Department of Energy & Climate Change

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

18 November 2015

URN 15D/448

Any enquiries regarding this publication should be sent to us at eu.ets@decc.gsi.gov.uk.

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

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 the period up to 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 to a target consistent resource-cost approach.

In 2012, the hybrid methodology for producing short-term traded carbon values was adopted and 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.[2]

In 2014, DECC's short-term traded carbon values[3] were updated based on revised assumptions on length of perfect foresight and discount rate in the DECC Carbon Price Model (DCPM)[4].

These values are being revised again as part of the annual process for updating DECC's analytical projections. Table 1 below shows the 2015 updated short-term traded carbon values for use in government appraisal.

---

[1] Available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/41798/1_20090715105804_e____carbonvaluationinukpolicyappraisal.pdf

[2] 2012 short-term traded carbon values update publication: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/245385/6667-update-short-term-traded-carbon-values-for-uk-publ.pdf

[3] 2014 short-term traded carbon values update publication:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/360277/Updated_short-term_traded_carbon_values_used_for_UK_policy_appraisal__2014_.pdf

[4] DCPM is an in-house fundamentals-based model for estimating carbon prices. The DCPM estimates EUA prices in any given year based on the equilibrium between demand for and supply of abatement over a chosen number of future years (the foresight window of the model), which can be set to be between 1 year (i.e. no foresight) to 35 years (i.e. perfect foresight to 2050). 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)

Methodology

Updated short term traded carbon values (2015) are based on the same hybrid methodology as in previous years, but use revised inputs and assumptions, which include:

- Revised Business As Usual (BAU) emissions projections and corresponding Marginal Abatement Cost Curves (MACCs). These were commissioned from consultants Enerdata and produced using their POLES model, a top-down global sectoral model for the world energy system[5]. These BAU emissions projections and MACCs are consistent with DECC's 2015 fossil fuel price projections and underlying economic growth assumptions.[6]
- Updated market prices of EUA futures contracts. 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 1 April 2015 and 30 June 2015.

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 DECC's long-term carbon values for the period beyond 2030.[7] These long-term carbon values reflect the costs required to achieve the internationally agreed UNFCCC long term goal of limiting global temperature increases to 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 volume of traded futures contracts decreases rapidly with contracts' settlement dates. For instance, over the period April to June 2015 there were over 597,000 traded lots (1 lot = 1,000 tCO_2) with the settlement date December 2015 and fewer than 1,000 lots with the settlement date December 2020. In light of this limited liquidity in the futures market beyond a few years, 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 of 6% nominal in line with that used in the DCPM (see footnote 3).

High scenario

Short-term traded carbon values under this scenario are entirely fundamentals-based and have been derived using the DCPM under the assumptions that the 40% EU GHG emissions reduction target is in place in 2030 and the Market Stability Reserve (MSR) is fully operational in 2019.

Additional assumptions that contribute to higher carbon prices:

- higher economic growth;
- low prices of coal relative to gas;

---

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

[6] DECC's 2015 fossil fuel price projections can be found here: https://www.gov.uk/government/publications/fossil-fuel-price-projections-2015

[7] Annex 2 (page12): https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48108/1_20100120165619_e____carbonvaluesbeyond2050.pdf

- the length of perfect foresight is 16 years, as opposed to 6 years' perfect foresight in the DCPM central assumption.

Low scenario

Short-term traded carbon values under this scenario are also fundamentals-based and derived using the DCPM under the same assumptions of meeting the 40% EU GHG target and tightening the EU ETS cap via the MSR. Assumptions that drive lower carbon prices:

- slower economic growth;
- high prices of coal relative to gas;
- 6 years' perfect foresight.

As with the high scenario, this is produced for the purpose of sensitivity analysis.

2015 updated short-term traded carbon values

DECC's 2015 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 2014 values is provided in the subsequent section.

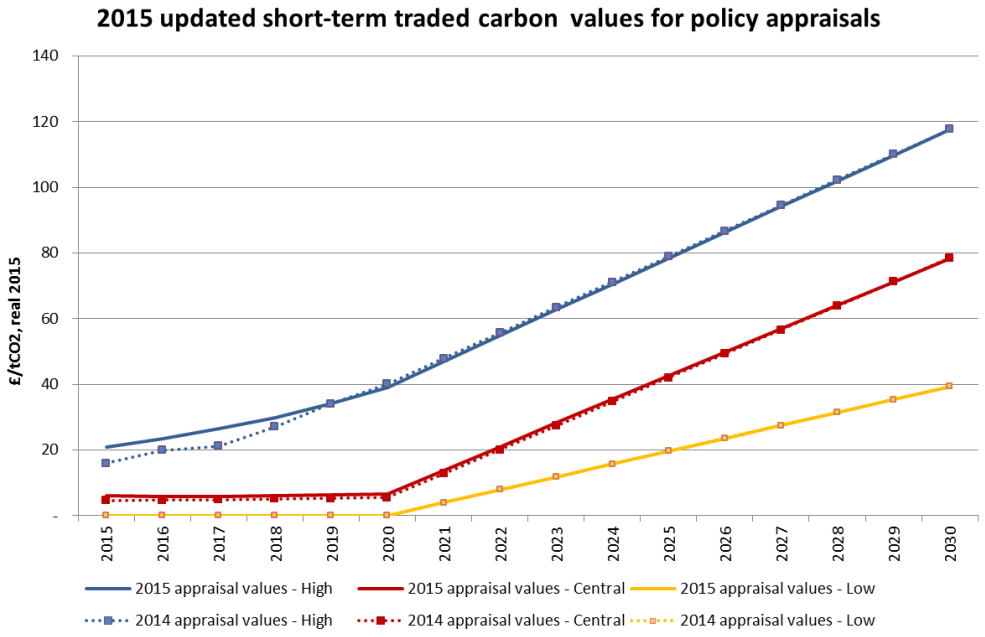
Table 1: DECC's updated short-term traded sector carbon values for policy appraisal in real 2015 terms, £/tCO2e

Year	Low	Central	High
2015	-	5.94	20.79
2016	-	5.91	23.40
2017	-	5.89	26.41
2018	-	6.12	29.86
2019	-	6.35	34.04
2020	-	6.59	39.03
2021	3.92	13.78	46.89
2022	7.85	20.96	54.76
2023	11.77	28.15	62.62
2024	15.69	35.33	70.49
2025	19.61	42.52	78.35
2026	23.54	49.71	86.22
2027	27.46	56.89	94.08
2028	31.38	64.08	101.95
2029	35.30	71.26	109.81
2030	39.23	78.45	117.68

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 2014 short-term traded carbon values

The chart below provides a comparison of the 2015 values with those published in 2014. The reasons for the differences between each scenario are explained in the following paragraphs.



Central scenario

The updated values in the central series, estimated up to 2020 based on futures prices, are slightly higher as compared with last year's values. This is on account of a slight increase in the market price of EUAs as compared with last year, possibly driven by a reduction in supply of allowances in 2014-16 due to the Commission's decision to backload 900 million EUAs, and expectations of future scarcity following agreement on the 2030 EU targets package and MSR. However, there have been no significant changes in the market since last year and over the short term it continues to suffer from oversupply and lack of demand for allowances.

High scenario

Updated carbon values in the high scenario are outputs of the fundamentals-based DCPM modelling up to 2020 and are higher than those from last year's update. All key parameters are unchanged from 2014, i.e. strong economic growth, low price of coal relative to gas and longer perfect foresight. The difference in the carbon values in 2015 is principally driven by the impact of decisions on the 2030 GHG target and MSR which have been agreed since the 2014 values were published.

Low scenario

Updated carbon values in the low scenario, based up to 2020 on fundamentals-based modelling using the DCPM, are the same as those from last year. The price of allowances up to 2020 remains zero in this scenario. This represents a pessimistic view of the future with continued chronic oversupply of allowances in the carbon market and consequently a low demand that drives low prices. This underpins 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.

Department of Energy & Climate Change
3 Whitehall Place
London SW1A 2AW
www.gov.uk/decc
URN 15D/448