

Article

Climate Change Insights, UK: May 2022

Quarterly publication bringing together the latest climate change-related statistics and analysis from a range of sources.

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Release date:
12 May 2022

Next release:
August 2022

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1 . Main points

- The average number of heating degree days in January to March 2022 was 1.3 lower when compared with the same period a year ago as well as the long term mean for the period, according to the Department for Business, Energy and Industrial Strategy data.
- Final energy consumption (excluding non-energy use) rose by 2.4% in October to December 2021 compared with the same period in 2020, reflecting easing coronavirus (COVID-19) restrictions, according to the Department for Business, Energy and Industrial Strategy's most recent quarterly energy statistics.
- Some 6 in 10 (62%) adults in Great Britain expect rising UK temperatures will directly affect them by 2030, according to the Office for National Statistics (ONS) Opinions and Lifestyle Survey in mid-April.
- Some 23% of large businesses reported to have a climate strategy, 17% have a greenhouse gas emissions target, and 8% monitor climate-related risks, according to the ONS Business Insights and Conditions Survey between 21 March and 3 April.
- Switching to LED bulbs and adjusting heating and cooling systems were the top two actions taken by all businesses to reduce their carbon emissions, according to the Business Insights and Conditions Survey between 21 March and 3 April.

2 . Providing latest insights on climate change

This is a pilot for a proposed new quarterly release, bringing together statistics and indicators to provide timely climate change insights. Where possible, we set these in the context of the UK's environmental and natural capital accounts, "satellites" to the national accounts, enabling direct comparison with Gross Domestic Product (GDP). This article has been published alongside [our first quarterly estimate of GDP for January to March 2022](#). Where possible, this article provides statistics for the same time period as the quarterly GDP article, or the most recent period for which data are available.

We present these statistics and indicators using the cross-government climate change statistical framework followed by the prototype [UK Climate Change Statistics Portal](#). The portal brings together climate change related data and statistics to improve coherence, accessibility and comparability, and will look to include the indicators used in this article.

3 . Climate and weather

“Climate change” refers to a large-scale, long-term shift in the planet’s weather patterns and average temperatures.

According to [Department for Business, Energy and Industrial Strategy estimates](#), the average temperature in January to March 2022 was 6.6 degrees Celsius. When rounded, this is 1.3 degrees Celsius higher than the same period a year earlier (5.3 degrees), and 1.3 degrees higher than the long term mean for the same period of 5.2 degrees.

Heating degree days record the number of degrees the air temperature is below the base temperature of 15.5 degrees Celsius each day. As well as providing insight on recent temperatures relative to long term trends, the measure provides an indication of the energy that would be required to heat a building to the base temperature.

The average number of heating degree days in January to March 2022 is 8.9, which, when rounded, is 1.3 lower than the same period a year earlier (10.2) and 1.3 lower than the long-term mean of 10.3

Figure 1: The average number of heating degree days in January to March 2022 was 1.3 lower when compared with the same period a year ago and the long-term mean

Average heating degree days and long-term mean by quarter, Great Britain, Quarter 1 (Jan to Mar) 2020 to Quarter 1 2022

Figure 1: The average number of heating degree days in January to March 2022 was 1.3 lower when compared with the same period a year ago and the long-term mean

Average heating degree days and long-term mean by quarter, Great Britain, Quarter 1 (Jan to Mar) 2020 to Quarter 1 2022



Source: Met Office and Department for Business, Energy and Industrial Strategy – Energy Trends

Notes:

1. Average mean air temperatures calculated from the maximum and minimum daily temperature as recorded at 17 meteorological stations, selected as representative of fuel consumption in Great Britain.
2. The long-term mean refers to the average for that quarter for the years 1981 to 2010.

4 . Greenhouse gas emissions

The [The latest physical science report from the Intergovernmental Panel on Climate Change](#) found that observed warming of the Earth's climate is a consequence of emissions from human activity. This activity has increased the concentration of greenhouse gases (GHGs) in the atmosphere globally.

There are [three key official measures of UK GHG emissions](#). In 2018, the latest year that all three measures are available, [territorial emissions](#) were 463 million tonnes of carbon dioxide equivalent (Mt CO₂e), [residence emissions](#) 569 Mt CO₂e and [footprint \(or consumption\) emissions](#) 703 Mt CO₂e.

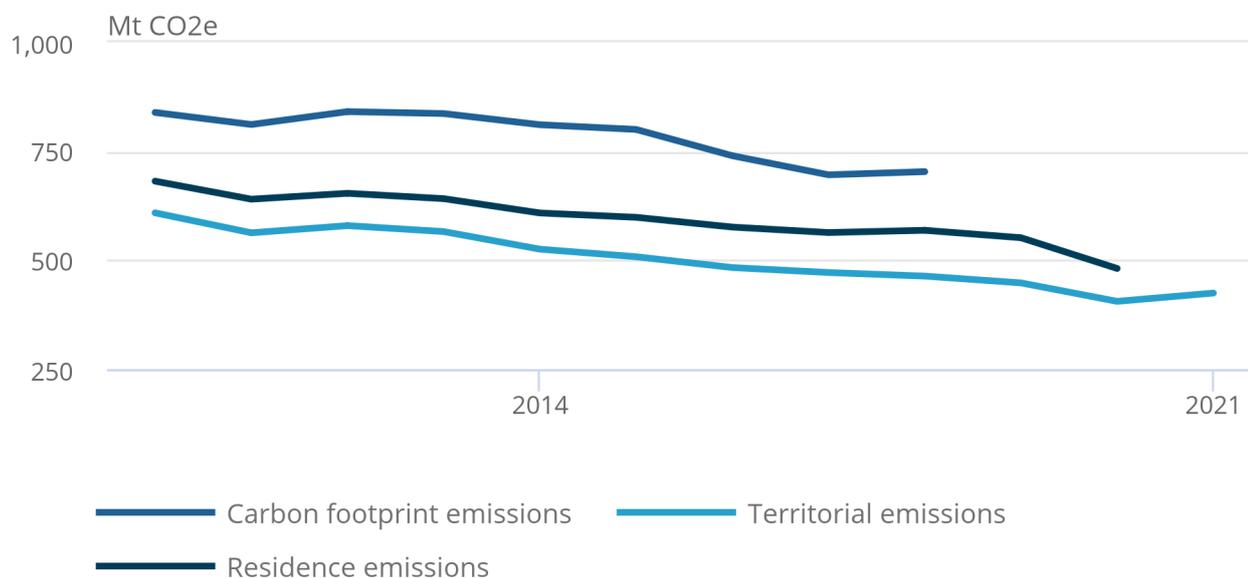
The most recent estimate is for territorial emissions, produced by the Department for Business, Energy and Industrial Strategy. Provisional 2021 data suggest an increase of 4.7% on 2020 to 425Mt CO₂e. This is 5.2% lower than the equivalent measure in 2019, reflecting the impacts of coronavirus (COVID-19) restrictions on emissions.

Figure 2: Since 2010, all three emissions measures have generally followed a downwards trend

Residence, territorial and footprint emissions, UK, 2010 to 2021

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Residence, territorial and footprint emissions, UK, 2010 to 2021



Source: Department for Business, Energy and Industrial Strategy – Emissions, Department for Environment, Food and Rural Affairs – Emissions, Office for National Statistics – Emissions

Notes:

1. Territorial estimates are published by the Department for Business, Energy and Industrial Strategy (BEIS), are used to monitor net zero and other UK-wide targets. These estimates include emissions produced within the UK's geographical borders. 2021 data are provisional.
2. Residence estimates cover emissions by UK residents and UK-registered businesses, whether they happen in the UK or overseas. The Office for National Statistics produces these as part of the UK's Environmental Accounts. These estimates provide additional useful information to complement the UK's national accounts as they enable a direct comparison of emissions by sector of UK industry and households with key economic indicators including Gross Domestic Product. 2020 data are provisional.
3. Carbon footprint estimates account for emissions through the supply chain of all goods and services consumed in the UK wherever they are produced in the world, so allow for emissions from UK imports but exclude emissions arising from UK produced goods that are exported. This measure, published by the Department for Environment, Food and Rural Affairs (Defra), helps to understand the UK's global contribution to climate change. Carbon footprint estimates are classified as Experimental Statistics and are subject to uncertainty. The methodology used to produce them is subject to ongoing review and refinement.

Our residence-based emissions cover UK residents and UK-registered business emissions whether they happen in the UK or overseas. Provisional estimates of this measure suggest that emissions fell by approximately 13% between 2019 and 2020 to 481 Mt CO2e. Coronavirus restrictions implemented in the UK in Quarter 1 (Jan to Mar) 2020 are likely to be the main driver of the declines in GHG emissions.

The four sectors contributing the most GHG to UK emissions are the same ones as in previous years: consumer expenditure, energy, manufacturing and transport. These four collectively contribute over 70% of total UK GHG emissions. The [first quarterly estimate of GDP for Jan to March 2022, published 12 May 2022](#), provides further insight into output within those sectors.

In 2020, GHG residence-based emissions intensity for the UK fell by 5% on the year to 0.20 thousand tonnes of Co2e per £1 million of gross value added (GVA). This annual reduction of intensity was slightly greater than the average year on year reduction of 4% since 1990. The sector with the largest fall was transport, which dropped by 29%. Usually, a reduction in overall UK greenhouse gas emissions intensity would indicate that the UK is moving towards a greener and more sustainable economy. However, coronavirus restrictions affected economic output in 2020.

Alongside this article, we are publishing an initial methodological article, titled [Developing quarterly greenhouse gas emissions accounts](#), which outlines options for producing quarterly estimates of residence-based UK greenhouse gas emissions. Further progress on this work will be informed by stakeholder and user feedback.

5 . Climate change drivers

A large majority of the UK's greenhouse gas emissions are produced as a result of energy consumption. Primary energy consumption includes use by consumers, fuel used for electricity generation and losses during transformation from one energy source to another.

According to [the Department for Business, Energy and Industrial Strategy's most recent quarterly energy statistics](#) , final energy consumption (excluding non-energy use) rose by 2.4% in Quarter 4 (Oct to Dec) 2021 compared with Quarter 4 2020. The easing of coronavirus restrictions were reflected in consumption levels. Transport consumption rose by 18% and industrial consumption rose by 1.4%. Average temperatures in Quarter 4 2021 were 0.6 degrees Celsius warmer than Quarter 4 2020, which contributed to domestic consumption falling by 7.5%. Statistics referenced are not seasonally or temperature adjusted.

Focussing on fuel type, total production was 29.2 million tonnes of oil equivalent in Quarter 4 2021, 7.2% lower than in Quarter 4 2020. Production of all primary fuels fell except for bioenergy and waste, and wind and solar because of growth in capacity.

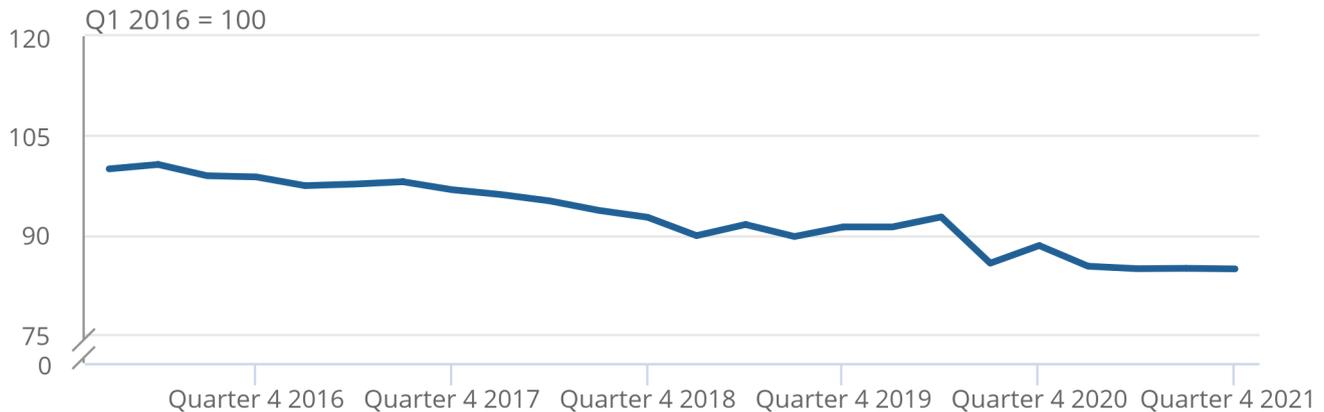
The relationship between energy consumption and economic activity can be represented by the energy ratio. In Quarter 4 2021, the most recent quarter for which energy consumption and gross domestic product (GDP) data are available, the energy ratio slightly fell. This was driven by GDP increasing on the quarter by more than the increase in energy consumption.

Figure 3: The energy ratio has continued to fall following a period of volatility on account of the coronavirus (COVID-19) pandemic

Energy ratio, UK, Quarter 1 (Jan to Mar) 2016 to Quarter 1 2021

Figure 3: The energy ratio has continued to fall following a period of volatility on account of the coronavirus (COVID-19) pandemic

Energy ratio, UK, Quarter 1 (Jan to Mar) 2016 to Quarter 1 2021



Source: Department for Business, Energy and Industrial Strategy – Energy Trends, Office for National Statistics – Gross Domestic Product

Notes:

1. For comparability, GDP and energy consumption data used in the ratio are seasonally adjusted. Energy consumption data are also temperature corrected.

The overall long-term downward trend is likely influenced, at least in part, by improvements in household energy efficiency. This is captured by the median energy efficiency scores for England and Wales. [Previous analysis of energy efficiency records up to March 2021](#) found the median energy efficiency score was 66 in England and 64 in Wales, which is equivalent to an energy performance certificate recording of band D. Flats and maisonettes were the most energy efficient property type in both England and Wales, with a median energy efficiency score of 72, equivalent to band C.

6 . Impacts on society and nature

In October 2021, three-quarters (75%) of adults in Great Britain said they were either very or somewhat worried about the impact of climate change, while around one-fifth (19%) were neither worried nor unworried. These findings from the [Office for National Statistics' \(ONS\)' Opinions and Lifestyle Survey \(OPN\)](#) for Great Britain are similar to results from the [Department of Business Energy and Industrial Strategy \(BEIS\) Public Attitudes Tracker \(319.5KB\)](#), which surveys UK households. In Winter 2021, 85% of people said they were concerned to some degree about climate change.

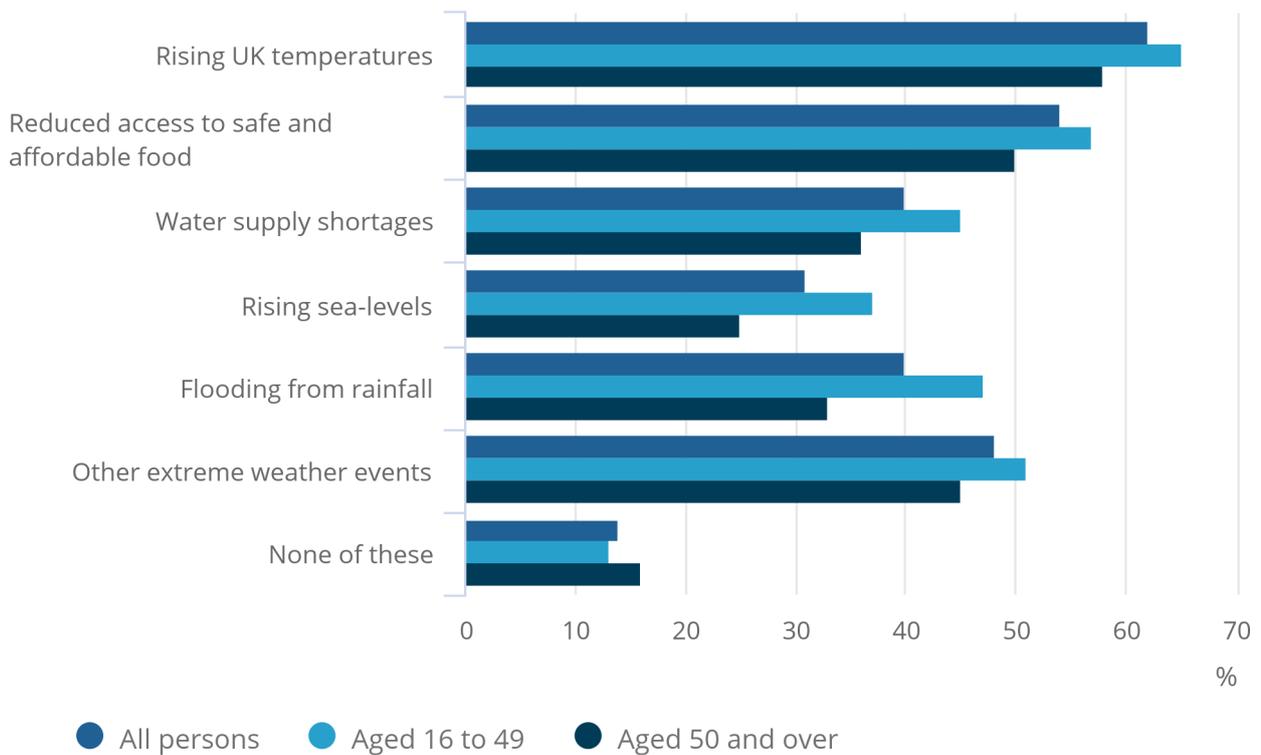
More recent statistics from the OPN collected between 13 and 24 April shows that over 6 in 10 (62%) of adults in Great Britain think rising UK temperatures will affect them by 2030. Over half (54%) thought they would be affected by reduced access to safe and affordable food. A slightly higher proportion of younger adults, compared with those aged 50 and over, thought each of the impacts they were asked about would affect them. Some 14% of adults thought none of the response options would directly affect them by 2030.

Figure 4: Over 6 in 10 adults expect rising UK temperatures will directly affect them by 2030

Percentage of adults selecting from a list of options that would directly affect them by 2030, Great Britain, 13 to 24 April 2022

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Percentage of adults selecting from a list of options that would directly affect them by 2030, Great Britain, 13 to 24 April 2022



Source: Office for National Statistics – Opinions and Lifestyle Survey

Notes:

1. Question: "Which of the following do you think will directly affect you by 2030?"
2. Base: All adults in Great Britain.
3. Respondents were allowed to select multiple options.
4. Confidence intervals for the estimates shown in this chart are available within the dataset published with this release.

7 . Mitigation (limiting emissions)

Mitigation refers to the actions taken to reduce greenhouse gas (GHG) emissions, including the [UK Government's target to reach net zero greenhouse gas emissions by 2050](#). Potential actions include reducing energy consumption and changing to low emission sources of energy, and planting trees that remove carbon dioxide (a key GHG) from the atmosphere.

According to [the Department of Business Energy and Industrial Strategy \(BEIS\) Public Attitudes Tracker \(319.5 KB\)](#), 91% of the public were aware of the concept of “net zero” in Winter 2021. This is a significant increase from 87% in the Autumn 2021 wave, potentially related to the major UN climate conference (COP26) held in Glasgow in November 2021. The public’s level of knowledge about net zero also increased significantly, with 15% saying they knew “a lot” and 35% who knew “a fair amount” about the concept in Winter 2021. This is compared with 13% who knew “a lot” and 33% who knew “a fair amount” in Autumn 2021.

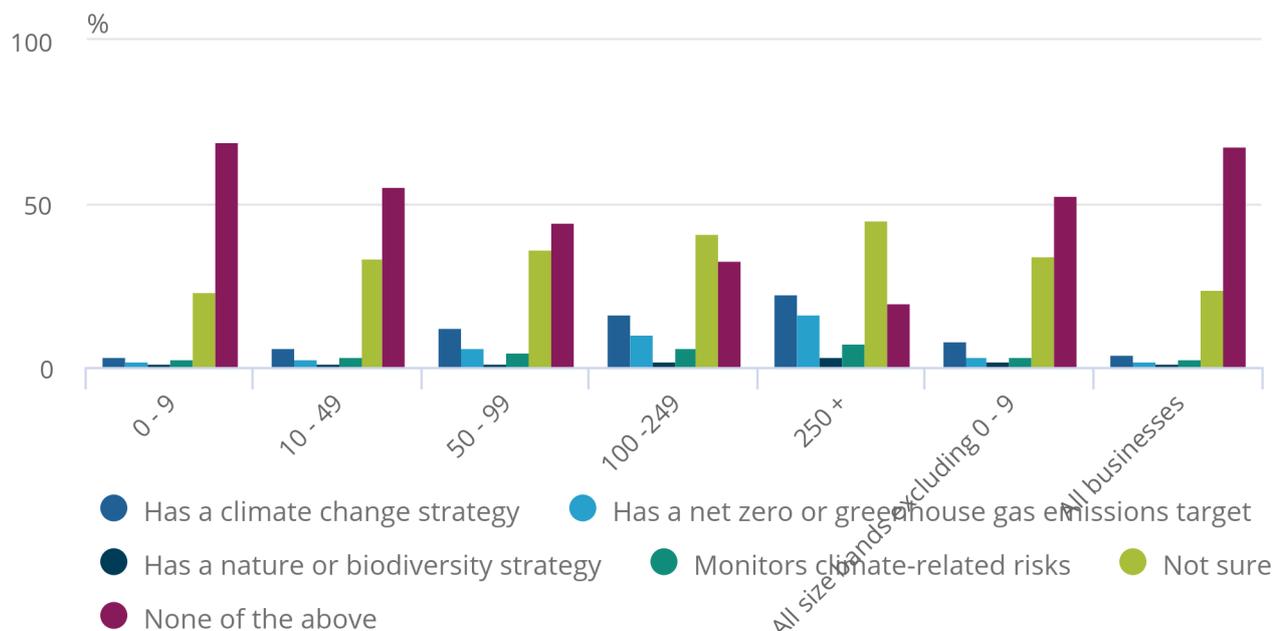
According to [Wave 53 of the Business Insights and Conditions Survey \(BICS\)](#), which ran from 21 March to 3 April 2022, approximately 8% of all businesses not permanently stopped trading reported taking at least one strategic action to protect the environment (the climate or nature). The arts, entertainment and recreation industry, human health and social work activities industry and the professional, scientific and technical activities industry reported the highest proportion of businesses to take at least one action, at 11%. Proportions of businesses taking actions varied by size of the business, with higher proportions of businesses with 250 or more employees reporting to take actions compared with smaller businesses.

Figure 5: While 23% of large businesses reported to have a climate strategy, only 8% reported they monitor climate-related risks

Environmental actions, businesses that have not permanently stopped trading and have reported taking at least one action to protect the environment, by size band, weighted by count, UK, 21 March to 3 April 2022

Figure 5: While 23% of large businesses reported to have a climate strategy, only 8% reported they monitor climate-related risks

Environmental actions, businesses that have not permanently stopped trading and have reported taking at least one action to protect the environment, by size band, weighted by count, UK, 21 March to 3 April 2022



Source: Office for National Statistics – Business Insights and Conditions Survey

Notes:

- Totals will not sum to 100% because businesses could select multiple options.

The two most common were switching to LED bulbs and adjusting heating and cooling systems. These were reported by 29% and 24% of businesses respectively, up from 11% and 10% in late January 2022.

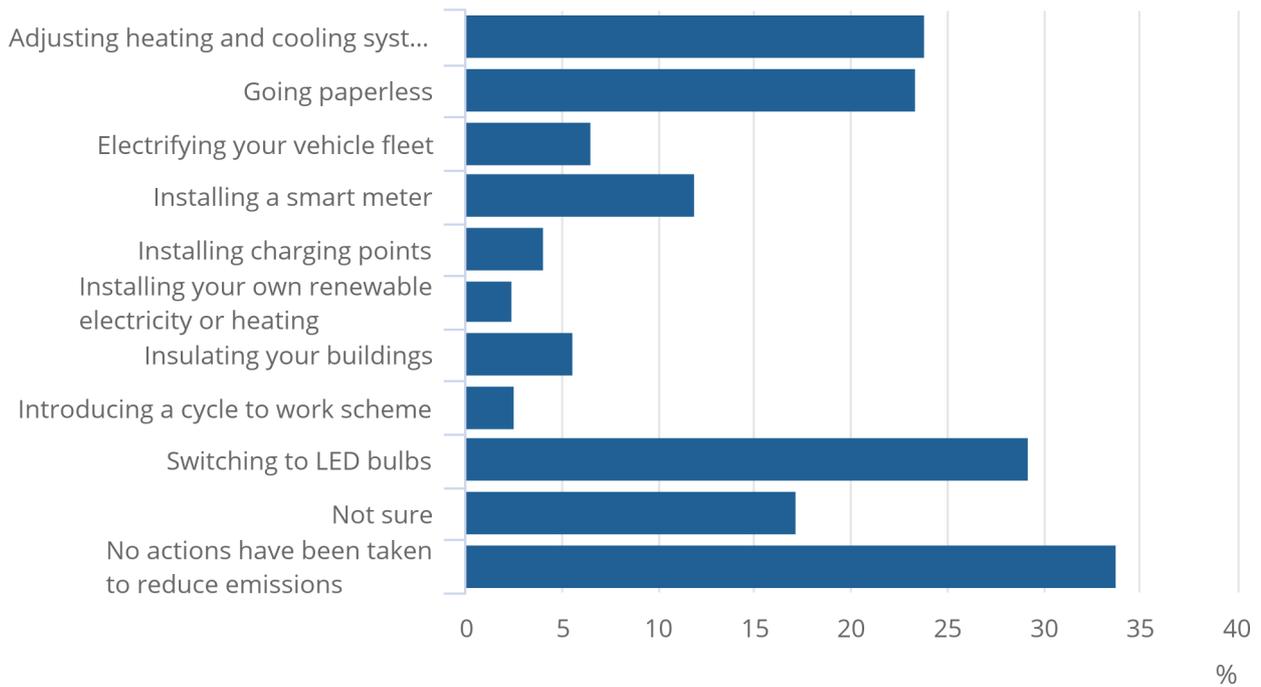
Higher proportions of larger businesses (of at least 100 employees) reported taking actions to reduce emissions compared with smaller businesses. Across all size bands, 17% of businesses reported being not sure and 34% of businesses reported taking no actions to reduce emissions.

Figure 6: Switching to LED bulbs and adjusting heating and cooling systems were the top two actions taken by businesses to reduce their carbon emissions

Actions to reduce carbon emissions, businesses not permanently stopped trading, weighted by count, UK, 21 March to 3 April 2022

Figure 6: Switching to LED bulbs and adjusting heating and cooling systems were the top two actions taken by businesses to reduce their carbon emissions

Actions to reduce carbon emissions, businesses not permanently stopped trading, weighted by count, UK, 21 March to 3 April 2022



Source: Office for National Statistics – Business Insights and Conditions Survey

Notes:

1. Totals will not sum to 100% because businesses could select multiple options.

8 . Adaptation to climate change

The UK is taking measures to adjust to the changing climate. One key measure is increasing the amount of woodland, as stated on the [Natural England website, new woodlands can sequester carbon at a higher rate than other semi-natural habitats](#). They become a significant carbon store as they age, generally taking 10 to 30 years to become significant sinks of carbon. The capacity for natural habitats to remove carbon or pollutants from the air depends upon the amount and type of vegetation. According to the [Office for National Statistics \(ONS\) natural capital accounts](#), the annual value of carbon sequestration in 2019 was £2,110 million in 2020 prices.

As well as being important to climate change mitigation, woodlands also need to be resilient to changes caused by a warming climate, such as new pests and diseases, and changing rain patterns. The Forestry Commission's research agency, Forest Research, has highlighted the importance of having ["the right tree in the right place for a resilient future"](#).

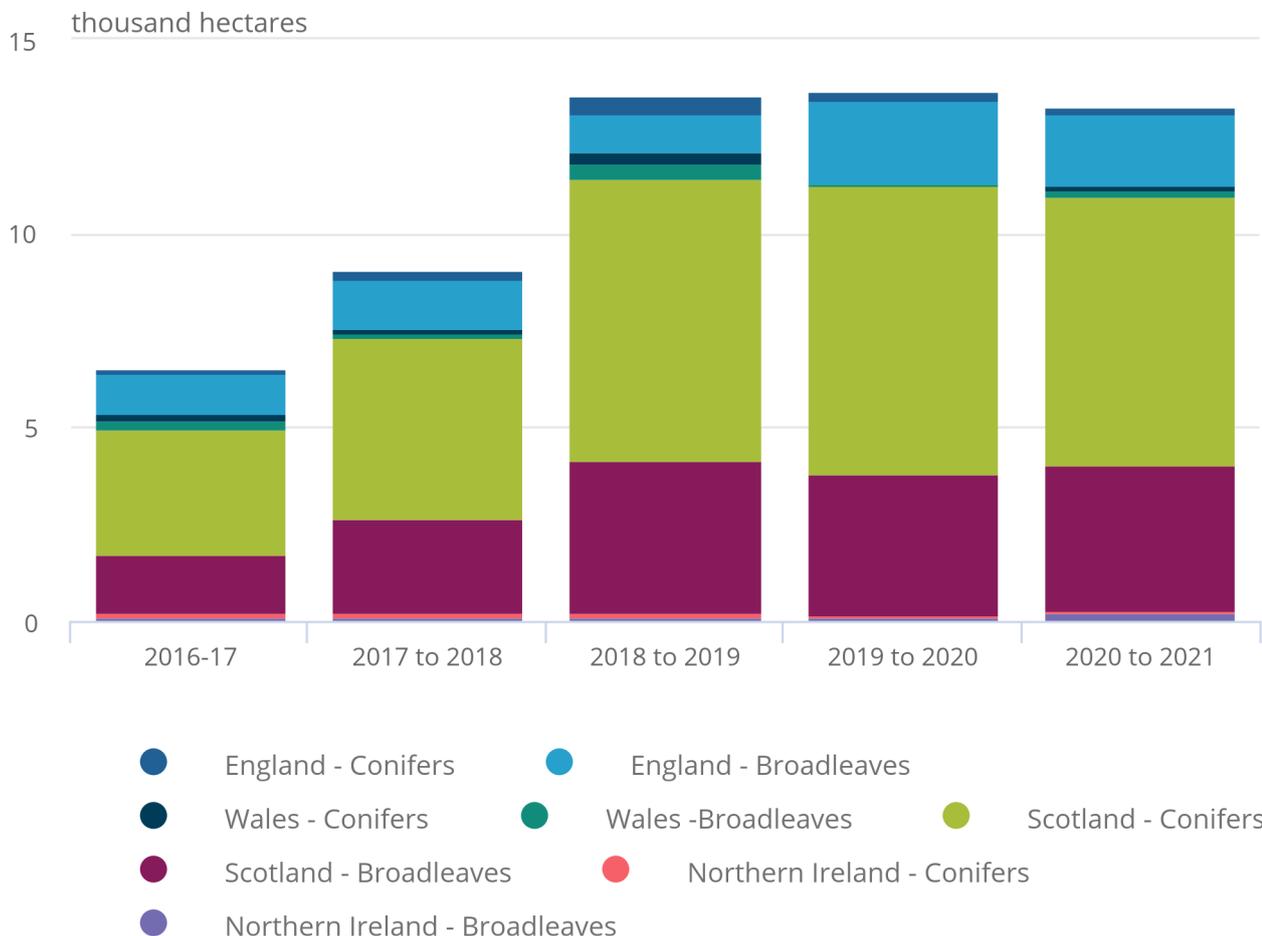
According to the most recent [Forestry Statistics 2021 \(PDF, 319.5K\)](#) data, 13,300 hectares of new woodland were created in the UK in the year ending March 2021. Conifers accounted for 55% of the new planting area in the year ending March 2021 with the remaining 45% broadleaves.

Figure 7: Of the 13,300 hectares of new woodland created from 2020 to 2021, 10,700 hectares were created in Scotland

New planting by forest type, UK, 2016 to 2017 and 2020 to 2021

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New planting by forest type, UK, 2016 to 2017 and 2020 to 2021



Notes:

1. Private sector new planting figures are based on grant-supported new planting and (where possible) estimates for areas planted without grant aid.
2. Figures for grant-aided planting relate to areas for which grants were paid during the year.
3. Estimates for areas planted without grant aid are believed to be under-reported and, as a result, the reported figures are likely to underestimate the true level of planting activity. For England, woodland planting funded by sources other than the Countryside Stewardship Woodland Creation Grant, the Woodland Carbon Fund and the HS2 Woodland Fund include the Woodland Trust, the Environment Agency, Natural England and land acquired by the National Forest Company. For Scotland, a small amount of new planting without grant aid was included for 2017, 2019 and 2020.
4. New planting is seasonal. The planting season lies both sides of 31 March, and the weather can cause planting to be advanced or delayed.
5. Includes woodland formed by natural colonisation (where known).
6. The next update to these figures is scheduled to be published on 16 June 2022 providing statistics for 2021 to 2022.

The Forestry Commission also publishes [headline key performance indicators for England](#) on a quarterly basis. The most recent of these shows that an area of 992 hectares of new woodland was planted in April to December 2021 in England, supported by the UK Government or the Woodland Trust.

9 . Going “Beyond GDP”

Alongside this article, [we published an inclusive income workplan on 12 May 2022](#), outlining plans to bring together a “spectrum” of welfare measures to compile new estimates of “inclusive income”. This will include impacts on nature from economic activity on a comparable basis: flows of benefits from natural capital as well as measures of its creation and depletion. This involves using the [UK Natural Capital Accounts](#), part of the satellite Environmental Accounts, and measures of atmospheric degradation on account of climate change and air pollution, for example.

In addition, alongside our [August gross domestic product \(GDP\) estimates release](#), we also plan to update the UK’s [Measuring National Well-being Dashboard](#). This provides an overview of the quality of life of those in the UK through the lenses of personal well-being, the environment, the economy, personal finance, health and governance, among others. It provides a rounded view of people’s lives. We will also review the indicators used within the dashboard, engaging with expert users and the public to ensure it continues to provide appropriate metrics as conditions change.

10 . Climate change insights data

[Impact of climate change by 2030](#)

Dataset | Released 12 May 2022

Public opinions and social trends, Great Britain: Impact of climate change by 2030. The estimates included here are based on data collected between 13 and 24 April 2022.

11 . Glossary

Mitigation

Mitigation is the reduction of emissions of greenhouse gases that lead to global warming. This includes reducing energy consumption and changing to low emission energy sources.

Adaptation

Adaptation is the response to climate change and the extreme weather that climate change makes more likely. This includes planting different tree species based on expected pests and diseases from higher temperatures and making our homes more resilient to extreme heat and cold weather.

Greenhouse gases

The seven greenhouse gases included in the atmospheric emissions accounts are those covered by the Kyoto Protocol. These are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF₆) and nitrogen trifluoride (NF₃). These gases contribute to global warming and climate change. Each gas' potential to cause global warming is assessed in relation to a given weight of CO₂, so all greenhouse gas emissions are measured as carbon dioxide equivalents (CO₂e).

Residence basis

Estimates compiled on a residence basis include data relating to UK residents and UK-registered businesses, regardless of whether they are in the UK or overseas. Data relating to foreign visitors and foreign businesses in the UK are excluded.

Energy Performance Certificate

Energy Performance Certificates (EPCs) are required for all buildings (domestic and non-domestic), when constructed, sold or rented. There are some exemptions, for example buildings used as places of worship. EPCs are valid for 10 years. The EPC records how energy efficient a property is as a building, using an A to G rating scale where A is the most efficient and G is the least efficient. The certificate also lists the potential rating of the building if all the cost-effective measures are installed.

Carbon sequestration

Carbon sequestration refers to the removal of carbon from the atmosphere. This includes by trees through photosynthesis.

12 . Data sources and quality

More quality and methodology information on the strengths, limitations, appropriate uses, and how the data were created can be found on the following original data source publication sites:

- Heating degree days, energy consumption and energy production – [Department for Business, Energy and Industrial Strategy: Energy trends](#)
- Carbon footprint emissions – [Department for Environment, Food and Rural Affairs: UK's carbon footprint](#)
- Territorial emissions – [Department for Business, Energy and Industrial Strategy: Provisional UK greenhouse gas emissions national statistics 2021](#)
- Woodland planting – [Forest research: Forestry Statistics 2021](#)
- Residence based emissions – [Office for National Statistics: Environmental accounts on air emissions QMI](#)
- Public opinion and social trends – [Office for National Statistics: Opinions and Lifestyle Survey QMI](#)
- Business insights and impact – [Office for National Statistics: Business Insights and Conditions Survey QMI](#)
- Gross Domestic Product (GDP) – [Office for National Statistics: GDP QMI](#)

13 . Future developments

Our pilot article brings together a range of insights on climate change from various sources, using the cross-government statistical framework also used on the prototype [UK Climate Change Statistics Portal](#).

Subject to assessment of impact, we intend for this to become a regularly quarterly article, and as such, we welcome user feedback. Please email environment@ons.gov.uk to share your feedback.

14 . Related links

[Beyond GDP measures for the UK: a workplan for measuring inclusive income](#)

Article | Released 12 May 2022

Planned work, as well as timeline estimates, for projects feeding into the creation of a measure of “inclusive income”, aligned with a similar concept of “inclusive wealth”.

[Developing quarterly greenhouse gas emissions accounts. UK: May 2022](#)

Article | Released 12 May 2022

Sets out a potential framework to develop annual greenhouse gas (GHG) emissions accounts on a quarterly basis. Also outlines potential issues and future work.

[UK Environmental Accounts: 2021](#)

Bulletin | Released 3 June 2021

Measuring the contribution of the environment to the economy, the impact of economic activity on the environment, and society's response to environmental issues. Satellite accounts to the main UK National Accounts.

[UK natural capital accounts: 2021](#)

Bulletin | Released 12 November 2021

Estimates of the financial and societal value of natural resources to people in the UK.

[Low carbon and renewable energy economy. UK: 2020](#)

Bulletin | 17 February 2022

Estimates in the size of the green economy from the Low Carbon and Renewable Energy Economy Survey, including turnover and employment.

[UK Climate Change Statistics Portal](#)

A prototype portal for data and insights on climate change.