

# Land Use, Land Use Change and Forestry (LULUCF)

## GHG Inventory summary Factsheet

**Territorial coverage:** UK including Crown Dependencies and Overseas Territories

**Total emissions:** Quoted with respect to emissions including net LULUCF

**Sector Definition:** National Communication

### Sector summary – historic emissions

- Overall contribution of LULUCF to UK GHG emissions in 2010 was -3.8 Mt CO<sub>2</sub>e (from a total of 590 Mt CO<sub>2</sub>e).
- Emissions from the LULUCF sector have changed from a source of +3.9 Mt CO<sub>2</sub>e in 1990 to a sink of -3.8 Mt CO<sub>2</sub>e in 2010.
- CO<sub>2</sub> is the dominant GHG.
- Land converted to cropland is the dominant source of CO<sub>2</sub>, and land converted to forest land is the dominant sink.

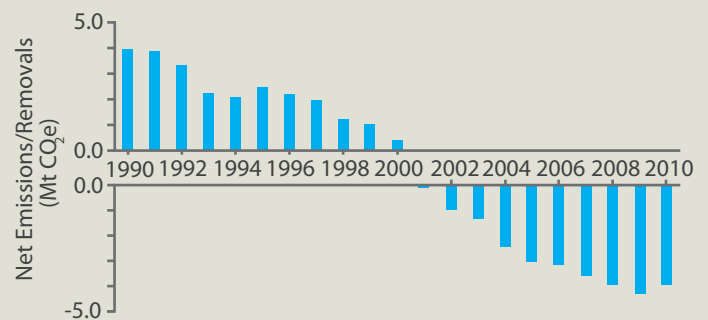
### Sources of emissions and data sets

- Sources/sinks include Forestland (5A), Cropland (5B), Grassland (5C), Settlements (5E) and Harvested Wood Products (5G).
- The main datasets which provide areas of land use and land use change are the Countryside Surveys for the UK constituent countries and statistics published by the Forestry Commission.
- Changes in carbon stocks in vegetation and soils produce emissions and removals of CO<sub>2</sub>.
- Emissions of CH<sub>4</sub> and N<sub>2</sub>O can also be produced.
- Separate land use change (LUC) matrices for each country in the UK are also produced, as well as estimates for the Crown Dependencies and Overseas Territories.

### Methodology

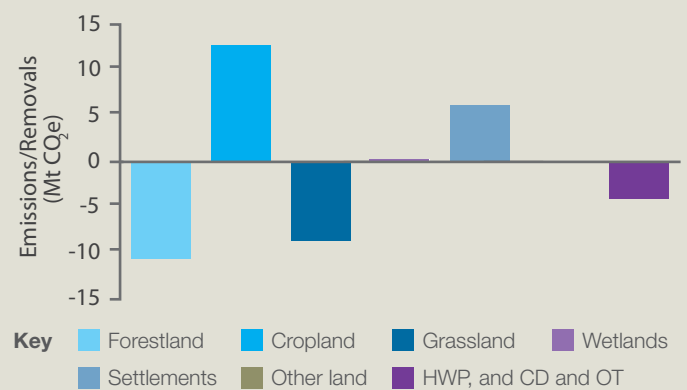
- Inventory compilers for the LULUCF sector are the centre for Ecology and Hydrology (CEH).
- The estimates for forest carbon emissions and removals are based largely on data from the Forestry Commission, which has carried out inventories of woodlands in Great Britain at 15-20 year intervals since 1924.
- Annual planting data and management information are used to update on the picture of the size and age structure of the national forest estate between the periodic inventories. This information, together with data derived from the growth characteristics of UK forests (so-called 'yield classes') is used

### LULUCF, 1990-2010



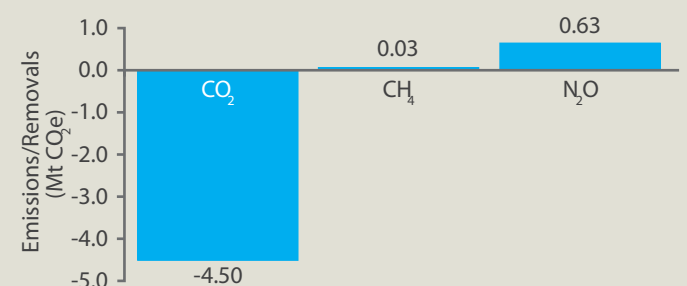
Source: UK GHG Inventory (UNFCCC coverage) (AEA, 2012)

### LULUCF Emissions/Removals by category, 2010



Source: UK GHG Inventory (UNFCCC coverage) (AEA, 2012)

### Net LULUCF Emissions/Removals by Gas 2010



Source: UK GHG Inventory (UNFCCC coverage) (AEA, 2012)

in a dynamic carbon accounting model (C FLOW) to estimate annual uptake and storage of atmospheric carbon by trees.

- Estimates of land use change emissions rely on separate land use change matrices for each country in the UK. These matrices are derived from surveys on land use conducted in 1947, 1980, 1984, 1990, 1998 and 2007. The matrices show the pattern of land use change between different categories of land which have been grouped into the broad land types of Grassland, Cropland, Forest Land, Settlements and Other Land.
- Changes in soil carbon density for the types of land undergoing transition are estimated from soil survey data and used in a dynamic model to estimate annual gains and losses of soil carbon associated with the land use transitions in the matrix.

## Uncertainties

- Uncertainties in this sector arise both from natural variability in vegetation and soils and incomplete knowledge about the extent of activities and the underlying processes affecting sinks and sources.
- Typically, uncertainties in the estimates associated with the soil carbon pool are much greater than those in above ground standing biomass in trees.
- A formal uncertainty analysis to support the UK's Kyoto Protocol LULUCF submission has been carried out and is set out in the 2012 NIR.

## Projections

- The time series of net LULUCF CO<sub>2</sub> emissions (all sources and sinks) indicates the sector is an increasing net sink from 2001 until 2009, with the magnitude of the net sink decreasing from 2010 onwards.
- Forest land is a sink (removal) from 1990 to 2020.
- Cropland is a source (emission) from 1990 to 2020
- Grassland is a sink because conversion to grassland generally results in a gain in soil carbon.
- Grassland is projected to become a bigger sink than forests by 2020 but note the forest sink will recover again after 2020.
- The projections are taken from DECC's Updated Energy and Emissions Projections: October 2011 although the historic emissions presented here are from the 2012 inventory.

## Links

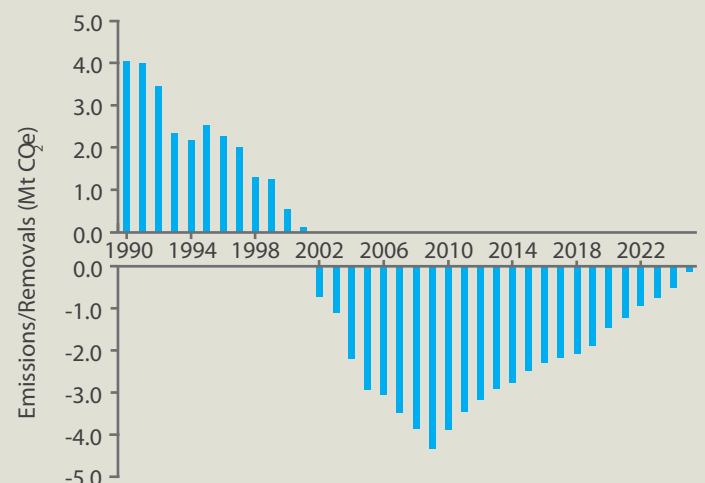
- UK GHG Inventory: <http://www.ghgi.org.uk/>
- UK GHG National Statistics: <http://www.statistics.gov.uk/hub/agriculture-environment/environment/climate-change/index.html>
- UK Updated Energy Projections: <http://www.decc.gov.uk/en/content/cms/statistics/projections/projections.aspx>
- CEH: <http://ceh.ac.uk>

- This indicated that the land use change data, and the parameterisation of the forest model and its parameters are the largest contributor to overall uncertainty in this sector.

## Improvements

- There is a development programme for the LULUCF inventory sector which takes into account review recommendations, new sources of data and improved scientific understanding of the relevant ecosystems.
- The sector has been internally restructured over the past two years so that a 20-year transition period is now used for reporting land use change, in line with IPCC methodology.
- There have been minor changes to data in the 1990-2010 inventory for deforestation, liming and peat extraction. Emissions and removals estimates for the Overseas Territories and Crown Dependencies were also revised.
- Future planned improvements include the incorporation of new forest data from the National Forest Inventory, improved representation of land management (including rotational crop-grass systems), the inclusion of emissions from non-forest wildfires and improved representation of land use change through data assimilation.

## Historic and Projected Emissions/Removals from LULUCF



Source: Updated Energy and Emissions Projections: October 2011 (DECC).