

Operations Note 032

18th September 2013

Carbon assessment in Environmental Statements relating to deforestation

Purpose

This note provides outline guidance on how the implications of deforestation on greenhouse gas balance should be addressed in Environmental Statements.

Overview

Although carbon balance should not be a determining factor in whether an unconditional felling licence is granted, a thorough assessment of the implications for greenhouse gas balance should be undertaken, together with an evaluation of actions to minimise emissions associated with the project.

Context

The Environmental Impact Assessment (Forestry) (England and Wales)

Regulations 1999 require that an Environmental Statement shall include a description of the likely significant effects of the project, direct and indirect, on the environment, explained by reference to its possible impact on: - human beings; flora; fauna; soil; water; air; climate, the landscape; the interaction between any of the foregoing; material assets (including the architectural and archaeological heritage); the cultural heritage.

'Climate' is now interpreted as including climate change mitigation and adaptation. The Practice Guide for Undertaking an Environmental Impact Assessment states that 'It is expected that increasing consideration will be given in the EIA process to the impact of projects in relation to mitigating and adapting to climate change and you should therefore consider the need to describe the likely implications for your site. For example, considering the implications of afforestation & deforestation on carbon sequestration or the release of soil carbon, or the likely future implications of climate change predictions on species distribution or flood risk. Tools for calculating the carbon implications of forestry projects are being developed, and further advice on all aspects of forestry and climate change will be included in guidelines to accompany the revised UK Forestry Standard (published November 2011). In the meantime, guidance is available on relevant aspects of climate change in existing Forestry Practice Guidelines.

The Climate Change Act (2008) set a challenging and legally binding target to reduce greenhouse gas emissions by 2050. All sectors, including the Land Use, Land Use Change and Forestry sector will have to contribute if this target is to be met.

The Government Policy on 'When to convert woods and forests to open habitat in England' states that *we will normally require applicants to consider the impacts on carbon emissions of conversion to open habitat as part of environmental impact assessment.*

When calculating the carbon impact of woodland removal, both the impact on the long-term carbon store of the site, and the reduced rate of production of timber and woodfuel that substitute for other energy intensive materials and fuels, should be taken into account. Similarly, practitioners should also take the impact on carbon storage and substitution for more energy intensive materials and fuels into account when calculating the carbon impact of compensatory woodland creation.

Converting woodland to open habitat should use methods that minimise greenhouse gas emissions during the conversion.

All projects will have to comply with good practice for minimising emissions. The UK Forestry Standard Forests and Climate Change Guidelines provide further information.

Guidance

A carbon assessment undertaken in respect of an Environmental Statement for a deforestation project should include the following elements:

- Changes in the long term average carbon stock of the site resulting from land use change, including both woody biomass and soils;
- Indicative estimates of the theoretical reduction in carbon storage in harvested wood products and in their ability to substitute for energy intensive materials that will result from the loss of timber production;
- An overview of 'operational emissions' associated with the project, including measures to reduce those emissions;
- Options to mitigate emissions, including through compensatory planting.

Further details on each element are given below:

Impacts on the long term carbon stock of the site

This should be calculated as the carbon stock of the woody forest biomass, averaged over a rotation, less the average carbon stock of the open ground vegetation. 'Carbon look-up tables' have been developed for the Woodland Carbon Code (WCC); it is appropriate to use values presented in these tables as estimates of carbon stocks of forest biomass.

In the case of unmanaged woodland or continuous cover management regimes, it is appropriate to use the carbon stock at 100 years. In both cases, these represent the maximum level of sequestration presented in the look-up tables. Average carbon stocks, based on the WCC look-up tables are summarised in Table 1 for a limited range of woodland types and open ground habitats. In the case of the latter, more detailed site and/or habitat specific carbon stocks should be used where available.

Table 1: Time-averaged carbon stock changes for a range of conversions from woodland to open-ground habitats.

Woodland carbon stocks are based on the Woodland Carbon Code look-up tables. Open-ground habitat carbon stocks are based on indicative estimates provided in the evidence summary supporting Government policy on *when to convert woods and forests to open habitats*. Estimates include stemwood, branchwood, roots and leaves, but do not include litter or soil organic matter.

Land use change	Average carbon stock (tCO ₂ e per hectare)		
	Woodland	Open habitat	Change
Scots pine GYC12 to lowland heathland	260	18	-242
Sitka spruce GYC8 (thinned) to upland Heathland	178	18	-160
Spruce/pine GYC8 (unthinned) to lowland raised bog or blanket bog	252	18	-234
Scots pine GYC8 to lowland dry acid grassland	215	18	-197
Douglas fir and Sitka spruce GYC18 to purple moor grass and rush pasture	346	18	-328
Poplar GYC16 to fen	370	18	-352
Native woodland GYC4 to calcareous or dry acid grass-land or purple moor pasture	200	18	-182
Native woodland GYC4 to lowland heathland	200	18	-182
Native woodland GYC4 to fens or wet reedbeds	200	37	-163

Note: values for woodland carbon stocks have been updated to maintain consistency with the WCC look-up tables.

Likely changes in long term average soil carbon stocks are difficult to quantify. It is therefore suggested that such changes are assumed to be zero. However, for some habitats (particularly those on peat soils), the removal of tree cover and blocking of drains would be expected to reduce soil carbon emissions through peat oxidation and, potentially, return peat-bogs to active carbon sequestration. Where evidence for significant changes in soil carbon stocks is available, this should also be included in estimates of average carbon stock changes.

Impacts on carbon storage in harvested wood products and substitution for more energy intensive materials and fuels

The ability of harvested wood products to mitigate greenhouse gas emissions by either storing carbon directly or substituting for materials or fuels with higher levels of embodied energy/carbon is highly uncertain because the nature of the harvested wood products, their destination, use, time in use and method of disposal are all uncertain. However, indicative figures, calculated over a 100-year period are available in Table 2. These are based on a highly conservative assumption that all biomass is used to

substitute for coal in electricity production. This also allows the mitigation potential of the restored open habitat to be included in the calculation

Table 2: Indicative estimates of notational climate change mitigation potential for harvested wood products and biomass from woodland and open-ground habitats.

Mitigation potential is calculated over a 100-year timeframe and includes a conservative assumption that all above-ground biomass is used to substitute for coal in electricity production. See evidence summary supporting Government policy on *when to convert woods and forests to open habitats*.

Land use change	Average carbon stock (tCO ₂ e per hectare)		
	Woodland	Open habitat	Change
Scots pine GYC12 to lowland heathland	724	92	-632
Sitka spruce GYC8 (thinned) to upland Heathland	406	92	-314
Spruce/pine GYC8 (unthinned) to lowland raised bog or blanket bog	355	0	-355
Scots pine GYC8 to lowland dry acid grassland	466	0	-466
Douglas fir and Sitka spruce GYC18 to purple moor grass and rush pasture	1051	0	-1051
Poplar GYC16 to fen	1633	0	-1,633
Native woodland GYC4 to calcareous or dry acid grass-land or purple moor pasture	179	92	-87
Native woodland GYC4 to lowland heathland	179	92	-87
Native woodland GYC4 to fens or wet reedbeds	179	330	151

Note: values for woodland mitigation potential have been updated to maintain consistency with the WCC look-up tables.

Operational emissions associated with deforestation

The carbon assessment should only consider the marginal greenhouse gas emissions that arise from management practice that is different to conventional forest management practice (including establishment and future site maintenance). This may include activities that lead to increased emissions (for example increased ground disturbance compared with conventional practice) or to reduced emissions (energy recovery from brash, rather than burning on site).

As set out in Government policy on when to convert woods and forests to open habitats and in the UKFS Forests and Climate Change Guidelines, the following principles would be expected, except in exceptional circumstances. In all cases, exceptions should be explained.

- Woodland should not be felled before economic maturity or conventional practice.
- The timber and other harvested wood products should not be felled to waste, but used for energy recovery (as woodfuel) in the absence of other markets.

- Stumps should not be removed as the practice would disturb the soil profile and increase soil carbon emissions.
- Brush burning should be avoided – harvesting residues should be used for energy recovery where possible. If brush is burned on site, any quantification of carbon emissions should extend to other greenhouse gases (nitrous oxide and methane), as implemented in the UK's greenhouse gas inventory for the land use, land use change and forestry sector.
- The removal of the top soil should be avoided, unless this impacts on the ability to restore a functioning priority open habitat in the long term.
- Deep peat should not be disturbed.

Mitigation options, including compensatory planting

Mitigation options to reduce the greenhouse emissions associated with deforestation should be presented. This could include emissions savings resulting from renewable energy projects associated with the deforestation activity, or compensatory planting directly associated with the deforestation project.

Emissions savings associated with renewable energy projects should be calculated over the design life of the installation.

Emissions savings associated with compensatory planting should be on the same basis as calculations of changes in carbon stock (long term average) and use of harvested wood products to store carbon and substitute for more energy intensive materials. The average carbon stock associated with a range of woodland types is available in the WCC look-up tables. Changes in soil carbon stocks associated with woodland planting are difficult to quantify, but [guidance on how to account for soil carbon losses and gains](#) is available from the Woodland Carbon Code website.

Sources of further advice

The [Grants and Regulations website](#) contains information on Environmental Impact Assessment Regulations.

Management Guidelines for good forestry practice, including Forests and Climate Change, Forests and Soils and Forests and biodiversity are available from the [UK Forestry Standard Website](#).

Carbon look-up tables are available from the [Woodland Carbon Code website](#).

Information regarding the UK's greenhouse gas inventory for the land Use, land use change and forestry sector is available from the [National Atmospheric Emissions Inventory website](#).

Details of [Government Policy on when to convert woods and forests to open Habitats in England](#), including a [summary of evidence](#) is available from the [Forestry Commission England website](#).

You can also request this information from your local [Forestry Commission office](#).

Versions

Version 1 issued 18th September 2013