

Carbon Appraisal in UK Policy Appraisal: A revised Approach

A brief guide to the new carbon values and their use in economic appraisal¹

The introduction of binding carbon budgets across the UK economy implies that a robust approach to valuing emission is vital in order to ensure that Government takes full account of climate change impacts in appraising and evaluating public policies and projects, whether those policies are intended to reduce emissions or are likely to have the effect of increasing emissions.

The main objective of assigning a value to GHG emissions that arise from potential Government policies is to allow for a more objective, consistent and evidence based approach to determining whether such policies should be implemented. Carbon values are used in the framework of broader cost benefit analyses to assess whether, taking into account all relevant costs and benefits (including impact of climate change), a particular policy may be expected to improve or reduce the overall welfare of society.

The approach to carbon valuation in Government has undergone a major review, concluded in July 2009.² The new approach moves away from a valuation based on the damages associated with impacts, instead using as its basis the cost of mitigation. More precisely, the new approach will set the valuation of carbon at a level that is consistent with the UK Government's targets in the short and long term. Previously our valuation of carbon has been based upon an estimate (drawn from the Stern Review) of the damages associated with the climate impacts of emissions so called the Shadow Price of Carbon (SPC).³

Valuing changes in domestic emissions

In December 2008, the EU Climate and Energy Package was agreed. This will achieve 20% reductions (on 1990 levels) across the EU by 2020 (increasing to 30% in the case of an international agreement in Copenhagen). This splits emission reductions into the 'traded' sector (those emissions covered – directly or indirectly – by the EU ETS), and the non-traded sector (those emission not covered by the EU ETS). The presence of separate targets in the Traded (ETS) and Non Traded (non-ETS) sectors imply that emissions in the sectors are essentially different commodities and the approach to valuing carbon needs to reflect this reality. In the UK, it is unlikely that the (marginal) cost of meeting targets in both these sectors is the same. This means that different carbon valuations are required in order to preserve target-consistency.

¹ Further guidance on greenhouse gas appraisal will be published later this year (2009) alongside a spreadsheet tool.

² Carbon Valuation in UK Policy Appraisal: A Revised Approach (July 2009) available www.decc.gov.uk

³ The Social Cost of Carbon and the Shadow Price of Carbon: What they are, and how to use them in economic appraisal in the UK (December 2007) available at <http://defraweb/environment/climatechange/research/carboncost/pdf/background.pdf>

Following the clear distinction between the traded and non-traded sectors, two sets of carbon price estimates have been recommended for 2008-2050. This approach enables more accurate policy appraisal, with respect to the costs and benefits to the UK, and consistency with our European obligations. For appraising policies that affect emissions in sectors covered by the EU ETS the **'traded price of carbon'** is recommended whereas for policies that affect emissions in sectors not covered by the EU ETS (the non-traded sector) a **'non-traded price of carbon'** is used. It is then assumed that a global carbon market is in place from 2030. This means that one target consistent price applies to all emissions, regardless of whether they originate in the current traded or non-traded sector. The abatement cost estimates underlying this price are consistent with the CCC analysis on stabilisation and emission reductions, which represents the most recent robust scientific evidence available.⁴ These proposed prices represent a view of likely future carbon prices, consistent with the ambitious 2020 targets and with long-term emission reduction targets as adopted by the Government. Table 1 summarises the new prices to be used and Box 1 illustrates how the values should be used in practise.

Carbon values to be used in Government appraisal will be regularly reviewed to account for new evidence and in light of multilateral negotiations. The traded carbon price (over the 2008-2020 period) will be revised alongside periodic updates to the fossil fuel price assumptions (usually once a year). However, further revision will be undertaken if there is a major change in the cap (for instance due to the achievement of a global deal on climate change). As for the non traded carbon values, it is recommended a further revision of the value after the setting of the fourth carbon budget (by end of June 2011). Further reviews of the non traded carbon values will occur every five years (starting in 2011). Finally, the long term global values will be revised every five years beginning in 2011.

⁴ Committee on Climate Change: "Building a low carbon economy" (December 2008).

Table 1: Summary of all carbon prices and sensitivities, 2009-2050

Year	Traded prices, £/t 2009			Non-traded prices, £/t 2009		
	Low	Central	High	Low	Central	High
2008	12	21	26	25	50	75
2009	12	21	27	25	51	76
2010	12	22	27	26	52	78
2011	12	22	27	26	52	79
2012	13	22	28	27	53	80
2013	13	23	28	27	54	81
2014	13	23	29	27	55	82
2015	13	23	29	28	56	84
2016	13	24	29	28	57	85
2017	14	24	30	29	57	86
2018	14	24	30	29	58	87
2019	14	25	31	30	59	89
2020	14	25	31	30	60	90
2021	16	30	39	31	61	92
2022	18	34	46	31	62	93
2023	20	39	53	32	63	95
2024	23	43	61	32	64	96
2025	25	48	68	33	65	98
2026	27	52	76	33	66	99
2027	29	57	83	34	67	101
2028	31	61	90	34	68	102
2029	33	66	98	35	69	104
2030	35	70	105	35	70	105
2031	38	77	115	38	77	115
2032	42	83	125	42	83	125
2033	45	90	134	45	90	134
2034	48	96	144	48	96	144
2035	51	103	154	51	103	154
2036	55	109	164	55	109	164
2037	58	116	173	58	116	173
2038	61	122	183	61	122	183
2039	64	129	193	64	129	193
2040	68	135	203	68	135	203
2041	71	142	212	71	142	212
2042	74	148	222	74	148	222
2043	77	155	232	77	155	232
2044	81	161	242	81	161	242
2045	84	168	251	84	168	251
2046	87	174	261	87	174	261
2047	90	181	271	90	181	271
2048	94	187	281	94	187	281
2049	97	194	290	97	194	290
2050	100	200	300	100	200	300

Box 1: How use the new carbon values for appraisal of policy A

An energy efficiency programme is being considered which reduces the use of gas and electricity by householders. The electricity reductions cut emissions in the traded sector by 1000tCO₂e (per year) while reduced gas usage cuts non-traded emissions by 1500tCO₂e (per year). These are annual reductions for each year between 2011 and 2020. Tables 2 and 3 demonstrate how to value the emission reductions using the new carbon values.

Table 2: Valuing reduction in traded sector emissions

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Emissions reductions, tCO ₂ e	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Traded carbon price, £/t 2009	22	22	23	23	23	24	24	24	25	25
Value of savings, £m 2009	0.022	0.022	0.023	0.023	0.023	0.024	0.024	0.024	0.025	0.025

Table 3: Valuing reduction in non-traded sector emissions

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Emissions reductions, tCO ₂ e	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Non-traded price, £/t 2009	52	53	54	55	56	57	57	58	59	60
Value of savings, £m 2009	0.078	0.080	0.081	0.083	0.084	0.086	0.086	0.087	0.089	0.090

These monetary savings can then be discounted in the usual way following Green Book guidance.

Suppose that policymakers then wish to consider the carbon impacts of extending the policy to 2040. It is expected that the emissions reductions associated with the programme will decline over time, to savings of 100tCO₂e in 2040 from reduced electricity use and savings of 200tCO₂e from reduced gas use (assume that savings reduce following a linear trajectory between 2020 and 2040).

As shown in Table 4, valuing the traded sector carbon savings up to 2030 follows the same methodology as in Table 2, simply using the traded carbon prices relating to 2021-2030. Likewise - but not shown - valuing the non-traded savings would follow the approach in Table 3 using the non-traded carbon prices for 2021-2030.

Table 4: Valuing traded sector savings

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Emissions savings, tCO ₂ e	955	910	865	820	775	730	685	640	595	550
Traded price, £/t 2009	30	34	39	43	48	52	57	61	66	70
Value of savings, £m 2009	0.029	0.031	0.034	0.035	0.037	0.038	0.039	0.039	0.039	0.039

Finally, Table 5 illustrates how to value carbon savings between 2030 and 2040. Following the assumption of a fully functioning global carbon market from 2030, there is a single price that applies to all emission savings arising from the gas and electricity reductions.

Table 5: Valuing emission savings after 2030

	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Total savings, tCO ₂ e	1290	1180	1070	960	850	740	630	520	410	300
Global price, £/t 2009	77	83	90	96	103	109	116	122	129	135
Value of savings, £m 2009	0.099	0.098	0.096	0.092	0.088	0.081	0.073	0.063	0.053	0.041