
The Costs of climate change

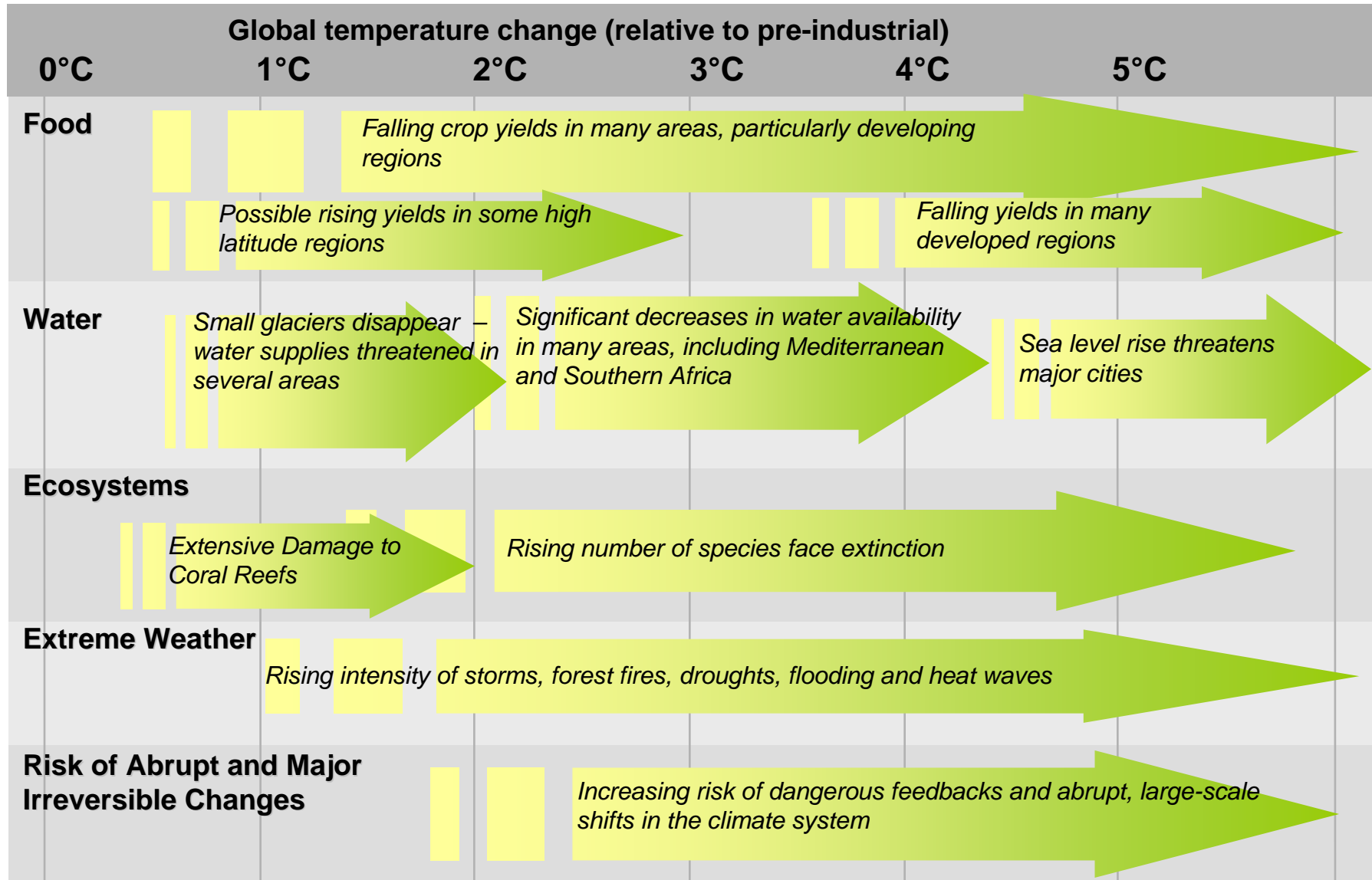
Melbourne 2 June 2009

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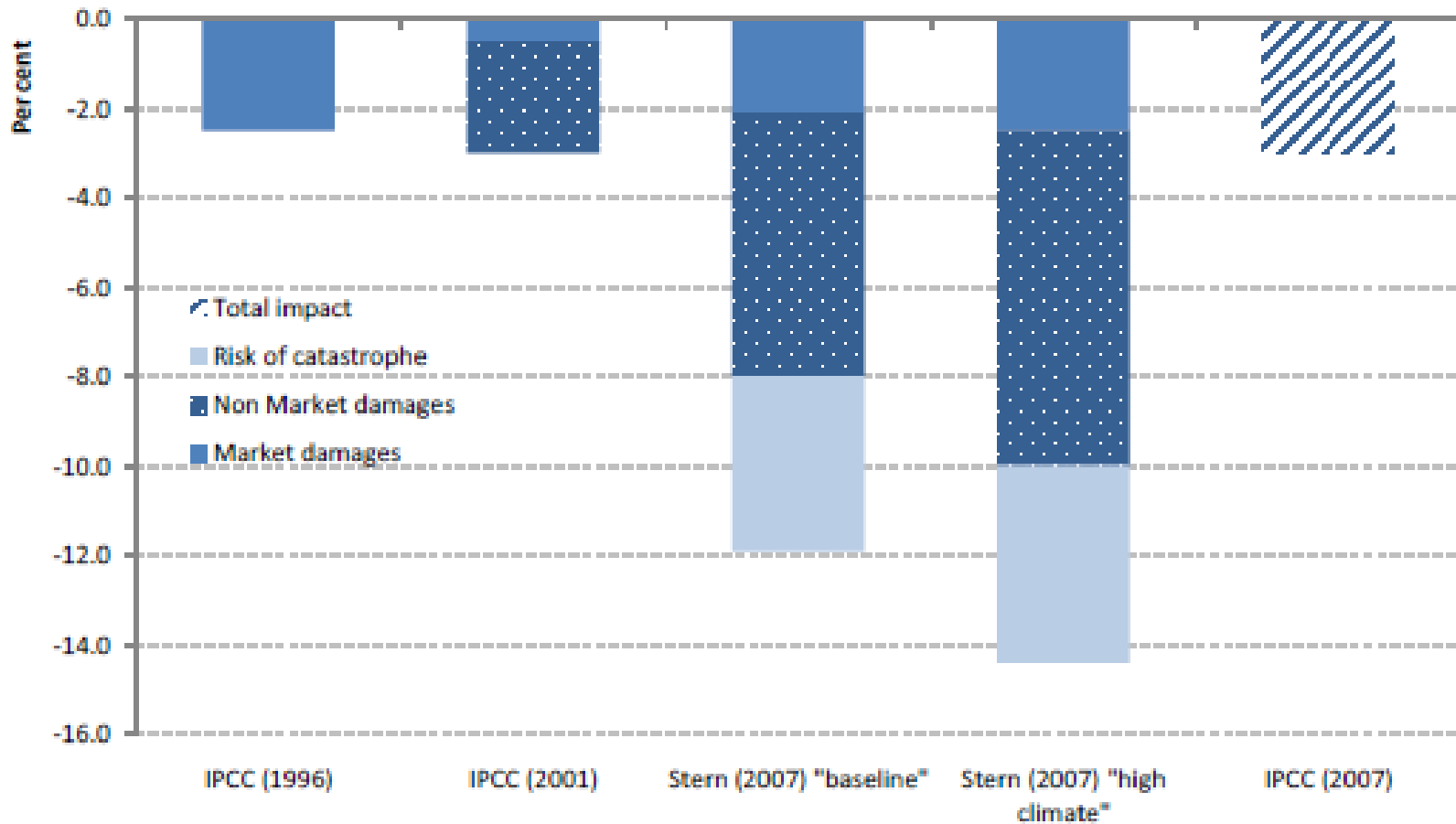
Two ways of looking at costs

- The economic costs of climate change
 - Adaptation costs
 - Residual impacts
- The cost of climate change policy
 - Marginal abatement costs
 - Increasingly: carbon price
- In a stylized world the two would be the same at the margin.
 - In reality they differ

Main impacts of climate change

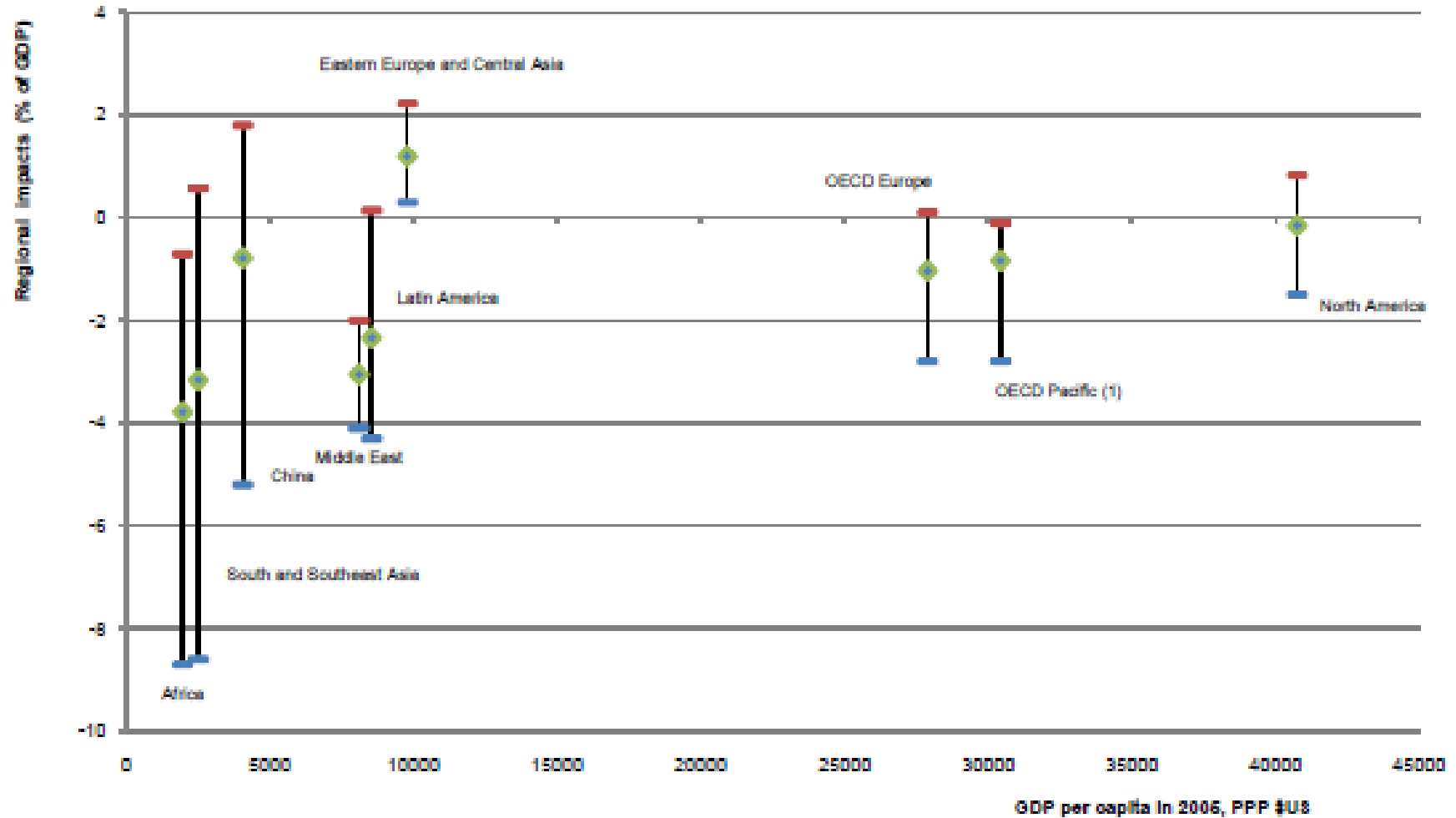


Economic costs



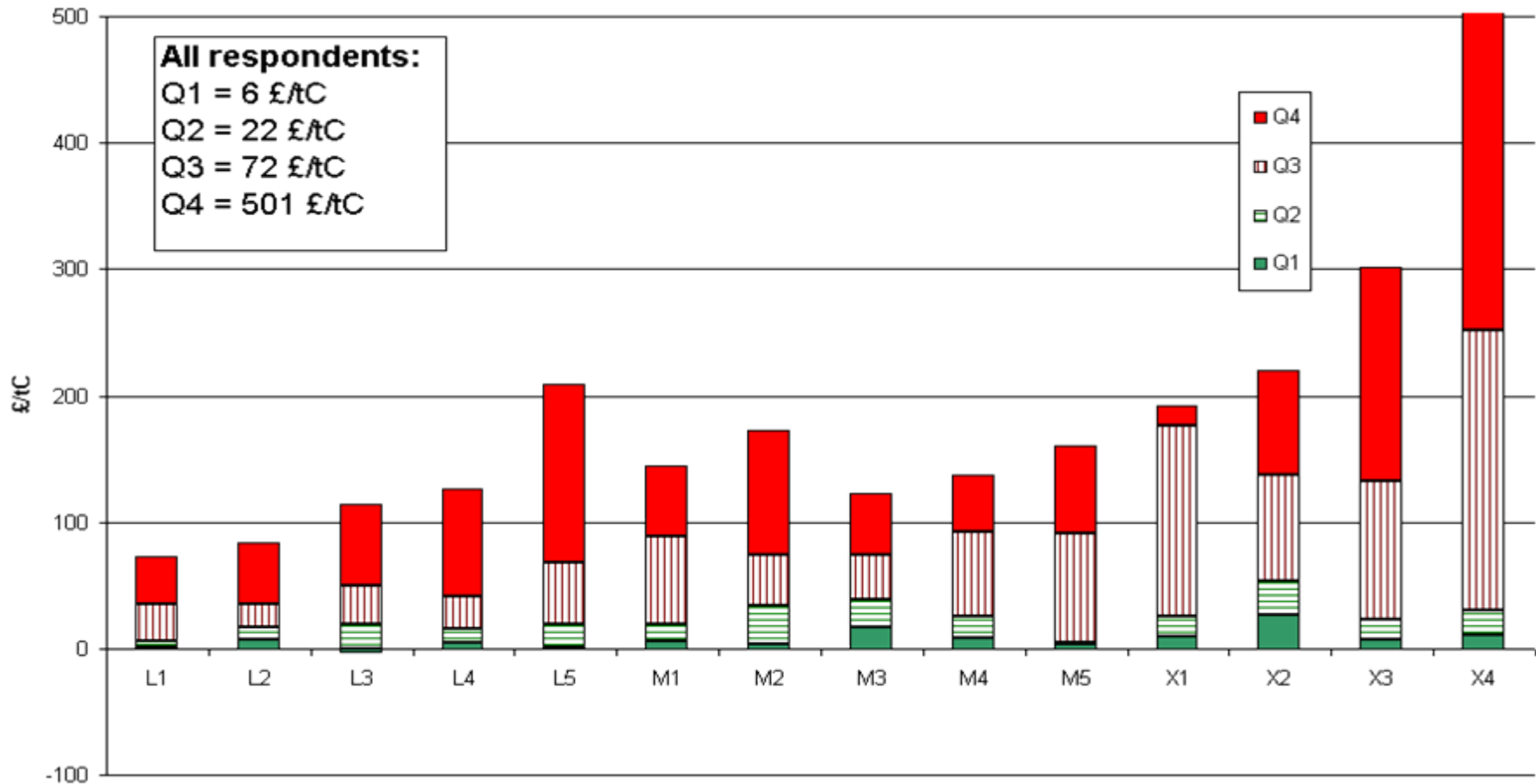
Source: OECD

Economic costs by region



Source: OECD

Social cost estimates



The chart shows the cost estimates (in £/tC) by 14 experts (L1 to X4) for different assumptions on impact, discount rates and aggregation methodologies. Q1 to Q4 show quartiles, i.e. 25% of estimates are in each band.

Source: Tom Downing, Oxford.

Adaptation costs and residual impact

- Economic cost has two components:
adaptation cost (A) + residual damage costs (RD)

- Formally:

$$\text{Min } D = A(a, C) + \text{RD}(a, C)$$

$$\Rightarrow \text{optimal condition: } A_a = -\text{RD}_a$$

$$\Rightarrow \text{optimal adaptation: } a^* = a^*(I)$$

$$\Rightarrow \text{min.cost: } D^*(C) = A(a^*(C), C) + \text{RD}(a^*(C), C)$$

The cost of adaptation

	US\$ billion p.a.	Comments
World Bank (2006)	9 - 41	Cost of climate proofing FDI, GDI and ODA flows
Stern Review	4 – 37	Update, with slight modification of WB 2006
Oxfam (2007)	>50	Based on WB, plus extrapolation of costs from NAPA and NGO projects
UNDP (2007)	86-109	WB study, plus costing of PRSP targets, better disaster response

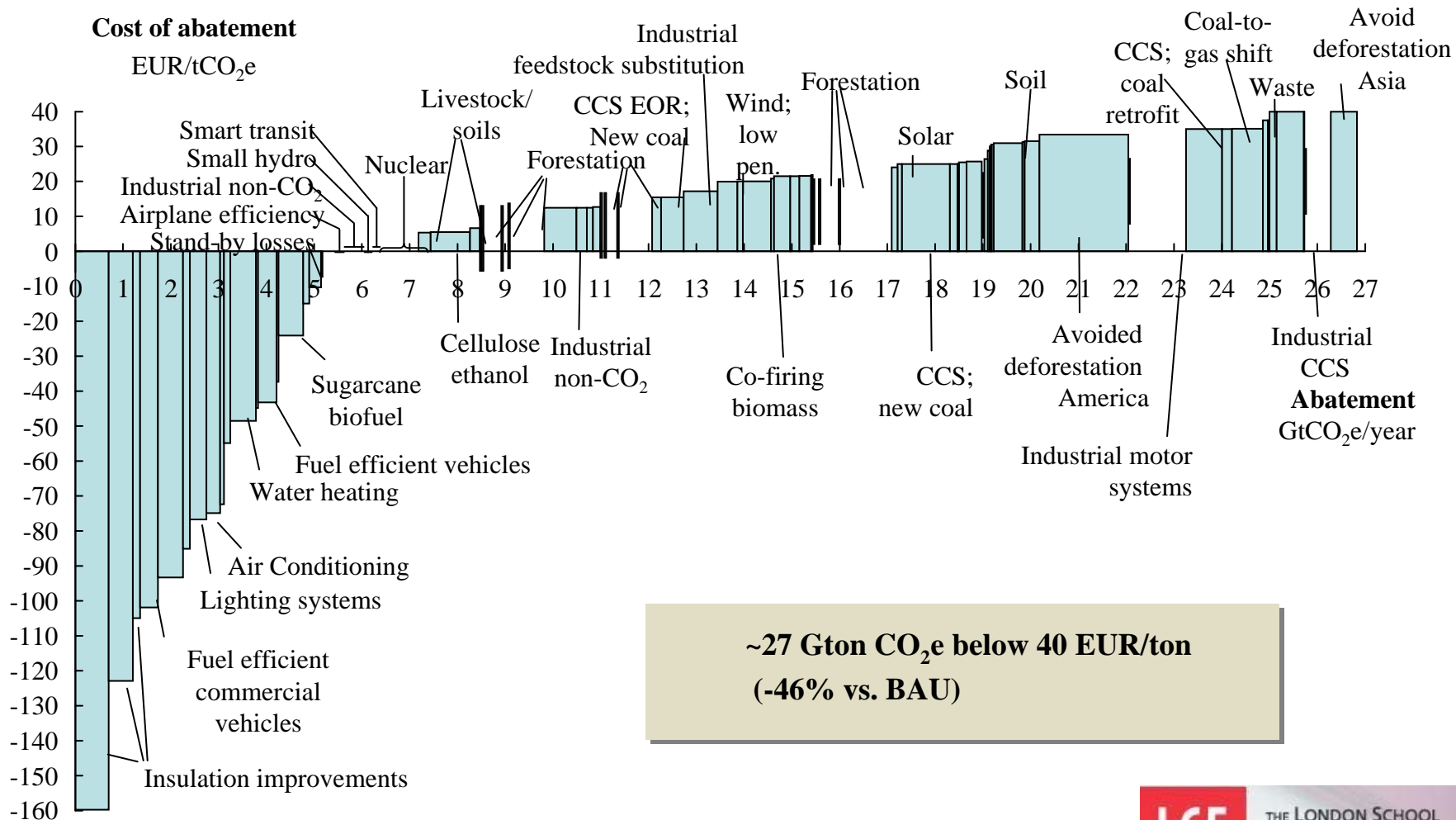
Note: Developing countries only. Timeframe: present or 2015 (UNDP)

The cost of adaptation: UNFCCC

Sector	Global cost (\$bn in 2030)	of which	
		Developed countries	Developing countries
Agriculture	14	7	7
Water	11	2	9
Human health	5	0	5
Coastal zones	11	7	4
Infrastructure	8 – 130	6 – 88	2 – 42
<i>Total</i>	<i>49 – 171</i>	<i>22 – 114</i>	<i>28 – 68</i>

Marginal abatement costs

2030

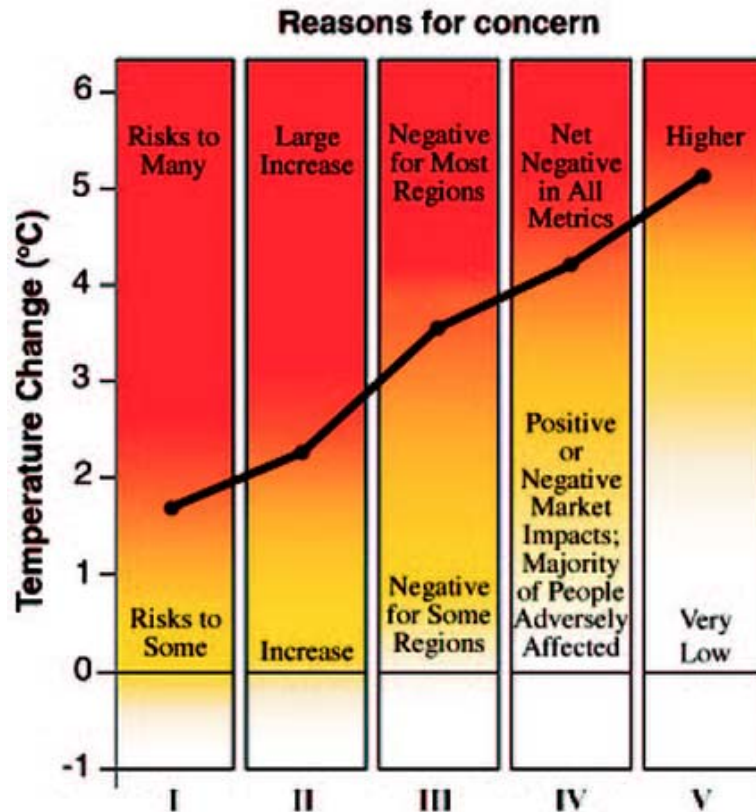


Observed market price

EUA Prices (EU-ETS)		<u>Date</u>	<u>Dec 08</u>	<u>Dec 09</u>	<u>Dec 10</u>	<u>Dec 11</u>	<u>Dec 12</u>	<u>Dec13</u>
FUTURES (ECX)		24-Oct	€19.14	€19.70	€20.28	€21.19	€22.32	€23.97
SPOT (BlueNext)		23-Oct	€19.01					
CER Prices (CDM)			<u>Dec 08</u>	<u>Dec 09</u>		<u>08-12 Strip</u>		
<u>Broker</u>								
TFS Energy	24-Oct	€16.00	€16.15	€15.85	€16.00	€16.00	€16.15	
Evolution Markets	24-Oct	€16.00	€16.15	€15.75	€15.95	€15.95	€16.15	
CantorCO2e	24-Oct	€15.95	€16.05	€15.75	€15.85	€15.95	€16.05	
Tullett Prebon	24-Oct	€16.00	€16.10	€15.82	€16.02	€15.85	€16.05	
ICAP	24-Oct	€16.00	€16.20	€15.80	€16.00	€15.95	€16.15	
MF Global Energy	24-Oct	€16.00	€16.20	€15.70	€15.90	€15.95	€16.15	
Spectron	24-Oct	€16.00	€16.05	€15.80	€15.85	€16.03	€16.08	
GFI Group	24-Oct	€15.90	€16.10	€15.70	€15.90	NA	NA	
			<u>Dec 08</u>	<u>Dec 09</u>		<u>Strip</u>		
*Reuters CER Index	24-Oct	€16.05	€15.85	€16.03				
Net Chg/ % Chg		-€0.86	-5.11%	-€0.87	-5.19%	-€0.89	-5.26%	
Implied Percentage/ € Spread		83.87%	€3.09	80.47%	€3.85	79.06%	€4.25	
<u>Exchange</u>		<u>Dec 08</u>	<u>Net Chg</u>	<u>Volume</u>	<u>Dec 09</u>	<u>Net Chg</u>	<u>Volume</u>	
ECX CERs	24-Oct	€16.02	-€0.94	157	€15.83	-€0.95	115	
Nord Pool CERs	24-Oct	€16.00	-€0.85	0	€15.80	-€0.90	0	
Green Exchange CERs	23-Oct	€17.03	€0.32	0	€16.84	€0.32	0	
		<u>Close</u>	<u>Net Chg</u>	<u>Volume</u>				
BlueNext (SPOT) CERs	23-Oct	€16.20	€0.00	0				
		<u>Nov 08</u>	<u>Net Chg</u>	<u>Volume</u>				
India's MCX (INR)	24-Oct	1,212.00	47.50	10				
VER Prices (Voluntary)			<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>
CCX Vintages (USA)		24-Oct	\$1.45	\$1.30	\$1.20	\$1.20	\$1.25	\$1.20

Source:
Thomson Reuters

Alternative “reasons for concern”



- | | |
|-----|-----------------------------------------------|
| I | Risks to Unique and Threatened Systems |
| II | Risks from Extreme Climate Events |
| III | Distribution of Impacts |
| IV | Aggregate Impacts |
| V | Risks from Future Large-Scale Discontinuities |

- Social cost estimates are associated with a particular philosophy – aggregate impacts
- IPCC has put forward other possible “reasons for concern”

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