# The Price of Carbon:

# What should it be and why?

Seminar, Mercer Suite, Royal Society, 8th July 2008

**Meeting summary**

http://www.foe.co.uk/resource/reports/carbon_price_seminar_2008.pdf

**Contents**



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**Introduction**

The back-drop to this seminar was the Government's Climate Change Bill, currently being debated in Parliament, which will set a series of carbon budgets for the UK economy up to 2050. The Committee on Climate Change is advising the Government on what these budgets should be, and will report by the end of 2008.

These carbon budgets are likely to be a challenge for the UK, and require the use of both new policies and strengthened existing policies. Carbon pricing has been identified, by the Stern Review amongst many others, as a critical policy tool for achieving carbon reductions, so how carbon pricing is implemented or revised will have a crucial effect on whether the UK meets these new carbon budgets.

Carbon pricing of course takes many forms – for example market prices per tonne of carbon in the traded sectors in the EU Emissions Trading Scheme, prices applied by Governments via taxation, or "shadow" prices applied by Governments in policy and project appraisal, to determine the relative weight to attach to carbon compared with other positive and negative impacts of potential policies.

This seminar focused on the latter point – what approach should be used towards carbon pricing in policy and project appraisal. Which approach is used has significant impacts – it affects the determination of whether big infrastructure projects have positive or negative net benefits, it affects the decision as to what is, say, the "optimal" level of energy efficiency or renewable electricity to adopt in new buildings. Getting this approach right will be a fundamental part of a successful carbon budget strategy.

However, it is not clear what is the best approach to take. There are a number of plausible options with numerous pros and cons for each. There are genuine difficulties here. What is clear though is that to ensure a successful strategy for delivering carbon budgets, these issues need resolving quickly. And so, the purpose of this seminar was to bring together people from Government, academia, business and the NGO sector to discuss what is the best way of tackling this problem. Friends of the Earth welcomes the Government's decision to review the use of its current method for valuing carbon in appraisal – the Shadow Price of Carbon (SPC) – and hope that the discussion at the seminar, and this meeting summary, will be helpful to the Government as it reviews its policy.

Friends of the Earth would like to thank all the participants for their constructive engagement in this seminar.

**Context – where are we now?**

Carbon valuation for appraisal is controversial. The argument for its use is that there are often real choices between competing objectives – explicit pricing in appraisal helps decision making by putting a price on something currently without one. However, which method to use for setting the price is controversial, and in addition there are arguments that the difficulties with each of the methods are so substantial that a different approach is required.

The figure the Government uses is based on the Social Cost of Carbon ("SCC" - broadly, the societal cost of a tonne of emissions) set out in the Stern Review, assuming the world is on course to meet a 550 ppmv CO2e target concentration. This value is currently £26.5 tCO2e, and is called the "Shadow Price of Carbon" (SPC).

The current carbon price approach has come in for some criticism, and is being reviewed by Government. An extra factor for this review will be the need to ensure compatibility with the new approach to carbon budgeting set out in the Climate Change Bill. One concern, for example, is that if high-carbon and very-long lived infrastructure is approved via the current carbon pricing approach, this locks the UK into a high carbon trajectory when in future decades carbon budgets will be becoming very small, making these budgets extremely difficult to achieve.

There are alternative methods – such as basing it on the cost of abating a tonne of emissions ("MAC"), or the market price. A further approach is to say that the difficulties in accurately calculating SCCs or MACs are too great for them to be of practical use as a guide price in policy appraisal, and that a different approach altogether is required. However, all of these approaches, like the SCC, have pros and cons as well.

## Summary of discussion

The discussion focused first on the purpose of carbon pricing, in general and then more specifically for policy appraisal. It then went on to look at the advantages and disadvantages of four possible approaches for treating carbon in policy appraisal.

## A) Purpose of carbon pricing

There was general consensus that the purpose of carbon pricing is to help deliver the Government's policy goals on climate change – soon to be set out as a series of carbon budgets as part of the Climate Change Bill currently going through parliament.

Two additional points were made. First, the purpose of carbon pricing is not primarily to "internalise the external costs" of carbon emissions (although in practice it will go some way to doing this). In this sense pricing is analogous to the situation with the development of the UK landfill tax, which started off set at rates to internalize external costs, but has since moved to be set according to the level deemed necessary to reach politically agreed targets.

Second, carbon pricing is not the only policy tool needed, a point strongly emphasised in the Stern Review, and indeed does not on its own necessarily guarantee that the overall policy objective is met.

## B) Carbon pricing in policy and project appraisal

There was general consensus too that there needs to be clarity over the different types of carbon pricing. The focus in the seminar was how to use carbon pricing in project and policy appraisal – in deciding what level of carbon emissions reduction to aim for in a particular policy, or how to assess the carbon impact of a specific new proposal against other objectives. Carbon pricing is already in place in other areas to some degree – for example in the EUETS, the use of a carbon cap leads to a (changing) carbon price; and in other areas the use of a variety of environmental taxes creates a carbon price of sorts, albeit varying considerably by sector.

## C) Different approaches to carbon pricing in appraisal

Four different approaches were discussed:

### 1) "Social Cost of Carbon" approaches (SCC).

Social cost approaches come from valuing in monetary terms the costs to society of a tonne of additional carbon emissions. This is used to assess the "cost" of the carbon emissions of any policy, for comparison with other impacts, both positive and negative.

The main advantage of this approach is that it is an attempt to measure actual costs, and as such is good for comparing with other types of costs and benefits of any proposal.

However, there are a series of major disadvantages. The first is that any estimate is riven with significant uncertainties, at many levels – from how to value ecosystems and knowledge of likely catastrophic damages, to how to value damage to different generations and how to model the effects on economic systems. The combination of all these difficulties leads to major difficulties in assigning any level of accuracy and precision to any figure, let alone the +20/-10% range currently used. Many of these uncertainties are unresolvable any time soon, certainly not within the period we have left to cut emissions; many of them are also ethical issues, and reflect distributional concerns to which there are no definitive "right" answers.

Second, because many of these impacts are so uncertain, the models which do exist usually assign a zero value to them – particularly for "socially contingent" and ecosystem losses. These represent a trend for SCC to be underestimates. A further recent trend for underestimates is that the SCC values are inevitably based on relatively old science. As the trend has been for the science of climate change to show things are getting worse with every passing year, the current SPCs are based on an overly optimistic and increasingly outdated view of lower costs of climate damages.

Third, values for the SCC are future-dependent. With strong emissions reductions in decades to come, future climate damages will be lower, so a tonne of emissions now has less impact. The SCC figure has to be based on some vision of the future. Unfortunately, assuming a world of strong future action on climate leads to a lower value for the SCC now, which when used in policy appraisal means less weight given to climate policies, which leads to less strong action on climate…a self-defeating cycle. In addition, the current value for the SCC used by Government in its Shadow Price of Carbon is based on a 550ppmv C02 future, which will require far stronger

policies than currently exist to be achievable. The reality is that we are on a higher trajectory, which under this methodology would require a higher price.

Fourth, there is little certainty about the link between this approach and with the Climate Change Bill's carbon budgets. It could well be that carbon pricing here results in major carbon intensive projects or policies going ahead (if the carbon costs were outweighed by other benefits). The current Heathrow expansion proposal was cited as an example of where the carbon cost of the proposal using SCC is outweighed by calculations of benefits of expansion – the proposal thus passes its impact assessment, despite its projected large net increase in carbon emissions, in likely conflict with carbon budgets requiring large overall cuts.

## 2) "Marginal Abatement Cost" approaches

This approach assesses the cost of cutting carbon emissions by an additional tonne, and compares the figure derived from this for the "cost" of the carbon emissions with other impacts.

The main advantage of this approach is that it is in theory compatible with the carbon budgets in the Climate Bill. If the carbon price used in appraisal is simply the most expensive measure in the strategy to meet the budgets, then a new policy or proposal is judged more easily against other carbon abating policies.

However, there remain a number of significant problems with a MAC approach.

First, MAC estimates have major uncertainties too, although possibly not to the same extent as for SCC estimates. MACs can change massively over time (eg as innovation kicks in), MACs can be artificially high due to market failures, many MACs assume policies which are not likely to happen at present for other reasons (for example wholesale improvement in domestic energy efficiency). MACs also have major problems with consistency in definitions from different studies. The issue of whether global or UK based MAC curves should be used also has a major impact on MAC values. Overall, there appears to be little sensitivity analysis around these figures.

Second, if used in appraisal, MAC figures would not be comparing like with like. For example, for all its flaws, cost-benefit analysis currently remains the main arbiter in policy appraisal. All other impacts would be considered in terms of their costs and benefits, monetized where

possible. But using MACs for carbon would mean using the cost for cutting a tonne of carbon, rather than the cost to society of emitting a tonne – two completely different measures. There is no guarantee at all that the MAC and the SCC are the same.

## 3) Market price approaches

This approach is to take the already existing market price for carbon – for example the price for a tonne of carbon traded in the EUETS.

The advantage of using a market price is that it is very "real" – this figure is the one financiers and business people use; it is the one which genuinely affects business decisions. A second advantage is that the price relates to a target that has been set; it is an approach which is in theory quite compatible with carbon budgets.

The market price is created by Government policy – so for appraisal purposes what that policy is is crucial. The disadvantage of this market price approach for appraisal (where there are no real prices) at the moment is that the market price is going to be very low, because it is based on an EUETS cap which is far too high in relation to a cap needed to keep climate change damages to an "acceptable" level, and also likely to be incompatible with the soon-to-be set UK carbon budgets.

A further potential disadvantage with this approach is that the market price is currently based only on particular sectors, and does not bear much relation to other sectors such as surface transport and households.

## 4) "Precaution and Pragmatism" approaches

The main argument for this approach is that the previous approaches, owing to their major uncertainties (SCC and MAC), are impractical to ensure carbon budgets are met. It was argued that a more pragmatic approach is needed instead. This proposed approach uses an escalating carbon tax to have a medium-long term influence on decisions (until it is having a strong enough effect on decision making to ensure carbon budgets are met) combined with a policy presumption against high carbon infrastructure to address the potential for carbon lock-in via short-term and high impact proposals.

The advantage of this approach is that it is likely to be compatible with the Bill's budgets, whereas the other three are likely to throw up situations where major carbon-intensive proposals get the go-ahead, requiring major revision of the strategy to deliver carbon budgets.

However, there are disadvantages over as yet unclear definitions – how would "carbon intensive" or "carbon-increasing" be defined, and at what rate would the carbon escalator need to rise?

## D) Which is the best approach?

There is a genuine unresolved question as to whether the uncertainties surrounding both SCC and MAC figures are so large as to make them unsuitable for setting a carbon price for use in appraisal. There is strong evidence that these uncertainties are too large for the SCC. For MACs, the jury is still out. Even if these figures can be calculated with any precision and accuracy it may not also ensure that the UK's carbon budgets are met – applied to very long term capital projects they may lock the UK into long-term high carbon infrastructure which although justifiable on short-term MAC or SCC analysis, in the long run would prove very costly to the UK.

It may be more effective to use a different approach. Using one based on market based prices does not look attractive at present, as carbon markets are new, based on inadequate caps and coverage of too small a fraction of total emissions. The fourth approach – around a combination of an escalating carbon tax and a presumption against high carbon projects or policies - has potential, and should be looked into in more detail. Critical questions would be how to define the boundaries as to what is carbon intensive or high carbon, and at what levels to set an effective carbon escalator.

**Appendix 1 Presentation from Paul Ekins, King's College London**

# Carbon Pricing

Presentation to the Seminar
'The Price of Carbon: What Should It Be and Why?'

**Professor Paul Ekins**
Professor of Energy and Environment Policy
Geography Department, King's College London

Tuesday 8th July, 2008
Royal Society, London



## The Imperative of Carbon Pricing

- At least since the Stern Review, everyone seems to agree that carbon should be priced
- What should be the conceptual basis for the carbon price?
- How high should the price be?

# Instruments of Carbon Pricing

- Carbon tax
  - Price of carbon equals the tax, quantity adjusts
  - Price is known, quantity outcome is not
  - How high should the tax be? Depends on conceptual basis
- Carbon trading
  - Quantity of carbon is set, price adjusts
  - Quantity is known, price outcome is not
  - How high should the quantity be? Depends on conceptual basis
- Shadow price of carbon (SPC)
  - For applying in appraisal of developments that have implications for emissions
  - What is the conceptual basis for SPC?
  - How high should it be?

# Conceptual Basis 1: Damage Costs (Social Cost of Carbon, SCC)

- Debate about theoretical basis/validity/feasibility/robustness of SCC calculations
- SCC depends on global emissions trajectory and atmospheric concentration of CO2
- What trajectory should be assumed?
  - 550 ppmv ➔ $110/tC
  - Stern BAU ➔ $312/tC
  - Heathrow 3rd runway consultation, assumed SPC based on SCC at $550 ppmv, approx. net benefit of £5bn; SPC of $238/tC would turn benefit into net cost

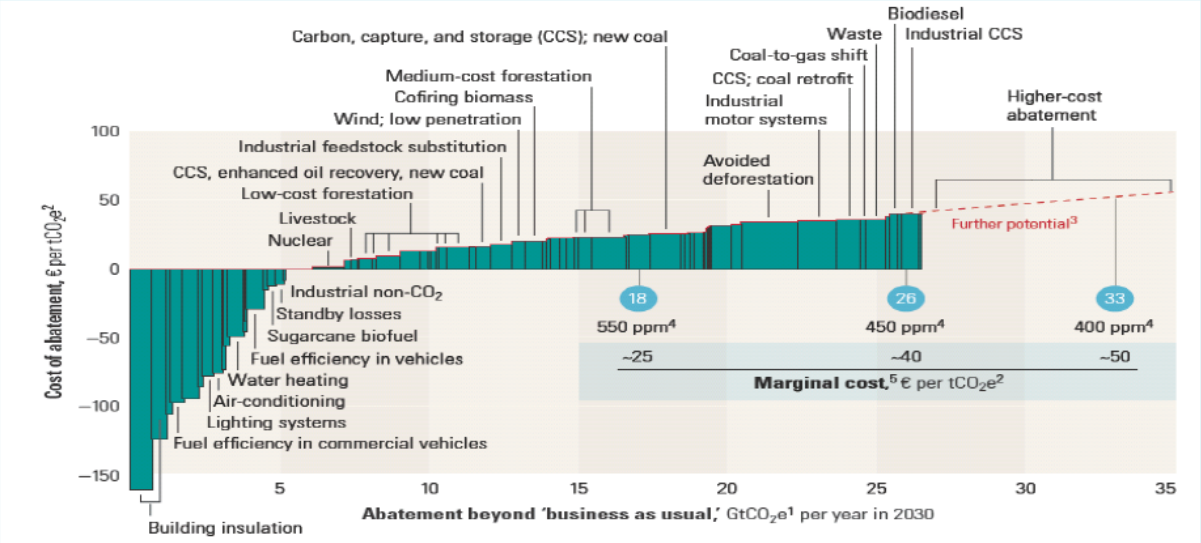
# Emission Trajectory Assumption

- Current trajectory, on basis of current global policies (i.e. no effective follow up to Kyoto), may lead to 700-750 ppmv or more, Stern BAU, so £312/tC
- 550 ppmv trajectory will require post-Kyoto agreement that greatly restricts emissions and national government policies that achieve this
  - Post-Kyoto negotiations are far from agreement
  - UK Government's record on achieving 2010 CO2 target
- What trajectory should be assumed?
  - Modelling would normally only include *implemented* policies, rather than those discussed or even promised
  - Could do Delphi survey of experts to determine most likely trajectory and derive SPC from this
  - Should NOT simply assume 550 ppmv outcome (as in Heathrow consultation)
    - Gives perverse incentives to allow carbon intensive developments (as with Heathrow) – by assuming stringent policies, allows non-stringent policies to be implemented
    - Inconsistent with precautionary principle (risks immoderate costs if no global agreement; extra emissions due to 550 ppmv assumption will be very difficult to reverse later if it becomes necessary because there is no global agreement)

# Conceptual Basis 2: Marginal Abatement Cost (MAC)

- Very different MACs in different sectors (see figure)
- In theory should choose MAC equal to SCC but don't know what this is
- Standard pricing approach: could choose MAC to deliver carbon reductions to get on UK trajectory consistent with 550 ppmv (e.g. trajectory consistent with Climate Change Bill targets), a politically-decided target based on climate change science (2°C limit)
  - Would need to be iterative
  - MACs are very uncertain
    - Depend on complementary policies (e.g. technology support)
    - Depend on technology learning and wide deployment (cost reductions)
    - Depend on draconian policies (e.g. energy efficiency of existing housing)
    - Depend on fossil fuel prices

# Global cost curve for greenhouse gas abatement




[1]$GtCO_2e$ = gigaton of carbon dioxide equivalent; "business as usual" based on emissions growth driven mainly, by increasing demand for energy and transport around the world, and by tropical deforestation.
[2]$tCO_2e$ = ton of carbon dioxide equivalent.
[3]Measures costing more than €40 a ton were not the focus of this study.
[4]Atmospheric concentration of all greenhouse gases recalculated into $CO_2$ equivalents; ppm = parts per million.
[5]Marginal cost of avoiding emissions of 1 ton of $CO_2$ equivalents in each abatement demand scenario.



*Source: A cost curve for greenhouse gas reductions, The* Mckinsey Quarterly, January 2007

# Conceptual Basis 3: Precaution and Pragmatism

- Even a 550 ppmv target will be very difficult to achieve;
- Climate science is already suggesting it is too high (Stern is now recommending 500 ppmv, a major downward adjustment in less than two years, Hansen is calling for 350 ppmv)
- Building of high-carbon infrastructure should be avoided
- Very substantial investment in low-carbon energy supply and infrastructure (e.g. high-speed rail) will be required
- Argues for high carbon tax, indefinite escalator over time, other taxes reduced (ETR) until it is clear that incentives are adequate for low (for than high) carbon investments in energy supply and infrastructure
- In the absence of a carbon tax, should apply same thinking to SPC

**Appendix 2 Presentation from Sam Fankhauser, IDEACarbon**

IDEAcarbon

# The starting point

- Three ways to get a price for carbon
  - Social costs (marginal damage per ton)
  - Marginal abatement costs
  - Market price
- In an ideal world they would all be the same
- In reality there are big differences between them
- And there are big differences within each class

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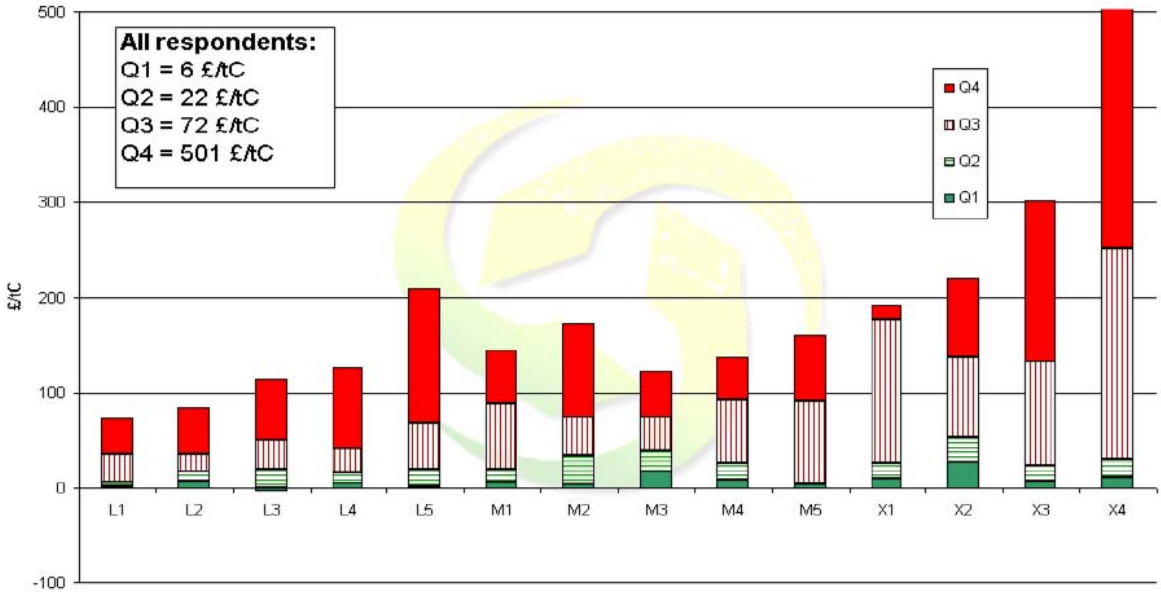
# Social cost estimates




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.

# Sources of uncertainty

- From **GDP** to **energy consumption** to **emissions**
  - socio-economic, technological uncertainty
- From **emissions** to **concentration** to **temperature**
  - scientific uncertainty
- From **temperature** to regional **climate change**
  - scientific uncertainty
- From **climate change** to **physical impact**
  - Scientific, technological, socio-economic uncertainty
- From **physical impact** to **social welfare**
  - economic, methodological, ethical uncertainty

# Market prices

| EUA Prices (EU-ETS) | Date | Dec 08 | Dec 09 | Dec 10 | Dec 11 | Dec 12 | |
|---|---|---|---|---|---|---|---|
| FUTURES (ECX) | 02-Jul | €27.99 | €29.19 | €30.26 | €31.49 | €32.85 | |
| SPOT (BlueNext) | 02-Jul | €27.15 | | | | | |
| **CER Prices (CDM)** | | **Dec 08** | | **Dec 09** | | **08-12 Strip** | |
| Broker | | | | | | | |
| TFS Energy | 02-Jul | N/A | N/A | N/A | N/A | N/A | N/A |
| Evolution Markets | 02-Jul | €22.15 | €25.35 | €23.20 | €23.45 | €23.95 | €24.10 |
| CantorCO2e | 02-Jul | €22.30 | €22.35 | €23.35 | €23.55 | €23.80 | €23.95 |
| Tullett Prebon | 02-Jul | €22.10 | €22.30 | €23.20 | €23.50 | €23.95 | €24.10 |
| ICAP | 02-Jul | €22.10 | €22.30 | €23.15 | €23.35 | €23.85 | €24.05 |
| MF Global Energy | 02-Jul | N/A | N/A | N/A | N/A | N/A | N/A |
| Spectron | 02-Jul | €22.20 | €22.30 | €23.30 | €23.40 | €24.00 | €24.10 |
| GFI Group | 02-Jul | €22.25 | €22.45 | €23.25 | €23.45 | €23.85 | €24.05 |
| | | Dec 08 | | Dec 09 | | Strip | |
| *Reuters CER Index | 02-Jul | €22.51 | | €23.35 | | €23.98 | |
| Net Chg/ | % Chg | €0.40 | 1.81% | €0.58 | 2.55% | €0.69 | 2.96% |
| Implied Percentage/ | € Spread | 80.43% | €5.48 | 79.98% | €5.84 | 79.24% | €6.28 |
| Exchange | | Dec 08 | Net Chg | Volume | Dec 09 | Net Chg | Volume |
| ECX CERs | 02-Jul | €22.34 | €0.43 | 646 | €23.37 | €0.73 | 230 |
| Nord Pool CERs | 02-Jul | €21.50 | -€0.25 | 1 | €22.35 | €0.00 | 0 |
| Green Exchange | 02-Jul | €21.78 | €0.00 | 0 | €22.63 | €0.06 | 0 |
| | | Nov 08 | Net Chg | Volume | | | |
| India's MCX (INR) | 02-Jul | 1,559.00 | 52.00 | 1 | | | |
| VER Prices (Voluntary) | | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
| CCX Vintages (USA) | 01-Jul | $4.80 | $4.80 | $4.75 | $4.75 | $4.75 | $4.75 |

Source: Reuters

# Sources of uncertainty

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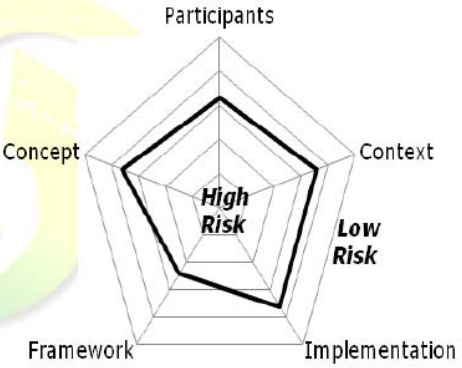
- Commodity prices
  - Coal, gas spread
- Regulatory risks
  - Cap, trading rules
- Economic risks
  - Growth, output
- Weather
  - Energy demand, hydro
- Project delivery risks
  - Technology, market etc.

**The Carbon Rating Agency**
**an IDEAcarbon company**




**Risk web for project-based credits**

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# Marginal abatement costs

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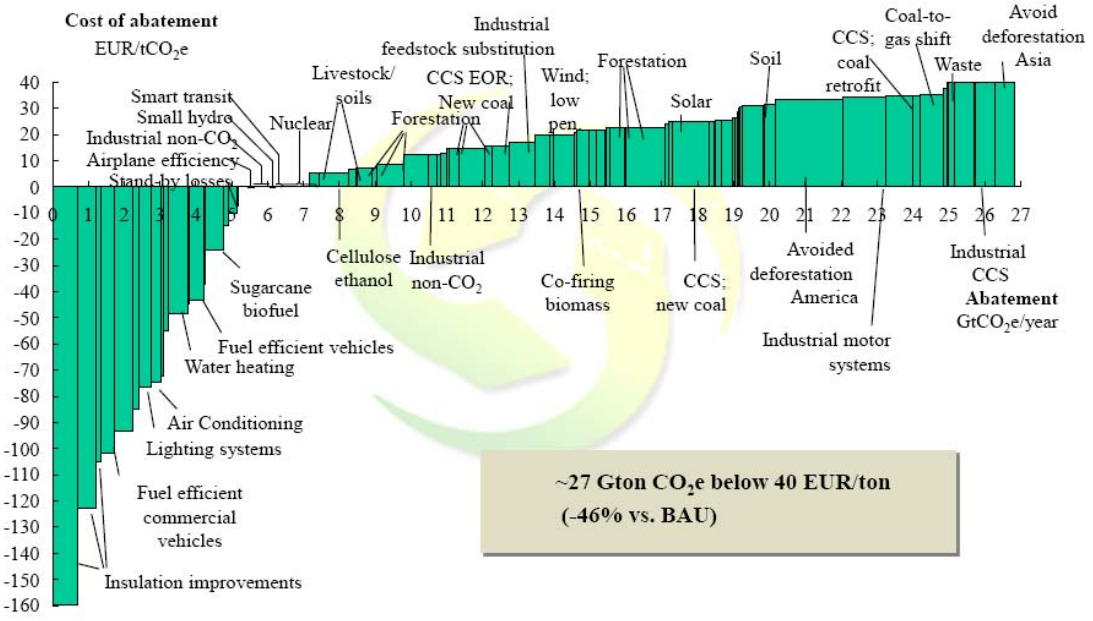
2030



# Sources of uncertainty

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- Modelling philosophy
  - Top down vs bottom up
  - Treatment of technological progress
- Technology costs
  - Learning curves
  - Deployment of new technologies (e.g. CCS)
- "non-tangible", hidden costs
  - e.g. in energy efficiency, land-use change
- Socio-economic factors
  - Business-as-usual
  - Fuel costs

# Climate Change Committee

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**Recommend**

- 2050 target:
  - 60%, 80%, or other
- First 3 budgets:
  - Where in 2018-22 (26%+)
  - Trajectory from today
- How much buy-in of credits allowed
- Should international aviation & shipping be included
- $CO_2$ budgets or all GHGs

**Identify implications of proposed budgets for**

- Competitiveness
- Security of supply
- Fuel poverty
- Fiscal revenues
- The regions
- Ancillary environmental effects

**Annual reports on**

- Progress against budgets
- Extent of borrowing/banking
- Other?

# The 2050 target

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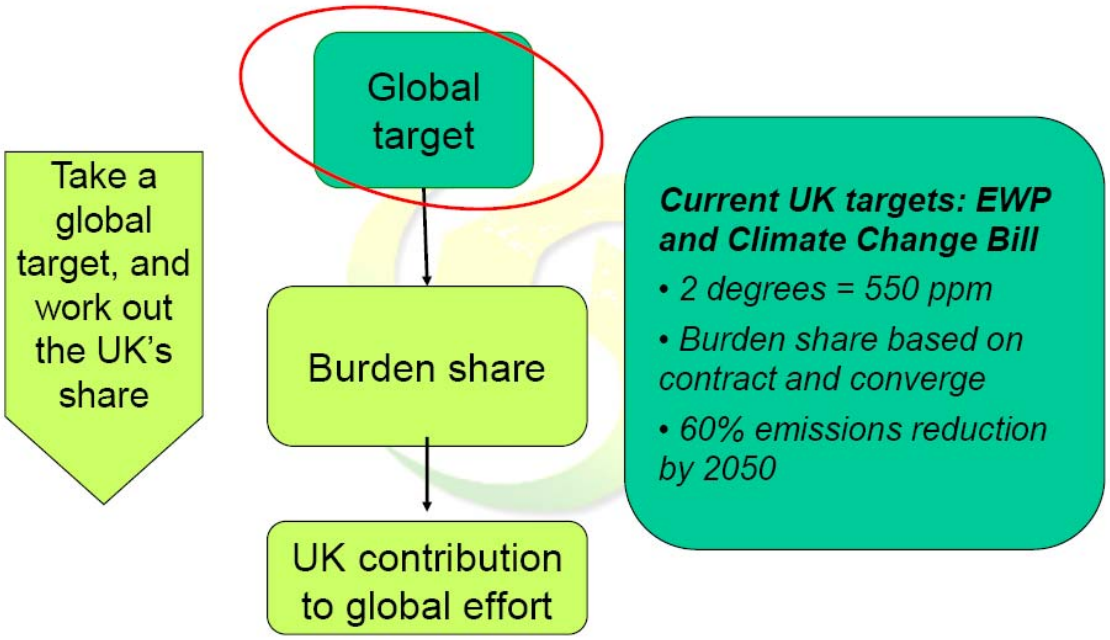


# Global Ambition for 2050

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- Scientific relationships
- Technology
- Economics

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

| | 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 |

Judgment on unacceptable temperature change, and required emissions reductions

## Conclusion

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- We need a shadow price of carbon to guide public investment decisions
- UK carbon budgets will be set based on a broader set of issues than just social costs
- Shadow price needs to be consistent with cost / price signals elsewhere
  - Private sector behaviour, based on market price
  - Marginal cost of meeting UK carbon budgets

## Appendix 3 Definitions

***Carbon price*** – A carbon price is a generic term for a value applied to each unit of carbon emissions, regardless of the methods used to determine this value. A carbon price can be set on the basis of the marginal abatement cost, the social cost of carbon, the shadow price of carbon, DEFRA's SPC, or some other estimation technique.

***Marginal Abatement Cost*** – The marginal abatement cost (MAC) is an estimate of how much it would cost to reduce (or "abate") the next unit of carbon emitted. It is commonly assumed that the more carbon that is abated (that is, the lower the emissions) the more expensive it becomes to abate the next unit. The presumption is that the cheapest and easiest abatement techniques will occur first, leaving the more expensive techniques for the future.

The **Social Cost of Carbon** (SCC) is the present discounted value of the future stream of costs resulting from today's emission of a new unit of carbon. Social costs are also called damage costs. The "present discounted value" is a way of making commensurate damage costs that will take place in different years. Future costs are discounted, or reduced in value; the further into the future a cost occurs, the less value it is given in present terms.

***Shadow price*** – A shadow price is the price of a negative externality, or a negative environmental effect that is not included in a good's market price. The shadow price of carbon is determined by estimating marginal abatement costs and social (or damage) costs for a range of different emissions levels. The shadow price is the price at which the marginal abatement costs and social costs agree

***SPC*** – DEFRA's "shadow price of carbon" (SPC) is not a shadow price in the classic sense of this term. Instead, the SPC is determined entirely by the social cost of carbon at an assumed stabilization trajectory. The SPC is determined by an assumed emissions level, while a true shadow price is determined by the intersection of marginal damages and marginal abatement costs.

** this section taken from http://www.foe.co.uk/resource/reports/shadow_cost_of_carbon.pdf

## Appendix 4 Participant list

**Speakers:**

| | |
|---|---|
| Paul Ekins | King's College London |
| Sam Fankhauser | Committee on Climate Change and IDEAcarbon |
| Simeon Thornton | DEFRA |

**Other participants:**

| | |
|---|---|
| Victor Anderson | Sustainable Development Commission |
| Simon Bullock | Friends of the Earth |
| James Burt | DEFRA |
| Ian Dickie | Eftec |
| Simon Dietz | London School of Economics |
| Richard Douglas | Environmental Audit Committee |
| Simon Ellis | Steer Davis Gleave |
| Adrian Gault | Department for Transport |
| Dominic Hogg | Eunomia Research and Consulting |
| Chris Hope | Judge Business School, University of Cambridge |
| Richard Houston | Office for Climate Change |
| Tim Jenkins | Friends of the Earth |
| Paul Johnson | Institute for Fiscal Studies |
| Sudhir Junankar | Cambridge Econometrics |
| Andrew Leicester | Institute for Fiscal Studies |
| Roger Levett | Levett-Therivel |
| Eric Lewis | National Audit Office |
| Pete Lockley | WWF-UK |
| Michael Mainelli | Z/Yen |
| Estela Montado | Department for Business, Enterprise and Regulatory Reform |
| Stephen Nelson | DEFRA |
| Dave Timms | Friends of the Earth |
| Paul Watkiss | Stockholm Environment Institute |


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