



Department
of Energy &
Climate Change

Updated short-term traded carbon values used for UK public policy appraisal

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Background

DECC's short-term traded carbon values for UK public policy appraisal are used for valuing the impact of government policies on emissions in the traded sector, i.e. those sectors covered by the EU Emissions Trading System (EU ETS). Short-term values quoted in this paper correspond to 2013-2030 and long-term values correspond to the period post 2030.

In 2009, DECC set out a methodology for producing traded sector carbon values to 2050 in the paper 'Carbon Valuation in UK Public Policy Appraisal: A Revised Approach'¹ (July 2009). The paper advocated moving from a damage cost approach for valuing carbon which was used before 2009 to a target consistent resource-cost approach.

In 2012, DECC's methodology for producing short-term traded carbon values was updated following peer review.² The hybrid methodology adopted in 2012 involved using a market-based approach based on futures prices to produce short-term traded carbon values in the central scenario with fundamentals-based high and low scenarios used for sensitivity purposes.

DECC's short-term traded carbon values were last updated in summer 2012 and are being revised again as part of the annual process for updating DECC's analytical projections. Table 1 below shows the 2013 updated short term traded carbon values for use in government appraisal.

Methodology

In light of the extensive review and update of the methodology used for estimating DECC's short-term traded values in 2012, the 2013 update is based on a light-touch approach which utilises the same methodology as in 2012, but uses revised inputs, which include:

¹ Available online at:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/41798/1_20090715105804_e_carbonvaluationinukpolicyappraisal.pdf

² DECC's methodology was peer reviewed by Prof Derek Bunn and Dr William Blyth. Their peer review reports can be found here:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/41795/6680-Derek-Bunn-peer-review.pdf

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/41796/6659-peer-review-of-deccs-2012-update-to-shortterm-tr-1.pdf

- Revised Business As Usual (BAU) emissions projections that are consistent DECC's fossil fuel prices assumptions and corresponding Marginal Abatement Cost Curves (MACCs); and
- Updated market prices of EUA futures contracts and carbon price forecasts. This includes data on daily settlement prices of EUA futures contracts with maturities up to 2017 traded on the InterContinental Exchange (ICE) over 3 months between 25 January 2013 and 25 April 2013, and April 2013 carbon price forecasts from Thomson Reuters Point Carbon.

Short-term traded carbon values for the period up to 2020 under all three scenarios (central, high and low) have been linearly extended beyond 2020 to reach the long-term carbon values for the period beyond 2030. These long-term carbon values reflect the costs required to achieve the internationally agreed UNFCCC long term goal of limiting global temperature increases to not greater than 2 degrees centigrade above pre-industrial levels.

Central scenario

Short-term traded values in the central scenario are estimated using a market-based approach which involves averaging daily settlement prices of end year EUA futures contracts of different vintages over a period of 3 months. The number of traded futures contracts decreases rapidly with contracts' settlement dates. For instance, in April 2013 there were above 20,000 traded lots (1 lot = 1,000 tCO₂) with the settlement date December 2013 and only about 30 lots with the settlement date December 2020. In light of this limited liquidity in the futures market for years in the distant future, prices are averaged for those futures with settlement dates up to 2017, where there are still a reasonable number of futures contracts, and then extrapolated to 2020 using a discount rate implied from the latest set of carbon market forecasts.

High scenario

The high scenario is based on assumptions of higher economic growth, low prices of coal relative to gas and tighter EU ETS caps. Short-term traded carbon values under this scenario have been derived using a fundamentals-based model of carbon prices. This model estimates EUA prices up to 2020 based on the equilibrium between demand for and supply of abatement over the period to 2030. Demand for abatement depends on the gap between Business As Usual (BAU) emissions and the EU ETS cap, while supply depends on marginal abatement costs (MACs). It is assumed that supply meets demand over this period. The BAU emissions and MACs underlying this analysis have been derived from Enerdata's POLES model, a top-down global sectoral model for the world energy system⁴ and are consistent with DECC's 2013 updated fossil fuel price projections and the economic growth assumptions underlying these fossil fuel prices.⁵

³https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/41807/1_20100120165619_e_carbon_valuesbeyond2050.pdf

⁴ Further information on the POLES model can be found here: <http://www.enerdata.net/enerdatauk/solutions/energy-models/poles-model.php>

⁵ DECC's 2013 updated fossil fuel price projections can be found here <https://www.gov.uk/government/organisations/department-of-energy-climate-change/series/fossil-fuel-price-projections>

Low scenario

The low scenario is based on a pessimistic outlook for the carbon market which assumes continued chronic oversupply and lack of demand for allowances for the period up to 2020 and results in carbon prices being set at zero up to this point.

2013 updated short-term traded carbon values

DECC's 2013 updated short-term traded values are shown below. Further detail on the underlying assumptions and an explanation of the reasons for the differences with the 2012 values is provided in the subsequent section.

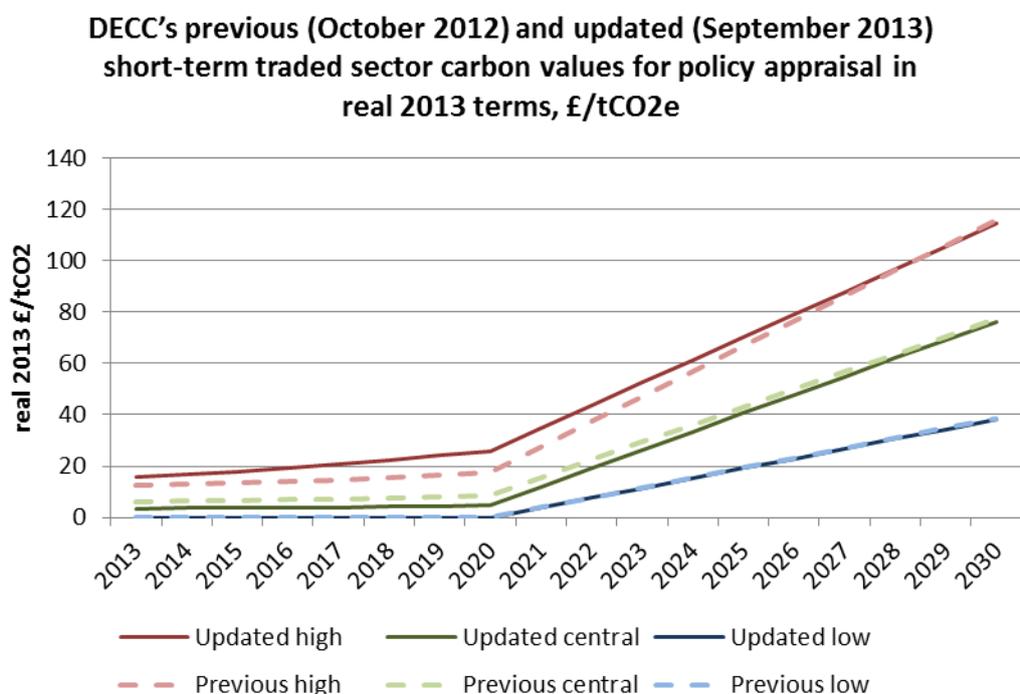
Table 1: DECC's updated short-term traded sector carbon values for policy appraisal in real 2013 terms, £/tCO₂e

	Low	Central	High
2013	0.00	3.49	15.57
2014	0.00	3.59	16.73
2015	0.00	3.67	18.01
2016	0.00	3.79	19.39
2017	0.00	3.92	20.89
2018	0.00	4.22	22.49
2019	0.00	4.53	24.19
2020	0.00	4.87	25.98
2021	3.81	12.01	34.82
2022	7.62	19.14	43.65
2023	11.43	26.28	52.49
2024	15.25	33.41	61.33
2025	19.06	40.55	70.16
2026	22.87	47.69	79.00
2027	26.68	54.82	87.84
2028	30.49	61.96	96.67
2029	34.30	69.10	105.51
2030	38.12	76.23	114.35

Please note that these values are based on a specific set of assumptions with respect to the move from the end of Phase III of the EU ETS (ending in 2020) to a fully functioning and comprehensive global carbon market in 2030. Consequently these values should not be considered as "forecasts" of future prices and DECC accepts no responsibility for any liability arising from the use of these figures.

Comparison with 2012 short-term traded carbon values

The chart below provides a comparison of the 2013 values with those published in 2012. The reasons for the differences between each scenario are explained in the following paragraphs.



Central scenario

Updated 2013 carbon values in the central scenario, estimated using a market-based approach based on futures prices, are lower as compared with 2012 values. This is a result of developments in the carbon market which have led to a fall in the price as compared with last year. The carbon market is currently suffering from oversupply and lack of demand for allowances owing to the economic slowdown. These factors continue to persist and have arguably worsened since 2012.

High scenario

Updated 2013 carbon values in the high scenario, which are based on fundamentals-based modelling, are higher than in 2012. This increase is driven by higher BAU emissions projections and a change in assumptions about the EU ETS cap trajectory.

The increase in projected BAU emissions is mostly attributable to 1) power sector results that are driven by coal and gas price projections until 2018-2020 that are lower than 2012 DECC's fossil fuel assumptions and 2) updated historical data in the POLES model⁶. There is a long term declining trend in projected emissions as a result of lower assumed economic growth in advanced (OECD) countries for most of the period up to 2030 which leads to reduced electricity and industrial demand and implies lower emissions in the long term. As a result, BAU

⁶ Actual 2011 emissions that are included in the 2013 POLES model are higher than those projected in the 2012 POLES model.

emissions are higher than in the 2012 update overall which, for a given target, tends to increase the modelled carbon price.

The 2013 update assumes a more stringent tightening of the EU ETS cap trajectory as compared to the assumptions made in the 2012 update. A tighter cap increases demand for allowances and therefore, the modelled carbon price. The 2013 updated values in the high scenario assume: 1) a permanent increase in the Linear Reduction Factor (LRF)⁷ in order to tighten the EU ETS cap trajectory in line with the estimated traded sector share of a 40% EU emissions reduction target for 2030⁸; and 2) a one-off cancellation of a volume of allowances in 2014 approximately equal to the current volume of surplus allowances in the EU ETS (1,800MtCO₂). Note that these assumptions about the EU ETS cap trajectory have been used for producing appraisal values in a high scenario purely for undertaking sensitivity analysis. This does not necessarily reflect or prejudice the UK's policy position on structural reform of the EU ETS or targets for 2030.

Low scenario

Updated carbon values in the low scenario are the same as those from last year. This represents an extremely pessimistic scenario with continued chronic oversupply in the carbon market as a result of which the carbon price up to 2020 is zero. Again, this just reflects a low scenario for the purpose of undertaking sensitivity analysis and does not reflect a view from Government that the market price is likely to reach zero in reality.

⁷ The LRF measures the year-on-year decline in the EU ETS cap. A higher LRF implies a steeper cap trajectory.

⁸ The traded sector's share of a 40% EU emissions reduction target for 2030 (as compared with 1990 levels) has been estimated using the emissions cuts for the traded and non-traded sectors identified in the European Commission's 2050 Roadmap Impact Assessment.

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