Department for Energy Security & Net Zero

National Energy Efficiency Data-Framework (NEED): Summary of Analysis, Great Britain, 2024

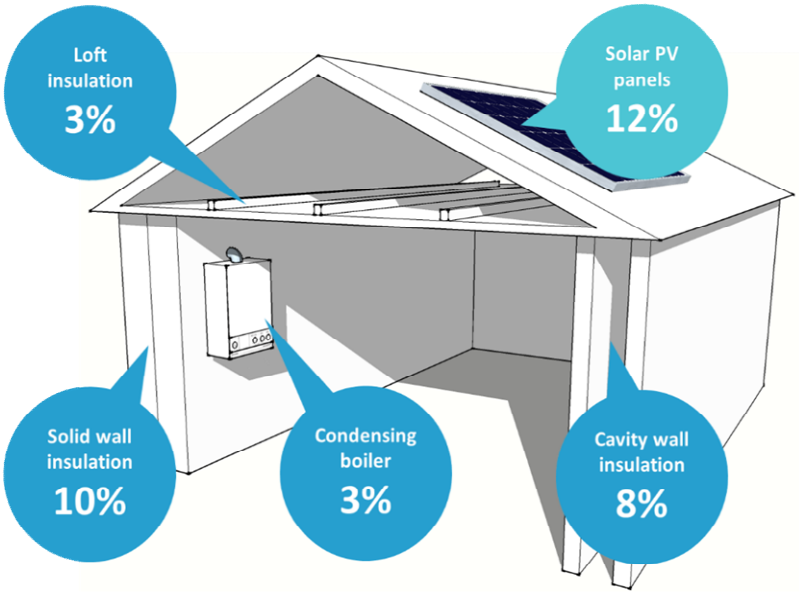
27 June 2024 **Accredited Official Statistics**

This report presents analysis of domestic energy consumption using the latest version of the National Energy Efficiency Data-Framework (NEED).

Key findings

- Between 2021 and 2022 there were record year-on-year falls in median domestic gas and electricity consumption, similar falls were seen across all property, household and area characteristics. These falls are likely to have been related to higher domestic energy prices as well as the generally higher cost of living.
- Median domestic electricity and gas consumption is higher for larger properties (as measured by floor area) and increases with adult occupancy. When gas consumption is considered on a per square metre basis, all types of houses have similar gas consumption, with the notable exception of bungalows which consume around 25 per cent more gas than other types of houses.
- Newer properties consume less gas, including on a per square metre basis, particularly those built since 2000. The same long-term trend is not seen for electricity consumption, except in more recent years where median electricity consumption was 11 per cent lower for properties built in 2021 than for those built in 2010.
- Estimated savings in consumption in 2022 from energy efficiency measures installed in England and Wales are shown below. While the gas savings from solid wall and cavity wall insulation are sustained in the 5 years after installation, the savings from loft insulation and new boilers are around a tenth lower in the fifth year after installation, than in the first year.

Typical gas savings in 2022 from measures installed in 2021, England and Wales (electricity savings are shown for solar panels)



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Contents

1. Introduction

NEED includes a range of property and household characteristics data linked to property level consumption data. This linked dataset provides insight on factors affecting household energy consumption and the consumption savings resulting from installation of government supported energy efficiency measures. As such, it is a key part of the evidence base used within and beyond government.

Within the Department for Energy Security and Net Zero (DESNZ), these data are used to develop, monitor and evaluate energy policies for specific government energy efficiency schemes. Beyond government, NEED is used by a variety of stakeholders, such as academics, local authorities, and other organisations. Uses vary, but they include using NEED data to look at trends in specific areas, and supporting analysis on housing, energy efficiency and Net Zero.

This publication only covers domestic properties. Non-domestic consumption is analysed in the Non-Domestic NEED publication.

Summary of documents and tables in NEED 2024

This report presents key findings from the latest version of Domestic NEED. Chapter 2 presents evidence on how domestic gas and electricity consumption vary by different property and household characteristics. Chapter 3 estimates the average impact of the most common energy efficiency measures on household energy consumption. This also includes common combinations of measures installed in the same year. As well as the estimated savings in the first year after the installation of the given measure, Chapter 3 also looks at how these savings change in subsequent years.

Published alongside this report are the following tables and documents:

- **Consumption data tables** – gas and electricity consumption estimates for different property attributes and household characteristics
- **Impact of measures data tables** – estimated consumption savings arising from installation of different energy efficiency measures
- **Annex A: What is Domestic NEED?** – an introductory overview of the NEED framework
- **Annex B: Overview of data tables** – a list of all the published tables and their contents
- **Annex C: Comparisons with other Sources** – a summary of comparisons of NEED outputs with other data sources for quality assurance purposes
- **Annex D: Methodology Note** – details of how the estimates of domestic electricity and gas consumption by property attributes and household characteristics are produced. It also sets out how the estimates of the impact of energy efficiency measures are derived.

What you need to know about these statistics

Electricity and gas consumption data

Consumption years, outlier removal and weather correction

For gas, from 2018 onwards the consumption year covers the period mid-May to mid-May, for example 2022 covers mid-May 2022 to mid-May 2023. Prior to 2018 the period associated with gas years varies (see Annex D: Methodology Note). For electricity, the consumption years cover the period February to January (2022 covers February 2022 to January 2023).

For gas, only households with gas consumption in the range of 100 to 50,000 kWh (kilowatt hours) have been included. For electricity, only households with electricity consumption in the range of 100 to 25,000 kWh are included. All consumption figures have been rounded to the nearest 100 kWh.

As gas is predominantly a heating fuel, its use depends heavily on the weather. Because of this, gas consumption for each household has been adjusted for differences in temperature and wind speed in each year ("weather correction"). This allows for a like-for like comparison of gas consumption over time. As electricity is used less often as a heating fuel, electricity consumption is less affected by the weather, so this data has not been weather corrected.

Breaks in gas time series

The summer of 2017 saw the implementation of new gas meter point management and settlement processes, which changed the period of gas consumption covered by the 2016 data and the way that this was collected. Due to this, a large proportion of meters which had not reported for some time had their annual consumption figures updated in the 2017 gas consumption figures.

This large update led to an increase in the total gas consumption reported in 2017. With the majority of gas meters now providing timely meter readings, the figures from 2017 onwards are a more accurate reflection of gas consumption. Further details are contained in Annex D: Methodology Note.

Floor area data

Data on floor area are taken from the Valuation Office Agency (VOA) Council Tax Database. While for houses[1] the floor area includes the entire floor area for the house (Reduced Cover Area), the floor area for flats only includes the Effective Floor Area, which excludes bathrooms, WCs, showers and lobby areas. Therefore, in this report, any comparisons made of average gas consumption on a per square metre of floor area basis, generally exclude flats.

[1] Throughout this report, data related to "houses" includes the following VOA property types: detached, semi-detached, bungalow, end-terraced and mid-terraced. These represent 75 per cent of properties in England and Wales as at 31 March 2023.

2. Domestic energy consumption

This section presents a summary of how domestic gas and domestic electricity consumption vary by property and household characteristics, showing trends in median gas and electricity consumption between 2005 and 2022. No attempt is made to control for relationships between characteristics, or characteristics not present in this data.

The analysis presented in this section is based on median gas and electricity consumption. This is generally a better indicator of typical consumption than the mean, as the mean can be influenced by a relatively small number of high-consuming households that are not representative of the population as a whole.

NEED and Subnational Consumption estimates

The Domestic NEED consumption statistics differ from those published in the Subnational electricity and gas consumption report as summarised below[2]:

Subnational Consumption	Domestic NEED Consumption
Primarily seeks to provide geographical breakdowns of **total** gas/electricity consumption, broken down by domestic and non-domestic meters.	Primarily seeks to provide analysis on **typical** domestic consumption, broken down by property and household characteristics
The summary report focuses on **mean** statistics, as these aggregate transparently across subnational geographies.	The summary report focuses on **median** statistics, as these are more relevant to typical consumption patterns.
Based on all meters (aside from a few non-domestic gas meters which are too disclosive) which are classified as domestic or non-domestic based on meter profile and consumption.	Based on domestic properties only and restricted to the sub-population to which electricity/gas meters could be successfully address matched. The Valuation Office Agency (VOA) Council Tax Database is used as the population of all domestic properties in England and Wales, while Ordnance Survey's AddressBase data is used for Scotland.
Consumption is provided for Great Britain as a whole and for a range of geographies from countries/regions down to postcodes.	The dataset used for the population and characteristics of all domestic properties differs between England and Wales (VOA) and Scotland (AddressBase and Experian). The categories used differ between these datasets which is why separate analysis is provided for England and Wales, and Scotland.

[2] Also see Annex C for comparisons with other data sources.

Domestic energy consumption in England and Wales

Figure 2.1 shows estimated median household gas and electricity consumption. Data for 2005 to 2010 cover England only, while the data for all subsequent years cover both England and Wales. Also note that the gas consumption estimates for the years 2017 onwards are not fully comparable with those for earlier years owing to changes in how gas meter readings are processed by Xoserve (see page 4).

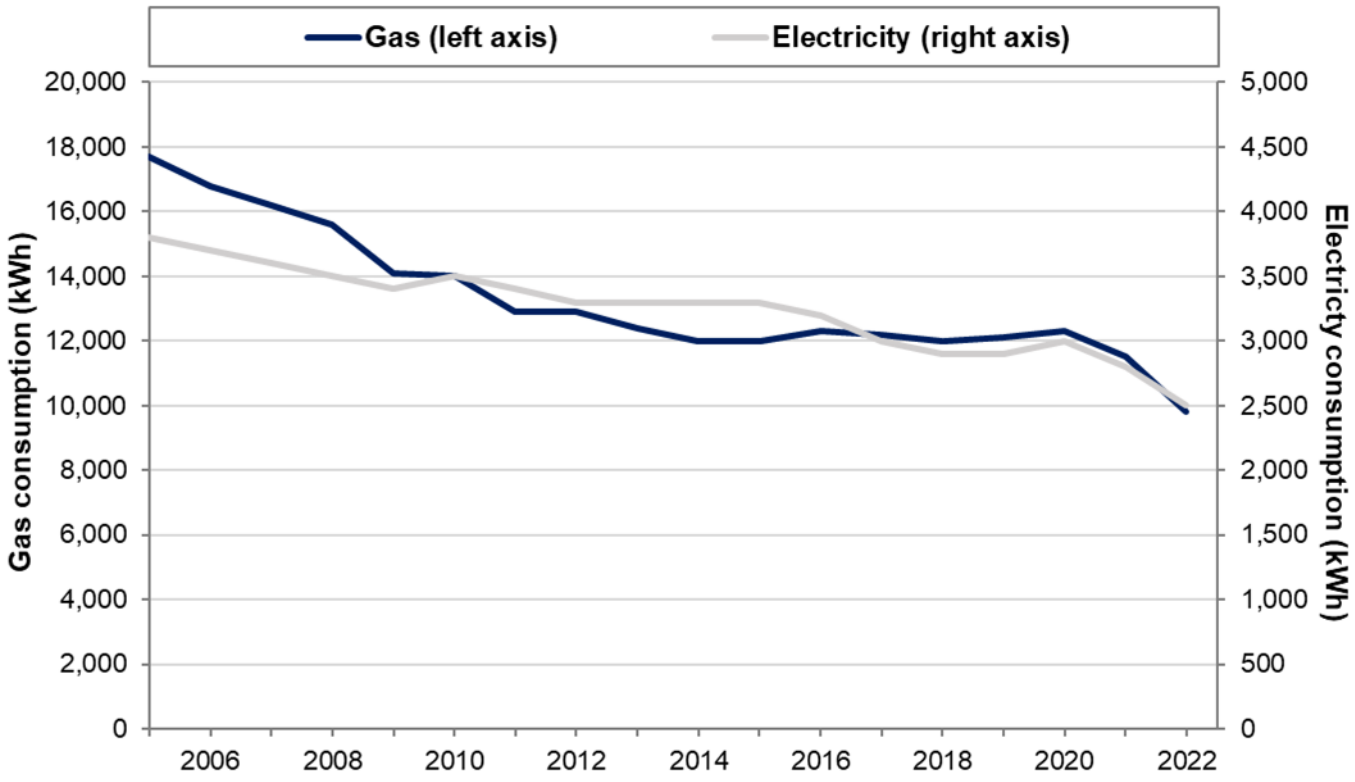
Median gas consumption was 45 per cent lower in 2022 than in 2005. Median electricity consumption decreased by 34 per cent over the same period. There has been a reduction in median consumption since 2005 across all property, household and area characteristics.

There were record (since 2005) year-on-year falls in median consumption between 2021 and 2022 for both gas (15 per cent) and electricity (11 per cent), likely to be related to higher domestic energy prices as well as the generally higher cost of living. Similar falls were seen across all property, household and area characteristics.

Table 2.1: Annual 2022 consumption summary statistics, England and Wales
All consumption values are in kWh

	Properties (millions)	Mean	Standard Deviation	Lower Quartile	Median	Upper Quartile
Gas	18.7	11,000	6,800	6,300	9,800	14,100
Electricity	23.2	3,300	2,700	1,600	2,500	3,900

Figure 2.1: Trends in median annual domestic gas and electricity consumption, England and Wales, 2005 – 2022



Domestic consumption by floor area and adult occupancy

Figure 2.2 shows that consumption increases with property floor area. Floor area impacts gas consumption more strongly than electricity consumption because gas is mostly used for space heating and space heating demands are higher for larger properties. Figure 2.2 also shows that both gas and electricity consumption increase with adult occupancy.

Figure 2.2: Median annual domestic gas and electricity consumption in 2022, by floor area and adult occupancy, England and Wales

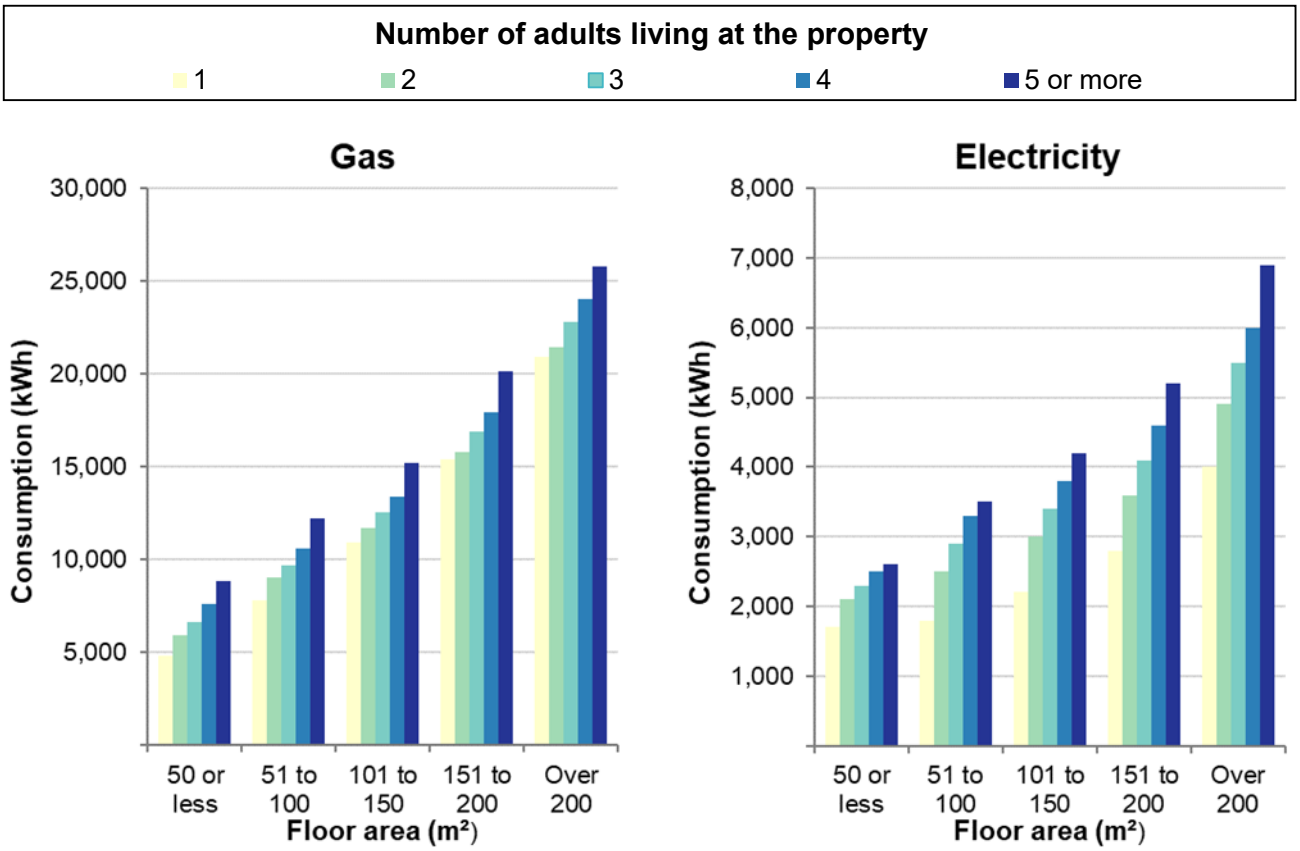


Figure 2.3 shows *Median gas consumption* and *Median gas consumption per square metre* for houses by floor area band. The vast majority (around 90 per cent) of houses are in the '51 to 100 m^2' and '100 to 150 m^2' bands, both of which had a median consumption close to 100 kWh per m^2 in 2022.

Figure 2.3: Median annual domestic gas consumption in 2022, per property and per square metre, by floor area, for houses in England and Wales

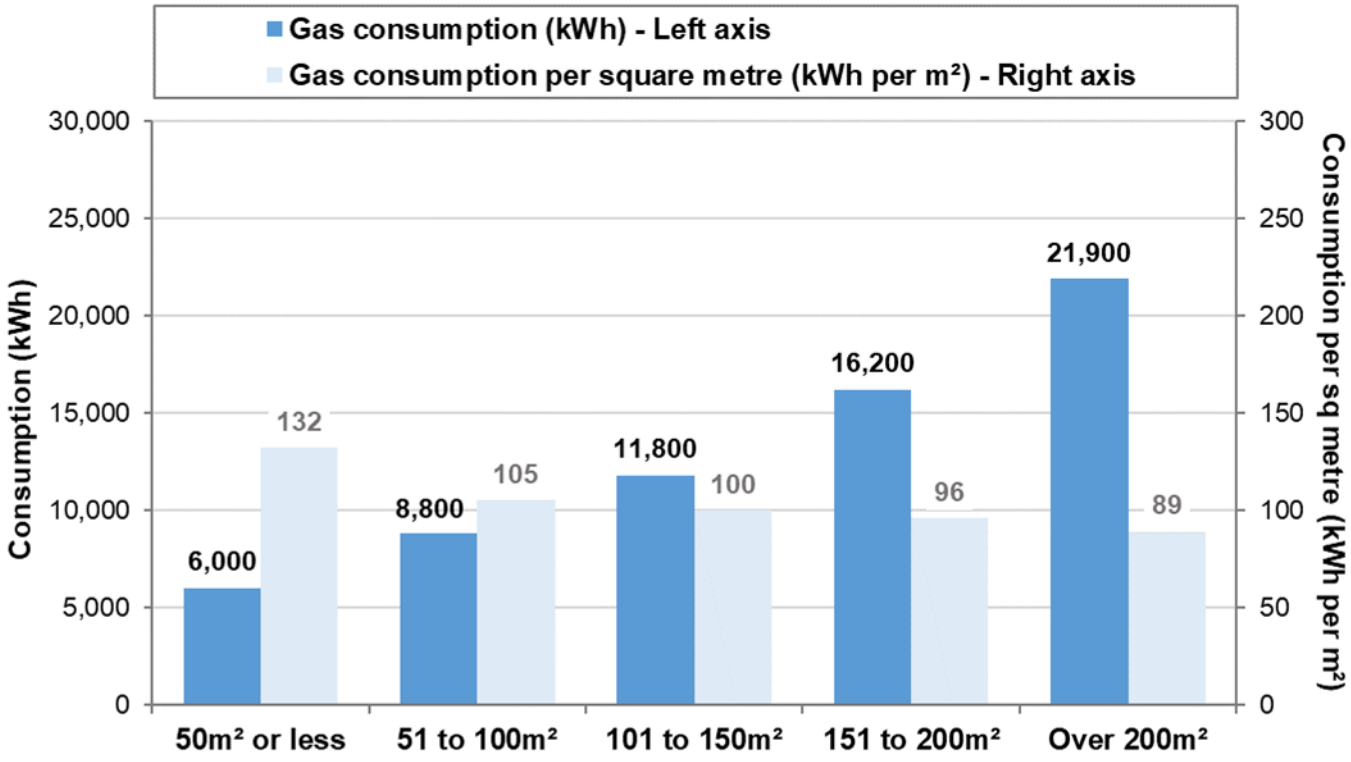


Figure 2.3 shows that the smallest properties have a higher gas consumption per metre squared. This is likely in part to be reflecting the non-heating uses of domestic gas, such as cooking and hot water, which may not increase in proportion to the size of the property.

Domestic consumption by Energy Performance Certificate (EPC) Rating

Energy Performance Certificate (EPC) ratings provide an assessment of the intrinsic energy efficiency of a property (based on the physical characteristics of the property). EPC ratings range from A to G, where A represents the most efficient properties and G represents the least efficient. As properties do not require a new EPC rating if they have already had an EPC assessment carried out less than 10 years ago, EPC ratings may not provide an up-to-date picture of the current energy efficiency of each property.

It is also worth noting around a third of domestic properties in England and Wales do not have an EPC rating, such as owner-occupied properties which have not been sold since EPC ratings came into use, and such properties are not included here.

Figure 2.4: Median annual domestic gas consumption in 2022, per property and per square metre, by EPC Rating, for houses in England and Wales

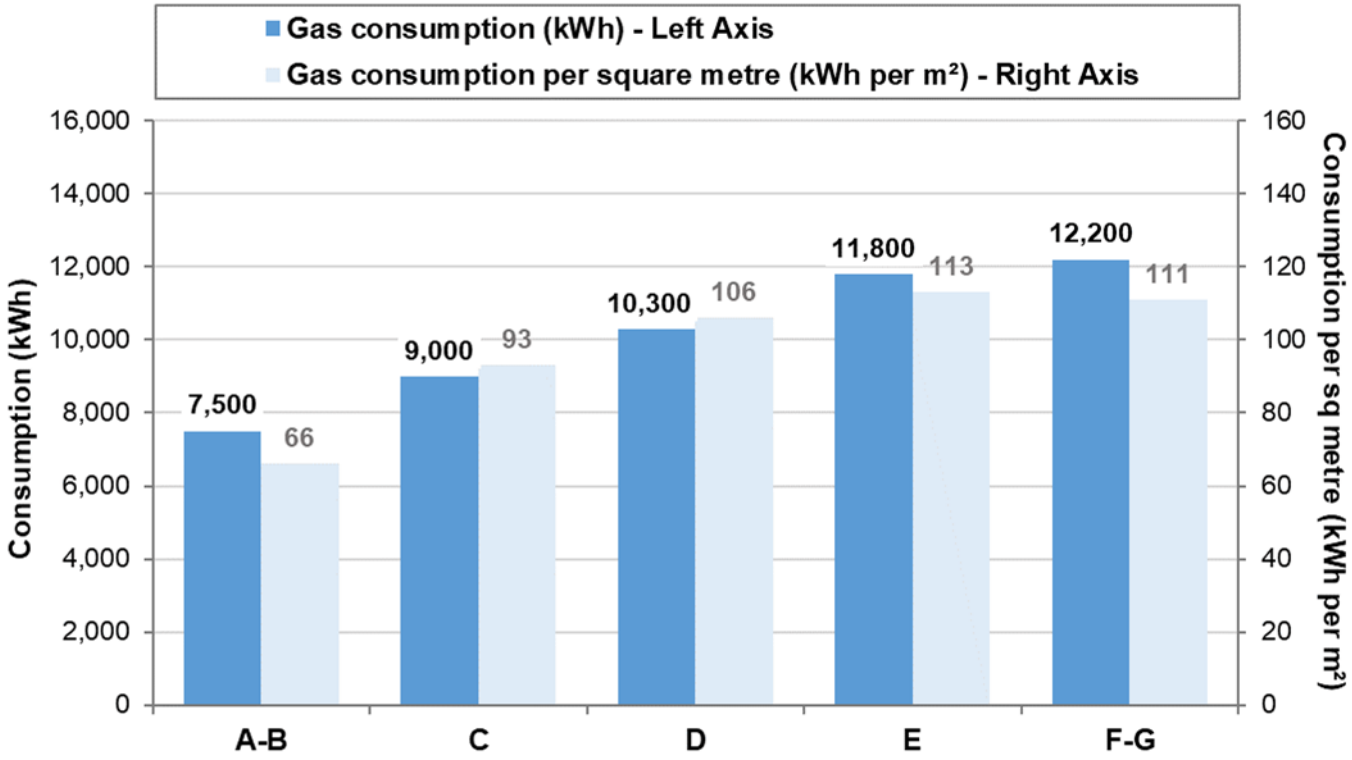


Figure 2.4 shows *Median gas consumption* and *Median gas consumption per square metre* by EPC rating for houses (flats are excluded here for reasons discussed in "*Floor area data*" on page 4). This illustrates that more energy efficient houses (as measured by the EPC rating) tend to have lower gas consumption in practice, even after adjusting for the floor area of the property.

Domestic consumption by property age

In general, newer properties tend to have lower average gas consumption (see Figure 2.5), as they tend to have higher quality insulation, with building regulations becoming more rigorous over time. Among gas consuming properties with an Energy Performance Certificate, around 20 per cent of those built before 1945 have the highest EPC ratings A-C, compared to over 90 per cent among properties built from 2000 onwards. The trend of newer properties to having lower consumption persists when adjusting for the floor area of houses.

Figure 2.5: Median annual domestic gas consumption in 2022, per property and per square metre, by year of property build, for houses in England and Wales

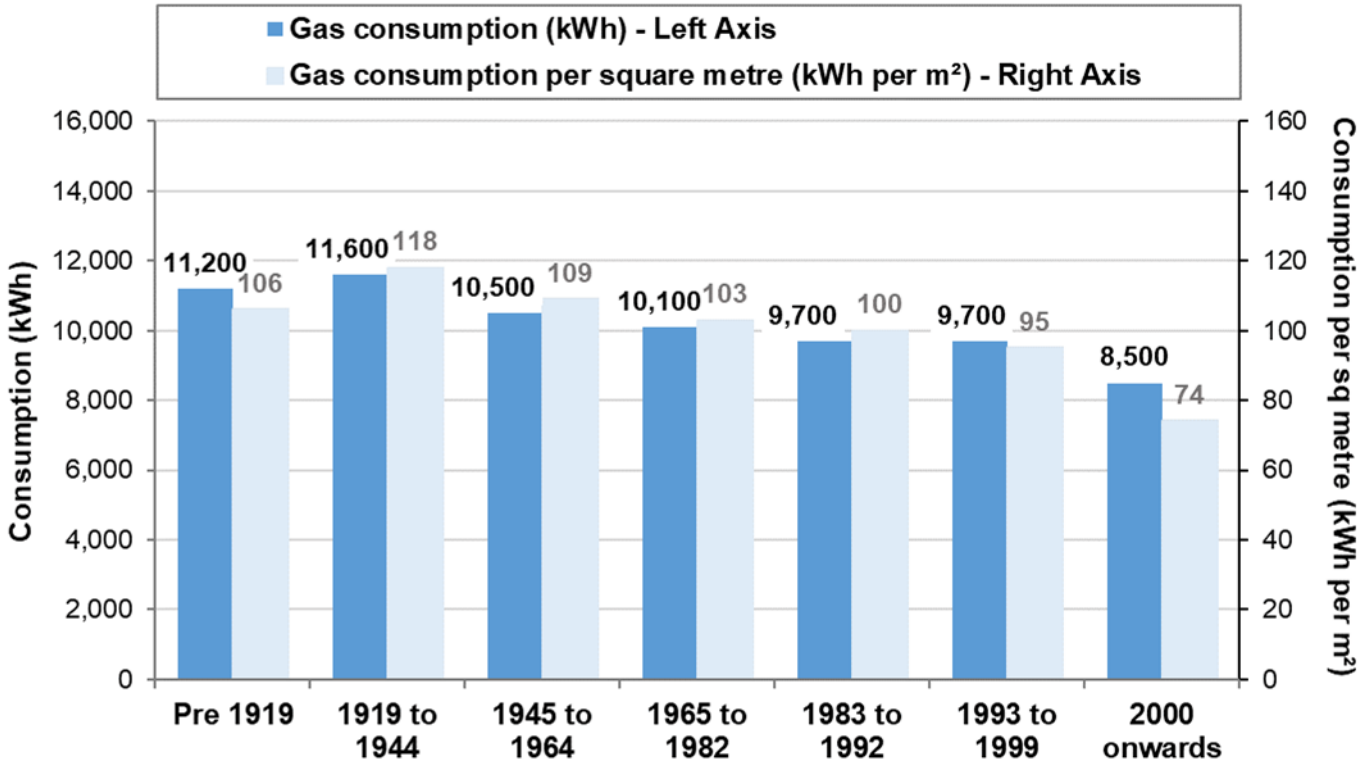


Figure 2.6 shows a trend of reducing gas consumption for all properties since 2005, across all property ages, with newer properties having consistently lower relative consumption. For electricity (see Figure 2.7) we see the same overall consumption reduction, but this is not notably differentiated by property age. This is likely to be because electricity is only used for space heating in a minority of properties; in England, 8 per cent of dwellings[3] in 2020 were fuelled by electricity.

[3] English Housing Survey data on energy performance, 2020, table DA6101: heating - dwellings.

Figure 2.6: Median annual domestic gas consumption over time by year of property build, England and Wales, 2005 – 2022

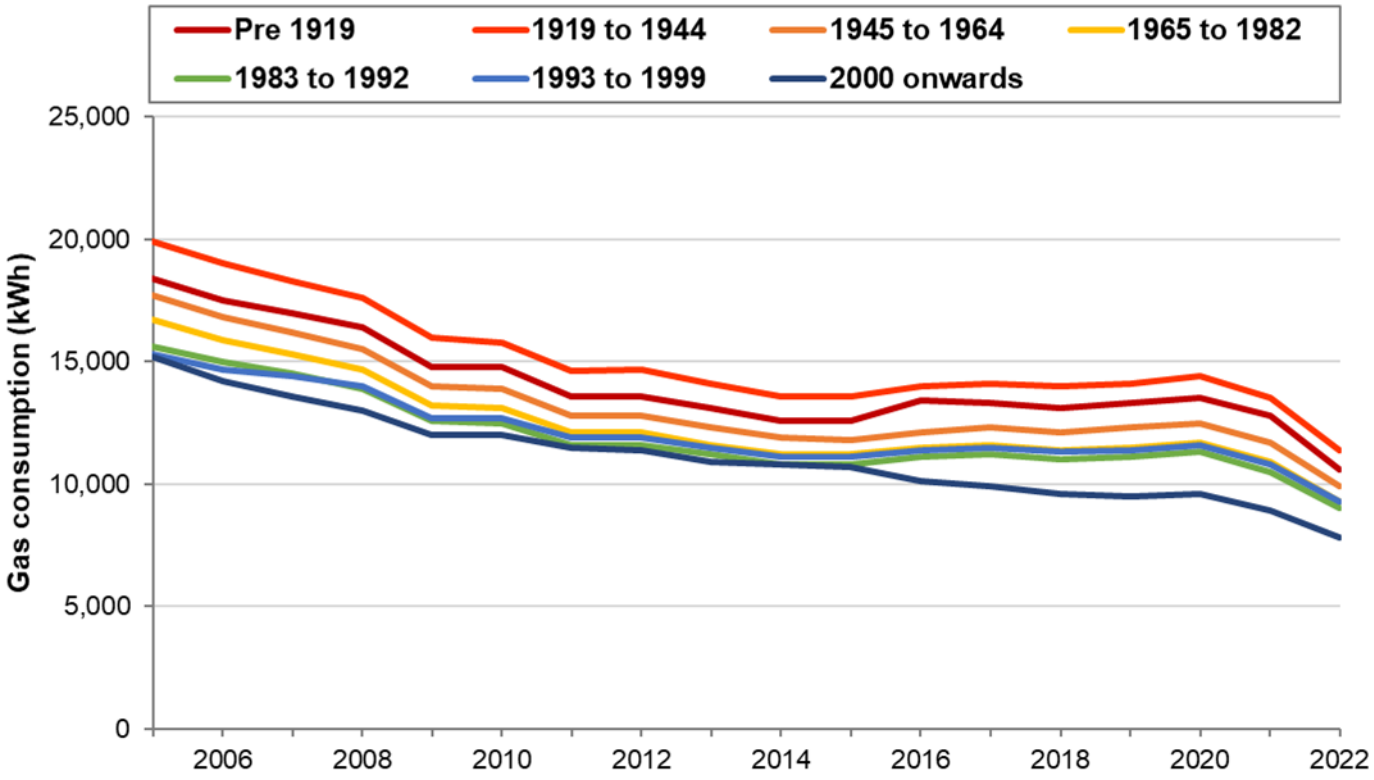
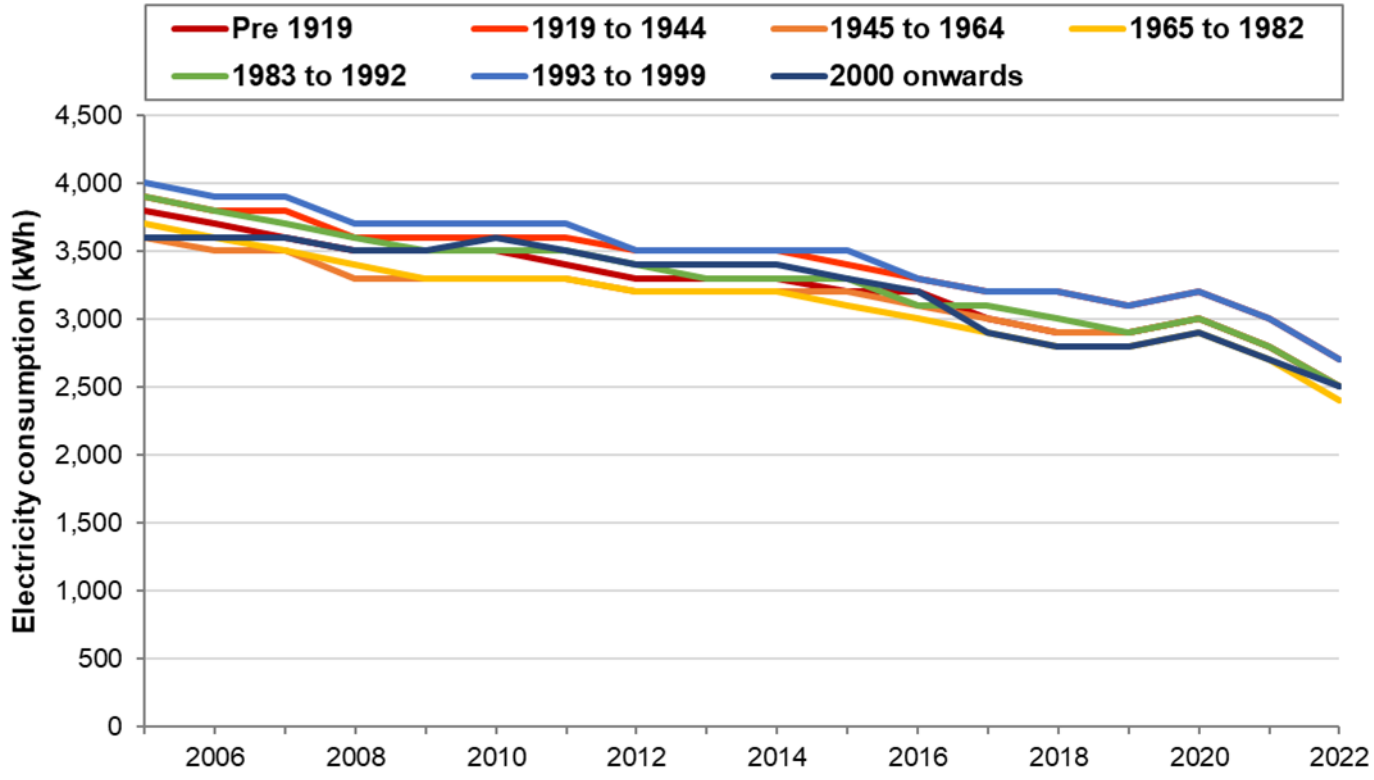
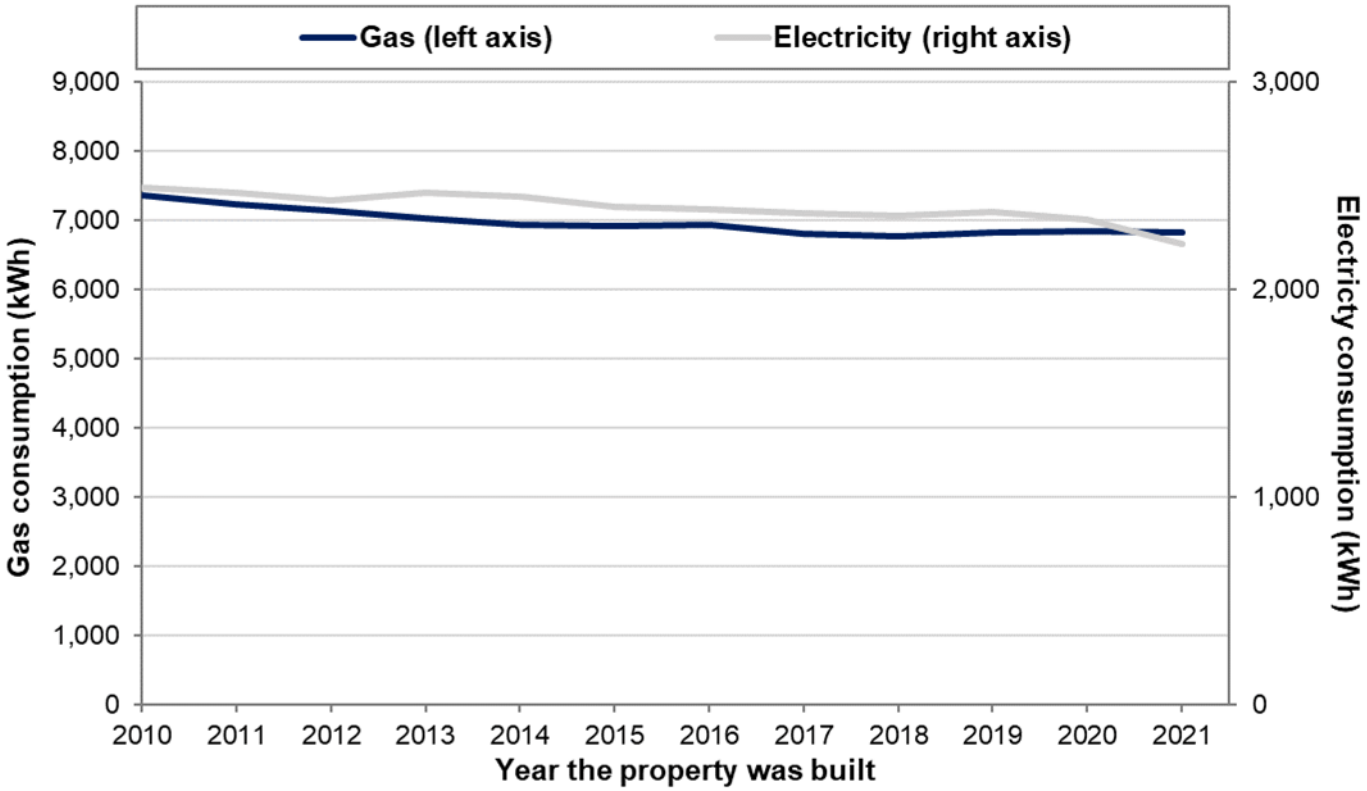


Figure 2.7: Median annual domestic electricity consumption over time by year of property build, England and Wales, 2005 – 2022



Whilst median electricity consumption has not shown significant variation with property age across the whole population of properties, there is evidence of reducing electricity consumption in more recently built properties. Figure 2.8 shows 2022 consumption for properties built between 2010 and 2021, by the year the property was built. There have been modest decreases in both electricity and gas consumption in recently built properties. Median gas consumption for properties built in 2021 was 7 per cent lower than for properties built in 2010, and the equivalent reduction in median electricity consumption was 11 per cent.

Figure 2.8: Median annual domestic gas and electricity consumption in 2022 for properties built since 2010, by year of property build, England and Wales



Domestic consumption by property type

Figure 2.9: Median annual domestic gas consumption over time by property type, England and Wales, 2005 – 2022

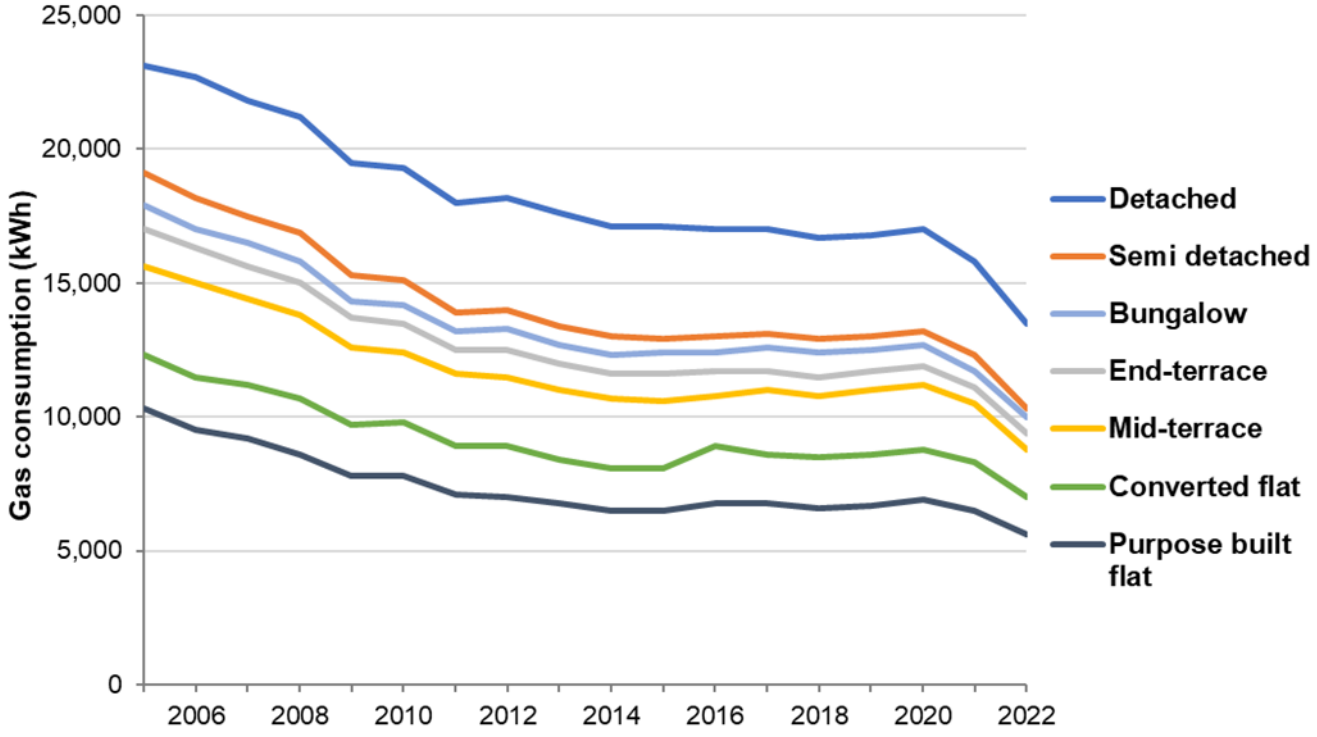


Figure 2.10: Median annual domestic electricity consumption over time by property type, England and Wales, 2005 – 2022

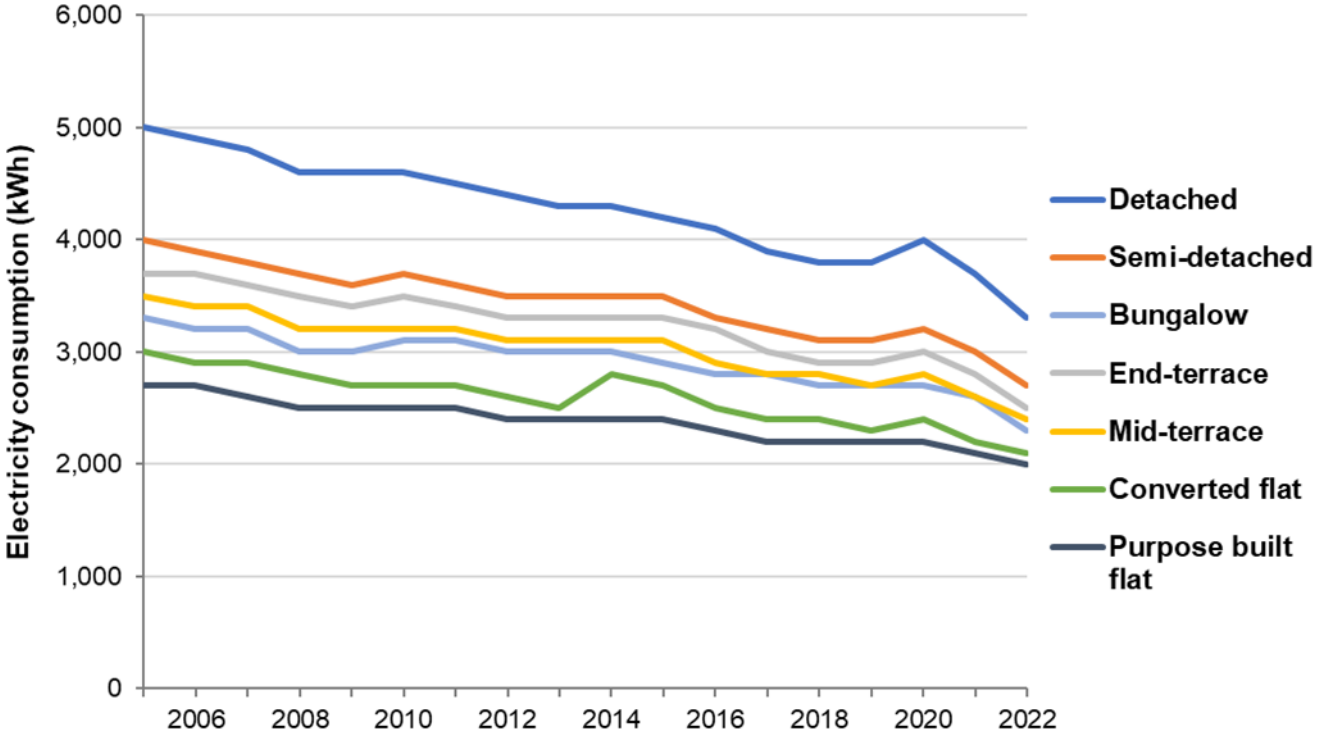
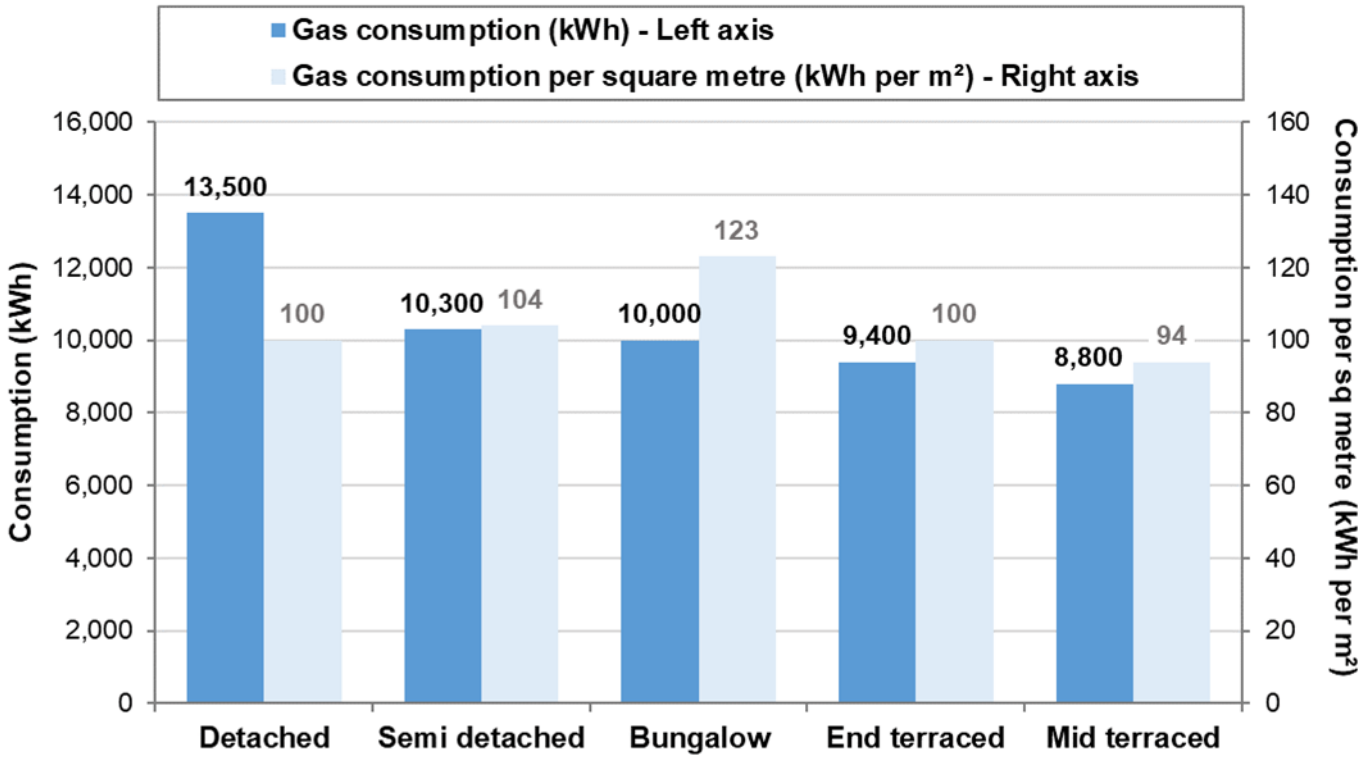


Figure 2.11: Median annual domestic gas consumption in 2022, per property and per square metre, by property type, for houses in England and Wales



There are similar trends of reducing median gas and electricity consumption across all property types (see Figures 2.9 and 2.10). In 2022, median gas consumption was around 45 per cent lower than in 2005, and median electricity consumption was around 30 per cent lower across all property types.

Figure 2.11 shows median gas consumption per property and per square metre by property type (excluding flats). Key things to note are:

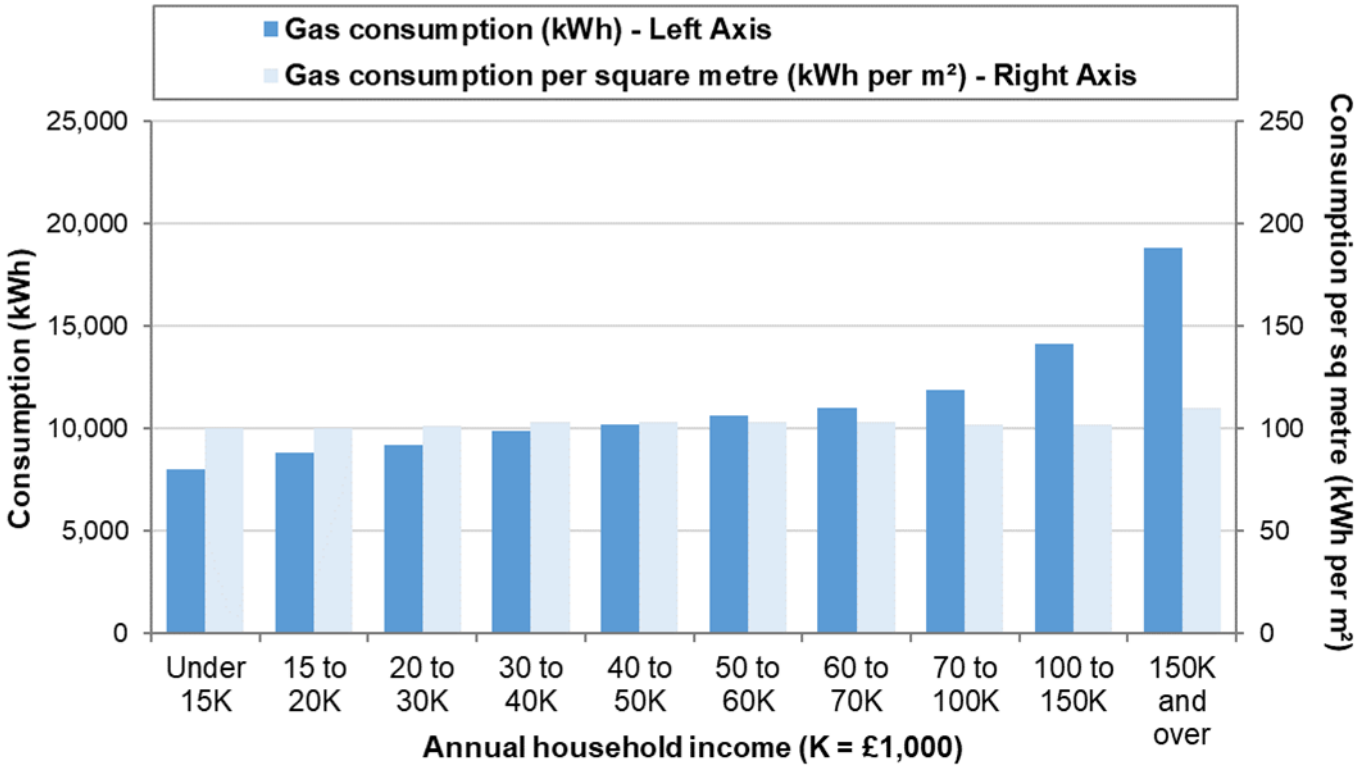
- Detached houses have the highest gas and electricity consumption of all property types, but on a per square metre basis they have a similar consumption to other types of houses (with the exception of bungalows).
- Bungalows have a notably higher gas consumption per square metre than other types of houses. This suggests that bungalows are the least energy efficient type of house. This assessment is corroborated by Energy Performance Certificate (EPC) data, where available, which shows that a lower proportion of bungalows have the highest EPC ratings (A-C) than any other type of property (including flats).

With flats generally being the smallest properties, they tend to have the lowest gas and electricity consumption.

Domestic consumption by household income

Median domestic gas consumption increases with household income. Figure 2.12 shows *Median gas consumption* and *Median gas consumption per square metre* by household income (excluding flats) in 2022. Although households with greater incomes tend to consume more gas overall, on a per square metre basis households across all income bands consume a similar amount of gas (around 100 kWh per m^2). So, the higher consumption for households with greater earnings can largely be explained by the larger size of the properties that they live in.

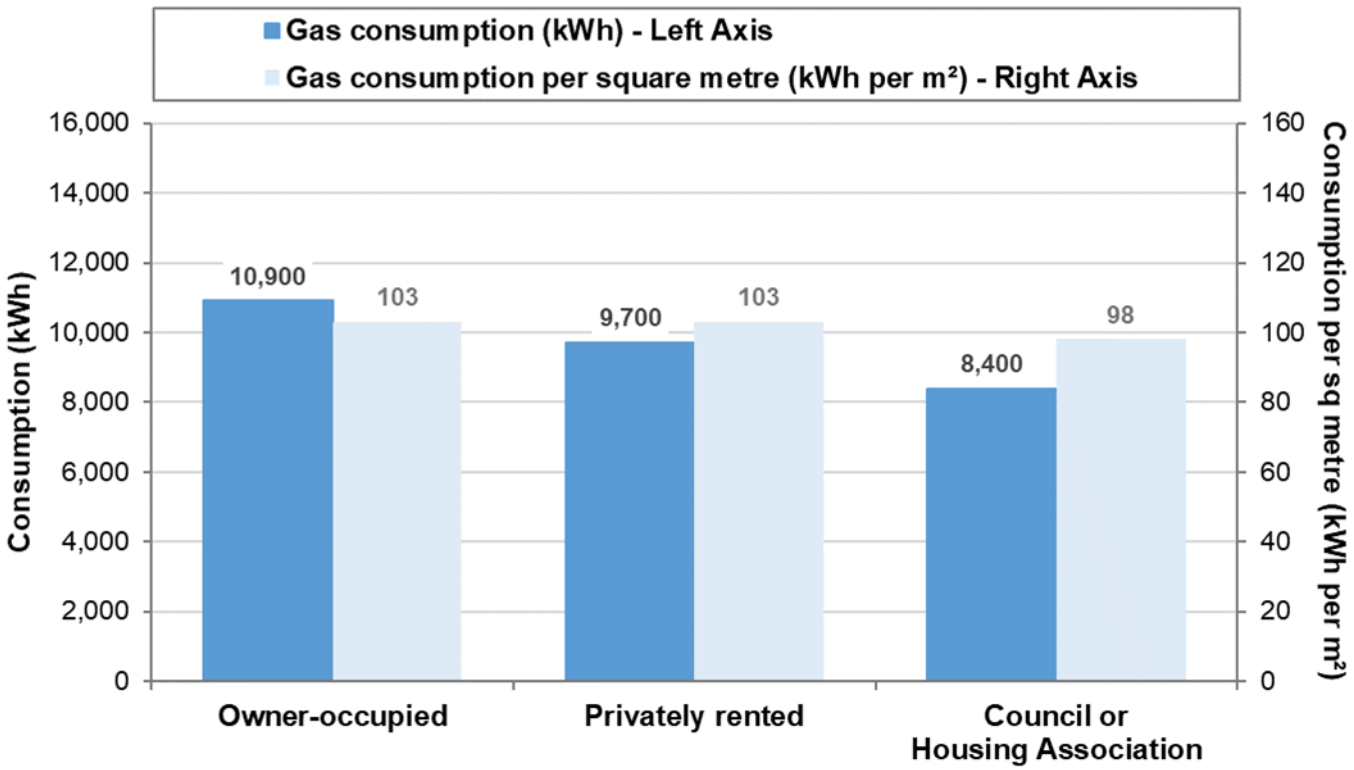
Figure 2.12: Median annual domestic gas consumption in 2022, per property and per square metre, by annual household income, for houses in England and Wales



Domestic consumption by tenure

Figure 2.13 shows *Median gas consumption* and *Median gas consumption per square metre* by tenure (excluding flats). While there are differences in overall consumption by tenure, on a per square metre basis households across all tenure types consume a similar amount of gas. This means that the differences by tenure can largely be explained by the differences in property size.

Figure 2.13: Median annual domestic gas consumption in 2022, per property and per square metre, by tenure, for houses in England and Wales



Below the broad impact of property size, we see that Council or Housing Association houses have a slightly lower gas consumption per square metre than houses in other tenure types. Looking at the EPC ratings of Council or Housing Association houses, around 60 per cent have the highest EPC ratings A-C, compared to around 40 per cent of houses in other tenure types.

Domestic energy consumption in Scotland

Changes made to the Scotland consumption estimates since the last publication

In previous publications, data provided by Scottish Assessors Association data (SAA) has been used to provide the population frame for all domestic properties in Scotland to use as the basis of the consumption estimates. However, this data was last updated in 2014 which meant that domestic properties built in Scotland since 2014 were being excluded from our analysis.

From this year's publication we are ceasing to use this SAA data and are instead using AddressBase (Ordnance Survey's database of all addresses in Great Britain) as the population frame for all domestic properties in Scotland (taking 'Domestic dwelling' addresses from this dataset). The Scotland consumption estimates in this publication have been revised back to 2018 to provide a longer consistent time series based on the new methodology. Figures 2.14 to 2.16 show both the revised and unrevised 2018 estimates, illustrating the discontinuity created in the time series.

There were two property characteristics previously sourced from the SAA data (property type and floor area) which have been dealt with as follows:

1. **Property type**: The building use information contained in AddressBase provides information on this and the consumption statistics for this variable have been revised back to 2018 accordingly.
2. **Floor area**: No new consumption breakdowns (for 2022) have been provided for this variable and the breakdowns for previous years have not been revised.

The sources of all other variables used for Scotland in this publication remain unchanged.

For more details on how the NEED Scotland sample compares with other estimates of consumption published by DESNZ and also data published in the Scottish Household Survey and Scotland House Condition Survey, please see Annex C: Comparisons with other sources.

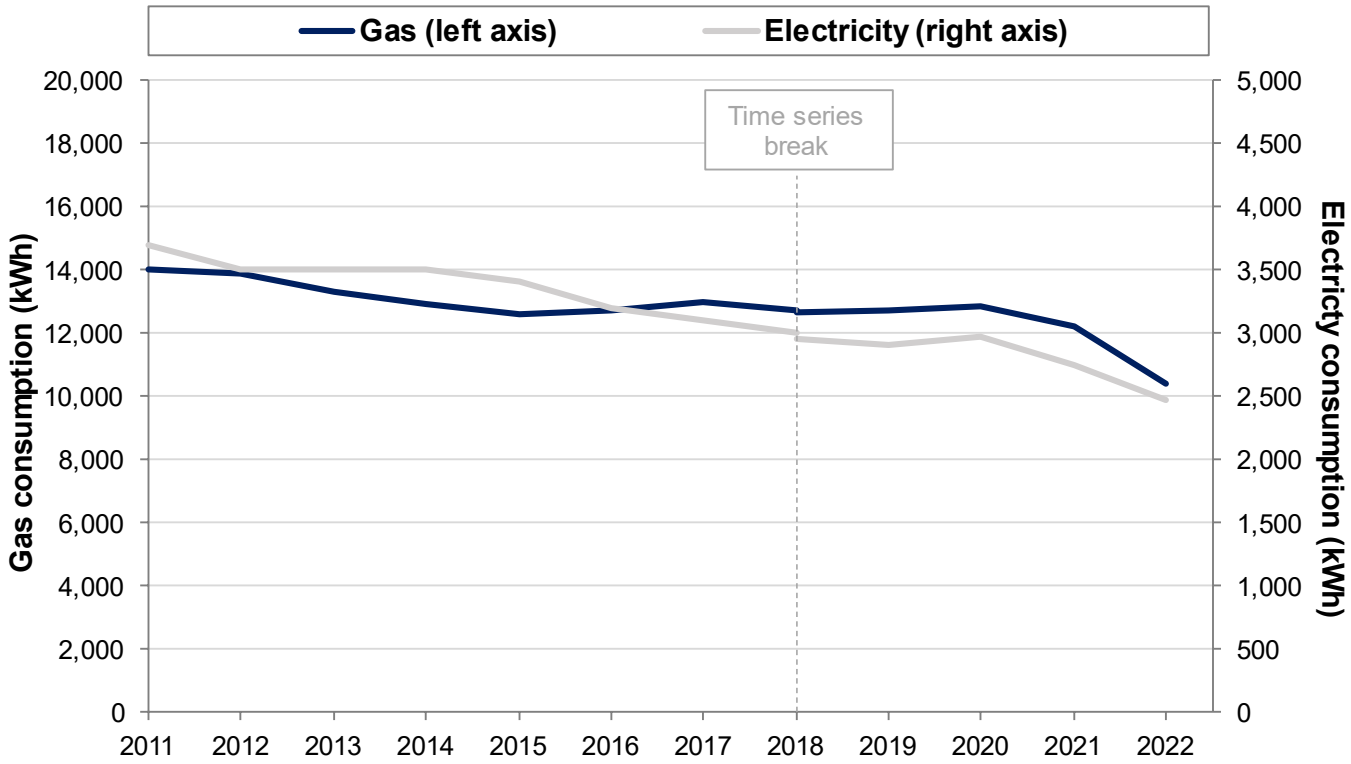
Median gas consumption was 26 per cent lower in 2022 than in 2011. Median electricity consumption decreased by 33 per cent over the same period (see Figure 2.14). There has been a reduction in median consumption since 2011 across the various property, household and area characteristics for which breakdowns are provided for Scotland.

There were record (since 2011) year-on-year falls in median consumption between 2021 and 2022 for both gas (15 per cent) and electricity (10 per cent), likely to be related to higher domestic energy prices as well as the generally higher cost of living. Similar falls were seen across all property, household and area characteristics.

Table 2.2: Annual 2022 consumption summary statistics, Scotland
All consumption values are in kWh

	Properties (millions)	Mean	Standard Deviation	Lower Quartile	Median	Upper Quartile
Gas	1.6	11,700	7,200	6,700	10,400	15,000
Electricity	2.2	3,200	2,800	1,600	2,500	3,800

Figure 2.14: Trends in median annual domestic gas and electricity consumption, Scotland, 2011 – 2022



As is the case for England and Wales, for Scotland there are similar trends in median gas and electricity consumption across all property types (see Figure 2.15 and Figure 2.16). With flats generally being the smallest properties, they tend to have the lowest gas and electricity consumption. Likewise with detached properties generally being the largest properties, they tend to have the highest electricity and gas consumption.

Figure 2.15: Median annual gas consumption over time by property type, Scotland, 2011 – 2022

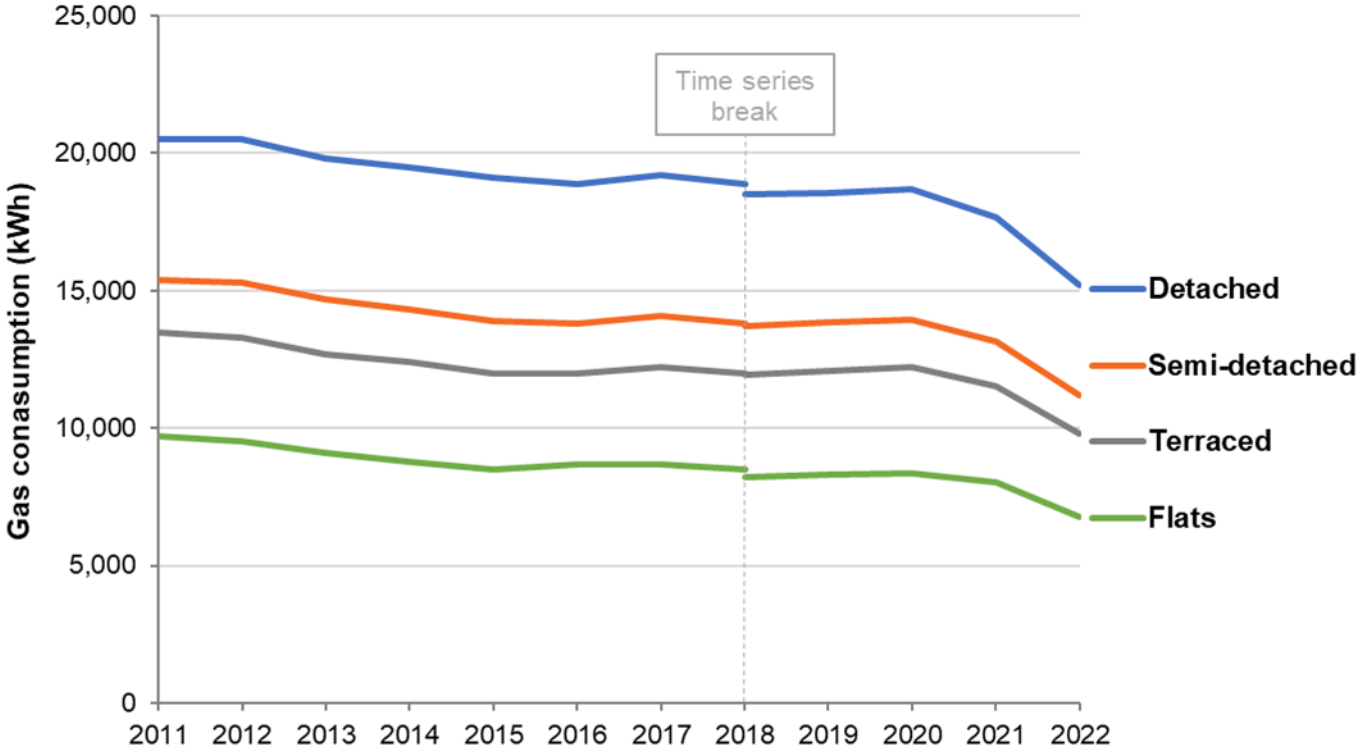
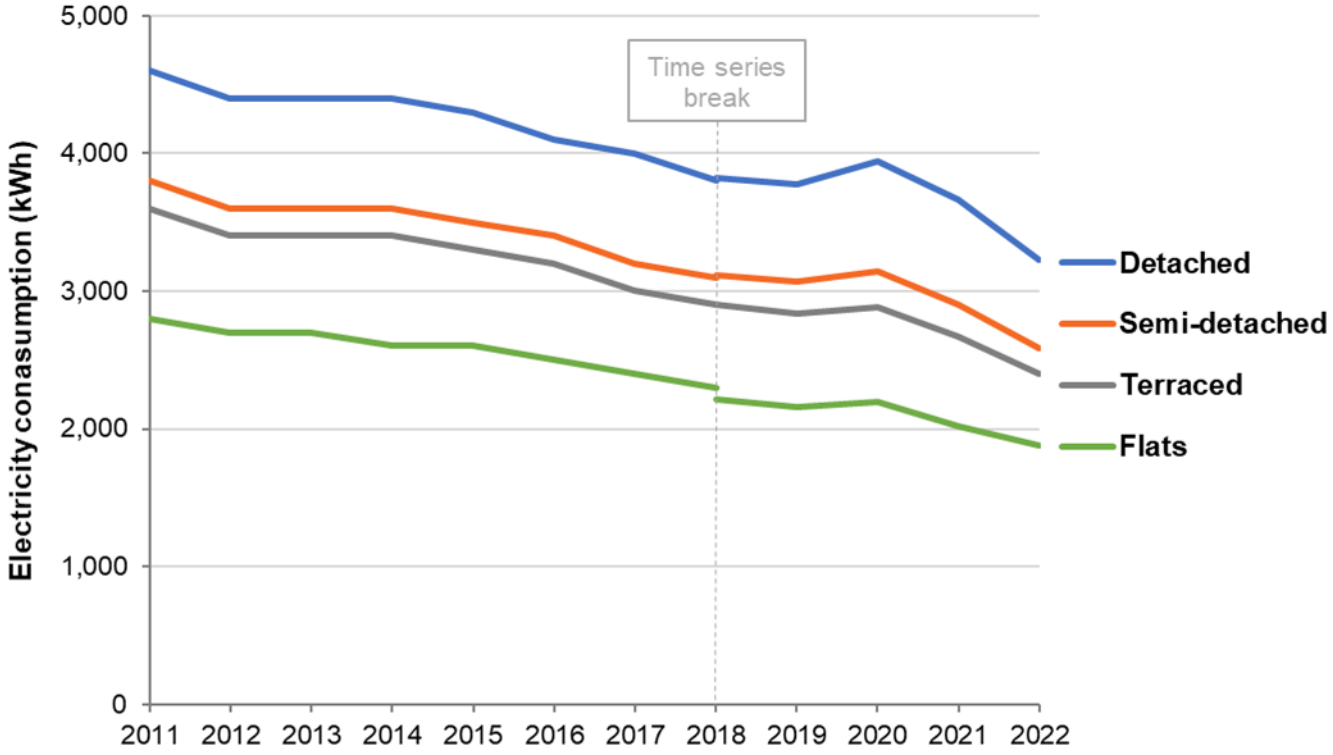


Figure 2.16: Median annual electricity consumption over time by property type, Scotland, 2011 – 2022



3. Impact of energy efficiency measures

This chapter presents estimates of the impact of installing energy efficiency measures[4] on gas consumption for properties in England and Wales, and separately for Scotland.

The analysis compares:

- gas consumption changes in properties which had energy efficiency measures installed (the intervention group), before and after the measure was installed with;
- the change in consumption over the same period for similar properties which have not had any measure installed the year before, the year after or during the year of installation (the comparator group).

This method is also applied to solar photovoltaics (PV), with corresponding comparisons of electricity consumption. For more details on how the impact of energy efficiency measures estimates are derived, please see Annex D: Methodology Note.

Note that this analysis mainly makes use of data on measures installed under government schemes, with the Energy Company Obligation (ECO) schemes accounting for around 80 per cent of such measures installed during the period mid-May 2021 to mid-May 2022, which is the time period that the latest NEED impact of measures estimates refer to. A full list of government schemes included in NEED analysis can be found in Annex A: What is Domestic NEED? Besides data on measures installed under government schemes the other sources of data used are the Gas Safe Register (which provides data on all boiler installations in England and Wales, but not all installations in Scotland) and the MCS Accreditation data (used for solar PV installations).

The headline estimates refer to energy savings in 2022 from energy efficiency measures installed in 2021. The key energy efficiency measures included in this analysis are:

- Condensing boiler (gas savings)
- Solid wall insulation (gas savings)
- Cavity wall insulation (gas savings)
- Loft insulation (gas savings)
- Solar PV (electricity savings)

Not all properties where a measure has been installed are included in the analysis. The properties excluded are:

- Flats, due to issues with matching these meters to properties. This is because including flats with the wrong meter point readings matched to them may result in inaccurate estimates.
- Where the consumption estimates are extreme compared to the previous year or are thought to be imputed.

[4] Apart from solar PV, the impact of measures analysis is presented for measures installed between mid-May 2021 and mid-May 2022, as the savings are based on comparing 2020 (before installation) and 2022 (after installation) gas years. For Solar PV the analysis refers to installations made during the months February 2021 to January 2022 as the savings are based on comparing the 2020 and 2022 electricity years.

All figures in this chapter are weighted, meaning that savings have been adjusted to be representative of the complete housing stock (excluding flats) rather than just the properties which have had the measure installed in the year under consideration. For more information on the weighting used, see Annex D: Methodology Note.

Uncertainty in estimated savings

The savings estimates for each measure vary from year to year and should be considered indicative rather than precise. There are a number of factors that are likely to contribute to variations in estimated savings from one year to the next:

Methodology and data

- While the fundamental methodological approach used for the impact of measures estimates has remained consistent since the creation of NEED, refinements have been made over time. The sensitivity of the estimates to these changes has not been fully assessed and therefore variation seen in estimates may in part be a result of methodological changes. Comparisons between the results published in different years should therefore be treated with caution.
- Measures installed outside of government schemes are mostly "hidden" from this methodology. Properties in our comparator group having energy measures installed which are not known about can lead to savings being underestimated.

Unknown information about the installations or property

- The quality or size of installations may vary between years. For example, trends in the size and quality of solar panels being installed will impact the estimated savings.
- The attributes of the property may vary between years. For example, property extensions will likely increase consumption and could be made alongside installation of energy efficiency measures, masking the savings benefit of those measures.
- The performance of a measure can vary by the brand or subtype of measure. For example, while cavity wall insulation is considered to be a single class of intervention, there are several types of cavity fill (PDF, 162KB), notably bead and mineral wool, which may have different impacts.

Unknown information about the household

- The results may be different for early adopters of novel measures because this self-selecting population may have a different energy consumption pattern to other consumers.
- Any variation between the treated populations which is not available in the data cannot be controlled for, for example, age of residents and the number of children in the home.
- Changes in energy consumption behaviour which follow the installation of an energy efficiency measure and may also vary over time and between different types of household. An example is when a household chooses to heat their home to a higher temperature following installation of a measure; this is a known phenomenon referred to as *comfort taking* (see following box).

Comfort taking

A known phenomenon when properties become more energy efficient is *comfort taking*. Rather than heating their home to the same temperature after the installation of the measure as before it, the resident takes advantage of the more efficient home by heating it more frequently and/or to a higher temperature ("taking comfort"). The impact of measures analysis presented here is based on metered savings and these will also reflect any extra consumption due to comfort taking. Therefore, the consumption savings presented here may be lower than expected based on energy efficiency considerations alone.

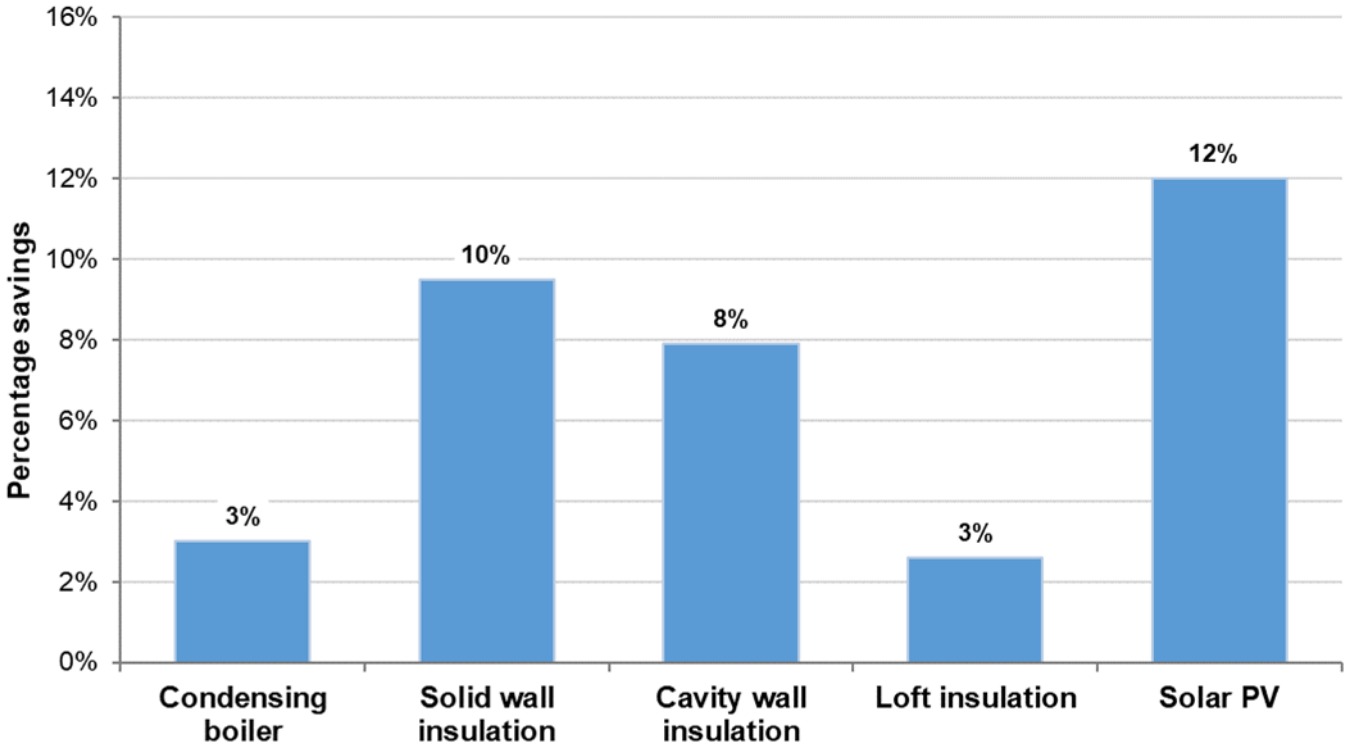
A similar effect can be expected with the installation of solar PV. The installation of solar PV may result in less electricity being drawn from the grid (which is detectable in NEED). However, this fall in electricity use from the grid may be partially offset by the household changing their consumption habits to use more electricity following the installation of a solar PV measure. Therefore, the grid-consumption savings following the installation of a solar PV measure may be lower than expected based on solar PV generation capacity alone.

Impact of Measures Installed in England and Wales

Single measures

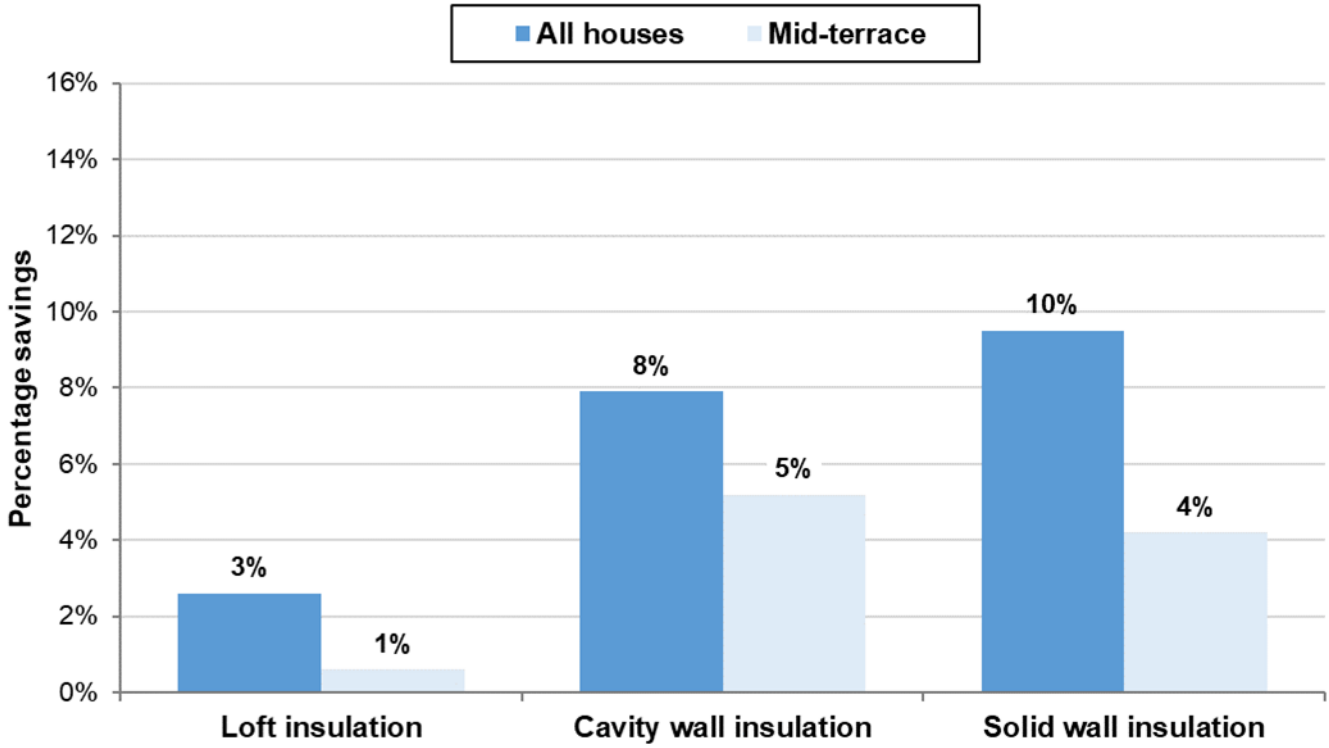
Figure 3.1 shows the median savings in 2022 from measures installed in 2021. Solid wall insulation has the highest median gas savings (10 per cent). The median is regarded as a more appropriate measure of typical savings as a small number of extreme values for individual properties (which are not representative of the rest) can distort the mean.

Figure 3.1: Median gas savings in 2022 for measures installed in 2021, England and Wales (electricity savings are shown for Solar PV)



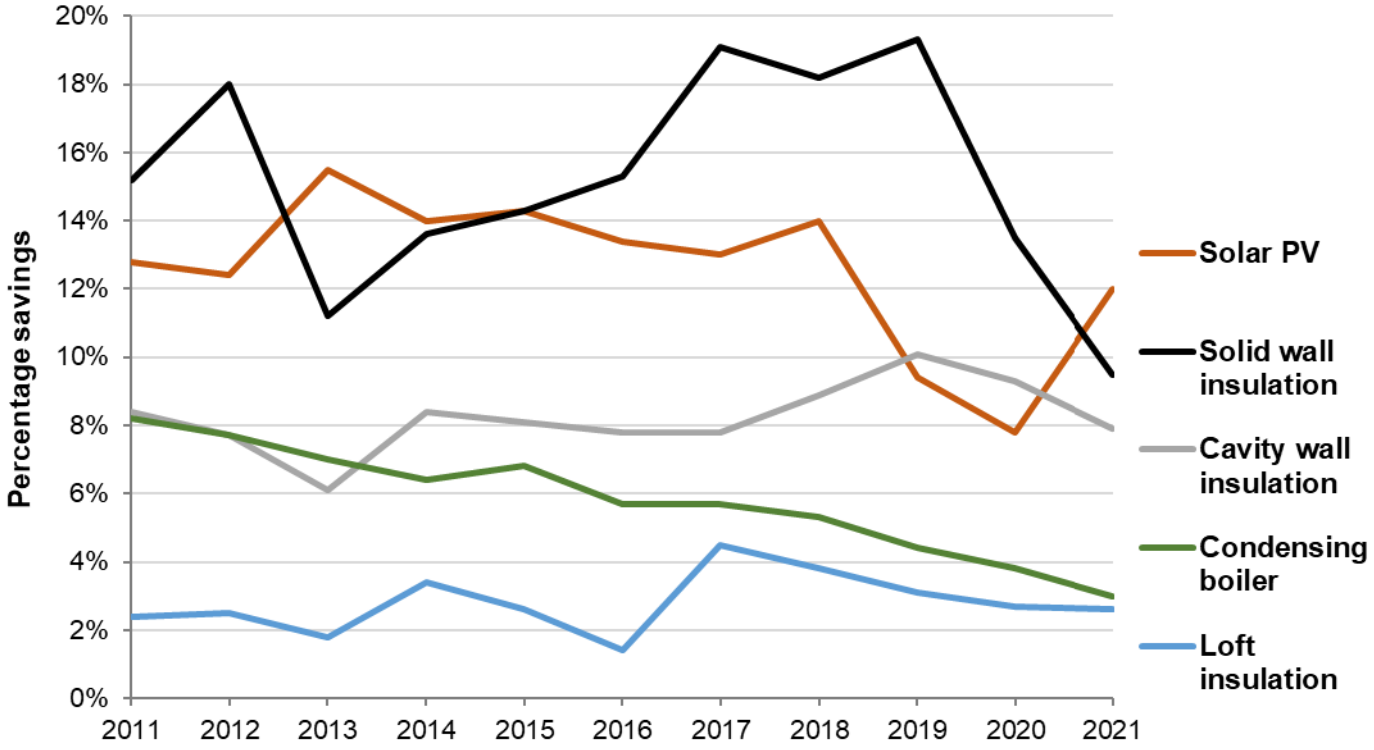
The accompanying attributes tables include estimates of the savings from each measure by household and property characteristics. There are broadly consistent savings across these characteristics. However, one apparent systematic difference to note is that, for the three most common insulation measures, gas savings are consistently the lowest for mid-terrace houses. Figure 3.2 compares the gas savings for mid-terrace houses with the equivalent saving across all houses. The comparatively lower savings for mid-terrace houses may in part reflect the additional insulation arising from the adjoining properties on both sides, leaving less scope for gas savings from further insulation.

Figure 3.2: Median gas savings in 2022 for insulation measures installed in 2021, for mid-terrace houses and all houses, England and Wales



The median savings from the main energy efficiency measures installed in previous years have been recalculated using the latest methodology (as used for 2021 installations) and based on the latest version of Domestic NEED. The resulting estimates are presented in Figure 3.3.

Figure 3.3: Median gas savings from energy efficiency measures in the first year after installation, by year of installation, England and Wales, 2011 – 2021
(electricity savings are shown for Solar PV)

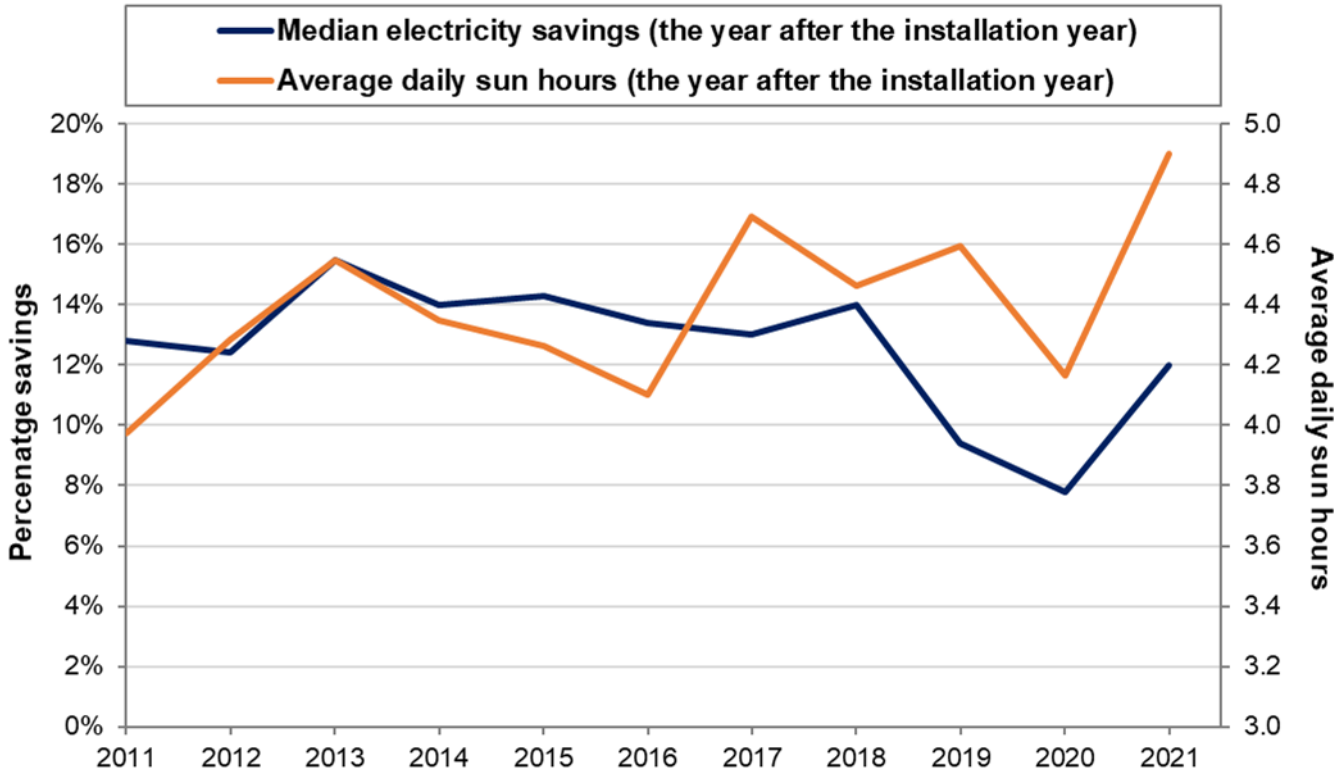


In general, the trends over time appear fairly volatile, which is probably a result of the low sample sizes on which these estimates are based. An example of this is solid wall insulation, which has a consistently large percentage saving, but the variation between years is most likely due to volatility originating from the small sample size combined with a large degree of variability in the savings estimates between individual properties in the sample. Solid wall insulation consistently yields the highest gas savings while loft insulation has consistently resulted in the lowest gas savings of the five measures reported in Figure 3.3.

Condensing boilers show a relatively smooth trend of decreasing savings. The smoothness of this trend likely reflects the relatively large sample sizes (hundreds of thousands) on which the estimates for this measure are based. The downward nature of this trend needs careful interpretation. In each year there is a saving in average gas consumption from installation of a new condensing boiler (relative to the old boiler it replaced). However, this analysis indicates that average savings have reduced slightly over time. This suggests that the greater efficiency of the replacement boilers *relative* to those being replaced is decreasing over time.

Figure 3.4 compares the median electricity savings from the installation of solar panels with the average daily sunlight hours for the given savings year. The increase in sunlight hours may help explain the increase in the estimated savings between 2020 and 2021 installations. It is not clear why more generally there isn't a close alignment between the two or why savings were notably lower in the 2019 and 2020 installation years. There hasn't been a decrease in the average capacity of installations, so other factors such as the orientation of installation sites, the use of batteries and other influences on consumption (for example, electric vehicle ownership) may affect the observed savings.

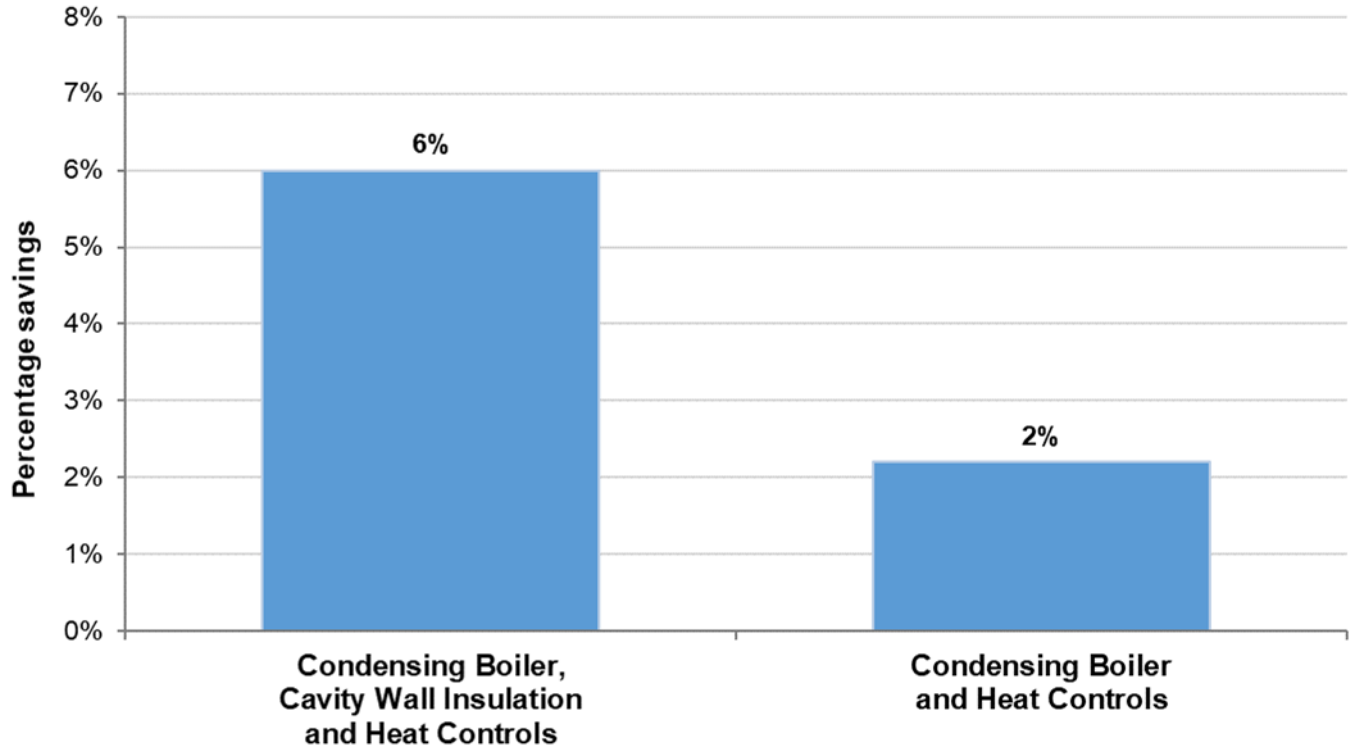
Figure 3.4: Median electricity savings from Solar PV and the average daily sun hours on the savings year, England and Wales, 2011 – 2021



Combinations of measures

Where a large enough number of properties have installed a particular combination of measures in a single year, the impact of that combination of measures can be estimated. Figure 3.5 below shows the savings from the most common combinations of measures installed in 2021. The combination of measures with the greatest estimated median gas saving was 'condensing boiler, cavity wall insulation and heat controls', with a median saving of 6 per cent.

Figure 3.5: Median gas savings in 2022 from common combinations of measures installed in 2021, England and Wales

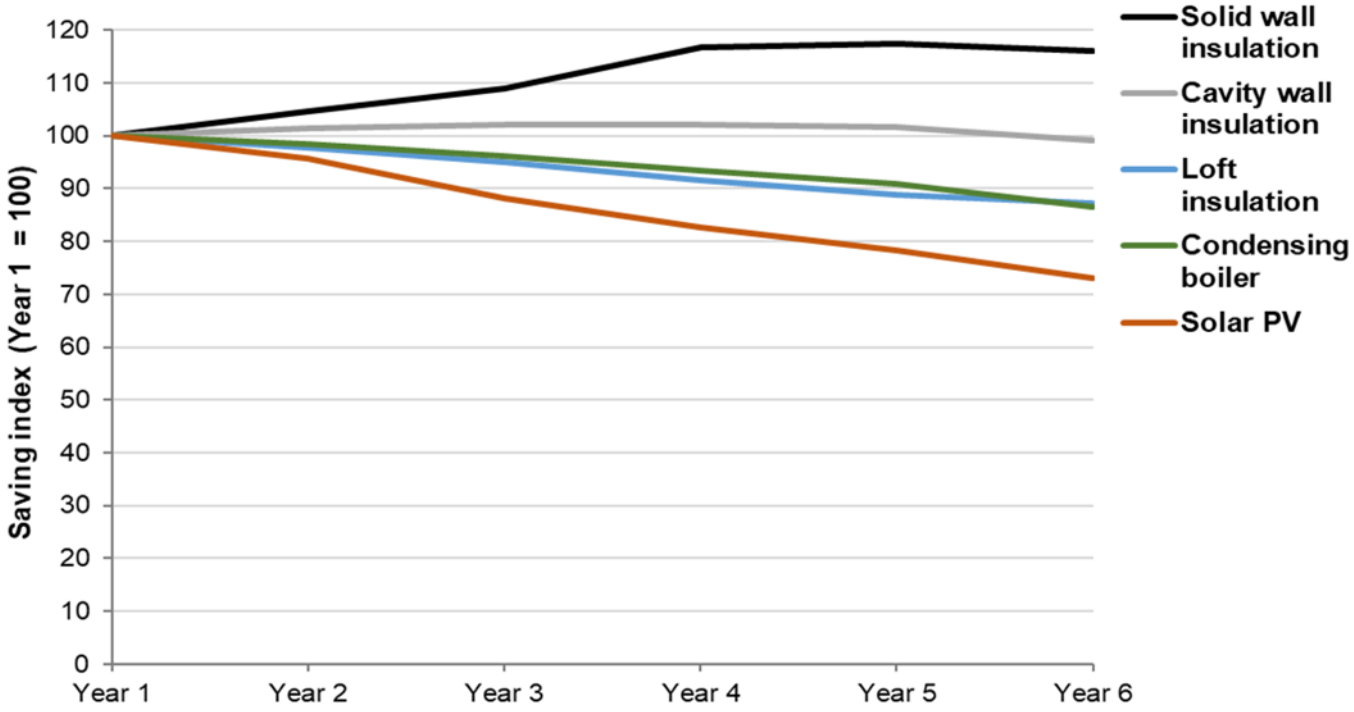


Condensing boiler appears to yield a slightly lower gas saving when combined with heat controls (2 per cent compared to 3 per cent), suggesting that heating controls may increase consumption. This finding should be interpreted with caution as properties that have both measures installed may differ in systematic ways from those which only had a cavity wall insulation or a new condensing boiler installed, and Domestic NEED may not include the necessary data to identify that systematic difference. However, a research paper assessing the evidence on heating controls suggests that comfort taking may be a key factor.

Savings in the years following installation

Estimates of savings over time for measures installed in 2011, 2012, 2013, 2014, 2015 and 2016 are published alongside this report in the table "Impact of measures in years following installation". The method used for these estimates was the same as that used for the other impact of measures analyses. The difference is that, instead of comparing the year before installation (Year -1) to the year after (Year +1), the year before installation is also compared to further years moving forward from Year +1 (Year +2, Year +3, etc). This is to estimate how savings change over time. More details on this can be found in Annex D: Methodology Note which accompanies this report.

Figure 3.6: Median annual percentage gas savings (electricity savings for Solar PV), in the 6 years following installation, relative to savings in Year 1, averaged over the installation years 2011 – 2016, England and Wales



The gas savings from solid wall insulation[5] and cavity wall insulation were sustained in the 5 years following installation (see Figure 3.6), while the savings from loft insulation and new condensing boilers decreased by around a tenth between Year 1 and Year 5 after installation. While this may indicate the physical degradation of these measures over time, other possible reasons for this reduction in savings may include increased comfort taking (see page 22).

The electricity savings from solar PV declined by around a fifth between Year 1 and Year 5 after installation. Degradation of a solar PV panel is likely to be below 1 per cent per year; however, this can be expected to vary between solar PV installations[6]. It is therefore likely that, in this case, the reduction in metered savings over time is too large to be attributed to physical degradation of the measure alone and is likely to be due to other factors. This may include residents taking advantage of the energy generated on-site and increasing their overall electricity use, or other factors not captured by this analysis.

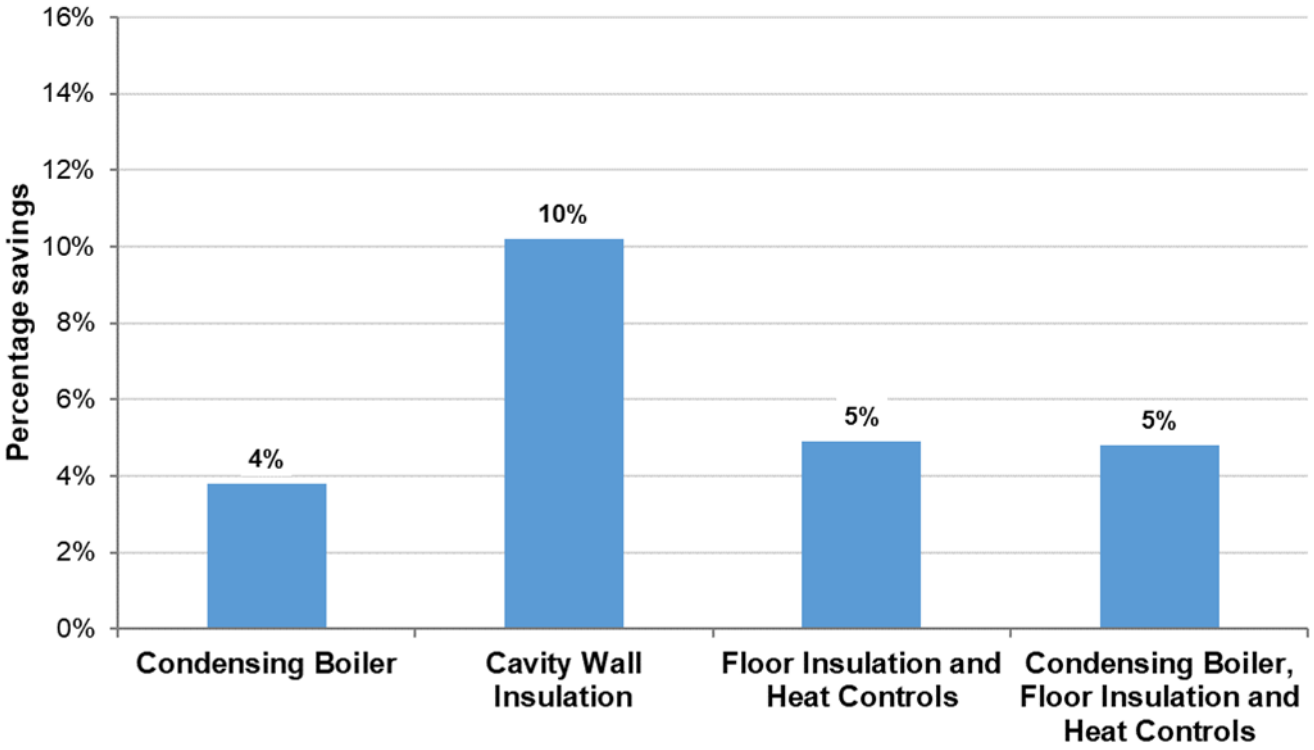
[5] Savings for solid and cavity wall insulation appear to increase in the years after installation. This arises due to the statistical variation in savings estimates that are particularly noticeable when the number of properties receiving the measure is small, as is the case for solid wall insulation.
[6] For example, Compendium of photovoltaic degradation rates, Jordan et al., 2016.

Impact of Measures Installed in Scotland

The following section sets out the results for the impact of measures analysis for measures installed in Scotland. Apart from different sources of information being used for the property characteristics used in the analysis[7], the method for Scottish properties is identical to that used for properties in England and Wales.

Estimates for the median gas savings from various measures installed in 2021 are shown in Figure 3.7. Cavity wall insulation yields the highest median gas savings (10 per cent).

Figure 3.7: Median gas savings in 2022 for measures installed in 2021, Scotland



[7] For Scotland, property characteristics are taken from a combination of data taken from Ordnance Survey's AddressBase and Experian data (which is modelled). For England and Wales, the equivalent information is taken from Valuation Office Agency (VOA) data that is updated annually.

Further Information

Supporting data tables

Data tables are available as part of this publication:

- Electricity and gas consumption data tables
- Impact of energy efficiency measures data tables

Access to data

Domestic NEED provides a valuable resource, and the team recognises potential uses beyond the projects currently taking place. There is published guidance which outlines routes for individuals or organisations to access property level data. Samples of anonymised record-level data are also made available.

Future updates to these statistics

The next release of these statistics, covering 2023 data, is planned for publication in June 2025. Subnational consumption statistics for 2023 will next be published in December 2024.

Related statistics

Non-domestic National Energy Efficiency Data-Framework
Statistics on the metered energy consumption of non-domestic buildings in England and Wales by sector, building size and occupying business size.

Subnational electricity consumption statistics
Summary statistics of domestic and non-domestic electricity consumption at different geographic levels from local authority to postcode.

Subnational gas consumption statistics
Summary statistics of domestic and non-domestic gas consumption at different geographic levels from local authority to postcode.

Subnational total final energy consumption statistics
Summary statistics of domestic and non-domestic consumption of all fuels reported on by DESNZ by local authority.

Household energy efficiency statistics
Monthly statistics on installations under the Energy Company Obligation (ECO), and previous schemes such as the Green Deal.

Great British Insulation Scheme
Monthly statistics on installations under the Great British Insulation Scheme (GBIS).

Green Homes Grant and Home Upgrade Grant statistics
Monthly statistics on installations under the Green Homes Grant Local Authority Delivery (LAD) and Home Upgrade Grant (HUG) schemes.

Social Housing Decarbonisation Fund statistics
Monthly statistics on installations under the Social Housing Decarbonisation Fund (SHDF) scheme.

Solar photovoltaics deployment statistics
Monthly statistics on deployment of all solar photovoltaic capacity in the United Kingdom.

Boiler Upgrade Scheme statistics
Monthly statistics monitoring the uptake of the Boiler Upgrade Scheme (BUS).

Revisions policy

The DESNZ statistical revisions policy sets out the revisions policy for these statistics, which has been developed in accordance with the UK Statistics Authority Code of Practice for Statistics.

User engagement

Users are encouraged to provide comments and feedback on how these statistics are used and how well they meet user needs. Comments on any issues relating to this statistical release are welcomed and should be sent to the Energy Efficiency Statistics mailbox.

The DESNZ statement on statistical public engagement and data standards sets out the department's commitments on public engagement and data standards as outlined by the Code of Practice for Statistics.

Official Statistics designation

Accredited Official Statistics status means that our statistics meet the highest standards of trustworthiness, quality, and public value, and it is our responsibility to maintain compliance with these standards.

The continued designation of these statistics as Accredited Official Statistics was confirmed in September 2018 following a compliance check by the Office for Statistics Regulation. The statistics last underwent a full assessment against the Code of Practice for Statistics in 2014.

Pre-release access to statistics

Some ministers and officials receive access to these statistics up to 24 hours before release. Details of the arrangements for doing this and a list of the ministers and officials that receive pre-release access to these statistics can be found in the DESNZ statement of compliance with the Pre-Release Access to Official Statistics Order 2008.

This publication is available from:
www.gov.uk/government/collections/national-energy-efficiency-data-need-framework

If you need a version of this document in a more accessible format, please email energyefficiency.stats@enerysecurity.gov.uk. Please tell us what format you need. It will help us if you tell us what assistive technology you use.