

Climate Change, Energy and the Global Deal

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Part One

Risks and Targets

'Probabilities' (in %) of exceeding a temperature increase at equilibrium

Stabilisation level

(in ppm CO ₂ e)	2°C	3°C	4°C	5°C	6°C	7°C
450	78	18	3	1	0	0
500	96	44	11	3	1	0
550	99	69	24	7	2	1
650	100	94	58	24	9	4
750	100	99	82	47	22	9

Source: Hadley Centre: From Murphy et al. 2004

- Monte Carlo estimates from Hadley Centre
- Model 'fairly cautious'
- Those who argue e.g. for stabilisation levels of 650ppm CO₂e and above are accepting very big risks of a transformation of the planet
- Figures similar to IPCC AR4 (no probabilities in TAR)

Structure of argument on mitigation objectives (I)

- Risk of going above 5°C increase are very severe: e.g. would induce massive movements of population
- On basis of implied probabilities of temperature increase, dangerous to go beyond 550ppm CO₂e
- Stabilisation to 550 or 500ppm CO₂e 'buys' sharp reduction in probabilities of dangerous temperature increases relative to BAU
- Cuts of 30-50% by 2050 required for target of stabilisation range 550- 500ppm CO₂e
- Cost of action to get in range looks acceptable relative to reduction of risks and damages avoided : 1 or 2% of GDP
- Some aggregate formal modelling useful to inform damage estimates but loses key detail, sensitive to assumptions and implausible for optimisation analysis

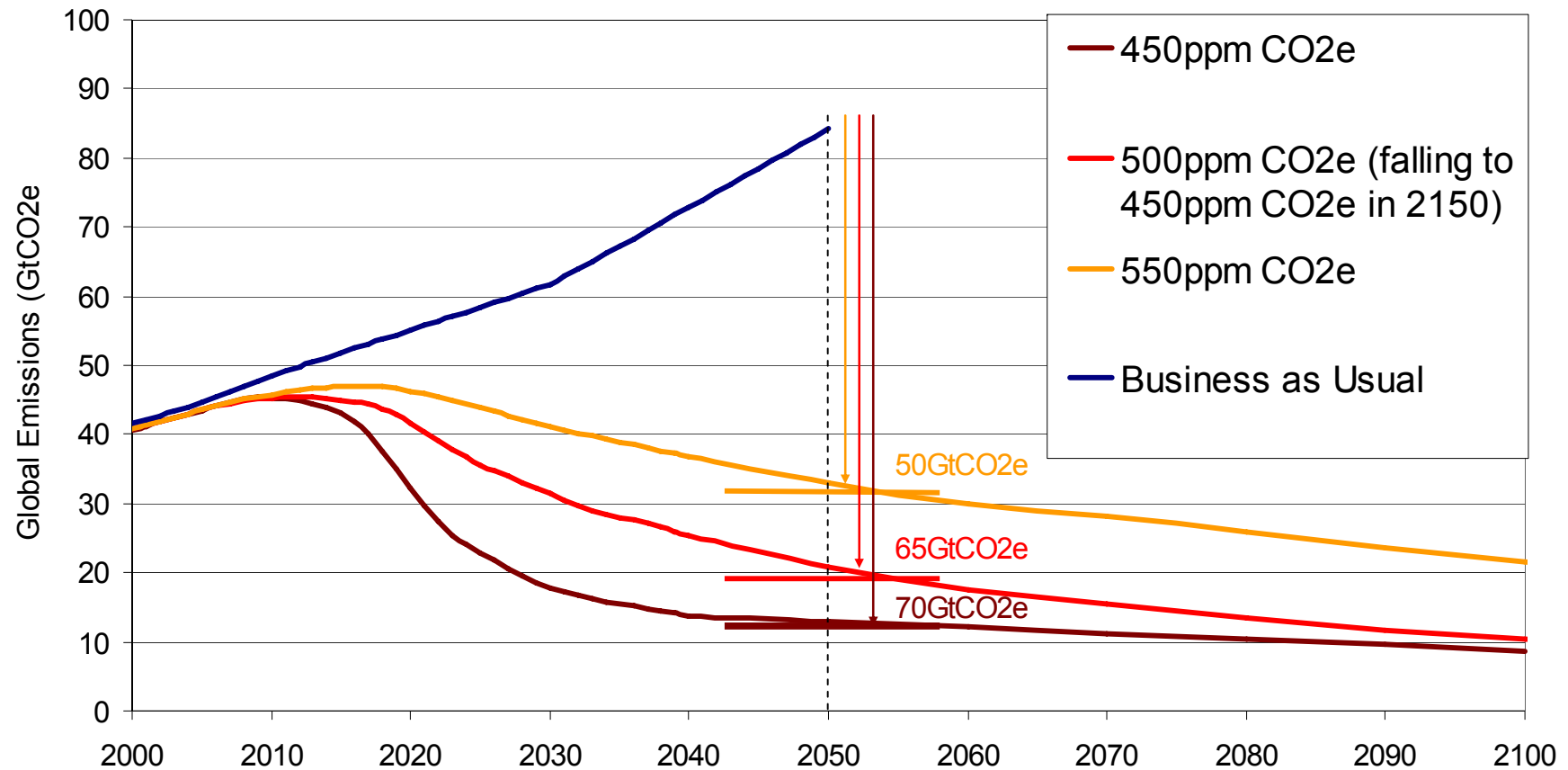
Structure of argument on mitigation objectives (II)

- Whilst considerations of risk steer quantity targets (i.e. cuts), efficiency requires use of market mechanism to keep down costs
- These cuts would need a carbon price of \$30 plus per tonne of CO₂e; thus we have a “take” on marginal abatement costs
- This is in range of marginal social cost (MSC), for paths associated with 500-550ppm CO₂e but MSC is very sensitive to ethical and structural assumptions
- Equity demands that rich countries take much bigger targets for cuts than poor. Trading can then provide flow of finance to developing countries

Part Two

Flows, Costs and Stern Review
One Year On

Delaying mitigation is dangerous and costly



Source: Stern Review

Cost estimates

- Review examined results from bottom-up (Ch 9) & top-down (Ch 10) studies: concluded that world could stabilise below 550ppm CO_{2e} for around 1% of global GDP
- Subsequent analyses Edenhofer/IPCC top-down have indicated lower figures
- So too have bottom-up IEA and McKinsey
- Starting planning now with clear targets and good policies allows measured action and keeps costs down. Delayed decisions/actions (or “slow ramp”), lack of clarity, bad policy will increase costs
- Associated co-benefits (energy security, reduced pollution) and opportunities (innovations, new markets)
- Importance of good policy.

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

- Emphasis on risk avoidance rather than formal modelling well-founded
- Modelling without making risk central misses the point – both ethics and risk crucial : Stern Review damages averaged over space, time, outcomes : 5-20% GDP
- Probably under-estimated emission growth (growth of emissions from China and India particularly)
- Probably under-estimated risks of high-temperatures (omitted features in climate science modelling) and damages from high temperatures (implausible 'overly linear' extrapolations)
- Thus magnitude of avoided damages under-estimated
- With high inequality/risk aversion (η between 1 and 2 say) and greater weights in damage tail find numbers similar to or larger than those of Review in formal modelling
- Cost of action about right, perhaps on high side. But good policy is important

Discounting

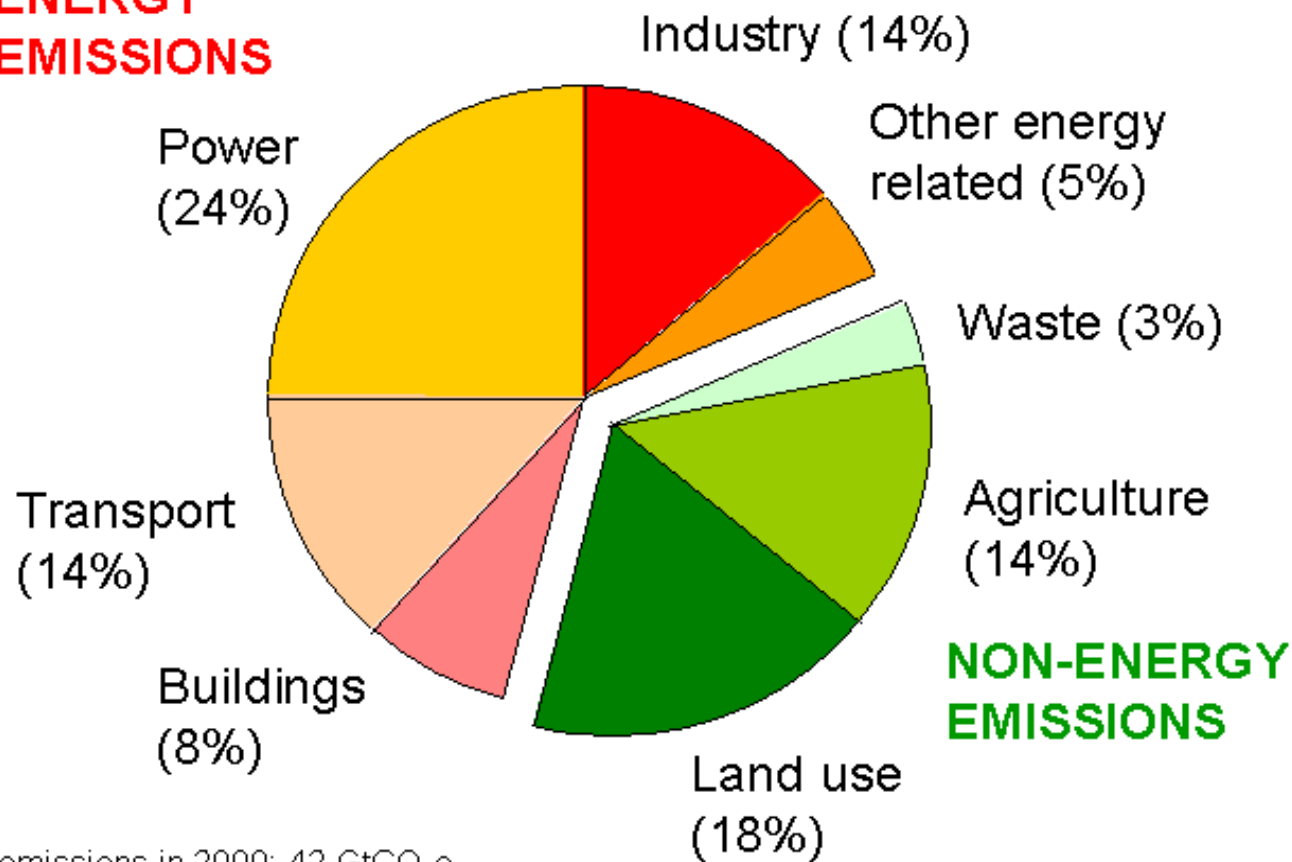
- Non-marginal problem, with big uncertainty, implies must consider social objectives and values directly and cannot operate only via first-order approximation around a given path as in standard CBA
- Thus cannot “import” a rate from outside markets, or standard public sector cut-offs (e.g. 3.5% in UK)
- No market on which one can “read off” anything similar to a revealed preference or appropriate rate for 100 years, involving collective action. Markets do not tell us the “right” thing to do
- If suppress above concerns and turn to markets they give big range; e.g. 1-1.5% real on very long-term government paper, and 5 to 7% on very long-term equities. If mitigation costs come out of consumption then former may be more relevant
- Take care with multi-good nature of this problem. If tried to invest in alternative activities and then spend on reducing climate change, the price for environment may have gone up sharply
- Many have confused pure time discounting (PTD) with discounting. The models can generate implied discount rates above UK Green Book test rate without PTD and retain very large damage estimates
- See Ely Lecture, American Economic Review, May 2008

Part Three

Energy, Emissions and Technologies

Reducing emissions requires action across many sectors

ENERGY EMISSIONS



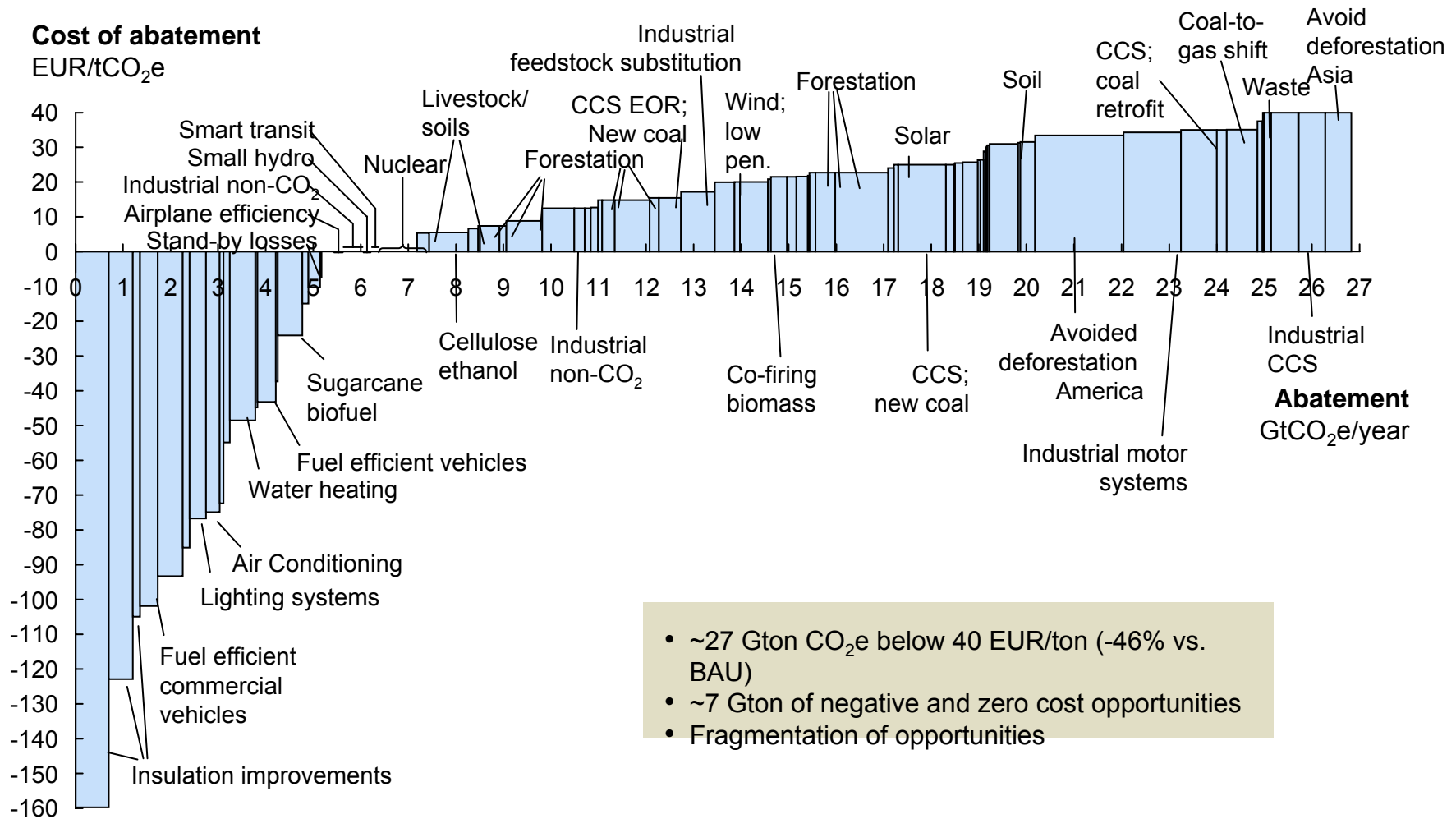
Total emissions in 2000: 42 GtCO₂e.

Oil/coal running out?

- Years of production left in ground with proven reserves and current consumption levels
 - Oil : 45 years
 - Gas : 72 years
 - Coal : 252 years
- These reserves are enough to take GHG concentrations to very dangerous levels: e.g. if used all the coal it might add around 400ppm to concentrations
- Have to find alternatives this century in any case – better to do it sooner rather than later

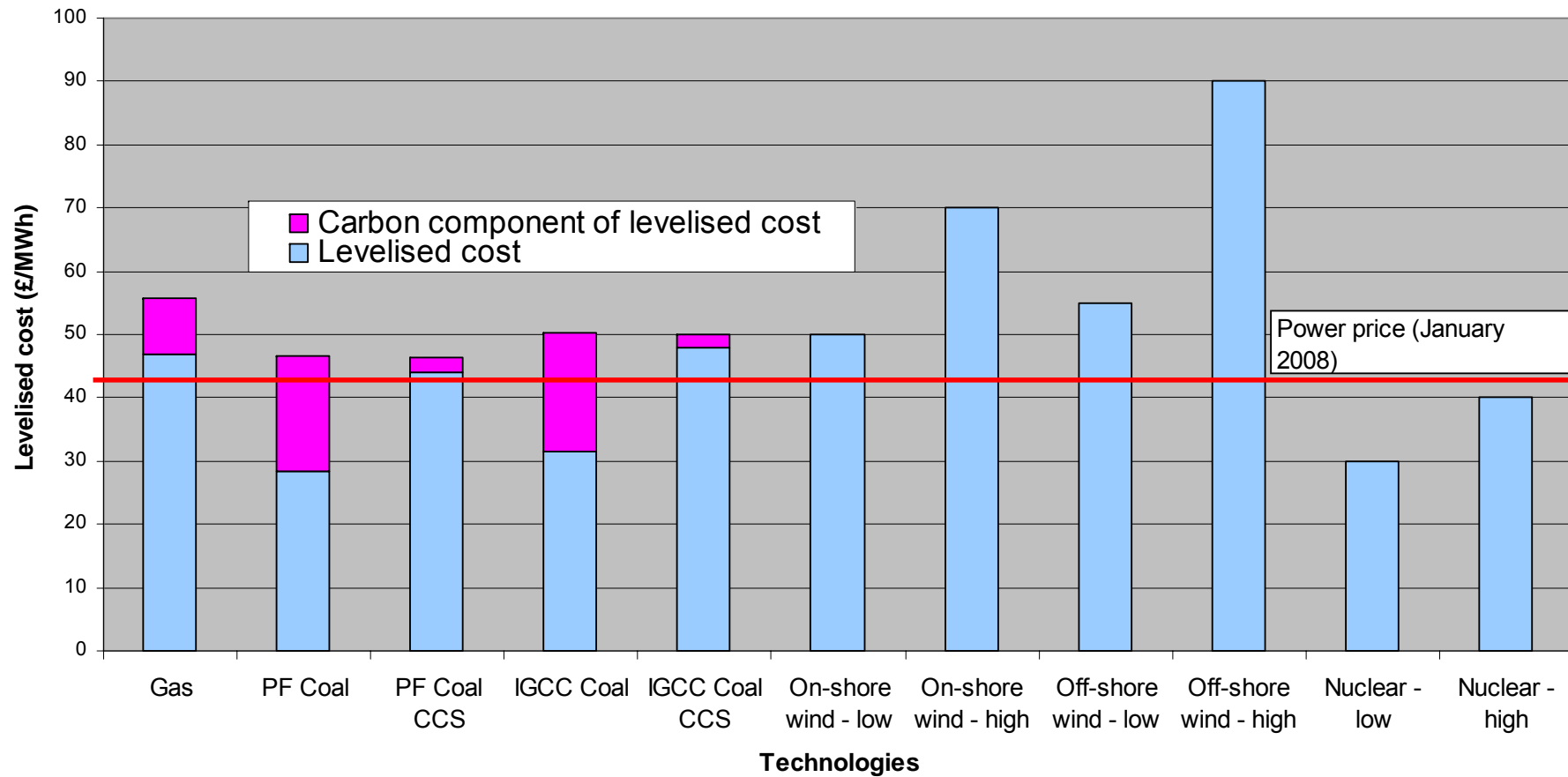
Many options: policy matters and prices crucial

2030

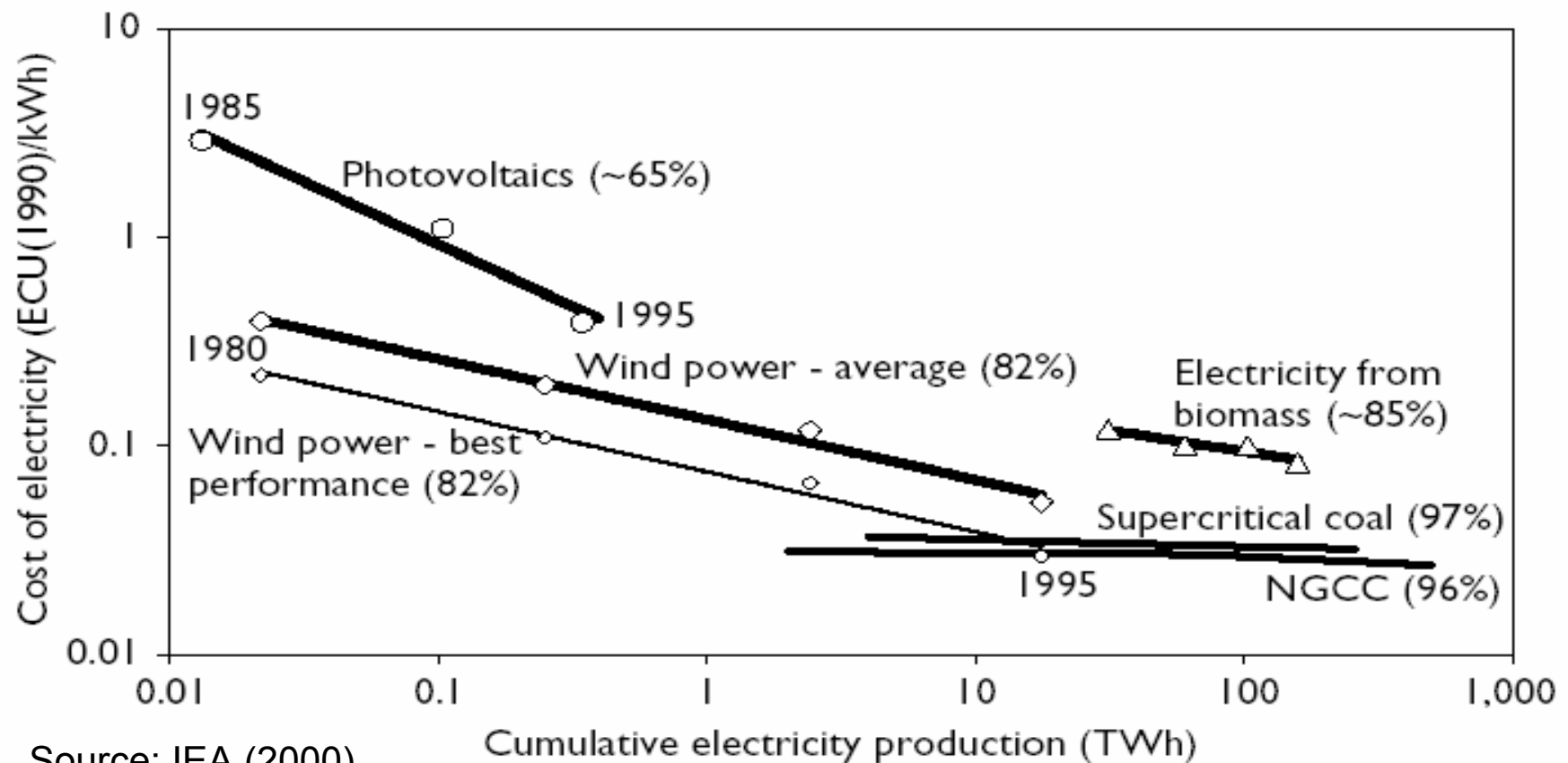


Source: McKinsey

Levelised costs of different technologies (£/MWh) : carbon price €40 per tonne CO₂



Technology needs more than a carbon price



One element of technology policy is public funding to support innovation and development of new technologies

Part Four

A Global Deal

Key elements of a global deal / framework (I)

Targets and Trade

- Confirm Heiligendamm **50%** cuts in world emissions by 2050 with rich country cuts at least **80%**
- Developing countries to take on **targets at latest by 2020** as rich countries demonstrate low-carbon growth, flows of funds, sharing technologies. Credible plans to reach 2 tonne/cap by 2050 - requires peaking before 2030
- Rich country reductions and trading schemes designed to be **open to trade with other countries**, including developing countries. **Supply side from developing countries** simplified to allow much bigger markets for emissions reductions: 'carbon flows' to rise to \$50-\$100bn p.a. by 2030

Key elements of a global deal / framework (II)

Funding Issues

- Strong initiatives, with public funding, on **deforestation** to prepare for inclusion in trading. For \$10-15 bn p.a. could have a programme which might halve deforestation. Importance of global action and involvement of IFIs
- Demonstration and sharing of **technologies**: e.g. \$5 bn p.a. commitment to feed-in tariffs for CCS coal would lead to 30+ new commercial size plants in the next 7-8 years
- Rich countries to deliver on Monterrey and Gleneagles commitments on **ODA** in context of extra costs of development arising from climate change: potential extra cost of development with climate change upwards of \$80bn p.a.

Nature of deal / framework

- Combination of the above can, with appropriate market institutions, help overcome the inequities of climate change and provide **incentives for developing countries to play strong role** in global deal, eventually **taking on their own targets**.
- Within such a framework **each country can advance** with some understanding of global picture.
- Individual country action **must not be delayed** (as e.g. WTO) until full deal is in place.
- Main enforcement mechanism, country-by-country, is **domestic pressure** ; but not in all – **leadership**
- If we argue that, “it is all too difficult” and the world lets stocks of GHGs rise to 650, 700 ppm or more must be **clear and transparent** about the great magnitude of these risks