Office for National Statistics

Article

Climate change insights, families and households, UK: August 2023

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

Contact:
Angela Watkins, Bec Williams and Amelia White
Climate.Change@ons.gov.uk
+44 1633 455783

Release date:
11 August 2023

Next release:
To be announced

Notice

25 July 2024

Our climate change insights, families and households, UK release is no longer being produced. The final release was published on 11 August 2023. Measuring progress, well-being and beyond GDP in the UK may be of interest. Please search the ONS release calendar and environmental accounts page for the most recent environment-related releases.

Table of contents

1 . Main points

- June 2023 was confirmed as the hottest June in the UK since records began in 1884, and July saw the world's hottest day with heatwaves across many parts of Europe, China, and the US.
- Only 4% of adults thought the UK was "well prepared" for hotter summers.
- Approximately 64% of adults in Great Britain said they were somewhat or very worried about the impact of climate change, with variation by region, sex and socio-economic status.
- Adults living in the least deprived areas of England were more likely to report having made some changes to their lifestyle to tackle climate change (70%) than those in the most deprived areas (55%).
- Total energy use by households in the UK, on a residence basis, has fallen 9% since 1990, having initially risen into the early 2000s.
- During Quarter 2 (Apr to June) 2023, over half (58%) of all energy performance certificates (EPC) lodged in England and Wales were rated band C or above; this is 19 percentage points higher than Quarter 4 (Oct to Dec) 2008, when EPCs were first made mandatory for all domestic properties.

We have published this alongside an update to our Quality of life in the UK bulletin and quarterly gross domestic product (GDP) figures.

This is the last planned edition of Climate Change Insights.

However, the sources of official statistics on which this output is based are available via the relevant producers' websites (see section 8).

Please contact climate.change@ons.gov.uk with any feedback or questions.

2 . Climate and weather

June 2023 was the UK's hottest June on record according to the Met Office, with an average mean temperature of 15.8 degrees Celsius. The Met Office reports that Climate change impacts June temperature records, stating that "we found that the chance of observing a June beating the previous joint 1940 and 1976 record of 14.9 degrees Celsius has at least doubled since the 1940s. Alongside natural variability, the background warming of the Earth's atmosphere due to human induced climate change has driven up the possibility of reaching record high temperatures".

July 2023 was the world's warmest month on record, with a global mean air temperature of 16.95 degrees Celsius, according to data from the Copernicus Climate Change Service. During the first and third weeks of July, temperatures temporarily exceeded the 1.5 threshold above preindustrial levels - a limit set by the Paris Agreement. The warmest day ever recorded was 6 July 2023, reaching an average of 17.08 degrees Celsius.

The cross-government UK Climate Change Statistics Portal's Climate and weather dashboard provides more detail and shows long-term rises in both mean temperature and annual rainfall for the UK.

3 . Impacts and signs of adaptation

A Public First survey (PDF, 242KB) for the Making Climate Adaptation Matter report (PDF, 1.8MB), commissioned by the National Trust, found that almost half (45%) of UK adults thought the country was "not at all prepared" for more hot summers, such as the 40-degree heatwaves experienced during the summer of 2022. Just under a third (31%) felt they themselves were not prepared, while just over a third felt the same for their home (35%), and for their garden (35%). Only 4% of respondents thought the UK was "well prepared" for hotter summers.

Overheating

It is estimated that, in the current climate, around 55% (15.7 million homes) of the UK's housing stock would fail the "bedroom overheating" test, according to an Arup report commissioned by the Climate Change Committee, Addressing overheating risk in existing UK homes. This is based on modelling carried out on a range of representative home types assessed for night-time overheating in bedrooms based on a fixed temperature threshold of 26 degrees Celsius.

The Climate Change Committee (CCC), in their recent Progress in adapting to climate change 2023 Report to Parliament, made four recommendations to the government aimed at measures to reduce overheating in buildings.

In the 2020 to 2021 English Housing Survey, 1.9 million (8%) households in England reported that at least one part of their home got uncomfortably hot, and over half (51%) of these experienced overheating in bedrooms.

Cooling

Urban areas can be prone to overheating because of "urban heat island" effects, where cities experience warmer temperatures than surrounding areas generally because of human activities and lack of green infrastructure. Temperatures in urban areas have been recorded as being, on average, five degrees Celsius warmer on a summer evening, according to a 2011 Temperature patterns across the UK study, cited by Arup in the Risks to health, wellbeing and productivity from overheating in buildings report for the CCC.

Our latest Habitat extent and condition, natural capital, UK: 2022 bulletin reports that in 2019, Great Britain (GB) had approximately 1.77 million hectares of urban areas, of which almost a third (31%) was characterised as natural land cover. Despite urban areas making up only 7% of total GB land area, they account for:

- 83% of the population in England (Department for Environment, Food and Rural Affairs Rural population and migration mid-year population estimates for 2020)
- 83% of the population in Scotland (Scottish Government Urban Rural classification 2020)
- 67% of the population in Wales (our 2011 Census Analysis - Comparing Rural and Urban Areas of England and Wales)
- 64% of the population in Northern Ireland (latest NISRA Key rural issues 2022)

Urban greenspace, such as woodland, parks and gardens, can create a "park cool island" effect to counteract urban heat islands, reducing surrounding local air temperatures by between 1.5 and 3.5 degrees Celsius, according to a study reported in Improving access to greenspace: A new review for 2020 (PDF, 1,210KB) from Public Health England.

Urban cooling had an estimated total annual value of £430 million in 2020 according to our latest Natural capital accounts: 2022 bulletin. Most of this value comes from improved labour productivity, with a small proportion coming from avoided costs of air conditioning. Greenspaces made up around 98% of the average annual cooling effect, with the remainder coming from blue spaces such as rivers and canals.

However, one in eight households (12%) in Great Britain does not have access to a private or shared garden, according to our analysis of greenspace in 2020. This rises to a high of one in five (21%) households in London. While Scotland recorded the second highest proportion of households (13%) who do not have access to a private or shared garden, it benefits from the highest proportion of natural urban area land cover (37%, compared with an average of 31% for Great Britain according to our Habitat extent and condition natural capital: 2022 bulletin). Edinburgh experienced the largest annual cooling effect (see our latest Natural capital: urban accounts bulletin for 2022) among the 11 city regions in Great Britain, with an average 0.88 degrees Celsius reduction in temperature from 2013 to 2018. Liverpool had the lowest annual cooling effect (0.63 degrees Celsius reduction from 2013 to 2018) among these city regions.

Our 2020 analysis, One in eight British households has no garden, found that people in the Black ethnic group are four times as likely as people in the White ethnic group to have no access to outdoor space at home.

4 . Emissions and drivers

Greenhouse gas emissions within the UK on a residence basis (different to territorial emissions used for UK climate targets) have fallen by 40% between 1990 and 2021 (see our latest UK Environmental Accounts: 2023 bulletin). However, emissions from households have only fallen 6% over the same period, making it currently the largest contributor to UK emissions of any sector.

For more about emissions, see the Measuring UK greenhouse gas emissions article on the UK Climate Change Statistics Portal, along with detail, charts and industry breakdowns in the Emissions dashboard, as well as our Experimental estimates of quarterly greenhouse gas emissions bulletin released last month.

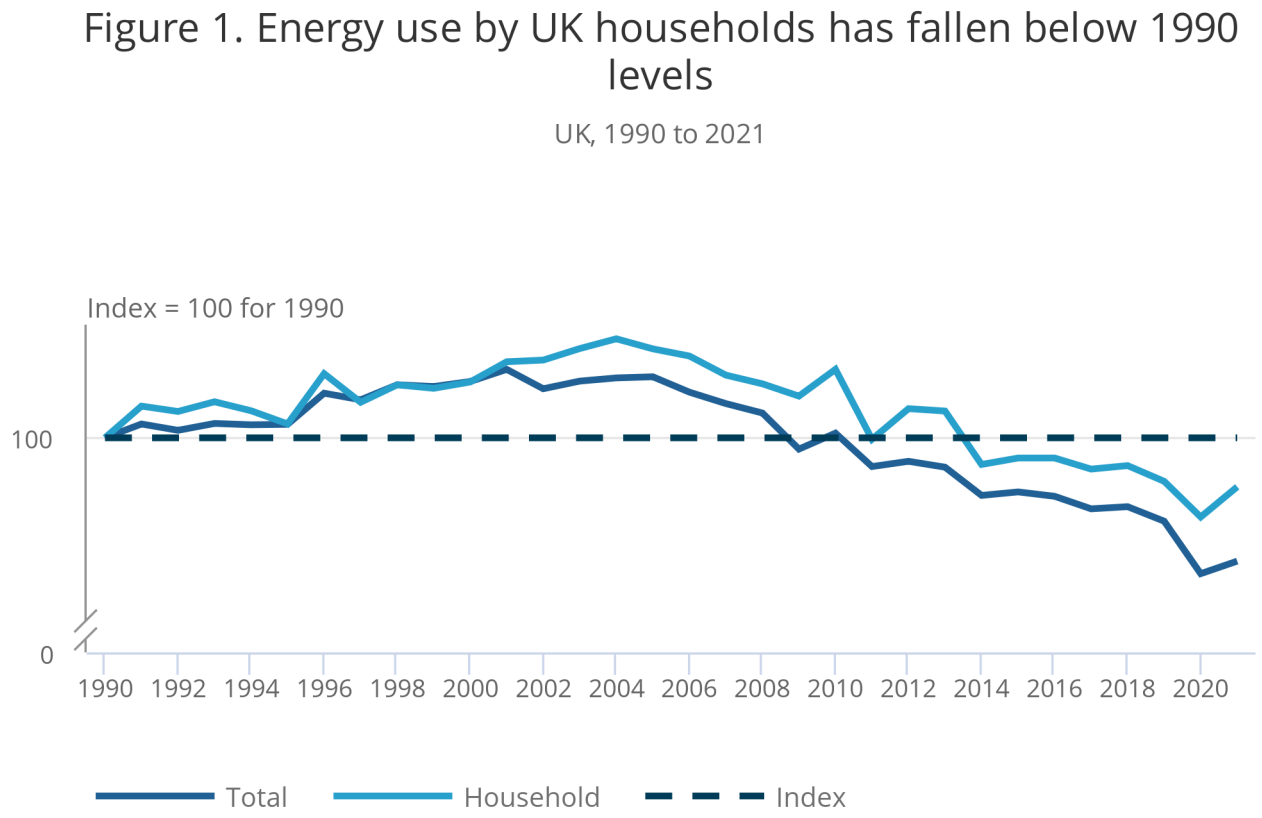
Energy use

Our Energy use dataset shows that, on a residence basis, total energy use by households in the UK fell by 9% between 1990 and 2021, despite some fluctuations in the intervening years and a single year increase of 6% between 2020 and 2021. Energy use rose during the mid-2000s and fell below 1990 levels for the first time in 2011, as shown in Figure 1.

On average, across all industries, energy use fell by almost a quarter (22%) between 1990 and 2021 despite a rise of 3% between 2020 and 2021.

Figure 1. Energy use by UK households has fallen below 1990 levels

UK, 1990 to 2021



Source: Energy use and energy intensity from the Office for National Statistics

Notes:

1. Reallocated energy use in million tonnes of oil equivalent.

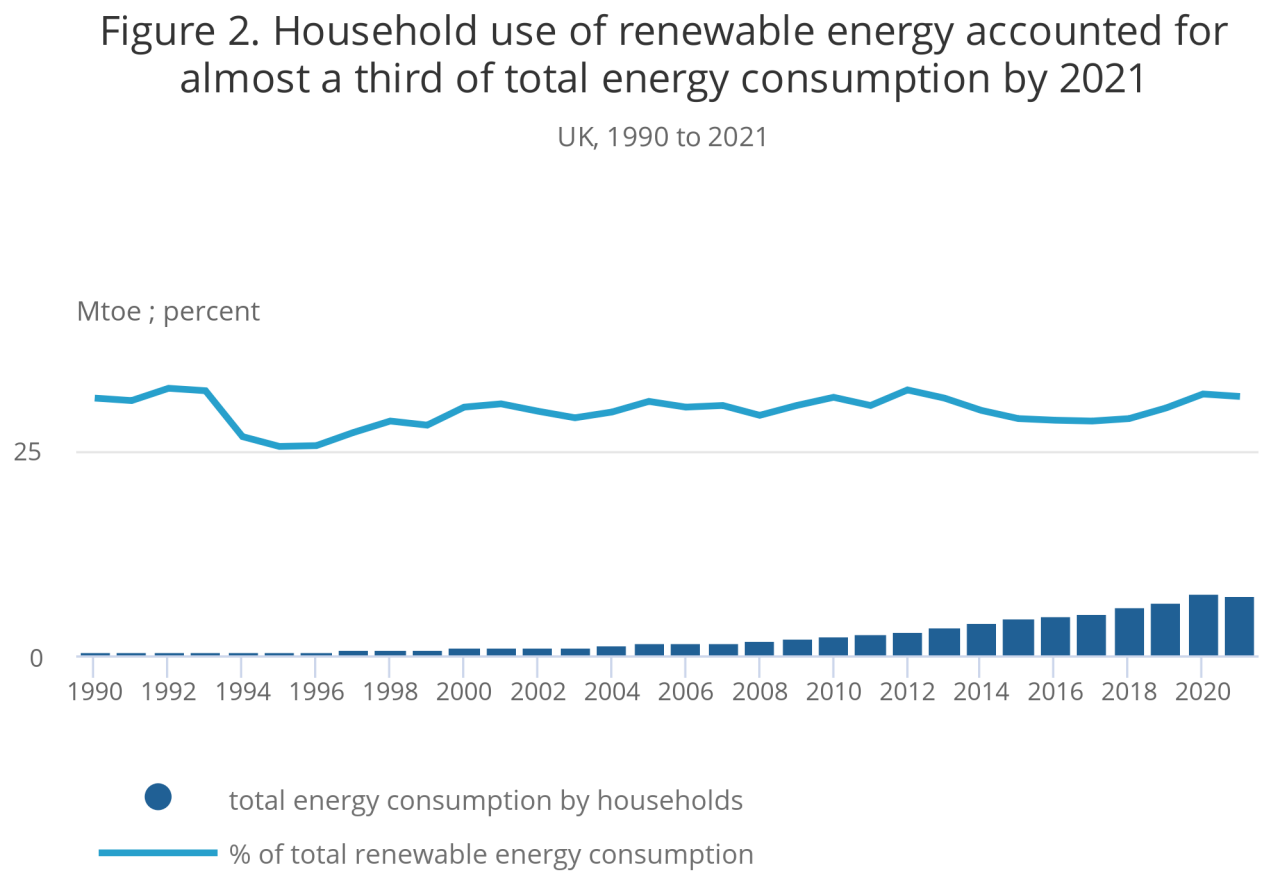
2. Households relate primarily to consumer expenditure within the environmental accounts. This refers to the consumption of fuels and other products by individuals in the UK, as opposed to the production of these by industry. '"Consumer expenditure – travel" consists almost entirely of road transport emissions.

Energy consumption from renewable sources has risen steadily since 1990. Our latest Energy use figures show that, on a residence basis, renewable energy use by households has risen from 0.5 million tonnes of oil equivalent (Mtoe) in 1990 to 7.3 Mtoe in 2021, although there was a fall of 3% between 2020 and 2021.

Households accounted for nearly a third (32%) of total renewable energy used in the UK in 2021, as shown in Figure 2.

Figure 2. Household use of renewable energy accounted for almost a third of total energy consumption by 2021

UK, 1990 to 2021



Source: Energy use: renewables and waste sources from the Office for National Statistics

Notes:

1. Households relate primarily to consumer expenditure within the environmental accounts. This refers to the consumption of fuels and other products by individuals in the UK, as opposed to the production of these by industry. ‘”Consumer expenditure – travel” consists almost entirely of road transport emissions.

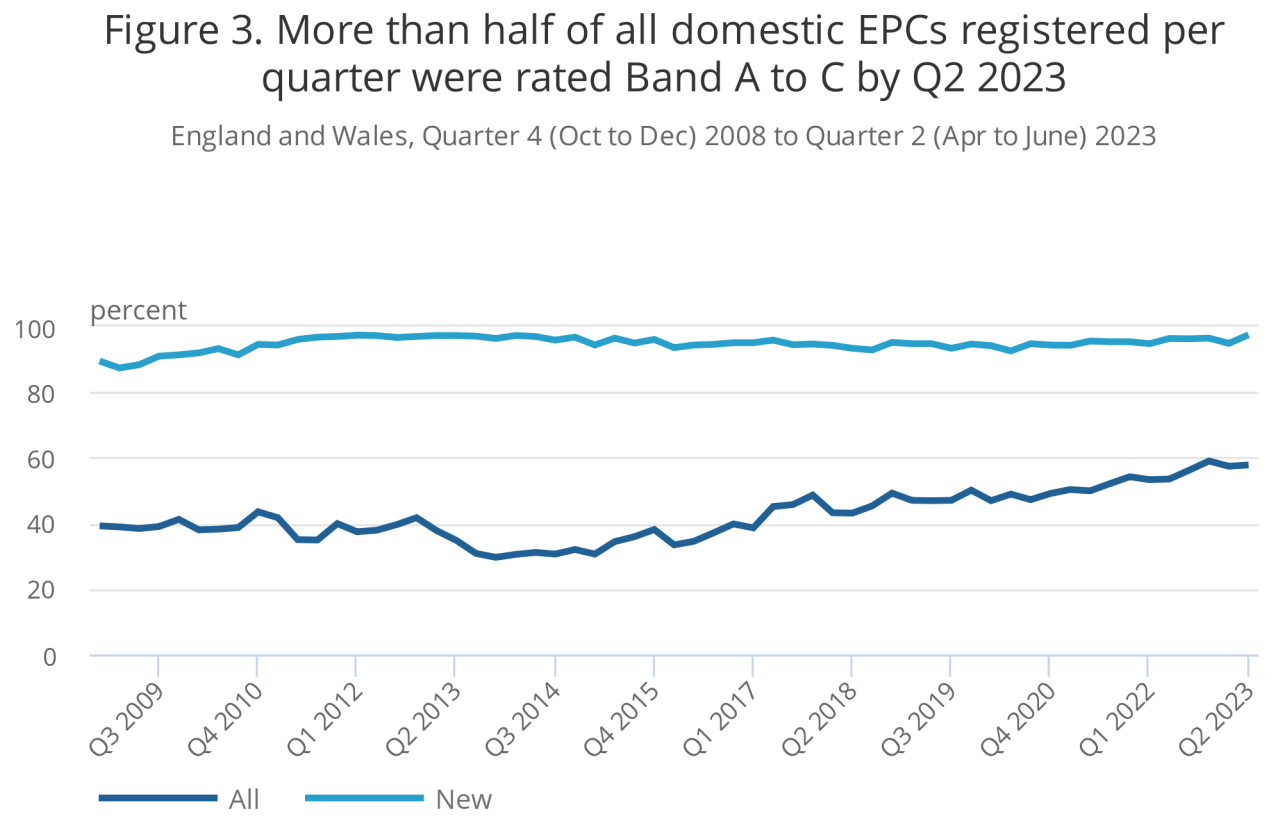
Domestic energy efficiency

An Energy Performance Certificate (EPC) is required in the UK when a building is constructed, sold, or let and if a valid certificate is not already in place and is intended to show prospective tenants or buyers the energy efficiency of the property. EPCs were made mandatory for all domestic properties in 2008. Properties are rated band A to G with a score typically between 1 and 100. Band C or above equates to a score of 69 or higher.

During Quarter 2 (Apr to June) of 2023, over half (58%) of all EPCs lodged in England and Wales were rated band C or above, according to the latest Department for Levelling Up, Housing and Communities (DLUHC) Domestic EPC dataset. This is an increase of 19 percentage points since Quarter 4 (Oct to Dec) of 2008, when EPCs were first made mandatory for all domestic properties. For new dwellings, 98% were rated band A to C during Quarter 2, 2023, as shown in Figure 3.

Figure 3. More than half of all domestic EPCs registered per quarter were rated Band A to C by Q2 2023

England and Wales, Quarter 4 (Oct to Dec) 2008 to Quarter 2 (Apr to June) 2023



Source: Energy Performance of Buildings Certificates (EPC) in England and Wales from the Department for Levelling Up, Housing and Communities

Our latest Energy efficiency of housing in England and Wales article figures show, for all EPC records up to March 2022, that homes in England and Wales had an average energy efficiency rating of 67 and 65, respectively (equivalent to band D). Wales's score is joint lowest, along with Yorkshire and the Humber, when compared across Wales and regions of England. London, and the South East, had the highest average energy efficiency scores, of 68.

There is variation across local authorities in England and Wales. Tower Hamlets had the highest average domestic energy efficiency score of 77 (band C) and had almost three-quarters (76%) of domestic properties rated band C or above. The Isles of Scilly had the lowest average score of 47 (band E), with only 14% of domestic properties rated band C or above.

Housing Condition Surveys for Scotland and Northern Ireland estimate the proportion of all domestic properties rated within each energy rating band (A to G). Latest national statistics show the following proportion of housing was rated band C or above:

- 52% in Scotland (experimental statistics from Scottish House Condition Survey: 2021)
- 49% in Northern Ireland (House Condition Survey, 2016)

5 . Moving towards net zero (attitudes and behaviours)

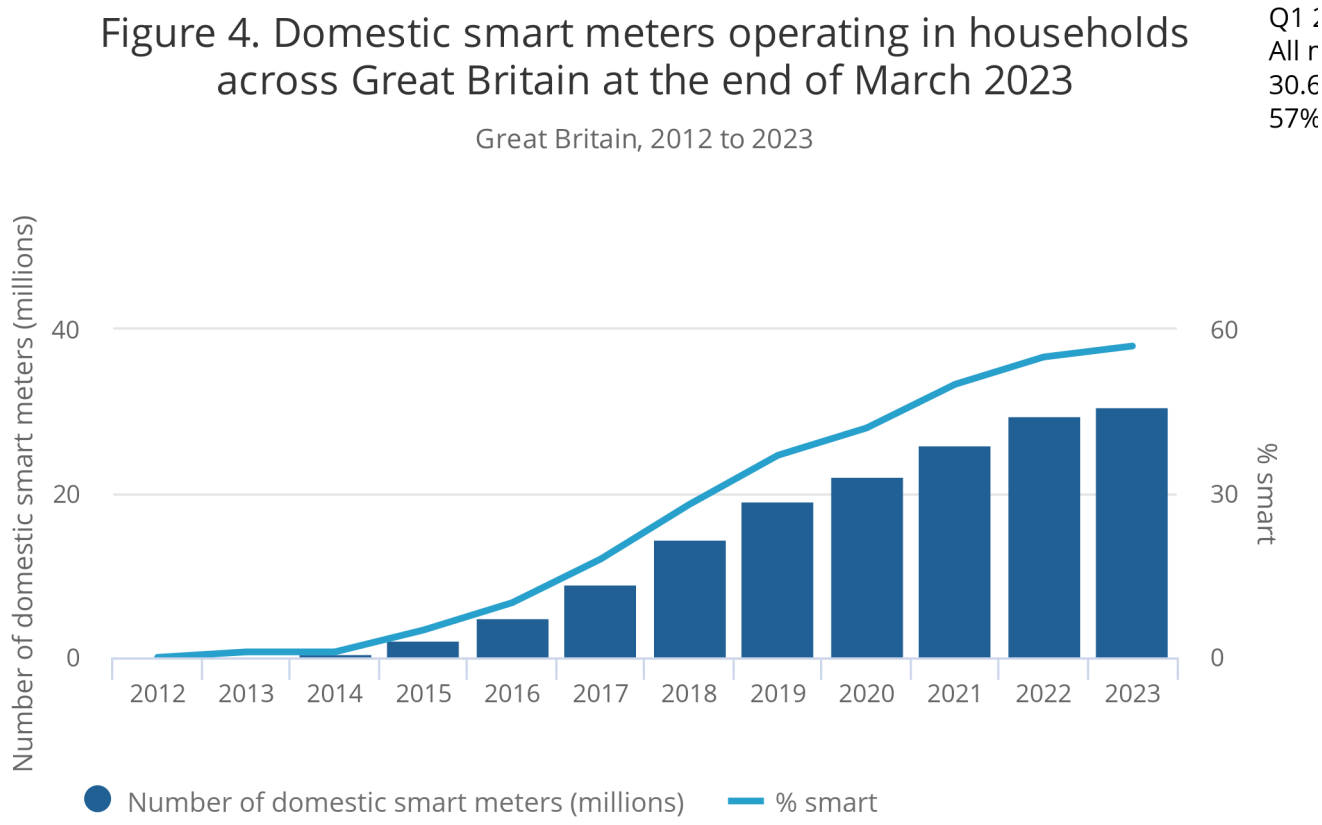
Heat and energy in the home

According to Smart meter statistics from the Department for Energy Security and Net Zero (DESNZ), as at end of March 2023, 57% (30.6 million) of all meters in homes across Great Britain are smart meters (Figure 4); by fuel type, the percentages are 54% (gas) versus 59% (electricity).

Smart meters provide near-real-time information which consumers can use to save energy and cut their bills and are designed to provide a more flexible and resilient energy system through new and innovative approaches to managing demand.

Figure 4. Domestic smart meters operating in households across Great Britain at the end of March 2023

Great Britain, 2012 to 2023



Source: Smart meters in Great Britain, quarterly report from the Department for Energy Security and Net Zero

Notes:

1. 2023 data to end of quarter one only

Owner-occupied households and social renters were more likely to report having an electricity smart meter (47% and 48%, respectively), compared with private renters (36%), in the 2021 to 2022 English Housing Survey. Comparable data for gas meters or for other parts of the UK are not currently available.

Low-carbon options for heating homes can reduce households' greenhouse gas emissions. However, the Public Attitudes Tracker, Winter 2022 (PDF, 1,514KB) found that people face significant barriers to switching to low-carbon heating systems. Of the five potential low carbon heating options (solar panels, air source heat pumps, ground source heat pumps, hybrid heat pumps, and biomass boilers), around 3 in 10 respondents (between 26% and 32%) were unlikely to install each of these. At least 2 in 10 (between 21% and 30%) did not know enough about these systems to decide, while another 3 in 10 (28% or 29% depending on the option) reported it was not their decision to make. The main barriers reported, based on owner-occupiers unlikely to install one or more low carbon heating options, were:

- concern about the cost of installation (45%)
- a preference to wait and see how technology develops (32%)
- the perception that it might not be possible to install in their home (30%)
- not knowing enough about the heating systems (27%)

According to the latest Public Attitudes Tracker, Spring 2023 (PDF, 2.4MB), almost one-third of respondents living in owner-occupied homes would either definitely (32%) or probably (30%) consider installing solar panels in the next few years, and 7% had already installed them. The main motivators cited by this group were economic, because it would cut their electricity bills (84%), and environmental, to provide a renewable source of electricity (75%).

Electric vehicle ownership

While only 4% of people in England currently owned or use a plug-in vehicle (battery electric or plug-in hybrid), more than half (57%) were either fairly or very likely to purchase or lease an ultra-low emission car in the future, according the Department for Transport's National Travel Attitudes Study, published February 2023. Three-quarters of respondents reported that lower purchase (76%) and running (75%) costs would encourage them to buy a low-emission car, suggesting that costs are an important factor in decisions about which vehicle to purchase.

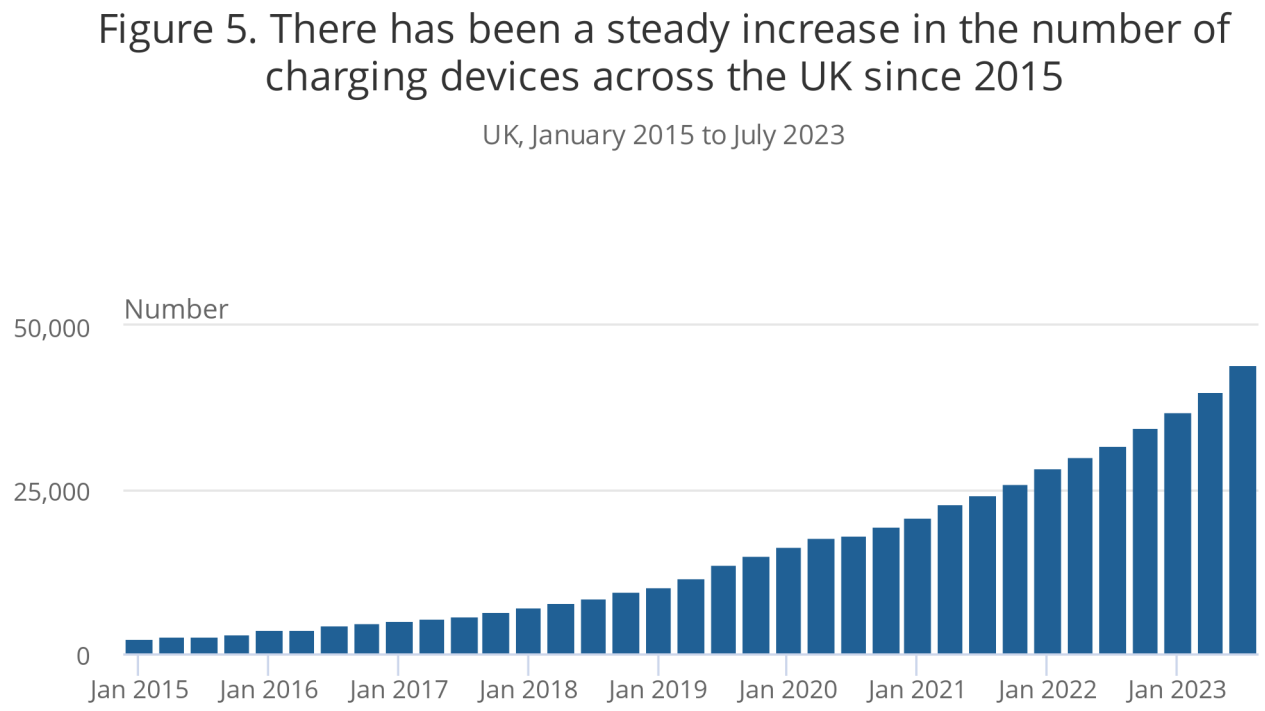
However, the highest level of concern expressed about driving an electric vehicle was about the availability of charging points at the end of long journeys, reported by 34% of respondents. Only 12% of all respondents agreed that there were enough publicly available charging devices to meet demand.

The latest Electric vehicle public charging device statistics: July 2023 from the Department for Transport using data sourced from Zapmap show that, as of 1 July 2023, there were 44,020 public electric vehicle (EV) charging devices installed across the UK. Over a third (34%) of these are "on street" (residential) and nearly half (48%) at "destination" (where drivers may typically stop for an extended period of time).

Figure 5 shows that the number of UK public EV charging devices has increased by more than a third (38%) since July 2022, with the greatest increase seen in the East of England (26.1%) and the smallest increase in Scotland (1.7%). London had the greatest number of charging devices per 100,000 population (152) and Northern Ireland the lowest (23).

Figure 5. There has been a steady increase in the number of charging devices across the UK since 2015

UK, January 2015 to July 2023



Source: Electric vehicle charging device statistics: July 2023 from the Department for Transport, using data sourced from Zapmap

Notes:

1. "Total devices" represent publicly available charging devices at all speeds. A device can have a number of connectors of varying speeds.

2. Any reference to this report should clearly refer to Zapmap as the source of the data.

Concern about climate change

The latest estimates from our Opinions and Lifestyle Survey (OPN) from 14 June to 9 July 2023 show that around two-thirds (64%) of adults in Great Britain said that in the past 12 months they had been worried (very or somewhat) about the impact of climate change (the same as in the previous period 5 April to 1 May 2023).

Groups of the population more likely to report having been worried about climate change include:

- those living in the least deprived areas of England (72%) compared with those living in the most deprived areas (50%)

- those living in the East of England (70%) compared with those living in the North East (53%)

- women (68%) compared with men (60%).

Lifestyle changes

Over 6 in 10 (64%) adults in Great Britain reported that they had made some changes to help tackle climate change, and a further 7% had made a lot of changes.

When asked about the specific actions they had taken to help tackle climate change in the past 12 months, the most frequently reported actions among adults in Great Britain included making changes to their:

- shopping habits (46%)
- travel (37%)
- diet (33%)
- garden (29%)

The most common reasons reported among people not making any changes included:

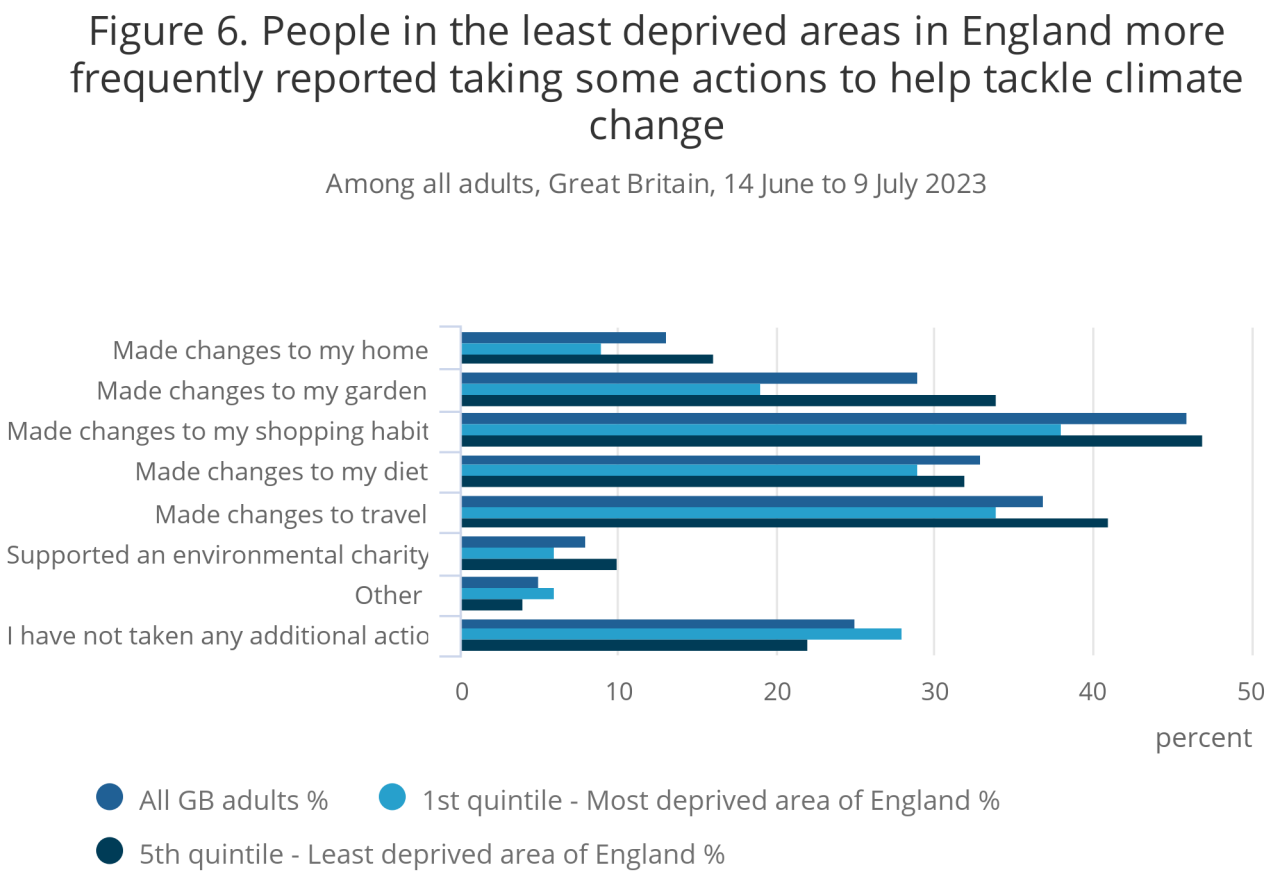
- feeling that large polluters should make changes before individuals (37%)
- that their changes will have no effect (33%)
- that it is too expensive to make changes (30%)

Of people who had taken actions to tackle climate change in the past 12 months, around 4 in 10 (41%) agreed or strongly agreed that the changes have had a positive impact on their life.

Adults living in the least deprived areas of England were more likely to report having made some changes to their lifestyle to tackle climate change (70%) than those in the most deprived areas (55%) and appeared more likely to have made changes to their home (16% compared with 9%), garden (34% compared with 19%) or shopping habits (47% compared with 38%). These results are shown in Figure 6.

Figure 6. People in the least deprived areas in England more frequently reported taking some actions to help tackle climate change

Among all adults, Great Britain, 14 June to 9 July 2023



Source: Opinions and Lifestyle Survey from the Office for National Statistics

Notes:

1. Question – What actions, if any, have you taken in the past 12 months to help tackle climate change?
2. Base – all adults
3. Respondents were allowed to select more than one option so percentages will not sum to 100%.
4. An area's deprivation quintile is based on the Index of Multiple Deprivation (IMD). Estimates are provided for England only.
5. Full breakdowns including confidence intervals for the estimates shown in this chart are available within the dataset published with this release.

6 . New climate change insights data

Climate change insights, families and households, UK: worries about climate change and changes to lifestyle to help tackle it, Great Britain, 14 June to 9 July 2023
Dataset | Released 11 August 2023
Opinions and Lifestyle Survey (OPN) findings about people's worries about climate change and changes to lifestyle to help tackle climate change, Great Britain.

7 . Glossary

Adaptation

Adaptation refers to actions to adjust to climate change, and the extreme weather that it makes increasingly likely. This includes making homes more resilient to extreme heat and cold weather and adapting our landscapes to better cope with flooding or drought events, for example.

Deprived areas

The Index of Multiple Deprivation, commonly known as the IMD, is the official measure of relative deprivation for small areas in England. The IMD ranks every small area in England from 1 (most deprived area) to 32,844 (least deprived area). Deciles are calculated by ranking the 32,844 small areas in England, from most deprived to least deprived, and dividing them into 10 equal groups. These range from the most deprived 10 per cent of small areas nationally to the least deprived 10 per cent of small areas nationally. For this analysis, to ensure robust sample sizes, we have further grouped deciles into quintiles.

Energy Performance Certificates (EPC)

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.

Greenhouse gases

The seven greenhouse gases included in the atmospheric emissions accounts are those covered by the Kyoto Protocol:

- carbon dioxide (CO2)
- methane (CH4)
- nitrous oxide (N2O)
- hydro-fluorocarbons (HFCs)
- perfluorocarbons (PFCs)
- sulphur hexafluoride (SF6)
- nitrogen trifluoride (NF3)

These gases contribute to global warming and climate change. The potential of each gas to cause global warming is assessed in relation to a given weight of CO2, so greenhouse gas emissions are measured as carbon dioxide equivalent (CO2e).

Net zero

Net zero is the UK government's target for at least a 100% reduction of net greenhouse gas emissions (compared with 1990 levels) in the UK by 2050. This can be achieved by a combination of emission reduction and emission removal.

Overheating

Overheating occurs when high internal temperatures in building cause people to feel uncomfortably hot. This can be measured using two main methods based on either the number of hours above a fixed temperature threshold (static approach), or the percentage of occupied hours during May to September above an adaptive thermal comfort threshold (adaptive approach).

Ultra-low emissions vehicle

Road-using vehicles that are reported to emit less than 75 grams of CO2 from the tailpipe for every kilometre travelled.

Urban heat island (UHI)

UHIs occur where cities experience higher temperatures than surrounding arears, particularly at night.

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.

8 . 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 original source publication sites:

UK Environmental Accounts - Office for National Statistics

Energy efficiency of housing in England and Wales: 2022 - Office for National Statistics

UK natural capital accounts - Office for National Statistics

Habitat extent and condition, natural capital, UK: 2022 - Office for National Statistics

Smart meters in Great Britain, quarterly update March 2023
Department for Energy Security and Net Zero

English Housing Survey - Department for Levelling Up, Housing and Communities

Public Attitudes Tracker: Winter 2022 - Department for Energy Security and Net Zero

National Travel Attitudes Study (NTAS) - Department for Transport

Electric Vehicle Charging Device Statistics: July 2023 - Department for Transport using data sourced from Zapmap

Opinions and Lifestyle Survey (OPN) QMI - Office for National Statistics

State of the UK Climate 2022 - Met Office

9 . Related links

UK Climate Change Statistics Portal
Web page | Last updated 11 August 2023.
Data, statistics and insights on climate change.

UK Environmental Accounts: 2023
Bulletin | 5 June 2023
Measuring the contribution of the environment to the economy, impact of economic activity on the environment, and response to environmental issues.

UK natural capital accounts: 2022
Bulletin | 10 November 2022
Estimates of the financial and societal value of natural resources to people in the UK.

Public opinions and social trends
Bulletin | Released fortnightly
Social insights on daily life and events, including estimates from the Opinions and Lifestyle Survey (OPN) relating to the important issues facing society today.

10 . Cite this article

Office for National Statistics (ONS), released 11 August 2023, ONS website, article, Climate change insights, families and households, UK: August 2023