

Article

# Energy efficiency of housing in England and Wales: 2023

Insights on the energy efficiency, carbon dioxide emissions and central heating main fuel type for new and existing homes by property type, tenure, and property age.

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# 1 . Main points

- Dwellings in England and in Wales had a median energy efficiency rating in band D, with scores of 68 and 66, respectively.
- “Flats and maisonettes” was the most energy-efficient property type in both England and Wales, with a median energy efficiency score of 73 in England and in Wales, equivalent to band C.
- Social rented dwellings had a median energy efficiency score of C in all English regions and Wales.
- In both countries, four in five dwellings used mains gas as a main fuel source for central heating.
- Of local authority districts, 26% had more than half of their dwellings at energy efficiency band C or above; just over half (52%) of these local authorities were in London or the South East.
- Of all dwellings built before 1930 in England and in Wales, more than 80% were rated in bands D to G.

## 2 . Energy efficiency of dwellings in England and Wales

Several factors affect the energy efficiency of a dwelling, including property type, tenure and when it was constructed. This article highlights the types of dwellings typically associated with high and low energy efficiency scores.

Energy Performance Certificates (EPCs) indicate the energy efficiency of dwellings. They are based on data about a building's energy features, for example, the building materials used, the heating systems and insulation. These are collected by an accredited energy assessor and entered into government-approved software to generate an EPC score, typically ranging from 1 to 100. Domestic EPCs are banded from A to G, where A is the most energy efficient.

EPC data for England and Wales are available from the Department for Levelling Up, Housing and Communities (DLUHC) [Open Data Communities website](#).

The scores associated with each energy efficiency band are:

- band A – 92 plus (most efficient)
- band B – 81 to 91
- band C – 69 to 80
- band D – 55 to 68
- band E – 39 to 54
- band F – 21 to 38
- band G – 1 to 20 (least efficient)

This analysis uses EPC data to present energy efficiency, the main fuel type used in central heating, and the carbon dioxide (CO<sub>2</sub>) emissions of dwellings with an EPC for England and Wales separately. It is based on one record per dwelling, using records from April 2013 to March 2023. This is because EPCs are only valid for 10 years from when dwellings are constructed, converted, sold or let.

This analysis does not cover all dwellings in England and Wales because not every dwelling has an EPC and so these statistics cannot be viewed as a full representation of the entire dwelling stock. However, they are still useful to provide insight into the energy efficiency of housing, as they include the most recent data available for each dwelling that has an EPC. More information on our base population can be found in [Section 10: Data sources and quality](#).

## Energy efficiency by region

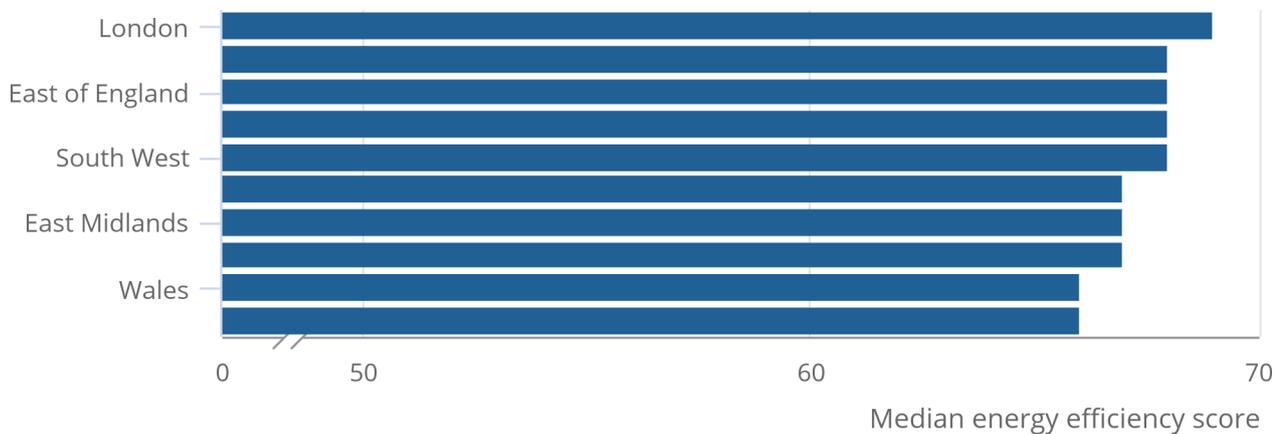
The housing stock across England and Wales varies, and this is reflected in median energy efficiency scores. The median energy efficiency score was 68 in England and 66 in Wales for all records up to March 2023, which are equivalent to band D. Within England, Yorkshire and The Humber had the lowest median score (66, equivalent to band D), the same as Wales. London was the only International Territorial Level 1 (ITL1) region with a median energy efficiency score in band C (69) where all other regions and countries were band D.

### Figure 1: London had the highest median energy efficiency score, compared with all other regions in England and Wales

Median energy efficiency score, English regions and Wales, up to March 2023

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Median energy efficiency score, English regions and Wales, up to March 2023



Source: Energy Performance Certificate data on Open Data Communities from the Department for Levelling Up, Housing and Communities, and Property Attributes data from the Valuation Office Agency

## Energy efficiency by property type

Property type affects energy efficiency. Overall, “flats and maisonettes” was the most energy-efficient property type in both England and Wales, with a median energy efficiency score of 73, which is equivalent to band C (see Figure 2). “Flats and maisonettes” is the only property type that had a score above band D.

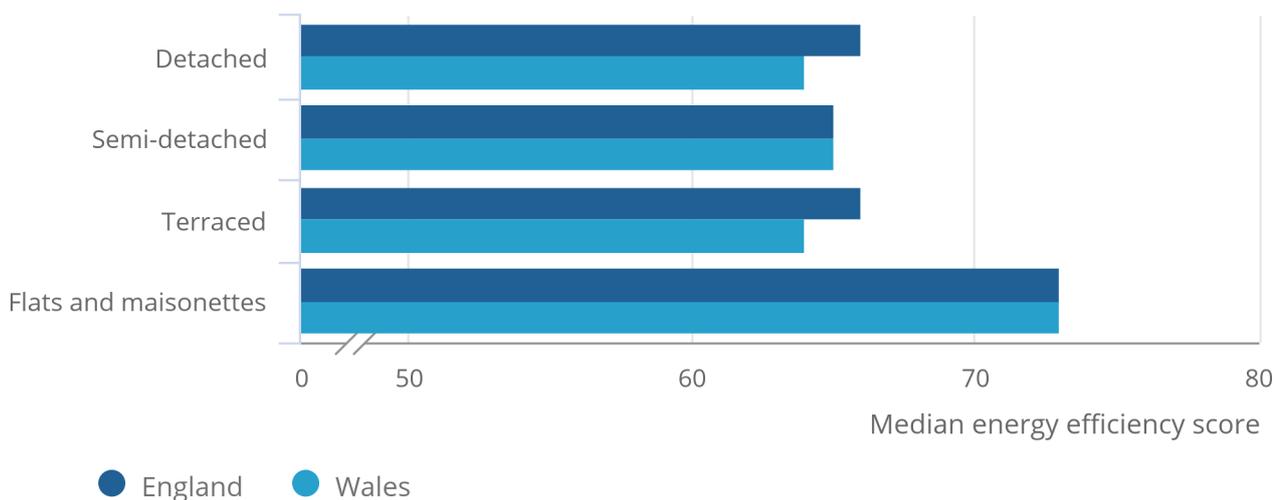
Detached and terraced dwellings scored the lowest in Wales (both 64), while in England, semi-detached (65) was the property type scoring the lowest. This may be a result of external wall exposure being higher in houses, compared with flats and maisonettes, which are more likely to be grouped in blocks. While there was a large difference in energy efficiency between flats and houses, there was only a small difference between the different types of houses.

### Figure 2: “Flats and maisonettes” was the most energy efficient property type for all dwellings in both England and Wales

Median energy efficiency score by property type, England and Wales, up to March 2023

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Median energy efficiency score by property type, England and Wales, up to March 2023



Source: Energy Performance Certificate data on Open Data Communities from the Department for Levelling Up, Housing and Communities, and Property Attributes data from the Valuation Office Agency

## Energy efficiency by property type and tenure

Looking at dwellings solely by tenure, social rented dwellings had the highest median energy efficiency score, 70 in England and 71 in Wales, equivalent to band C. Owner-occupied dwellings scored the lowest in both England and Wales, with scores of 64 and 62, respectively, equivalent to band D. However, this does not account for property type.

By combining property type and tenure, a more detailed picture of the energy efficiency of housing appears. Social rented dwellings scored the highest median energy efficiency across property types in England and Wales, sharing the top score only with owner-occupied flats in England at a median of 72 (Figure 3).

### Figure 3: Social rented dwellings were more energy efficient for most property types, in both England and Wales

Median energy efficiency score by tenure and property type, England and Wales, up to March 2023

[Download the data](#)

### Energy efficiency by property age

The age of a dwelling affects the energy efficiency, as building techniques and regulations have changed over time, in addition to the effects of ordinary use and aging. Dwellings constructed after 2011 had a median energy efficiency score equivalent to band B, 84 in England and 83 in Wales (Figure 4). In contrast, dwellings constructed before 1930 had a median score of 59 in England and 58 in Wales, equivalent to band E.

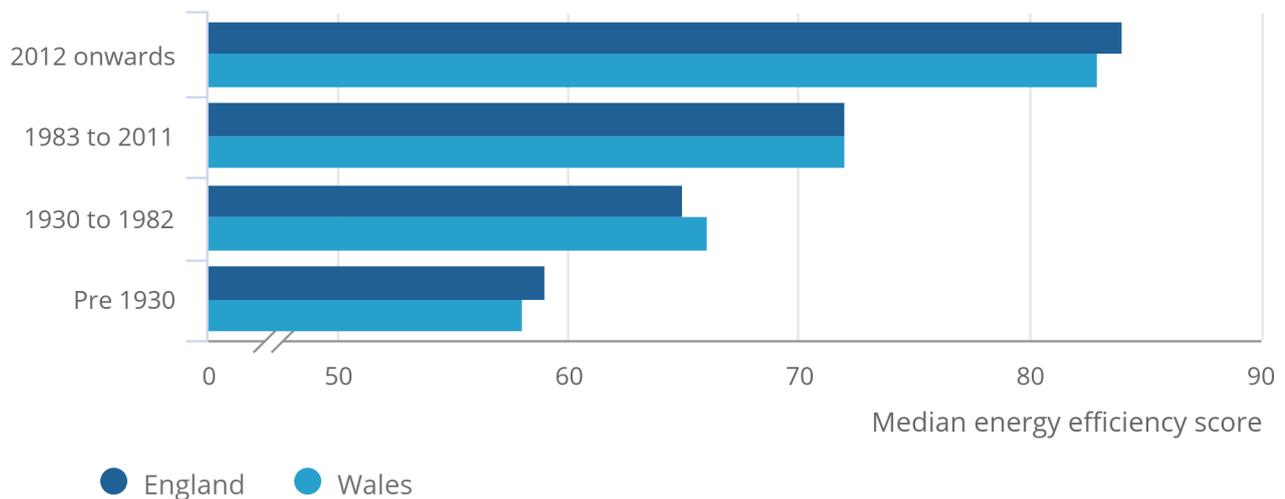
The proportion of older dwellings can differ across areas, which can influence energy efficiency median scores. For instance, in the EPC records we analysed, Wales had a higher proportion (33%) of older dwellings (built before 1930) than England (22%). This may have had an impact on national level medians.

### Figure 4: Older dwellings had a lower median energy efficiency score than dwellings that were constructed more recently

Median energy efficiency score, by property age, England and Wales, up to March 2023

Figure 4: Older dwellings had a lower median energy efficiency score than dwellings that were constructed more recently

Median energy efficiency score, by property age, England and Wales, up to March 2023



Source: Energy Performance Certificate data on Open Data Communities from the Department for Levelling Up, Housing and Communities, and Property Attributes data from the Valuation Office Agency

## Energy efficiency for new and existing dwellings

EPCs were introduced in 2007 and the EPC register is continually updated. For instance, in the financial year ending March 2023, around 1.9 million dwellings were added to the register. This is a mix of newly built or converted dwellings and existing properties being issued with a first or updated EPC. New and existing dwellings are assessed using slightly different methodologies (the [standard assessment procedure](#) and the reduced data standard assessment procedure). For more information about the number of properties added to the EPC register, see the [DLUHC interactive dashboard](#).

The median energy efficiency score of new and existing buildings can differ because of the use of modern techniques and materials. The scores for new dwellings in England and in Wales were equivalent to band B (84 and 83, respectively), compared with the scores of existing dwellings that were equivalent to band D (66 for England and 64 for Wales), indicating that existing dwellings had a lower level of energy efficiency.

The median energy efficiency score for new properties in England and in Wales was similar across all housing types and tenures, ranging from 81 to 84 (Figure 5). However, as existing dwellings make up the majority of the EPC records we analysed (85% in England, 90% in Wales), the energy efficiency patterns shown in the existing dwellings have a greater impact on the overall figures for all dwellings.

### Figure 5: Median energy efficiency scores for new dwellings were higher than existing dwellings

Median energy efficiency score for new and existing dwellings, by property type and tenure, England and Wales, up to March 2023

[Download the data](#)

### 3 . Central heating fuel type for dwellings

One of the main contributors to energy use in the home is central heating, with different sources of central heating seen as more or less energy efficient. As part of the Energy Performance Certificate (EPC) assessment, the main fuel type of central heating is recorded. This article focuses on the fuel type that directly powers a dwelling’s central heating. This means that someone who is on a 100% renewable tariff for their electricity will be categorised as using electricity as their central heating fuel type, rather than renewable energy. If there was no central heating recorded, for this analysis we grouped these dwellings in the “others and unknown” category.

As of March 2023, 80% of dwellings with an EPC analysed in both England and Wales used mains gas to fuel their central heating. Electricity was the second most common fuel type used to fuel central heating in England (11%). In Wales, oil and electricity (both around 7%) were joint second. Renewable energy on its own or combined with another type of fuel makes up only just over 1% of fuel used in central heating in England and in Wales.

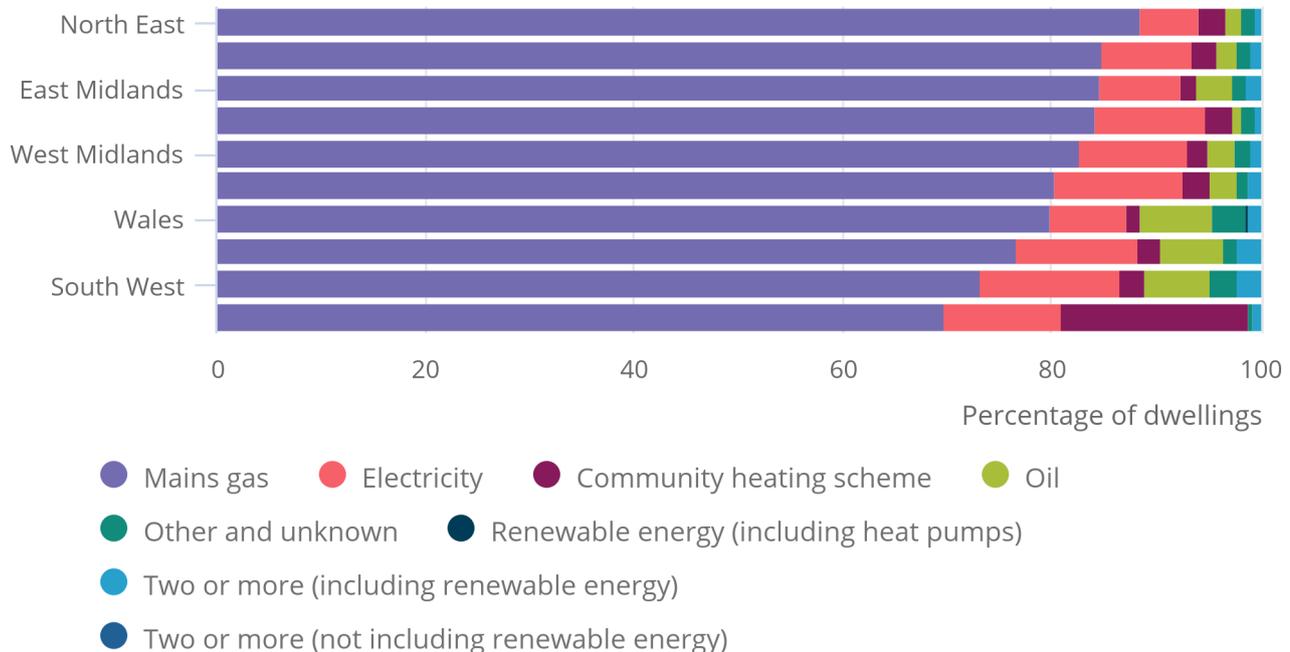
Among English regions and Wales, the North East had the largest proportion of dwellings that used mains gas (89%) and London the smallest (70%). London also had the largest proportion of dwellings using community heating schemes (18%), around eight times that of any other English region.

**Figure6: Mains gas was the most common source of central heating fuel in all English regions and Wales**

Main fuel type used in central heating, English regions and Wales, up to March 2023

Figure 6: Mains gas was the most common source of central heating fuel in all English regions and Wales

Main fuel type used in central heating, English regions and Wales, up to March 2023



Source: Energy Performance Certificate data on Open Data Communities from the Department for Levelling Up, Housing and Communities, and Property Attributes data from the Valuation Office Agency

Notes:

1. Other includes B30K (blended biofuel), bioethanol, biogas, biomass, dual fuel (mineral and wood), liquid biofuel, solid fuel (for example coal), tank or bottled gas (like liquefied petroleum gas), wood, and when the fuel source is unknown.

In most regions, except for London, the proportion of mains gas for new dwellings is similar to those for all dwellings. In London, only 25% of new dwellings used mains gas, compared with 70% for all dwellings. In London, more new dwellings used community heating schemes (66%). In the North West, 21% of new dwellings used electricity as their main fuel source, while Yorkshire and The Humber and the West Midlands had the second largest proportion with 13%. In the East of England, 7% of new dwellings used two or more methods including renewable energy, compared to 6% in the South West and 3% in the South East and the East Midlands.

## 4 . Subnational statistics

### Local authority areas and middle layer super output area level

Looking at smaller geographical areas provides a local picture of energy efficiency. There is a much greater variation at the local-authority level than at the region level.

For local authority areas across England and Wales, Energy Performance Certificate (EPC) data up to March 2023 showed the following trends:

- in England, the median energy efficiency scores ranged from 78 for Tower Hamlets in London to 47 in the Isles of Scilly in the South West
- in Wales, median scores ranged from 69 for Newport, Monmouthshire, Torfaen, Vale of Glamorgan and Cardiff to 59 for Gwynedd and Ceredigion
- of local authority districts, 26% had more than half of dwellings at energy efficiency band C or above; just over half (52%) of these local authorities were in London or the South East
- in England, Tower Hamlets and City of London had the highest percentages of dwellings in energy efficiency band C or above (79% and 67%, respectively), while the Isles of Scilly and Pendle had the lowest percentages (13% and 24%, respectively)
- in Wales, Newport and Torfaen had the highest percentages of dwellings in band C or above (51% each) and Gwynedd had the lowest percentage (25%).
- the median energy efficiency of new dwellings was higher than existing dwellings in all local authorities in England and Wales
- the Isles of Scilly in the South West had the largest difference (29 points) in median energy efficiency score between new and existing dwellings, while Tower Hamlets in London had the smallest difference (11 points)
- in Newham in London, 92% of new dwellings were heated mainly by a community energy scheme, while in Tower Hamlets it was 90%
- Kings Lynn and West Norfolk (in the East of England) had 42% of their new dwellings mainly heated with two or more fuel types, including renewable energy, while Ceredigion (in Wales) had 36%

To explore the energy efficiency of dwellings in local areas, use our interactive tool (Figure 7).

### Figure 7: Energy efficiency of dwellings in your area

Median energy efficiency score for new and existing houses and flats/maisonettes, Middle layer super output areas (MSOAs), England and Wales up to March 2023

Notes:

1. At small geographies such as middle layer super output area (MSOA) there are some median energy efficiency scores that are over 100, this indicates that in these areas the dwellings that have Energy Performance Certificates produce more energy than they consume.

[Download the data](#)

## 5 . Carbon dioxide emissions

Energy Performance Certificate (EPC) data on estimated carbon dioxide (CO<sub>2</sub>) emissions are based on standardised assumptions about how residents will use the dwelling (such as number of occupants, heating patterns and hot water usage).

### Median estimated CO<sub>2</sub> emissions per year for new and existing dwellings

Figure 8 shows that for records up to March 2023, in all English regions and Wales, the median estimated CO<sub>2</sub> emissions for existing dwellings were more than double the estimated emissions of new dwellings. In London, the median estimated CO<sub>2</sub> emissions for existing dwellings is four times that for new dwellings. Overall, however, London showed the lowest median estimated CO<sub>2</sub> emissions, which is likely because of the high proportion of flats and small properties. A breakdown of property type by region can be found in our [Housing in England and Wales Census article](#).

#### Figure8: Estimated carbon dioxide (CO<sub>2</sub>) emissions were far higher for existing dwellings than new dwellings

Median estimated CO<sub>2</sub> emissions, for new and existing dwellings, English regions and Wales, up to March 2023

[Download the data](#)

## 6 . Individual EPC bands

Following user feedback, we have added an analysis of individual Energy Performance Certificate (EPC) bands by country and region. This gives us a chance to see how different variables may affect the individual EPC ratings at country and region level.

In England and in Wales, 82% of new dwellings achieved a band B and 13% achieved a band C rating. In contrast, only 3% of existing dwellings in England and Wales had a rating in band B. Most existing dwellings were in band C and band D; 35% in band C, and 44% in band D in England, and 32% and 43% in Wales, respectively. This pattern is replicated at the region level. All regions showed over 78% of new dwellings in band B.

Looking at age of property for individual EPC bands, dwellings built before 1930 were most commonly rated in band D in both England (51%) and Wales (48%) (Figure 9). Over 80% of all dwellings in England and Wales built before 1930 were rated in bands D to G. For dwellings constructed after 2011, band B was the most common rating, with 84% of such dwellings in England and 82% in Wales rated in band B.

#### Figure9: Newer dwellings were more likely to be in a higher-rated EPC band

Individual EPC bands by age of property band, England and Wales, up to March 2023

[Download the data](#)

Across all English regions and Wales, most houses were rated in band D while most flats achieved a rating in band C. Although most owner-occupied dwellings were rated in band D, a larger proportion of such dwellings achieved a band B than rented properties in all English regions and Wales (Figure 10). Social rented dwellings were most commonly rated in band C in all English regions and Wales.

### **Figure10: Social rented dwellings were most commonly rated in band C in all English regions and Wales**

Individual EPC bands by tenure, English regions and Wales, up to March 2023

[Download the data](#)

## **7 . Representativeness of dwellings covered by an EPC**

To analyse the representativeness of dwellings covered by Energy Performance Certificates (EPCs), we compared these with the addresses available in the Valuation Office Agency's (VOA's) Property Attributes data. Around 67% of all residential dwellings in England and 65% in Wales (as at March 2023) had at least one EPC registration since records began. There was a similar proportion across all regions in England, but London had the highest coverage, with 69%.

In both England and Wales, flats and maisonettes had the highest coverage out of all property types (83% for both countries). Detached houses had the lowest coverage, with 60% in England and 59% in Wales.

When looking at the age of property bands, generally the newer the property, the higher the coverage in EPC certificates. In England, the coverage of properties built before 1930 was 58%, while those built after 2011 had a coverage of 95%. Similarly in Wales, a much smaller proportion of dwellings built before 1930 were covered by an EPC (57%) compared to dwellings built after 2011 (90%).

## 8 . Energy efficiency of housing in England and Wales data

### [Energy efficiency of housing, England and Wales, five rolling years](#)

Dataset | Released 1 November 2023

Data on the energy efficiency of dwellings, estimated CO2 emissions and main fuel type of central heating in England and Wales for five-year groups, by property type, tenure and whether new or existing.

### [Median energy efficiency score, England and Wales](#)

Dataset | Released 1 November 2023

Data on the median energy efficiency score of dwellings in England and Wales. These are broken down by property type, tenure, property age and whether a dwelling is new or existing.

### [Energy Performance Certificate \(EPC\) Band C or above, England and Wales](#)

Dataset | Released 1 November 2023

Data on dwellings with EPC Band C or above in England and Wales. These are broken down by property type, tenure, property age and whether a dwelling is new or existing.

### [Individual Energy Performance Certificate \(EPC\) Bands, England and Wales](#)

Dataset | Released 1 November 2023

Data on the EPC Bands of dwellings in England and Wales. These are broken down by property type, tenure, property age and whether a dwelling is new or existing.

### [Main fuel type or method of heating used in central heating, England and Wales](#)

Dataset | Released 1 November 2023

Data on the main fuel type of central heating of dwellings in England and Wales. These are broken down by property type, tenure, property age and whether a dwelling is new or existing.

### [Median estimated carbon dioxide \(CO2\) emissions, England and Wales](#)

Dataset | Released 1 November 2023

Data on the carbon dioxide (CO2) emissions of dwellings in England and Wales. These are broken down by property type, tenure, property age and whether a dwelling is new or existing.

## 9 . Glossary

### Community heating scheme

A community heating scheme is a distribution system of insulated pipes that takes heat from a central source (usually in the form of hot water or steam) and delivers it to different buildings or dwellings within the same building.

### Dwelling

A dwelling is an address containing a unit of accommodation that can comprise one or more household spaces.

### Energy efficiency

Energy efficiency relates to the concept of efficient energy use, which means using less energy to provide a given amount of heating or lighting. Using less energy reduces emissions of carbon dioxide.

### Energy efficiency score

The energy efficiency score (SAP score) is a measure of the overall efficiency of a building. This score is based on the performance of the building and its fixed services (such as heating and lighting). The higher the score, the more energy-efficient the home. The score is produced during an Energy Performance Certificate (EPC) assessment and is based on standardised assumptions for occupancy and behaviour. This enables a like-for-like comparison of a dwelling's energy efficiency performance.

## 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 for buildings used as places of worship. EPCs are valid for 10 years. The EPC records how energy efficient a property is as a building. The EPC uses 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.

### Existing dwelling

Statistics for existing dwellings were created using data from the latest EPC record available for existing dwellings in a financial year. Existing dwellings are those that are required to undergo an energy performance assessment as they are either being sold or let and are not newly constructed or converted.

### Heat pump

A heat pump is a device that absorbs heat from one environment and transports it into another using electricity. For example, an air-source heat pump extracts heat from the air outside and transfers it into the home. This heat can then be used to warm radiators and underfloor heating systems.

### New dwelling

Statistics for new dwellings are generated using data from new dwelling EPC records. A new dwelling is any dwelling that has been newly constructed, created by conversion or has undergone a change of use and is now required to have an energy performance assessment.

## 10 . Data sources and quality

### How we used the Energy Performance Certificate data

This article contains analysis of the Energy Performance Certificate (EPC) data downloaded from the [Department for Levelling up, Housing and Communities \(DLUHC\) Open Data Communities website](#), for England and Wales.

Much of this article uses analysis of the stock of dwellings with a valid EPC. This gives a good indication of the current situation across England and Wales.

EPCs are valid for up to 10 years, so for our analysis we used all valid EPC lodgements (the latest record for each dwelling) from April 2013 to March 2023.

Further details are available in our [Energy Efficiency of Housing in England and Wales Quality and Methodology Information \(QMI\) report](#).

### How we used the property attributes data

To quality check the EPC records used for analysis, the EPC data were linked to Valuation Office Agency (VOA) property attributes data at the address level. This enabled us to check that the dwelling with an EPC record still existed, and that there was consistent property information (property type and age of property band) across both data sources. We excluded records that had a direct contradiction between data sources on these property variables from the analysis. After we applied these quality assurance checks, 46.2% of the original EPC dataset remained, upon which we conducted most of our analysis.

The following is an overview of the data parsing process. This includes the number of records removed, as a percentage of the original 24,592,952 records and the type of remaining record:

- EPC records for properties that no longer exist are filtered out of the dataset (4.5% of original records)
- records with implausible values on important variables are filtered out (less than 0.1%)
- EPC records where there is direct contradiction between the property types provided in the EPC and VOA property attributes (where both have property type information available) are removed (6.6%)
- EPC records where there is direct contradiction between the age of property band provided in EPC and the VOA property attributes, where both have age of property information available, are removed (11.6%)
- duplicated EPC records based on multiple variables including Unique Property Reference Number and inspection date are removed (0.2%)
- EPC records that have been superseded by a later record for the same dwelling are removed (20.8%)
- EPC records that are older than 10 years are removed (14.6%)
- 11,367,842 EPC records are retained and used for analysis (46.2%)

## Interpreting these statistics

The analysis in this article does not cover all dwellings in England and Wales because not every dwelling has an EPC (as these are only required when a dwelling is constructed, converted, sold or let). EPCs are valid for 10 years, so do not necessarily reflect energy efficiency improvements. Dwellings can have more than one record, but we keep only the latest record for our analysis, so dwellings are not double counted in any time period we analysed.

Some dwellings included in our statistics may have changed tenure since the date of their latest EPC. For instance, dwellings that had an EPC for reasons other than being let may have since entered the private or social rented sector.

## 11 . Related links

### [Energy Performance of Buildings Certificates](#)

Collection | Last updated 26 October 2023

The Department of Levelling Up, Housing and Communities (DLUHC) publish quarterly EPC statistical releases. These focus primarily on describing the Energy Performance Certificates (EPCs) themselves, presenting timely information for domestic and non-domestic buildings in England and Wales.

### [Energy Performance Certificates \(EPCs\) for homes in Wales: interactive dashboard](#)

Statistics Dashboard | 26 May 2023

The Welsh Government produces this interactive dashboard containing data and insights on EPCs in Wales.

### [Scottish house condition survey](#)

Statistics | Released 30 May 2023

The Scottish house condition survey contains statistics on energy efficiency, based on an annual survey sample of around 3,000 dwellings. This is the primary source of data at a national level on the energy efficiency of the Scottish housing stock.

### [Northern Ireland Housing Statistics](#)

Report | Last updated 15 December 2022

The Northern Ireland Housing Statistics report contains information and statistics relating to domestic energy and energy efficiency of homes in Northern Ireland.

### [UK Climate Change Statistics Portal](#)

Statistics Dashboard | Updated regularly

A prototype portal for data and insights on climate change.

## 12 . Cite this article

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