Forest Research

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Chapter 4: Carbon

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The Research Agency of the
Forestry Commission

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The Agency aims to support and enhance forestry and its role in sustainable development by providing innovative, high quality scientific research, data, technical support and consultancy services.

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Introduction

This chapter contains information on:

- carbon in forests
- carbon sequestration
- the Woodland Carbon Code
- public attitudes to forestry and climate change.

Estimates for England, Wales, Scotland, and Northern Ireland are included, where possible, in addition to UK totals. International comparisons of carbon stocks are provided in Chapter 9: International Forestry.

The statistics presented in this chapter have been previously released. A copy of all carbon tables can be accessed in spreadsheet format from the publication page. Time series for woodland carbon code projects, projected carbon sequestration and area can be accessed in spreadsheet format from the Time Series page

Figures in tables have been independently rounded, so may not add to the totals shown. The figures in this chapter are outside the scope of Accredited Official Statistics. Further information on the data sources and methodology used to compile the figures is provided in Chapter 10: Sources and Methodology.

In addition to the statistics presented here, information on UK forests and climate change is available from Combating Climate Change: a role for UK forests (The Read Report), an independent assessment of the science published in November 2009.

Key findings

The main findings are:

- The total carbon stock in UK forests is estimated to have increased, from around 3.2 billion tonnes of carbon dioxide equivalent in 1990 to 4.1 billion tonnes of carbon dioxide equivalent in 2025, of which 2.8 billion tonnes of carbon dioxide equivalent are in soils, 0.9 billion tonnes of carbon dioxide equivalent are in living woody biomass and the remainder is in deadwood and litter.
- Almost one-half (46%) of the estimated total UK forest carbon stock in 2025 is in Scotland (1.9 billion tonnes of carbon dioxide equivalent), 41% is in England (1.7 billion tonnes), 10% is in Wales (0.4 billion tonnes), and 4% is in Northern Ireland (0.1 billion tonnes).
- The net annual rate of carbon dioxide accumulation by UK forests is projected to show an overall fall from around 16.5 million tonnes CO2 in 2025 to around 10.1 million tonnes CO2 by 2050. This is in part due to the uneven age distribution of UK forests today.
- A total of 907 projects had been validated to the Woodland Carbon Code in the UK at 31 March 2026, covering 45.5 thousand hectares and projected to sequester 15.7 million tonnes of carbon dioxide over their lifetime.
- There are 12.8 million tonnes (82%) of projected carbon dioxide sequestration by validated Woodland Carbon Code projects in Scotland, 2.1 million tonnes in England, 0.7 million tonnes in Wales, and 0.1 million tonnes in Northern Ireland.

4.1 Forest carbon stock

Forest carbon stock is the amount of carbon that has been sequestered from the atmosphere and is now stored within the forest ecosystem, mainly within living biomass and soil, and to a lesser extent also in dead wood and litter.

The figures in section 4.1 are outside the scope of Accredited Official Statistics. For further information see Chapter 10: Sources and Methodology.

Table 4.1a presents modelled estimates of UK forest carbon stock that were compiled for submission to international organisations. The total carbon stock stored within UK forests is estimated to have increased, from around 3.2 billion tonnes of carbon dioxide equivalent in 1990 to 4.1 billion tonnes of carbon dioxide equivalent in 2025 (Table 4.1a). The carbon stored in forest soils accounts for around 70% of total forest carbon stock.

Table 4.1a Forest carbon stock, UK, 1990 to 2025

million tonnes of carbon dioxide equivalent

Carbon stock	1990	2000	2010	2015	2020	2025
Carbon in above-ground biomass	376	482	586	630	643	649
Carbon in below-ground biomass	135	173	211	227	231	234
Carbon in dead wood	132	141	146	150	153	154
Carbon in litter	163	173	179	185	189	194
Soil carbon	2,366	2,533	2,629	2,726	2,761	2,819
Total forest carbon	**3,173**	**3,503**	**3,751**	**3,918**	**3,977**	**4,050**

Source: Forest Research.

Notes:

1. To convert tonnes carbon dioxide equivalent (CO2e) to tonnes carbon (C), multiply by 12/44.
2. Carbon in soil to a depth of 0 to 100 cm.
3. Changes in soil carbon stocks over the period can be attributed to changes in UK forest area.
4. These figures are outside the scope of Accredited Official Statistics. For further information see Chapter 10: Sources and Methodology.

Almost one-half (46%) of the estimated total UK forest carbon stock in 2025 is in Scotland (1.9 billion tonnes of carbon dioxide equivalent), 41% is in England (1.7 billion tonnes), 10% is in Wales (0.4 billion tonnes), and 4% is in Northern Ireland (0.1 billion tonnes).

Table 4.1b Forest carbon stock by country, UK, 2025

million tonnes of carbon dioxide equivalent

Carbon stock	England	Wales	Scotland	Northern Ireland	UK
Carbon in above-ground biomass	265	62	298	24	649
Carbon in below-ground biomass	95	22	107	8	232
Carbon in dead wood	64	15	72	6	157
Carbon in litter	78	18	88	7	191
Soil carbon	1,150	271	1,296	102	2,819
Total forest carbon	**1,652**	**389**	**1,862**	**147**	**4,050**

Source: Forest Research.

Notes:

1. See Table 4.1a for more information.

4.2 Carbon sequestration

Forest carbon sequestration is the process of increasing the carbon content of the forest through processes that remove carbon dioxide from the atmosphere (i.e. photosynthesis). Once sequestered the carbon is stored in the forest within living biomass, soil, and litter and contributes to the forest carbon stock. The forest carbon sink describes the natural reservoir that accumulates and stores sequestered carbon. The forest carbon sink is dynamic and can gain (e.g. sequestration by photosynthesis) and lose (e.g. emission by forest fires) carbon. The forest carbon sink is quantified as the net annual accumulation of carbon (carbon sequestration) by living biomass, soils, and litter in forests.

The figures in section 4.2 are outside the scope of Accredited Official Statistics. For further information see Chapter 10: Sources and Methodology.

The figures presented in Table 4.2 and Figure 4.1 represent the net annual accumulation of carbon dioxide by UK forests, accounting for both removals of carbon from future woodland creation and emissions from timber harvesting, forest wildfires, and deforestation. The figures in Tables 4.2 and 4.3 are restricted to woodland only. Carbon stored in harvested wood products (HWPs) is not included in these figures. However, carbon associated with HWPs is included in the UK's greenhouse gas inventory statistics and energy and emissions projections.

The net annual accumulation of carbon dioxide by UK forests is projected to show an overall fall from around 16.5 million tonnes CO2 in total in 2025 to around 10.1 million tonnes CO2 by 2050 under a central scenario (Table 4.2 and Figure 4.1).

The projected decline in carbon accumulation from the 2010s to 2040s results from the age composition of UK forests (Figure 4.1). Many of the trees currently in UK forests were planted in the 1970s and 1980s and are reaching economic maturity and

being felled (and restocked). Since then, tree planting rates have fallen, resulting in an uneven age distribution today.

This uneven age distribution results in peaks and troughs in the level of carbon sequestration in UK forests over time, due to a changing balance between restocked young woodlands (following timber extraction) which grow relatively more slowly, and more established woodlands which grow relatively more quickly during their active growth phase.

Table 4.2 Net annual carbon stock change in forests, UK, 1990 to 2050

million tonnes of carbon dioxide equivalent

Year	England	Wales	Scotland	Northern Ireland	UK
1990	6.63	0.38	5.67	1.47	14.15
1995	7.24	0.49	6.42	1.50	15.65
2000	7.92	0.51	7.08	1.51	17.02
2005	8.62	0.50	7.89	1.66	18.67
2010	9.10	0.48	8.44	1.68	19.70
2015	8.79	0.55	7.95	1.44	18.73
2020	8.64	0.54	7.91	1.42	18.50
2025	8.09	0.55	6.38	1.52	16.53
2030	7.20	0.44	4.93	1.54	14.12
2035	6.20	0.48	3.29	1.61	11.58
2040	5.30	0.51	2.50	1.66	9.97
2045	4.61	0.52	2.95	1.65	9.73
2050	4.31	0.55	3.63	1.56	10.05

Source: National Atmospheric Emissions Inventory: Projections of Emissions and Removals from the LULUCF Sector to 2050/2100 (2024).

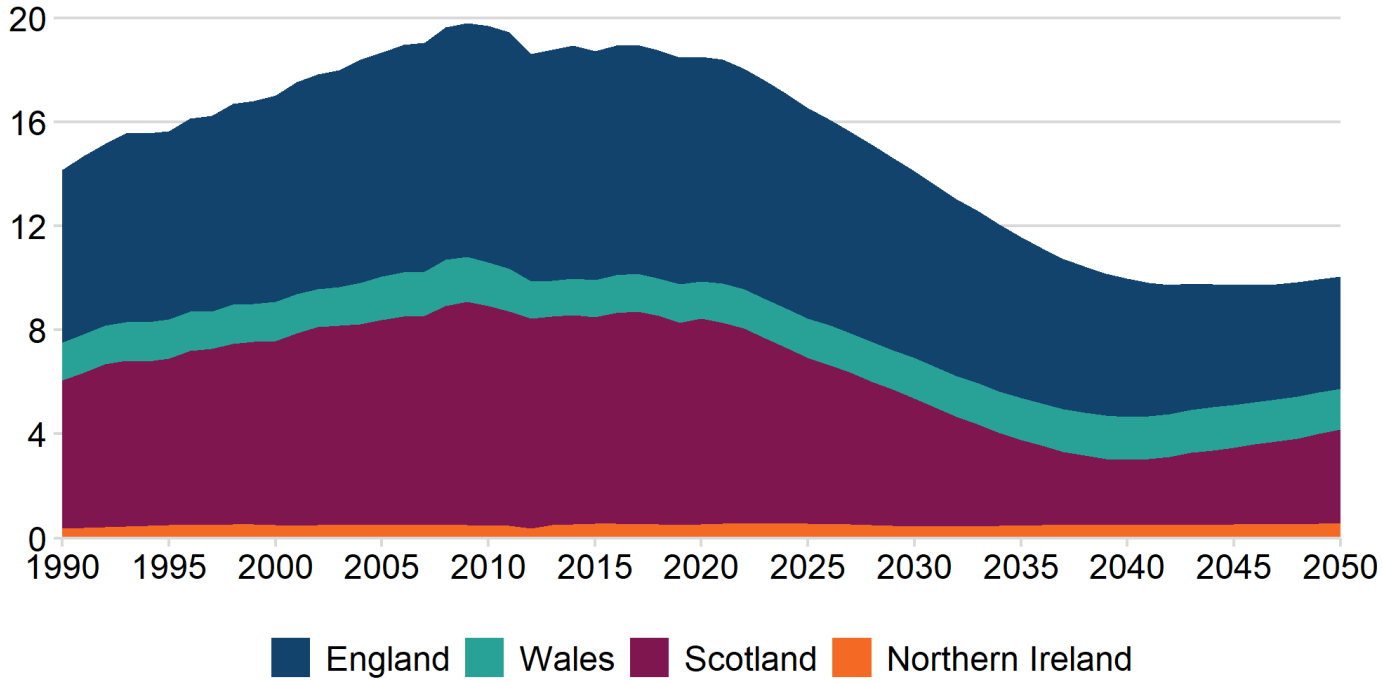
Notes:

1. Net annual accumulation of carbon in forests by woody biomass, soils, and litter. Adjusted for losses from deforestation and forest wildfires. Excludes changes in UK harvested wood products.
2. Emissions and sequestration can be presented as tonnes carbon or tonnes carbon dioxide (CO2). To convert from tonnes CO2 to tonnes carbon multiply by 12/44.

3. Future predictions of carbon uptake assume that commercial conifer plantations will be replanted when felled. Planting of new woodland follows the central afforestation trajectory from the 2022 National Atmospheric Emissions Inventory Land Use, Land-Use Change and Forestry projections, in which planting rates vary by country. In England, planting is assumed to rise to 10.3 kha/year by 2035 and then be maintained through to 2050; in Scotland, rates increase to 18 kha/year by 2024/25 before reverting to baseline; in Wales, planting remains at baseline levels; and in Northern Ireland, planting rises to 2.5 kha/year by 2035 and is then maintained. Forecast planting rates are scenario assumptions from the 2022 National Atmospheric Emissions Inventory LULUCF projections and do not reflect country plans published since.
4. These figures are outside the scope of Accredited Official Statistics. For further information see Chapter 10: Sources and Methodology.

Figure 4.1 Net annual carbon stock change in forests, UK, 1990 to 2050

million tonnes of carbon dioxide equivalent



Source: National Atmospheric Emissions Inventory: Projections of Emissions and Removals from the LULUCF Sector to 2050/2100 (2024).

Notes:

1. See Table 4.2 for more information.

4.3 Woodland Carbon Code

The Woodland Carbon Code is a voluntary standard, introduced in July 2011, for woodland creation projects that make claims about the carbon they sequester (take out of the atmosphere).

All projects must be placed on the UK Land Carbon Registry. Their claims about potential carbon sequestration are validated by an independent certification body. Validated projects are then verified on a regular basis to confirm the progress of carbon sequestration.

The figures in section 4.3 are outside the scope of Accredited Official Statistics. For further information see Chapter 10: Sources and Methodology. Further information on Woodland Carbon Code projects is also provided in Chapter 10: Sources and Methodology.

Table 4.3a provides annual data on projects registered under the Woodland Carbon Code. The table provides information on the cumulative number of projects, area of woodland covered by the projects and the total projected carbon sequestration over the lifetime (up to 100 years) of the projects.

A total of 907 projects had been validated (including those that had also been verified) to the Woodland Carbon Code at 31 March 2026, covering over 45.5 thousand hectares and projected to sequester 15.7 million tonnes of carbon dioxide over their lifetime (Table 4.3a, 4.3b and 4.3c).

A total of 2,347 projects were registered under the Woodland Carbon Code at 31 March 2026, covering around 109.3 thousand hectares of woodland and projected to sequester 32.2 million tonnes of carbon dioxide (Table 4.3a, Table 4.3b, Table 4.3c).

Table 4.3a Number of Woodland Carbon Code projects, UK, 2022 to 2026

Date	Verified	Validated only	Awaiting validation	Total
March 2022	119	247	1,168	1,534
March 2023	124	327	1,465	1,916
March 2024	127	494	1,530	2,151
March 2025	152	610	1,396	2,158
March 2026	233	674	1,440	2,347

Source: UK Land Carbon Registry.

Notes:

1. Projects can be validated or verified individually or as part of a group. The number of projects shown here includes all projects, whether processed individually or as part of a group.
2. Definitions of Verified, Validated and Awaiting validation are included in Glossary.
3. These figures are outside the scope of Accredited Official Statistics. For further information see Chapter 10: Sources and Methodology.

Table 4.3b Cumulative area of Woodland Carbon Code projects, UK, 2022 to 2026

thousand hectares

Date	Verified	Validated only	Awaiting validation	Total
March 2022	4.42	14.13	40.90	59.45
March 2023	4.64	19.70	46.06	70.40
March 2024	4.77	29.26	47.90	81.93
March 2025	5.66	33.05	54.09	92.79
March 2026	9.67	35.80	63.80	109.27

Source: UK Land Carbon Registry.

Notes:

1. Projects can be validated or verified individually or as part of a group. The area of projects shown here includes all projects, whether processed individually or as part of a group.
2. Definitions of Verified, Validated and Awaiting validation are included in Glossary.
3. These figures are outside the scope of Accredited Official Statistics. For further information see Chapter 10: Sources and Methodology.

Table 4.3c Projected carbon sequestration of Woodland Carbon Code projects, UK, 2022 to 2026

thousand tonnes of carbon dioxide equivalent

Date	Verified	Validated only	Awaiting validation	Total
March 2022	1,927	4,927	11,860	18,714
March 2023	2,015	6,525	14,408	22,948
March 2024	2,067	9,267	15,662	26,996
March 2025	2,381	10,656	16,037	29,075
March 2026	3,452	12,236	16,547	32,234

Source: UK Land Carbon Registry.

Notes:

1. Projects can be validated/verified individually or come together as part of a group. The statistics presented here show the projected carbon sequestration of projects validated or verified whether they were put through the process individually or as part of a group.
2. Definitions of Verified, Validated and Awaiting validation are included in Glossary.
3. Figures for carbon sequestration indicate the total projected sequestration of the projects over their lifetime of up to 100 years, and include the amount claimable by a project plus the amount allocated to a shared "buffer" in case of unanticipated losses.
4. These figures are outside the scope of Accredited Official Statistics. For further information see Chapter 10: Sources and Methodology.

Together, all validated (including verified) projects at March 2026 were predicted to sequester 12.8 million tonnes of carbon dioxide in Scotland, 2.1 million tonnes in England, 0.7 million tonnes in Wales, and 0.1 million tonnes in Northern Ireland over their lifetime (Table 4.3f and Figure 4.2).

Table 4.3d Number of Woodland Carbon Code projects, UK, 31 March 2026

Project status	England	Wales	Scotland	Northern Ireland	UK
Verified	65	18	146	4	233
Validated only	179	55	424	16	674
Total validated	244	73	570	20	907
Awaiting validation	757	187	401	95	1,440
Total	1,001	260	971	115	2,347

Source: UK Land Carbon Registry.

Notes:

1. See Table 4.3a for more information.

Table 4.3e Area of Woodland Carbon Code projects, UK, 31 March 2026

hectares

Project status	England	Wales	Scotland	Northern Ireland	UK
Verified	1,110	429	8,064	68	9,670
Validated only	3,780	1,420	30,336	261	35,796
Total validated	4,889	1,849	38,400	329	45,467
Awaiting validation	10,204	1,813	50,995	788	63,799
Total	15,094	3,661	89,394	1,117	109,266

Source: UK Land Carbon Registry.

Notes:

1. See Table 4.3b for more information.

Table 4.3f Projected carbon sequestration of Woodland Carbon Code projects, UK, 31 March 2026

thousand tonnes of carbon dioxide equivalent

Project status	England	Wales	Scotland	Northern Ireland	UK
Verified	572	144	2,713	23	3,452
Validated only	1,536	508	10,115	77	12,236
Total validated	2,108	652	12,828	99	15,688
Awaiting validation	4,100	650	11,437	359	16,547
Total	6,208	1,303	24,265	459	32,234

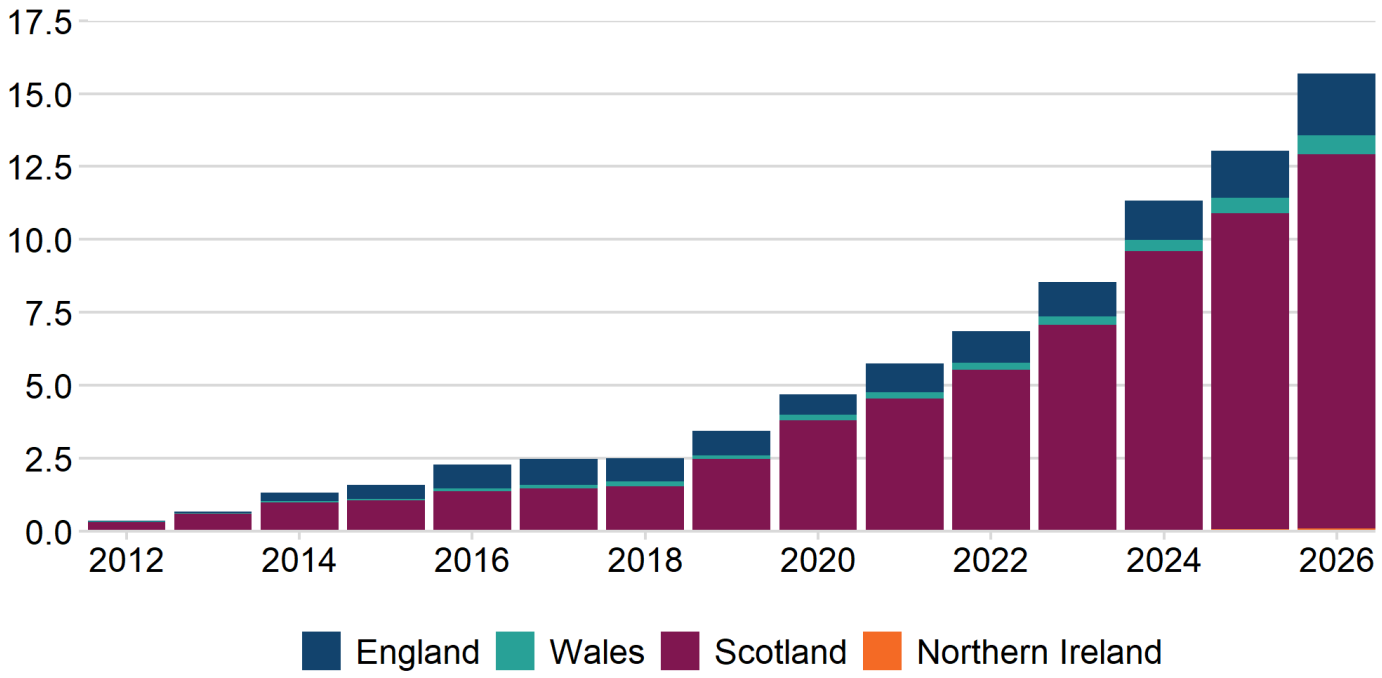
Source: UK Land Carbon Registry.

Notes:

1. See Table 4.3c for more information.

Figure 4.2 Projected carbon sequestration of validated Woodland Carbon Code projects by country, UK, 2012 to 2026

million tonnes of carbon dioxide equivalent



Source: UK Land Carbon Registry.

Notes:

1. Definition of Validated is included in Glossary.
2. Projects can be validated or verified individually or as part of a group. The projected carbon sequestration of projects shown here includes all projects, whether processed individually or as part of a group.
3. Figures for carbon sequestration indicate the total projected sequestration of the projects over their lifetime of up to 100 years, and include the amount claimable by a project plus the amount allocated to a shared "buffer" in case of unanticipated losses.
4. These figures are outside the scope of Accredited Official Statistics. For further information see Chapter 10: Sources and Methodology.

4.4 Public attitudes to climate change issues

Forest Research has conducted surveys of public attitudes to forestry and forestry-related issues every two years since 1995. The most recent Public Opinion of Forestry surveys were conducted in 2025.

The figures in section 4.4 are outside the scope of Accredited Official Statistics. For further information see Chapter 10: Sources and Methodology.

In the UK survey in 2025, questions were asked to gauge the public's agreement on climate change issues, including on the management of UK forests in response to the threat of climate change (Table 4.4). Some of the public views presented below do not reflect expert opinion.

There were high levels of agreement (respondents stating that they agreed or strongly agreed) with the statements:

- "A lot more trees should be planted", supported by 76% of the UK public in 2025
- "Different types of trees should be planted that will be more suited to future climates", supported by 72% in 2025.

Conversely, there were much lower levels of agreement with the statements:

- "No action is needed", supported by 22% in 2025
- "Trees should not be felled under any circumstances, even if they are replaced", supported by 41% in 2025.

Table 4.4 Proportion of respondents in agreement with statements on the management of UK forests and woodlands in response to the threat of climate change, UK, 2017 to 2025

Statement	2017	2019	2021	2023	2025
A lot more trees should be planted	84	88	83	84	76
Different types of trees should be planted that will be more suited to future climates	76	78	72	72	72
Trees should not be felled in any circumstances, even if they are replaced	26	29	36	35	41
No action is needed	24	26	30	9	22

Source: UK Public Opinion of Forestry surveys (2017 to 2025).

Notes:

1. Results are based on all respondents: 2,113 (2017), 2,174 (2019), 11,055 (2023), 10,281 (2025). Results for 2021 are based on respondents who visited woodland in the last few years (3,557).
2. Given the change in base, the results from the 2021 survey are not directly comparable with other years.
3. The range of uncertainty around any result should be no more than 3.2% in 2017 and 2019, 2.1% in 2021, and 1.4% in 2023 and 2025.
4. These figures are outside the scope of Accredited Official Statistics. For further information see Chapter 10: Sources and Methodology.

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