DEPARTMENT OF ENERGY & CLIMATE CHANGE

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

15 October 2012

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Background

In 2009, DECC set out a methodology for producing traded sector (EU Emissions Trading System (ETS)) carbon values to 2030 in the paper 'Carbon Valuation in UK Public Policy Appraisal: A Revised Approach'[1] (July 2009). The 2009 paper also set out a schedule for annual updates to the values. In line with this schedule, Table 1 below shows the 2012 revised short term traded carbon values for use in government appraisal.

The changes to the values are consistent with the approach set out in 'Carbon Valuation in UK Policy Appraisal: A Revised Approach' but have been updated using a revised methodological approach and new information (details below). The impact of these updates has led to a downward revision to DECC's traded sector carbon values as compared to the previous updated[2] values.

2012 update

The changes to the underlying approach and assumptions related to the update are described in further detail below. The approach underlying the 2012 update was peer reviewed by two independent peer reviewers and their reports are available on DECC's website.[3]

Using a market-based approach

Three alternative approaches were explored for updating short-term traded carbon values:

- Continuing to use fundamentals-based modelling, under which traded carbon values are estimated based on the demand for and supply of abatement as explained in Annex A;
- Moving to a market-based approach using market forecasts, under which traded carbon values are estimated by averaging across price forecasts; and

[1] Available online at: http://www.decc.gov.uk/en/content/cms/what_we_do/lc_uk/valuation/valuation.aspx
[2] The previous update note (October 2011) is available on the DECC website at: http://www.decc.gov.uk/media/viewfile.ashx?filetype=4&filepath=11/cutting-emissions/carbon-valuation/3137-update-short-term-traded-carbon-values-uk.pdf&minwidth=true
[3] Available online at: http://www.decc.gov.uk/en/content/cms/what_we_do/lc_uk/valuation/valuation.aspx

- Moving to a market-based approach using futures prices, under which traded carbon values are estimated from average market prices of EUAs (EU Allowances).

It was acknowledged in 'Carbon Valuation in UK Policy Appraisal: A Revised Approach' that observed market prices would be the best estimate of the traded price of carbon but reliable data on market prices were not available at the time. However, better availability of data has now made it possible to use this approach. A market-based approach using market forecasts was not adopted following advice from peer reviewers given lack of transparency about assumptions underlying different forecasts.

The main reasons in support of moving to a market-based approach using futures prices are:

- As discussed, market prices are now available for a greater proportion of time up to 2020, for which short-term traded values are being estimated. This makes it possible to use this approach.
- The market for EUAs is currently oversupplied and is subject to policy uncertainty due to possible reform of the EU ETS. Such policy uncertainty is not captured by a fundamentals-based model that estimates carbon values based on an unchanged cap, whereas actual market prices do reflect expectations based on the possibility that the EU emissions cap might be changed. This makes a market-based approach using futures prices more appropriate than a fundamentals-based approach.

The 2012 updated values are derived using a hybrid methodological approach. Values in the central scenario are based on market prices of EUA futures contracts, whilst values in high and low scenarios are based on fundamentals-based modelling of different states of the carbon market. Note that although fundamentals-based values presented in this note only extend to 2020, they are based upon emissions projections and marginal abatement costs for the period up to 2030.

The central scenario reflects the resource cost of an EU Allowance based on existing market conditions.

The low scenario reflects a pessimistic outlook for the carbon market with low emissions and continued oversupply of allowances. Business as usual emissions are lower than the cap in this scenario cumulatively up to 2030, as a result of which no effort is required to meet emission reduction targets. Thus causes the modelled resource cost of allowances to collapse to zero.

The high scenario reflects high demand for allowances as a result of tighter caps, faster growth and low prices of coal relative to gas. It is assumed in the high scenario that the EU ETS cap trajectory becomes steeper over the period 2013-2030 through an increase in the linear reduction factor which measures the year-on-year decrease in the cap.[4] Coal and gas prices used in estimating business as usual emissions are consistent with DECC's updated fossil fuel projections.[5]

[4] The associated increase in the linear reduction factor is the same as that required for removal of 1,400 million EUAs over Phase III of the EU ETS.

[5] DECC's updated fossil fuel projections can be found at:
http://www.decc.gov.uk/en/content/cms/about/ec_social_res/analytic_projs/ff_prices/ff_prices.aspx

Other revisions

A number of other adjustments and revisions have been made in addition to the change in methodological approach explained above. These revisions relate to fundamentals-based modelling used for producing values under high and low scenarios.

Business as usual (BAU) emissions and marginal abatement cost curves (MACCs) that serve as inputs under a fundamentals-based approach have been updated, taking into account revised growth rates and DECC's updated fossil fuel projections. The BAU emissions and MACCs used in producing traded carbon values have been taken from Enerdata's POLES model, a top-down global sectoral model for the world energy system.[6] Updated BAU emissions are significantly lower than for the previous update, largely due to lower expected growth, which has the effect of lowering the estimated carbon price.

The method of aggregating MACCs to estimate the total supply of abatement has been modified following advice from peer reviewers. Instead of horizontally aggregating MACCs for different years, they have been sliced using specified carbon price paths. This helps estimate the amount of abatement that occurs in each year as the carbon price rises along the specified carbon price path, which when added across years gives the total supply of abatement. This change has the effect of increasing the supply of abatement at each price and hence it lowers the estimated carbon price for a given level of demand. Given the revised approach for aggregating MACCs, myopia assumptions that were used in the previous update have not been used, following advice from peer reviewers.

Actual verified emissions data have been used for 2011. Emissions in 2011 were lower than expected. Since lower emissions imply weaker demand for allowances, this has the effect of reducing the estimated carbon price.

Prices of CDM (Clean Development Mechanism) credits, which can be used for compliance under the EU ETS, have also been updated. These are lower than previous estimates and thus have the effect of lowering the estimated carbon price.

The overall impact of these changes is to decrease the short-term traded carbon values when compared to the 2011 short-term traded carbon values.

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

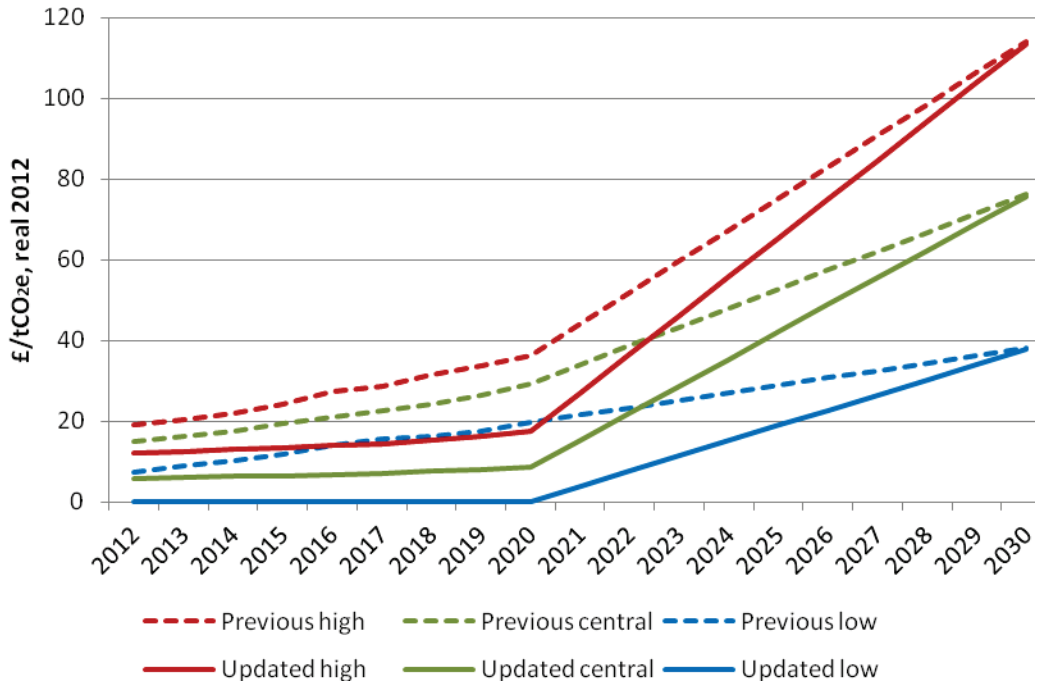
Updated values

DECC's updated short-term traded values for 2012 are as below.

Table 1: DECC's updated traded sector carbon values for policy appraisal

£/tCO$_2$e Real 2012	Updated Low	Updated Central	Updated High
2012	0.00	5.76	11.98
2013	0.00	5.98	12.42
2014	0.00	6.24	12.88
2015	0.00	6.45	13.36
2016	0.00	6.67	13.85
2017	0.00	7.10	14.37
2018	0.00	7.55	15.29
2019	0.00	8.03	16.28
2020	0.00	8.55	17.33
2021	3.78	15.26	26.94
2022	7.57	21.97	36.56
2023	11.35	28.68	46.17
2024	15.13	35.39	55.79
2025	18.92	42.10	65.40
2026	22.70	48.81	75.02
2027	26.48	55.52	84.63
2028	30.26	62.23	94.25
2029	34.05	68.94	103.86
2030	37.83	75.65	113.48

Chart 1: DECC's previous (October 2011) and updated (October 2012) traded sector carbon values for use in government appraisal (all in £2012 prices)



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[7]. 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.

[7] See description of methodology in Carbon Valuation in Public Policy Appraisal: A Revised Approach - http://www.decc.gov.uk/en/content/cms/what_we_do/lc_uk/valuation/valuation.aspx

Annex A

Short-term traded carbon values up to 2020 under high and low scenarios have been derived using a fundamentals-based model of the carbon market. The model estimates prices of allowances based on equilibrium between demand for and supply of abatement over the period up to 2030. It is assumed that the market clears over this period. 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). 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 system.

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