

Carbon valuation, discounting and risk management

Establishing a framework that places a value on carbon, and thereby gives financial incentives for businesses and households to incorporate climate change impacts of their activities into their decisions, is of key importance for the Government. Valuing carbon is also important for comparing the relative merits of climate change mitigation activities over time. This paper summarises a review of approaches to forestry carbon valuation, discounting and risk management. The review was prepared to assist the development of a Code of Good Practice for UK forestry carbon projects.

Background

Increasing atmospheric concentrations of 'greenhouse gases' (GHGs), of which carbon dioxide (CO₂) is the most important, is a primary cause of anthropogenic climate change. The global atmospheric CO₂ concentration has risen by over a third from pre-industrial levels of about 280 ppm in 1750 to 383 ppm in 2007. This far exceeds the maximum of the natural range over the past 650,000 years of 300 ppm, and is currently rising at over 2 ppm a year. Aggregate atmospheric GHG concentrations, often measured in carbon dioxide equivalents (CO₂e), currently exceed 430 ppm CO₂e. It is thought that they will have to be stabilised at around 450 ppm CO₂e if global warming is to be limited to below 2 °C and dangerous climate change prevented.

Objectives

This project aimed to review methods used to value carbon and designed to:

- compare sequestration benefits in different time periods;
- manage risks that anticipated future benefits will not materialise (e.g. due to fire or other causes).

Methods

- Literature and methodological review.
- Comparative analysis of methods and approaches to comparing and valuing carbon benefits in different time periods and risk management.

Findings

- A wide range of estimates of the social value of carbon exists, spanning at least three orders of magnitude from zero to over £270/tCO₂e (£1000/tC), and reflecting different methods, assumptions, models, and uncertainty concerning future impacts.
- Current UK government guidance (DECC, 2009) includes central estimates for 2009 of £21/tCO₂e (£77/tC) for sectors covered by the EU Emissions Trading Scheme (ETS) and £51/tCO₂e (£183/tC) for non-ETS sectors, both rising over time to £200/tCO₂e (£733/tC) by 2050 at 2009 prices. These estimated values are considered consistent with meeting the UK's targets of reducing emissions by 34% compared to 1990 levels by 2020 and 80% by 2050, representing the UK's contribution to limiting global temperature increase to around 2 °C, and atmospheric GHG concentrations to within the 460–480ppm CO₂e range in 2200.
- The effect of applying Treasury Green Book discount rates (Treasury, undated) is shown in the Table overleaf for selected years, which illustrates how present values of future carbon benefits (i.e. what they are estimated to be worth currently) initially declines, before increasing again. Post-2050 social values of carbon have yet to be published (as at November 2009).
- Market prices for carbon tend to be lower than social values. Prices in voluntary carbon markets worldwide are reported to have ranged from around \$1/tCO₂e to \$47/tCO₂e (\$4/tC to \$182/tC) in 2008, illustrating the importance of differences of quality and type between traded carbon instruments and associated climate mitigation projects.

Table: UK social values of carbon and discounted values (2009 prices)

Year	'Traded' price of carbon (sectors covered by EU ETS)					'Non-traded' price of carbon (sectors not covered by EU ETS)				
	Low £/tCO ₂	Central £/tCO ₂	High £/tCO ₂	Discounted		Low £/tCO ₂	Central £/tCO ₂	High £/tCO ₂	Discounted	
				Central £/tCO ₂	Index				Central £/tCO ₂	Index
2009	12	21	27	21	100	25	51	76	51	100
2020	14	25	31	17	82	30	60	90	41	81
2030	35	70	105	34	162	35	70	105	34	67
2040	68	135	203	47	222	68	135	203	47	92
2050	100	200	300	51	245	100	200	300	51	101

- Sale of carbon units by sectors covered by binding national or international carbon reduction commitments gives rise to potential double-counting issues that can undermine their market value. No mechanism currently exists to ensure the additionality of any voluntary carbon units issued by the UK forestry sector by excluding them from national reporting, or allowing equivalent carbon credits to be retired.
- Although discounting is a standard approach for comparing benefits across time which could also be used to manage risks, it is not currently used by either

international mechanisms or voluntary carbon standards. Retaining a buffer of carbon units is a more prevalent approach.

- If concerns increased over factors, such as more severe than anticipated impacts, or a desire for greater certainty that critical thresholds will not be exceeded, this could lead to a tightening of targets. If so, estimates of the social value of carbon would need to be revised upwards.

Recommendations

- Establishing a robust framework that values forestry carbon will be important if the forestry sector is to be encouraged to play a greater role in helping to meet national carbon emission reduction commitments, and if significant opportunities for climate change mitigation by the sector are not to be missed.
- Adopting a declining present value of carbon in real terms (as initially the case under current UK guidance) may be preferable to a constant (or increasing) value over time if there are significant benefits of allowing more time to avoid 'dangerous' climate change.
- Maintaining a buffer may be a more practical option to carbon risk management than discounting, since this avoids potential confusion in establishing discounting protocols if future benefits are also to be discounted for time and changing circumstances.
- A transparent method for comparing the value of carbon instruments of different duration would be useful, possibly based upon a tonne-year, rather than a tonne, of carbon as the unit of comparison.
- Developing a code for forestry carbon projects that covers those carbon units that have already been verified to have occurred (ex-post) and those that are anticipated to occur, before carbon benefits are quantified and verified, (ex-ante) will be useful. This is because delayed carbon sequestration benefits and high up-front investment costs suggest that the bulk of forestry carbon in voluntary markets will continue to be ex-ante units.

Further information:

For further information contact: gregory.valatin@forestry.gsi.gov.uk

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References

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