

A brief guide to the carbon valuation methodology for UK policy appraisal

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This note provides brief guidance for the use of the UK Government carbon valuation methodology in UK policy appraisal. **Table 1** at the end of the document details the carbon values to be used in economic appraisal over the 2008 to 2100 period (in real 2011 prices).¹ For full guidance on appraisal see the IAG Guidance page: <http://www.decc.gov.uk/en/content/cms/about/ec_social_res/iag_guidance/iag_guidance.aspx>.

The introduction of binding carbon budgets across the UK economy implies that a robust approach to valuing carbon emissions² is vital to ensuring 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.

Government concluded a major review of the carbon valuation approach to be used in UK policy appraisal in July 2009. The revised approach moves away from a valuation based on the damages associated with impacts, instead using as its basis the cost of mitigation. The new approach set the valuation of carbon over the 2008-2050 period at a level that is consistent with the UK Government's targets in the short and long term. In June 2010, Government set out an interim carbon value profile over the 2050 - 2100 period to be used for economic appraisal consistent with the agreed carbon values up to 2050.³

This note clarifies the use of the carbon values in UK policy appraisal and provides an example.

Traded and non traded carbon values in UK policy appraisal

The EU Climate and Energy Package (December 2008) introduced separate emissions reduction targets for the traded sector (i.e. emissions covered by the EU Emission Trading System) and for the non-traded sector (i.e. emissions outside the EU Emission Trading System). The presence of separate targets in the Traded and Non-Traded sectors implies that emissions in the two sectors are essentially different commodities.

¹ Please note that DECC has developed a set of carbon values for energy modelling that can be found on the DECC's carbon valuation web page <http://www.decc.gov.uk/en/content/cms/emissions/valuation/valuation.aspx> For more guidance on how to value impacts of a policy on energy use and GHG emissions, see also "Guidance on the valuation of energy use and GHG emissions for appraisal and evaluation" available at http://www.decc.gov.uk/en/content/cms/about/ec_social_res/iag_guidance/iag_guidance.aspx

² In this guide we refer to carbon as carbon dioxide equivalent (CO₂e).

³ More information on the carbon valuation methodology see "Carbon Valuation in UK Policy Appraisal: A Revised Approach" (July 2009) available on DECC's carbon valuation web page

<http://www.decc.gov.uk/en/content/cms/emissions/valuation/valuation.aspx>

Information on the post 2050 carbon valuation interim methodology are available at

http://www.decc.gov.uk/en/content/cms/emissions/valuation/shadow_cost/shadow_cost.aspx

In the UK, it is unlikely that the (marginal) cost of meeting targets in the traded and non traded sector is the same. This means that different carbon valuations are required in order to preserve target-consistency. Following the clear distinction between the traded and non-traded sectors, two sets of carbon values have been recommended for the 2008 -2030 period: changes in emissions in the traded sector (i.e. covered by the EU Emission Trading System (EU ETS)) should be valued at the **traded carbon value**, whereas changes in emissions in the non-traded sector (i.e. outside the EU ETS) should use the **non-traded carbon value**. This approach enables more accurate policy appraisal, with respect to the costs and benefits to the UK, and consistency with our European obligations. Post 2030, it is assumed that a global carbon market is in place. Therefore, one target consistent **global carbon value** applies to all emissions, regardless of whether they originate in the current traded or non-traded sector of the economy.

Standard Green Book guidance encourages analysts to perform sensitivity analyses in order to assess how future uncertainties can affect the choice between the policy options. In the area of energy and climate change, the net costs of a policy are sensitive to the fossil fuel price assumptions. For example, in a low fossil fuel price scenario, the net costs of an energy efficiency policy are likely to be higher because the energy savings will be worth less than in a scenario with high fossil fuel prices. Government has therefore produced low, central and high traded/non traded carbon values over the 2008-2100 period (in real 2011prices) to be used in sensitivity analysis (Table 1).

The next section provides an example of how the carbon values should be used in policy appraisal.

Example of how to use the new carbon values for appraisal

Assume that an energy efficiency programme reduces the use of electricity and gas by householders. The programme reduces electricity and gas consumption leading to a reduction of emissions in the traded and non traded sector respectively. The reduced electricity consumption cuts emissions in the traded sector by 1000tCO_{2e} (per year) and lower gas usage in the non-traded sector by 1500tCO_{2e} (per year). Tables 2 and 3 demonstrates how to value the emission reductions of this programme using the new carbon values in the traded (Table 2) and non traded (Table 3) sector respectively.

Table 2: Valuing traded sector savings

Valuing traded sector savings										
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Emissions reduction, tCO _{2e}	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
traded carbon price, £/t 2011	13	14	16	17	19	21	22	24	26	29
Value of savings, £m 2011	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03

These monetary savings can then be discounted in the usual way following Green Book guidance.⁴

It is worth noting that the traded sector savings are from a financial (rather than an environmental) gain following the lower purchase of EU ETS allowances that the UK as a whole will need as a result of lower electricity consumption. As the quantity of emissions in the traded sector is fixed at the EU level, a reduction in traded sector emissions in the UK will not translate in a reduction of emissions in the overall system. However, the reduction in electricity consumption will require the UK to purchase a lower amount of allowances than otherwise, thus leading to a financial saving for the economy.

Table 3: Valuing reduction in non traded sector emissions

Valuing reduction in non-traded sector emissions										
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Emissions reduction, tCO ₂ e	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
traded carbon price, £/t 2011	52	53	54	55	56	57	57	58	59	60
Value of savings, £m 2011	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09

⁴ http://hm-treasury.gov.uk/data_greenbook_guidance.htm

Table 1: Summary of all carbon values and sensitivities over the 2008-2100 period (a)
(Real £2011)

	Traded			Non-traded		
	Low	Central	High	Low	Central	High
2008	19	19	19	27	53	80
2009	12	12	12	27	54	81
2010	13	13	13	27	55	82
2011	6	13	17	28	56	83
2012	7	14	18	28	56	85
2013	9	16	20	29	57	86
2014	10	17	21	29	58	87
2015	12	19	24	30	59	89
2016	14	21	27	30	60	90
2017	15	22	28	30	61	91
2018	16	24	31	31	62	93
2019	17	26	33	31	63	94
2020	19	29	35	32	64	95
2021	21	33	43	32	65	97
2022	23	38	51	33	66	99
2023	25	42	58	33	67	100
2024	26	47	66	34	68	102
2025	28	51	73	34	69	103
2026	30	56	81	35	70	105
2027	32	61	89	36	71	107
2028	34	65	96	36	72	108
2029	35	70	104	37	73	110
2030	37	74	111	37	74	111
2031	41	81	122	41	81	122
2032	44	88	132	44	88	132
2033	47	95	142	47	95	142
2034	51	102	153	51	102	153
2035	54	109	163	54	109	163
2036	58	116	173	58	116	173
2037	61	122	184	61	122	184
2038	65	129	194	65	129	194
2039	68	136	204	68	136	204
2040	72	143	215	72	143	215
2041	75	150	225	75	150	225
2042	78	157	235	78	157	235
2043	82	164	246	82	164	246
2044	85	171	256	85	171	256
2045	89	178	266	89	178	266
2046	92	184	277	92	184	277
2047	96	191	287	96	191	287
2048	99	198	297	99	198	297
2049	103	205	308	103	205	308
2050	106	212	318	106	212	318

	Traded			Non-traded		
	Low	Central	High	Low	Central	High
2051	109	220	330	109	220	330
2052	111	227	342	111	227	342
2053	114	234	355	114	234	355
2054	116	241	367	116	241	367
2055	118	248	379	118	248	379
2056	120	256	391	120	256	391
2057	122	262	403	122	262	403
2058	124	269	414	124	269	414
2059	125	276	426	125	276	426
2060	127	282	437	127	282	437
2061	128	287	447	128	287	447
2062	129	292	456	129	292	456
2063	129	297	465	129	297	465
2064	129	301	473	129	301	473
2065	130	305	480	130	305	480
2066	130	309	488	130	309	488
2067	129	312	494	129	312	494
2068	129	315	500	129	315	500
2069	128	317	506	128	317	506
2070	128	319	511	128	319	511
2071	127	321	515	127	321	515
2072	126	323	520	126	323	520
2073	125	324	524	125	324	524
2074	124	325	527	124	325	527
2075	122	326	530	122	326	530
2076	121	326	532	121	326	532
2077	119	326	534	119	326	534
2078	117	326	535	117	326	535
2079	115	325	535	115	325	535
2080	113	324	535	113	324	535
2081	112	324	536	112	324	536
2082	110	323	537	110	323	537
2083	108	322	537	108	322	537
2084	106	321	536	106	321	536
2085	104	320	536	104	320	536
2086	102	318	535	102	318	535
2087	100	316	533	100	316	533
2088	97	315	532	97	315	532
2089	95	312	529	95	312	529
2090	93	310	527	93	310	527
2091	91	308	525	91	308	525
2092	89	306	523	89	306	523
2093	87	304	521	87	304	521
2094	84	301	518	84	301	518
2095	82	298	515	82	298	515
2096	80	296	511	80	296	511
2097	78	293	508	78	293	508
2098	75	290	505	75	290	505
2099	73	287	501	73	287	501
2100	71	284	497	71	284	497

(a) 2008, 2009, 2010 traded prices are based on actual EU ETS prices.

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