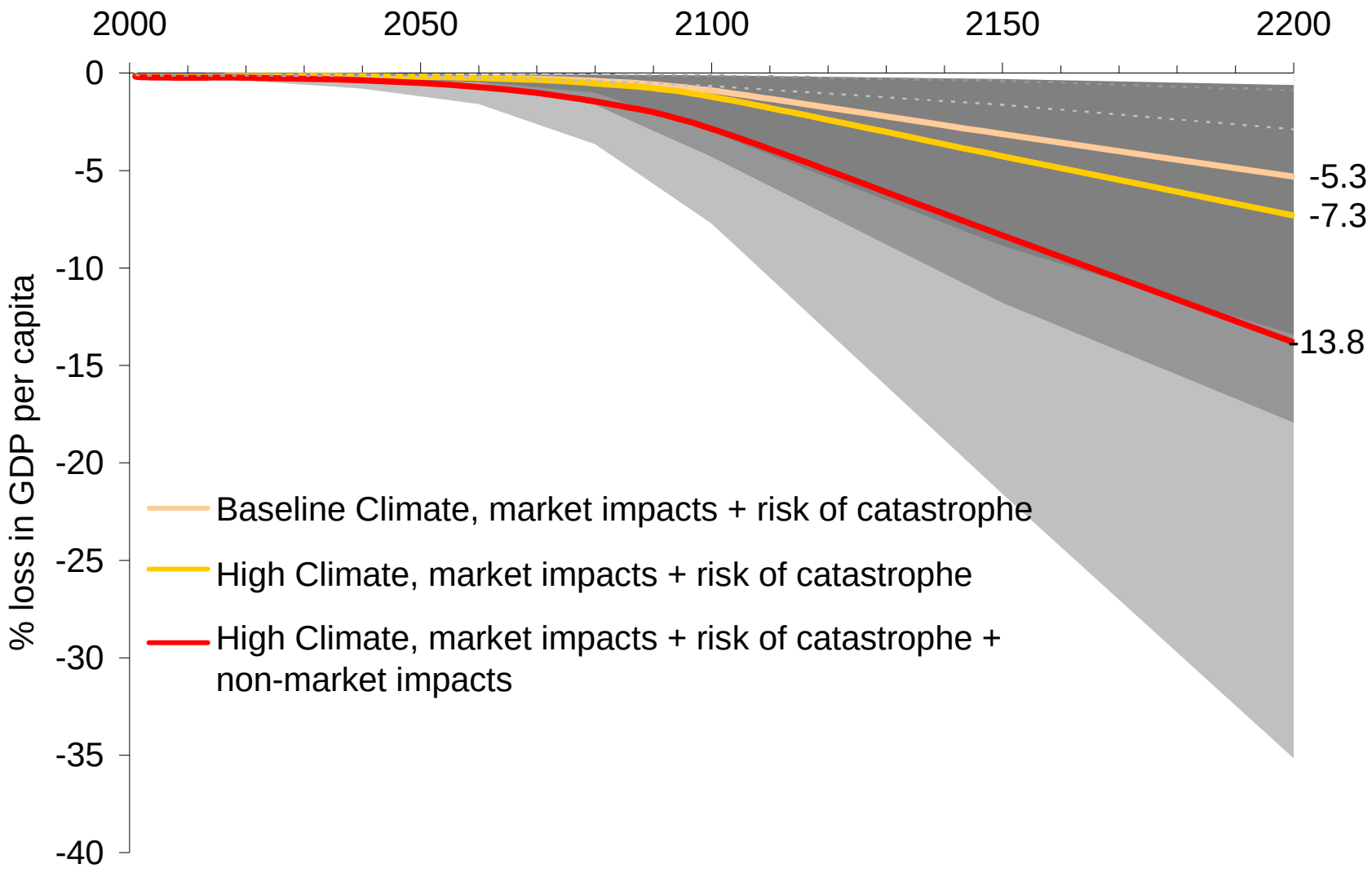
Values in the literature are a sub-total of impacts

Source: Watkiss, Downing *et al*. (2005)

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**

Damages


2000
2050
2100
2150
2200
0
-5
-10
-15
-20
-25
-30
-35
-40
% loss in GDP per capita
-5.3
-7.3
-13.8
Baseline Climate, market impacts + risk of catastrophe
High Climate, market impacts + risk of catastrophe
High Climate, market impacts + risk of catastrophe + non-market impacts

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

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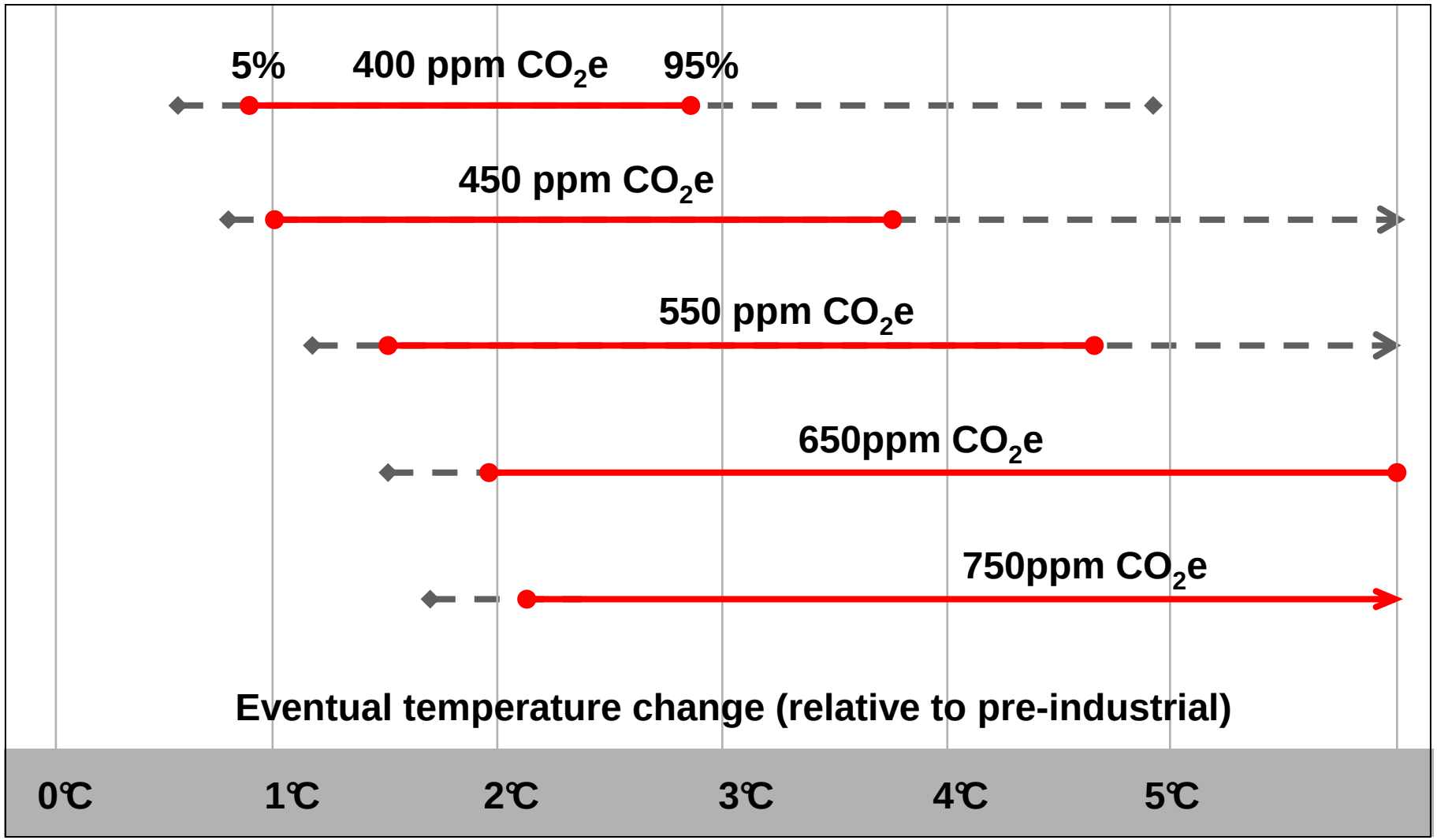
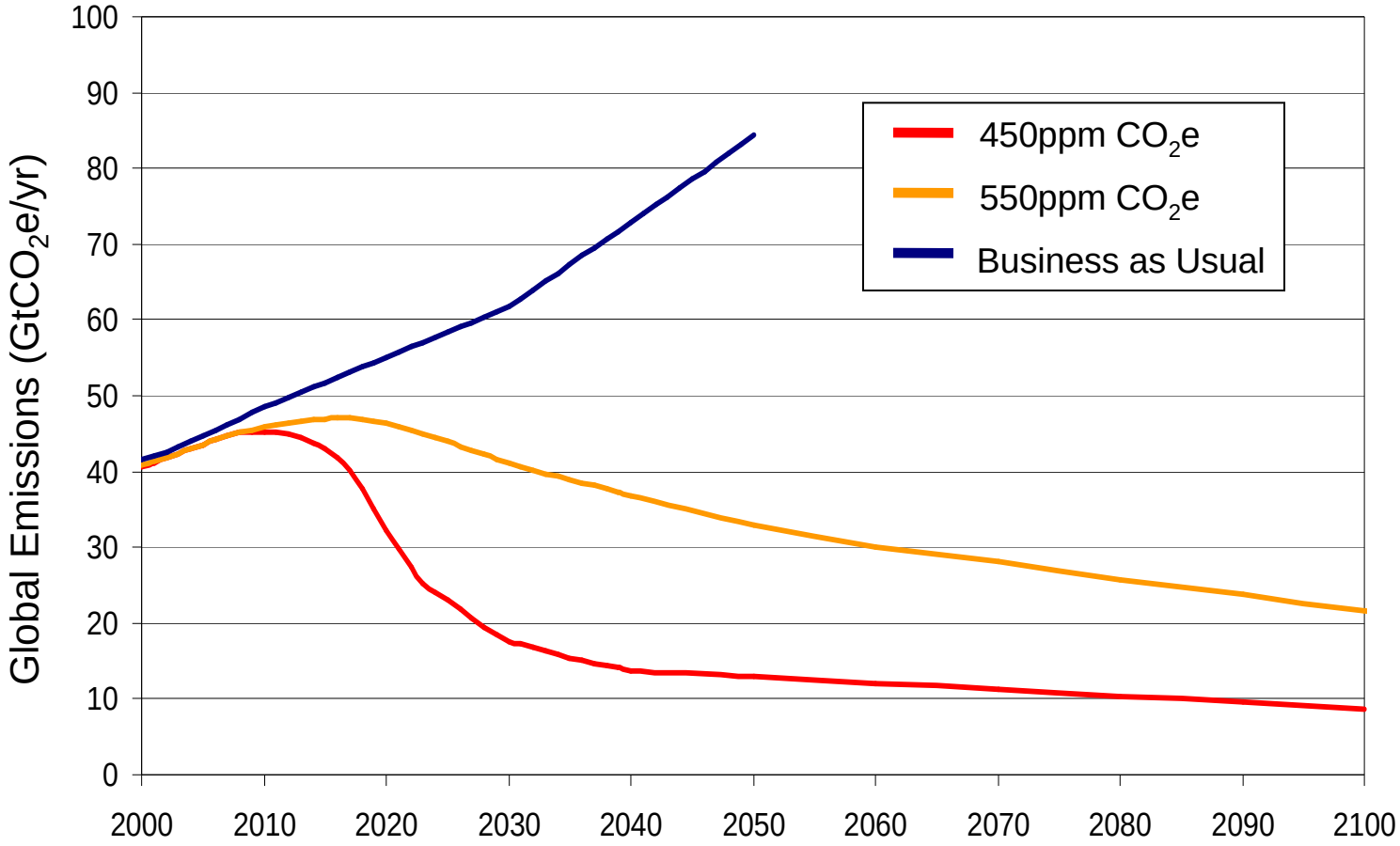
Stabilisation and Commitment to Warming



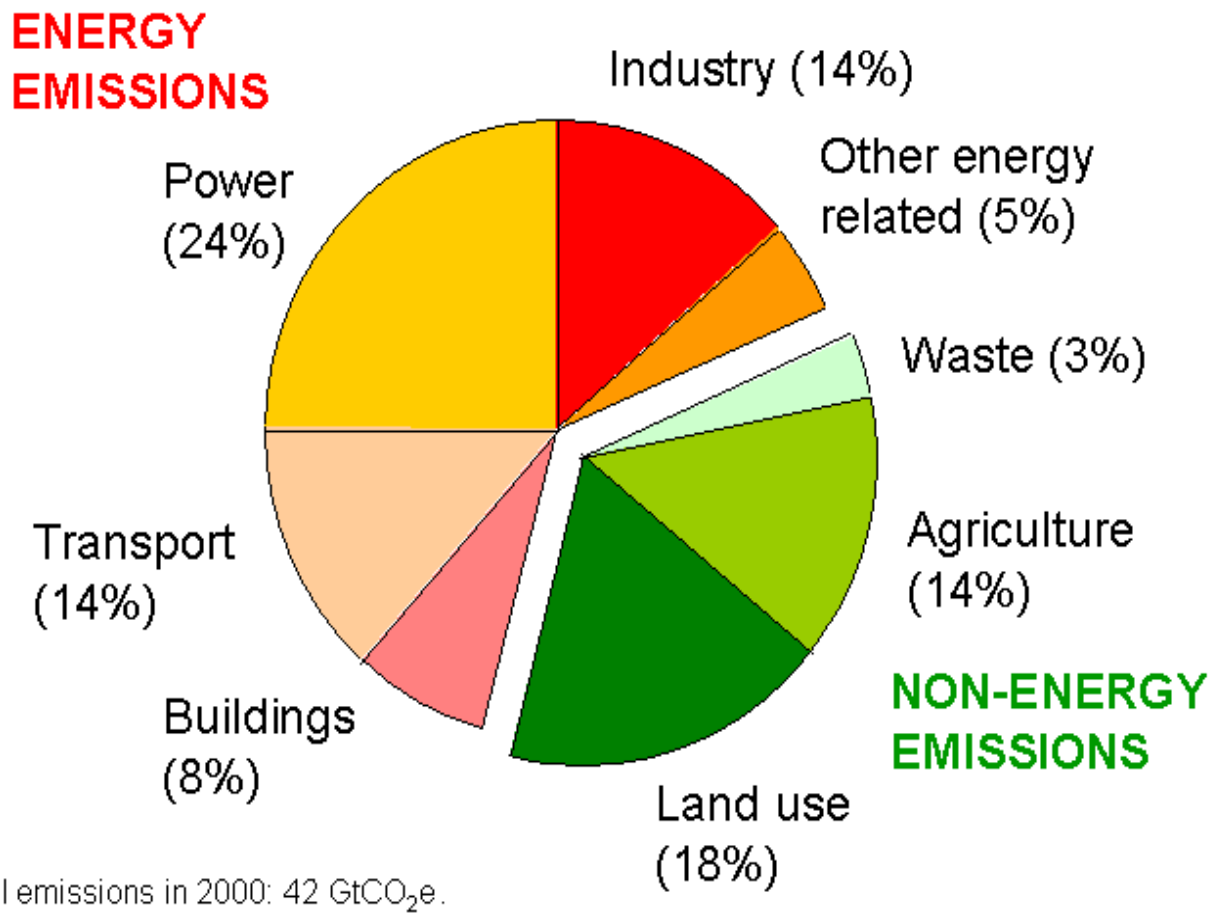
Emissions Paths to Stabilisation



Growth, change and opportunity

- Mitigation costs around 1% GDP worldwide in 2050
- Mitigation fully consistent the aspirations for growth and development in poor and rich countries.
- **Business as usual is not consistent with growth.**
- Costs short term impact and long term eq.:
  - Competitiveness
  - New markets will be created
  - Risks and opportunities
- Mitigation policy and potential win-wins:
  - energy - air quality, energy security and energy access
  - forestry - watershed protection, biodiversity, rural livelihoods

Global Emissions by Sector



Total emissions in 2000: 42 $GtCO_2e$.

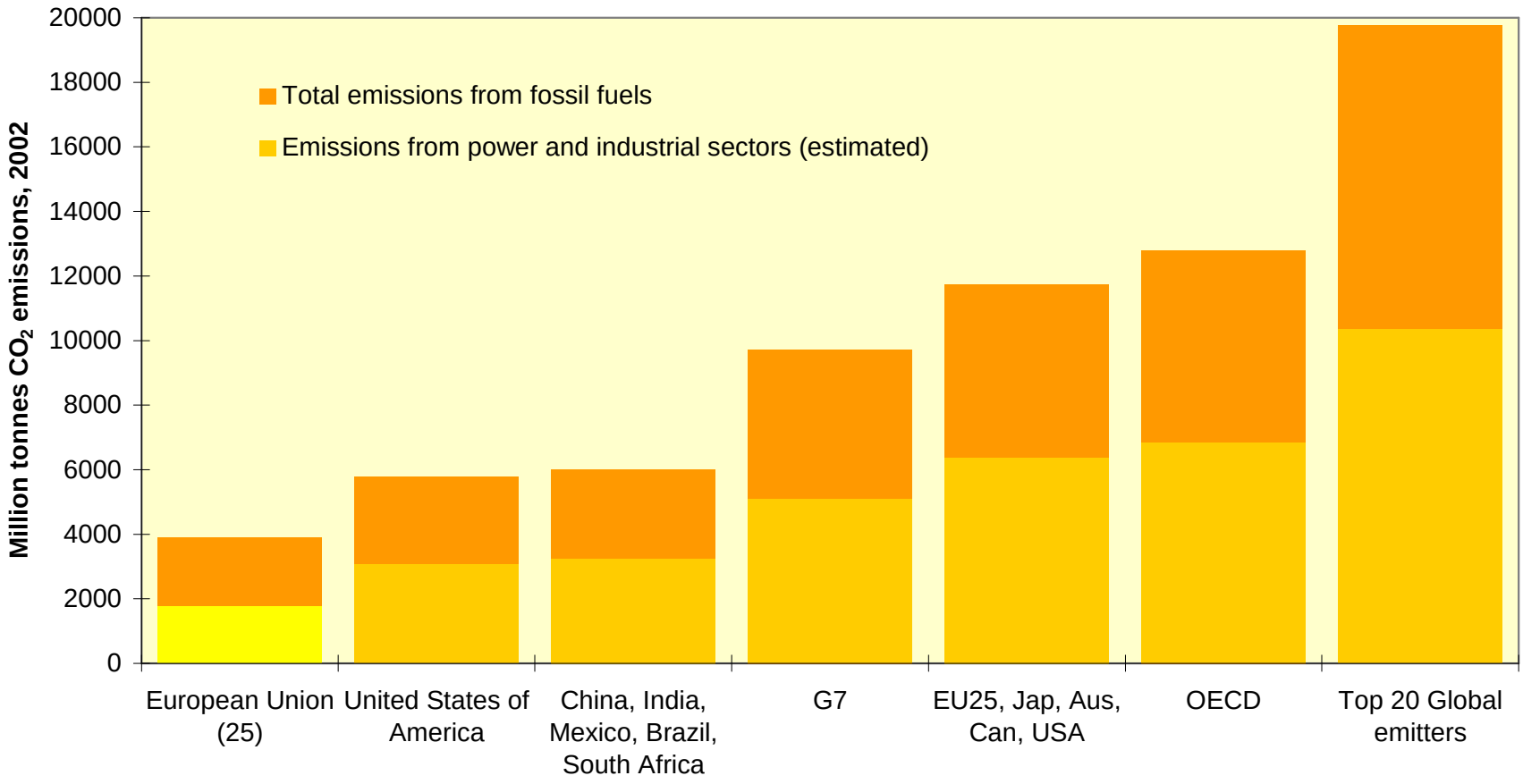
- reduce demand;
- improve efficiency;
- use lower-carbon technologies;
- tackle non-energy emissions.

Mitigation demands a strong policy framework

Key Recommendations:

- Establish a carbon price

Potential Emissions Markets from Power and Industrial Sectors

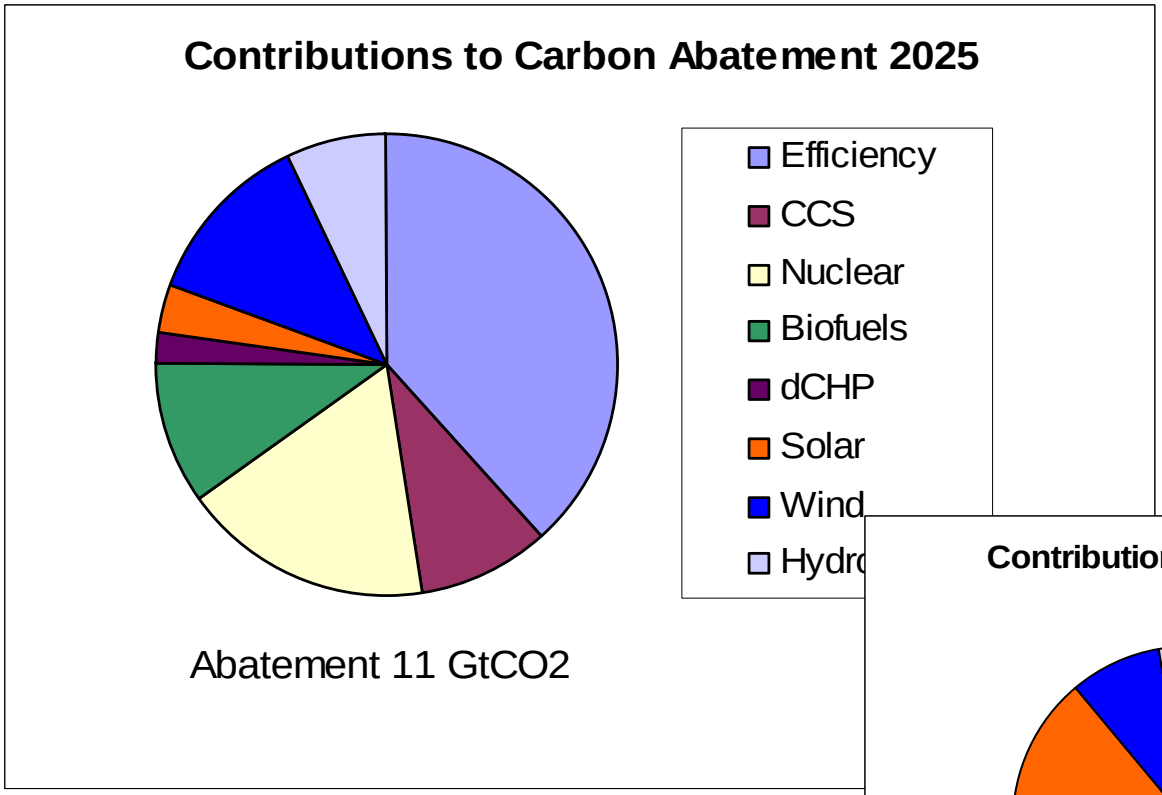


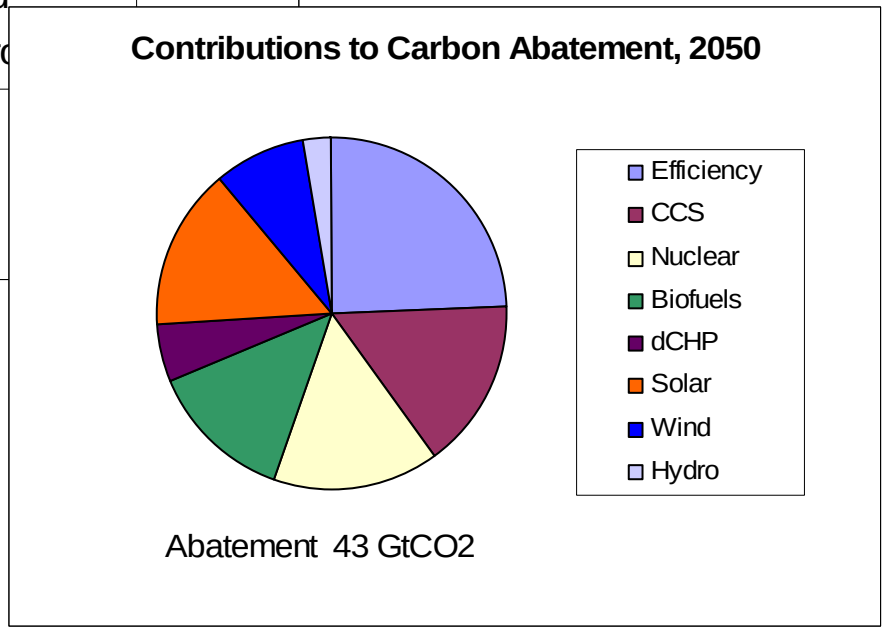
Mitigation demands a strong policy framework

Key recommendations:

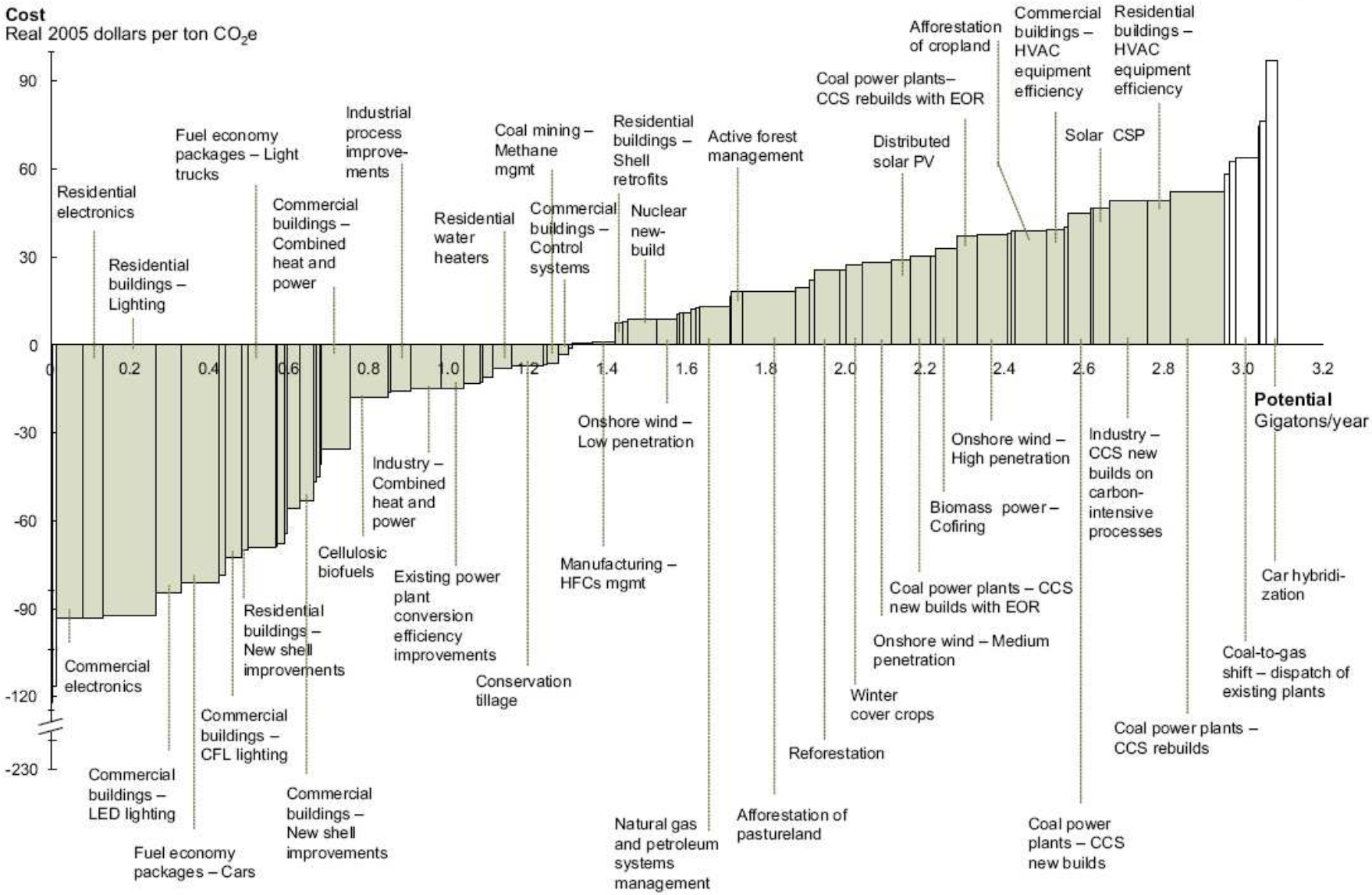
- Establish a carbon price
- Support technological development and research
    - Increase in R&D funding
    - Product standards
    - Share learning
- Remove the barriers to behavioural change

The distribution of emission savings by technology





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



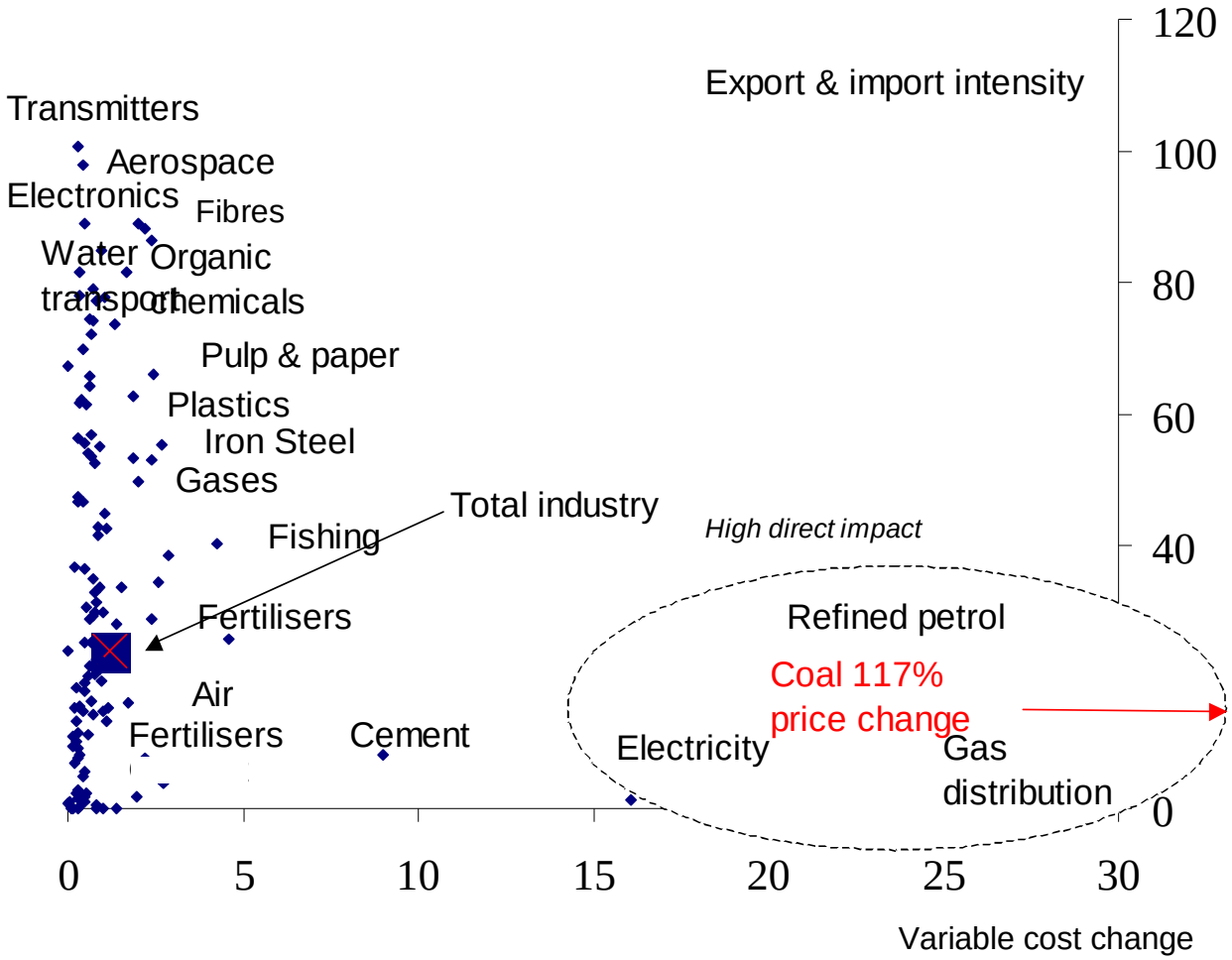
Source: McKinsey

Whole-economy competitiveness

- Energy-intensive industries account for a **small proportion of UK output** (and falling)
- Illustrative carbon price **$30/tCO2** applied
- Only the **19 (out of 123)** most carbon intensive UK sectors (account for < 5% of total output) would see variable costs **increase of more than 2%**
- Only 6 would undergo an increase of 5%+:
  - Gas supply and distribution (28%);
  - Refined petroleum (24%);
  - Electricity production and distribution (19%);
  - Cement (9%);
  - Fertilisers (5%);
  - Fishing (5%)

Vulnerable industries

Price sensitivity and trade exposure, per cent



Export and import intensity is defined as exports of goods and services as a percentage of total supply of goods and services, plus imports of goods and services as a percentage of total demand for goods and services. Output is defined as gross, so the maximum value attainable is 200.

Workstream evidence competitiveness

Benefits from moving early/pushing for global deal

Opportunities

- **Opportunities** to set standards, technologies, regulation, markets
- Case study analysis: **early-moving** can gain market share:
  - Shell/BP; Toyota/Honda; GE all v carbon exposed
  - Developing world producers too - Wal Mart and China
  - New world wines
- **Losers shout louder….**

Financing opportunities

- Benefits from **selling credits**: CDMs, programmes, benchmarking
- Benefits from **new technology** transfer, demonstration
- But - **macro modelling** of inflows needed

Removing the barriers to behavioural change

- Regulatory Measures
- Information Policies
- Financing Measures
- Shared Understanding

ADAPTATION

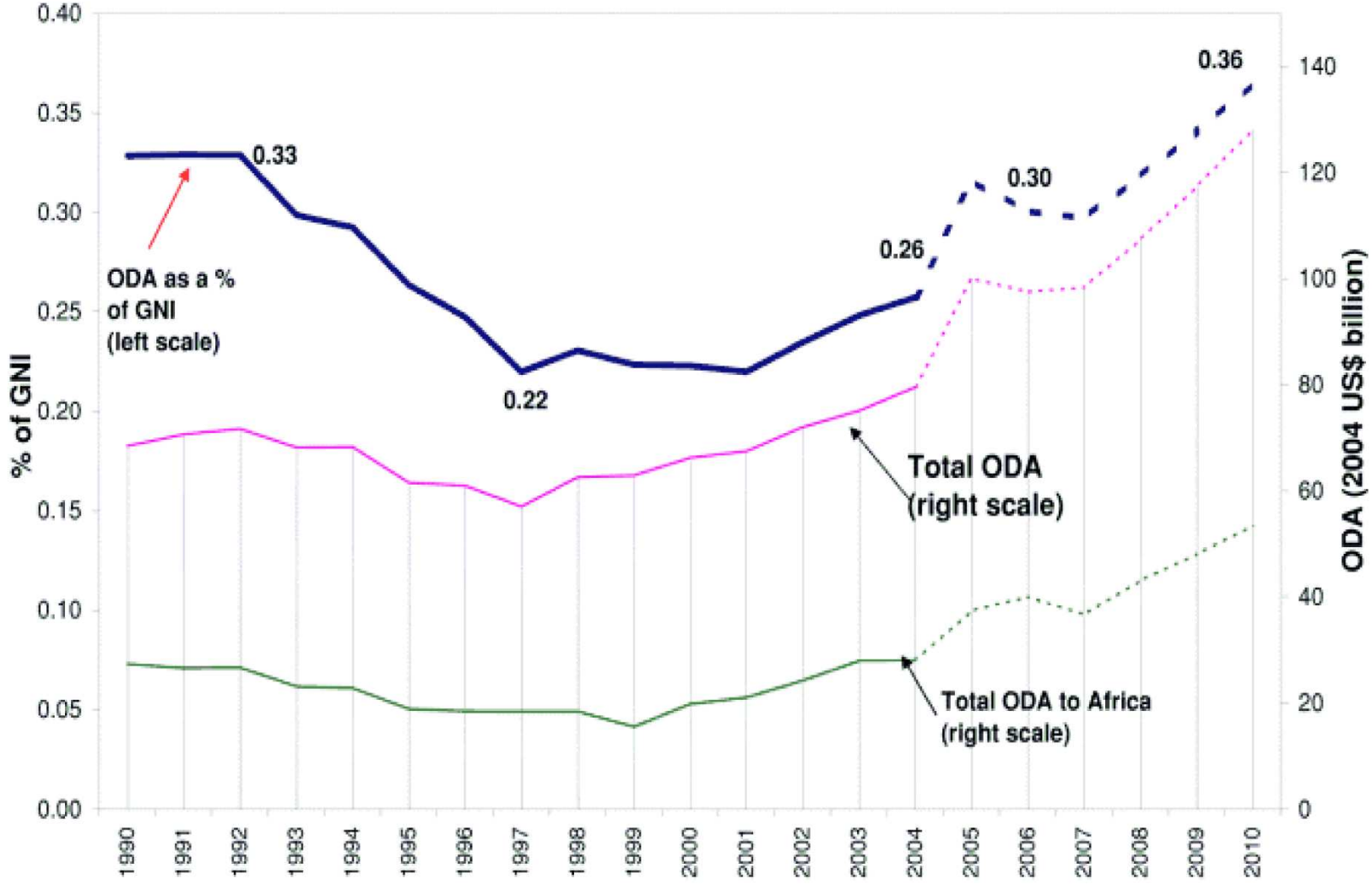
…IS INEVITABLE:

- The world is already locked into further temperature rise
- Adaptation is a critical part of the response to climate change

…BUT, IT IS NOT A SUBSTITUTE FOR MITIGATION:

- Not a cheap option
- Can only mute the impacts of climate change; there are limits to what it can achieve.

Adaptation: Scaling up Overseas Development Aid



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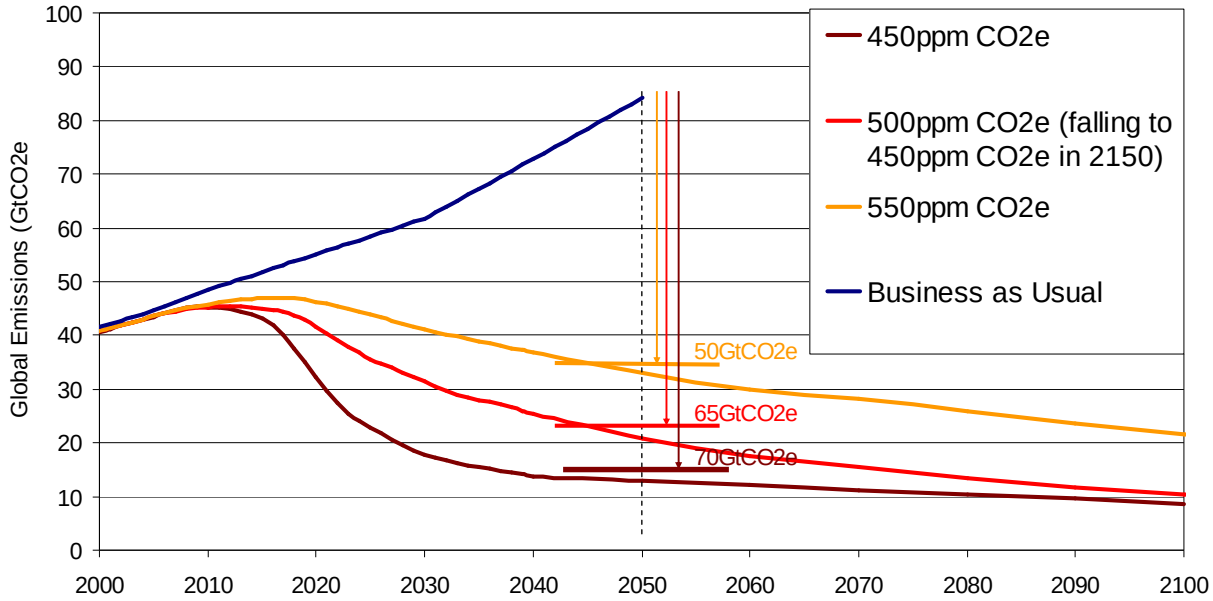
Three principles and four actions

- **Effectiveness**
- **Efficiency**
- **Equity**

How?

- **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
- Common but **differentiated** responsibilities

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 500ppm CO_2e if we achieve annual declines of **4 – 6% afterwards**.

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

500 ppm CO2e: recognizing the goal

- 500ppm CO2e:11% probability of exceeding 4^{o}C
- This would be consistent with a target of around 50% cuts of total GHG emissions by 2050 with respect to 1990.
- In per capita terms, it means to go from 7T CO2e per capita to around 2T CO2e per capita.
- Peaking in 2020 it means annual declines of 4-6%
- Different implications for different countries:
  - EU and Japan 10-12T CO2e– 80% reduction
  - US at 20-25T – 90% reduction
  - China at 4-5T – 50% reduction

Key elements of a global deal

- **Targets**: 500 ppm CO2e stabilization, global GHGs cut 50% by 2050, 2T per capita.
- **Carbon Markets**: cap and trade, tax, hybird
- **Financial flows** to developing countries: CDM reform
- **Avoiding deforestation**: publicly funded pilots, forestry funds, markets in the long term, capacity building
- **Technology**: ad hoc funds, revenues from auctions, public private collaboration, global standards


united nations
climate change conference

CONCLUSION

- ***Action cheaper than inaction:***
  - 1% GDP v 5-20% GDP
  - Delay means greater risks and higher costs
  - Policies must be designed to reduce risk as much as possible

- ***Need all three policy responses:***
  - A carbon price
  - Increased technological R&D
  - Remove barriers to behavioural change

- ***And simultaneously address:***
  - Deforestation
  - Adaptation
  - Development

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What discount rate was used to calculate the impacts?

$$\text{Discount rate} = \delta + (\eta \times g)$$

Reflects pure rate of time preference: risk of human extinction (which we select as 0.1)

Elasticity of marginal utility of consumption (we suggest = 1, society is moderately adverse to income inequality)

Growth in per capita consumption (**varies** over time and according to extent of climate change damages)