Department for Business, Energy & Industrial Strategy

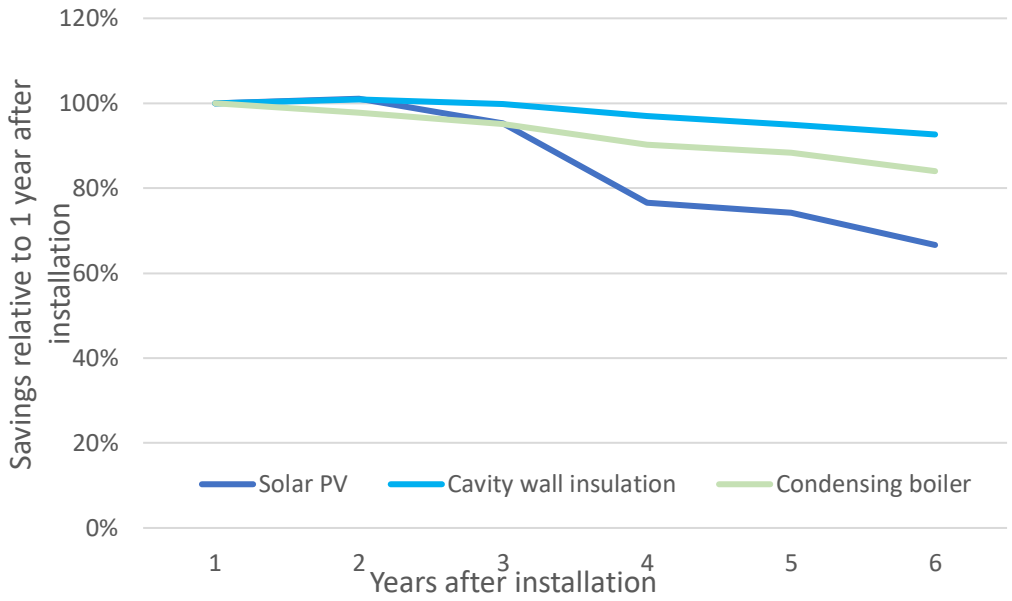
National Energy Efficiency Data-Framework (NEED): Summary of Analysis, Great Britain, 2019

27 June 2019 **National Statistics**

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

- The pattern of average consumption by household and property attributes remains broadly stable over time. Unsurprisingly, average consumption tends to be lower for newer and smaller properties, those in social housing, and those on lower incomes.
- The method used to assess the impact of energy efficiency measures has been improved. The estimated reduction in median gas consumption for measures installed in 2016 ranges from 3.9 per cent for loft insulation to 13.2 per cent for solid wall insulation. Solar PV results in a 15.2 per cent reduction in median electricity consumption.
- For the first time, reductions of gas and electricity have been estimated for all energy efficiency measures. A new boiler is estimated to reduce electricity consumption by 4.4 per cent, in addition to 7.0 per cent for gas.
- The impacts of energy efficiency measures over time has also been estimated for the first time. Figure 1 shows the change in savings for different measures, with solar photovoltaics (PV) seeing the largest reduction in metered savings against a comparator group.

Figure 1: Metered savings from energy efficiency measures installed in 2011, over time



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What you need to know about this report:
The article “What is NEED?”1 provides an introductory overview of the NEED framework. All accompanying tables are published alongside this report2. This includes a ‘table generator’ which allows users to create custom comparisons of consumption statistics. Note that “2017” refers to mid June 2017 – mid June 2018 for gas consumption, and late January 2017 – late January 2018 for electricity consumption.

Analysis for 2017 is based on 22.1m properties in England & Wales for electricity and 18.3m for gas. Estimates for Scotland are based on 2.1m for electricity and 1.6m for gas.

[1] “What is NEED?” can be found here: https://www.gov.uk/government/statistics/national-energy-efficiency-data-framework-need-report-summary-of-analysis-2018
[2] Summary statistics on gas and electricity consumption can be found here: https://www.gov.uk/government/statistics/national-energy-efficiency-data-framework-need-consumption-data-tables-2019
Summary statistics of the impact of energy efficiency measures can be found here: https://www.gov.uk/government/statistics/national-energy-efficiency-data-framework-need-impact-of-measure-data-tables-2019

Contents

Chapter 1: Introduction

This report presents the headline results and key findings of the analysis carried out and tables created using the latest version of NEED. Chapter 2 presents evidence of how domestic energy use varies, with mean and median consumption statistics broken down by different property characteristics. Chapter 3 presents estimates of the impact on average consumption of different energy efficiency measures, including estimates for single and combinations of measures installed in a property, comparisons of savings over time, and changes in consumption broken down by different property and household characteristics.

Detailed tables, including breakdowns by property attributes and household characteristics, and estimates for the impacts of installing different energy efficiency measures, are published alongside this report (see Annex B for details of all published tables). In addition to these tables four annexes and a NEED methodology note have been published alongside this report:

- **Annex A: Comparison with Other Sources** – gives a summary of the data sources used in NEED and provides an assessment of this against other sources.
- **Annex B: Overview of Data Tables** - gives a summary list of all the published tables.
- **Annex C: Update to Impact of Measures Method** – this describes the updated methodology for assessing the impact of different energy efficiency measures.
- **Annex D: Determinants of Household Gas Use** – this summarises regression analysis to understand which features held in NEED are most associated with the amount of household gas consumed.

A domestic NEED methodology note[3] has been published alongside this publication, which includes details of how estimates of domestic electricity and gas consumption by property attributes and household characteristics are produced. It also sets out the methodology for estimating the saving in gas consumption following the installation of retro-fit energy efficiency measures (e.g. cavity wall insulation, loft insulation).

Uses of the data

This data framework uniquely provides meter consumption estimates linked to other data sources for 23.8m properties in England and Wales. Combined with a range of demographic and property data, it can provide insight on factors affecting household energy consumption and the consumption savings resulting from installation of government supported energy efficiency measures. As such, it is key part of the evidence base supporting BEIS to develop, monitor and evaluate energy policies.

Temporal coverage of the data

The latest data in this report relate to 2017. The precise time periods covered by different years of data differ for gas and electricity consumption.

[3] The methodology note can be found here: https://www.gov.uk/government/publications/domestic-national-energy-efficiency-data-framework-need-methodology

The summer of 2017 saw the implementation of new gas meter point management and settlement processes, which caused a change in the period of gas consumption covered by the 2016 data. Further details are contained in the NEED Methodology. The gas consumption periods each year refers to are:

- Prior to 2014: October – September (same period as 2014 and 2015)
- 2014: October 2013 – September 2014
- 2015: October 2014 – September 2015
- 2016: mid July 2016 – mid July 2017
- 2017: mid June 2017 – mid June 2018
- 2018 (expected): mid June 2018 – Mid June 2019
- 2019 onwards (expected): mid June – mid June (same period as 2018)

For this report and all accompanying annexes and tables, when gas consumption is referred to in a particular year, this relates to the “gas period” set out above, rather than the “gas year” or calendar year.

For electricity consumption the time period is late January – late January. For example “2017” covers late January 2017 to late January 2018.

Summary of data sources

The data sources which contribute to NEED are listed below:

- Gas meters (source: Xoserve)
- Electricity meters (source: electricity data aggregators)
- Property characteristics (source: Valuation Office Agency and Scottish and Assessor)
- Household characteristics (source: Experian)
- Boiler installs (source: Gas Safe register)
- Installation of energy efficiency measures (source: statistics from government schemes including the Energy Company Obligation, Green Deal, Feed-in Tariff, and others)

Impact of measures method

This year sees an update to the methodology used to find the energy savings from installing different energy efficiency measures. This analysis is referred to as “impact of measures”. Details are provided in Annex C. The main points are:

- Due to improvements in the method the results generated are of higher quality and closer to a “true” estimate of the savings.
- The estimates enable disaggregation by new property and household characteristics, including EPC ratings.
- The only data needed for assessing new energy efficiency measurements are the addresses of the properties and the dates of install. The rest of the data required is held in NEED. The new method provides a robust and flexible approach to assessing the

impact of new measures.

- The amount of labour required to estimate the impact of a measure is lower than it was in the past, meaning that it may be possible to assess additional measures as and when the data requirements set out in the point above become available.

In the spirit of continuous improvement, the method may be updated in future years as methodological improvements are made. In such an event the tables published using this new method may be revised.

Future uses for NEED

NEED provides a valuable resource and the team recognises potential uses beyond the projects currently taking place. The NEED team is keen to collaborate with external stakeholders to maximise the impact of the data-framework. To get in touch with the team please email: energyefficiency.stats@beis.gov.uk.

To maximise the usefulness of future publications and to influence the work carried out by the NEED team in the future, please complete the 1 minute survey linked below: https://www.surveymonkey.co.uk/r/WBDTPGF.

Chapter 2: Domestic energy consumption

This section presents an analysis of domestic gas and electricity consumption by property attributes and household characteristics.

The data included in this chapter can be found in the Headline Consumption Tables[4] published alongside this report. A full list of the property and household characteristics is given in Annex B: Overview of Data Tables.

The patterns in energy consumption by household and property characteristics tend to show little variation between years, other than following the general national trends in consumption. Therefore this chapter describes a selection of the trends and does not draw on all of the published tables. Users are also referred to the NEED 2018 report for additional graphics and commentary on how consumption varies by different property, household and geographic characteristics[5].

All the results for England and Wales are based on 22.1 million properties for electricity consumption and 18.3 million for gas consumption. Unlike publications in previous years, this year's analysis uses the full property database rather than a sample (in previous years roughly 4 million properties were included for electricity and roughly 3 million for gas[6]).

An analysis of consumption trends in Scotland is in a sub-section at the end of this chapter.

All consumption figures presented in this section are based on valid domestic gas and electricity consumption and are 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 consistent comparison of gas consumption over time. As electricity is used for a much wider variety of reasons (and far less often as a heating fuel) consumption is less affected by the weather, so this data is not temperature corrected.

Extreme weather events
The weather correction process used assumes a brief lag between changes in weather and the average consumer's change in heating behaviour. This assumption generally results in good performance of the weather correction process, however in extreme weather events, such as those seen in the UK in February and March 2018, the rapid drop in temperatures mean that the weather correction process may not have fully compensated for the lower temperatures for those days. This means that a "truly" weather corrected figure for the 2017 gas period could be slightly lower than that reported.

There is a strong positive relationship between certain characteristics and a household's energy use (for example, size of property or household income). This section provides insight into how each individual characteristic relates to energy use but makes no attempt to control

[4] Consumption tables can be found here: https://www.gov.uk/government/statistics/national-energy-efficiency-data-framework-need-consumption-data-tables-2019
[5] The NEED 2018 Summary of Analysis can be found here: https://www.gov.uk/government/statistics/national-energy-efficiency-data-framework-need-report-summary-of-analysis-2018
[6] This is due to the property characteristic data supplied by the Valuation Office Agency now being held by BEIS, removing the need to create a sample

for relationships between characteristics in the dataset or with other characteristics not captured by this data.

Trends in domestic consumption

This section provides analysis of the trends in median gas and electricity consumption between 2005 and 2017 for selected property attributes and household characteristics.

Table 1: Annual consumption summary statistics for England and Wales 2017

					(kWh)
	Mean	Standard Deviation	Lower quartile	Median	Upper quartile
Gas	13,500	7,500	8,300	12,300	17,100
Electric	3,900	3,000	2,000	3,100	4,700

Table 1 shows summary statistics for domestic gas and electricity consumption in England and Wales. The mean gas consumption is over three times that of electricity consumption. For a detailed breakdown of domestic gas and electricity consumption by different geographic areas (from local authority to postcode) and annual trends for these please see the Sub-national consumption publication[7].

Figure 2.1: Trends in median annual domestic gas and electricity consumption (kWh)

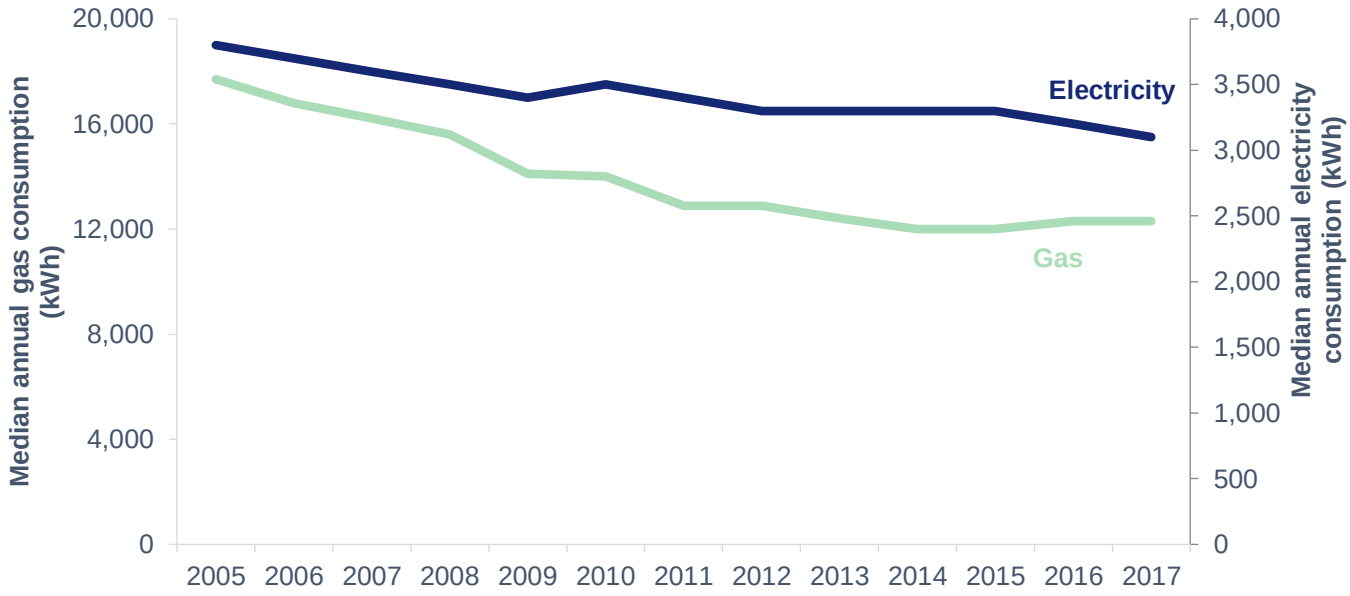


Figure 2.1 shows the median gas and electricity consumption for all households in the NEED sample with valid consumption in each year from 2005 to 2017. Data for 2005 to 2010 cover

[7] Sub-national gas and electricity consumption statistics can be found at: https://www.gov.uk/government/collections/sub-national-gas-consumption-data and https://www.gov.uk/government/collections/sub-national-electricity-consumption-data

England only and later data (2011 onwards) cover both England & Wales. The changes in median electricity usage since 2005 have been smaller than they have been for gas.

It can be seen from figure 2.1 that median consumption for both gas and electricity has been steadily declining since 2005. However, while consumption of gas has fallen by nearly a third (31 per cent) since 2005, there has been a recent increase in the period 2015 to 2017 of 3 per cent. This reverse in the trend of decreasing median gas could be caused by various factors, such as changes in energy prices.

The fall in median consumption is seen consistently across all property types, household characteristics, geographies and socio-demographic classifications. However, certain households will have been affected to a greater or lesser extent by the different factors described above. The remainder of this section provides some highlights of changes over time for different property attributes and household characteristics.

Trends in domestic consumption by property age

Figure 2.2: Median gas consumption over time by property age

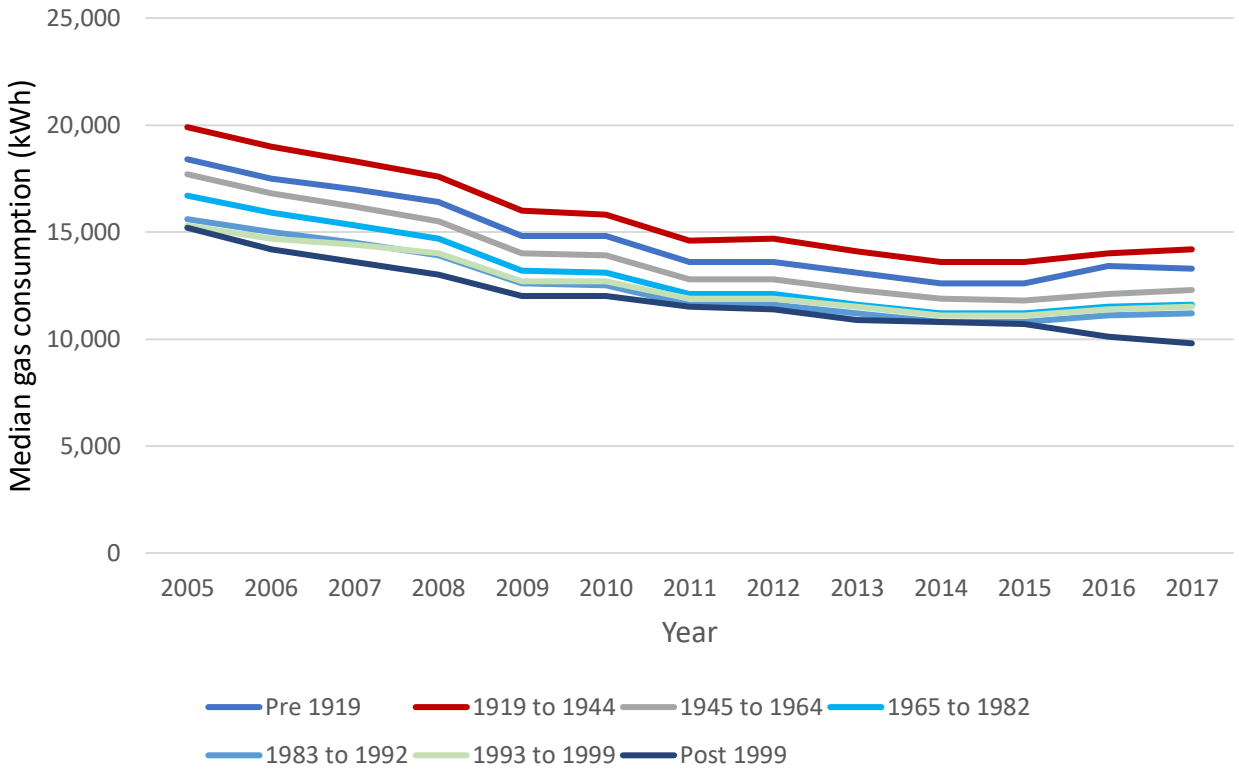


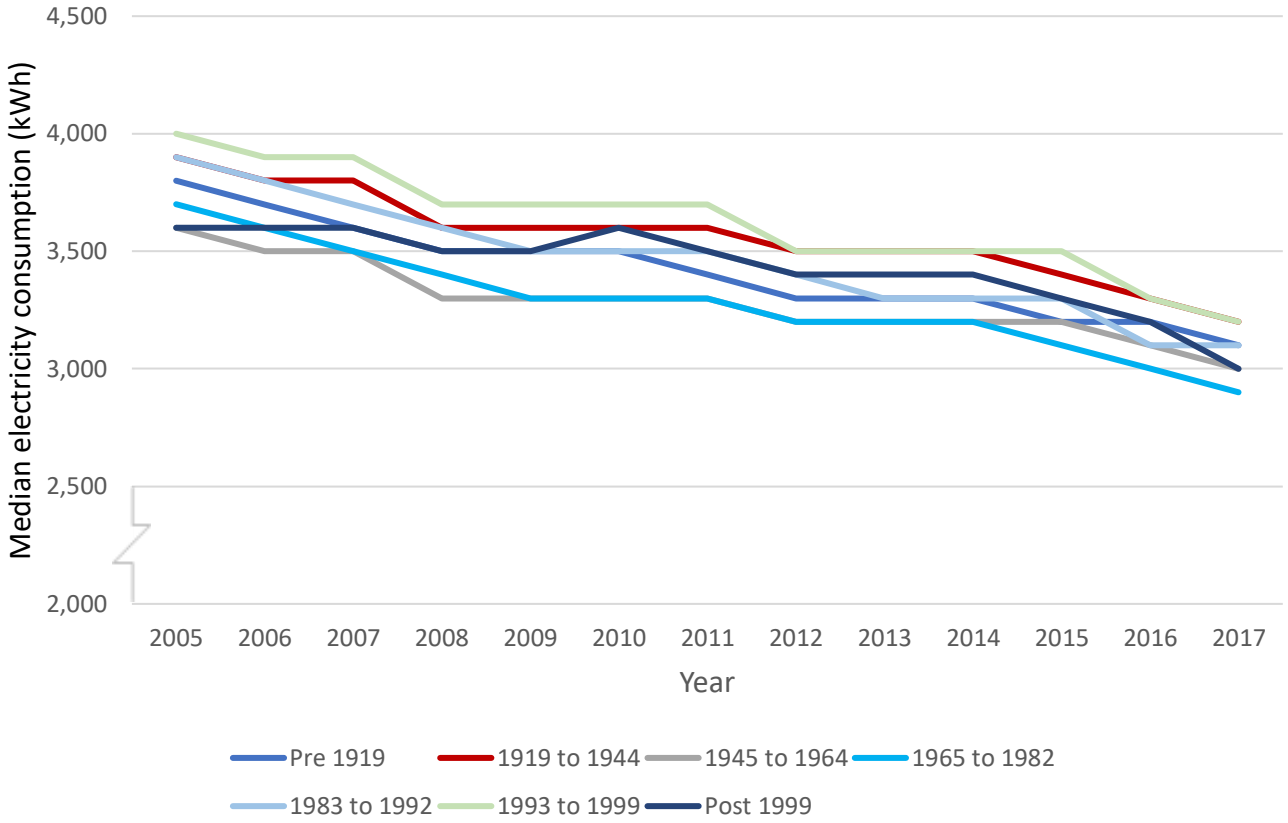
Figure 2.2 shows that up until 2015, while there has been a general downward trend in gas consumption for properties of all property age groups, the trends have diverged for consumption in 2016 and 2017.

Newer builds can be expected to be more energy efficient (for example, having higher quality insulation) because the building regulations have changed, along with consumer's improved access to information and other factors.

More recently built properties consistently see lower gas consumption. This suggests that as more properties are built, the more the median gas consumption of all properties will likely be

reduced. This is because the proportion of the housing stock made up of newer properties is increasing with time.

Figure 2.3: Median electricity consumption over time by property age



For all properties median electricity consumption decreased by 18% between 2005 and 2017, whereas for gas the median consumption decreased by 31%. In figure 2.3 properties built between 1965 to 1982 can be seen to consistently consume less electricity than properties built in other periods. Electricity is used for a greater variety of activities than gas, which is used mainly to heat homes, meaning that the building regulations which newer properties abide by are less likely to impact electricity consumption.

Trends in domestic consumption by property attributes

Figure 2.4: Percentage change in median gas consumption over time by property type (2005=100)

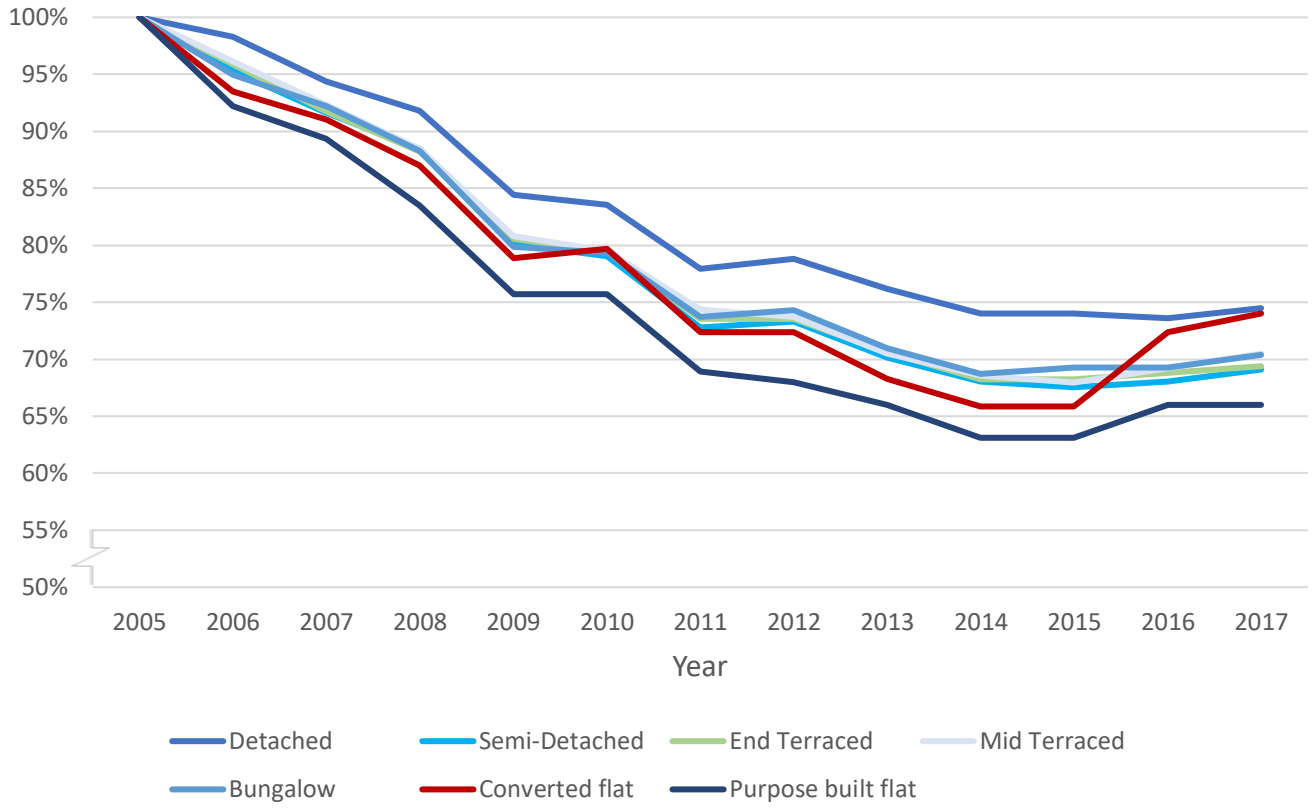


Figure 2.4 shows the trend in median gas consumption by property type. It demonstrates that between 2005 and 2014 the fall seen in gas consumption was evident among all property types.

In general, smaller properties showed a greater percentage decrease in median consumption when compared with larger properties. For example, in 2014 typical gas consumption for purpose built flats was 37 per cent lower than in 2005, but for detached dwellings this reduction was only 26 per cent. The mid-size property types (bungalows, semi-detached and terraced) all follow a similar pattern.

Figure 2.4 also suggests that the increase in median gas consumption for all properties in 2016 and 2017 may be more attributable to converted flats than to other property types, as the gas consumption of converted flats showed the highest increase between 2015 and 2017 (12 per cent).

Converted flats
A large proportion of converted flats in England and Wales were originally built before 1919, putting them in the oldest age group held in NEED. As these properties are older, converted flats are generally less efficient than newer properties. This can be seen when comparing converted flats to purpose built flats, where in 2017 converted flats had a median gas consumption 34 per cent higher than purpose built flats, despite the fact that both property types tend to be similar sizes.

Figure 2.5: Percentage change in median electricity consumption over time by property type (2005=100)

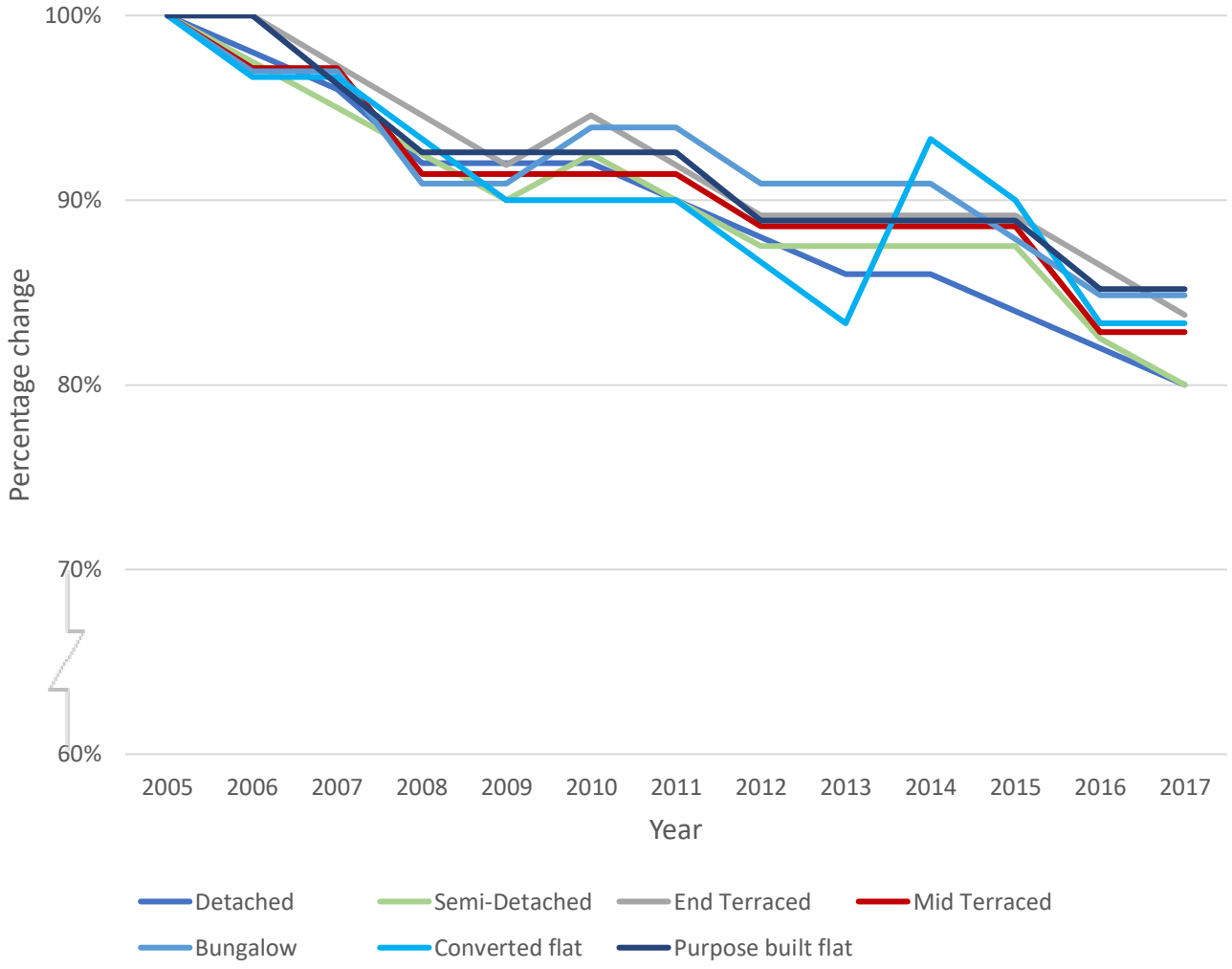


Figure 2.5 shows that detached and semi-detached properties saw the largest decline in median electricity consumption between 2005 and 2017 (20 per cent) while purpose built flats (15 per cent) saw the smallest. This contrasts with changes in gas consumption where purpose built flats saw the greatest percentage decrease

The higher volatility in data shown in figure 2.5 compared to figure 2.4 likely reflects the fact that, unlike gas, the electricity consumption figures are not weather corrected. It is estimated

that 14 per cent of properties are off the gas grid and use alternative fuel sources, including electricity to heat their homes[8].

Trends in domestic consumption by household characteristics

Figure 2.6 Percentage change in median gas consumption over time by tenure (2005=100)

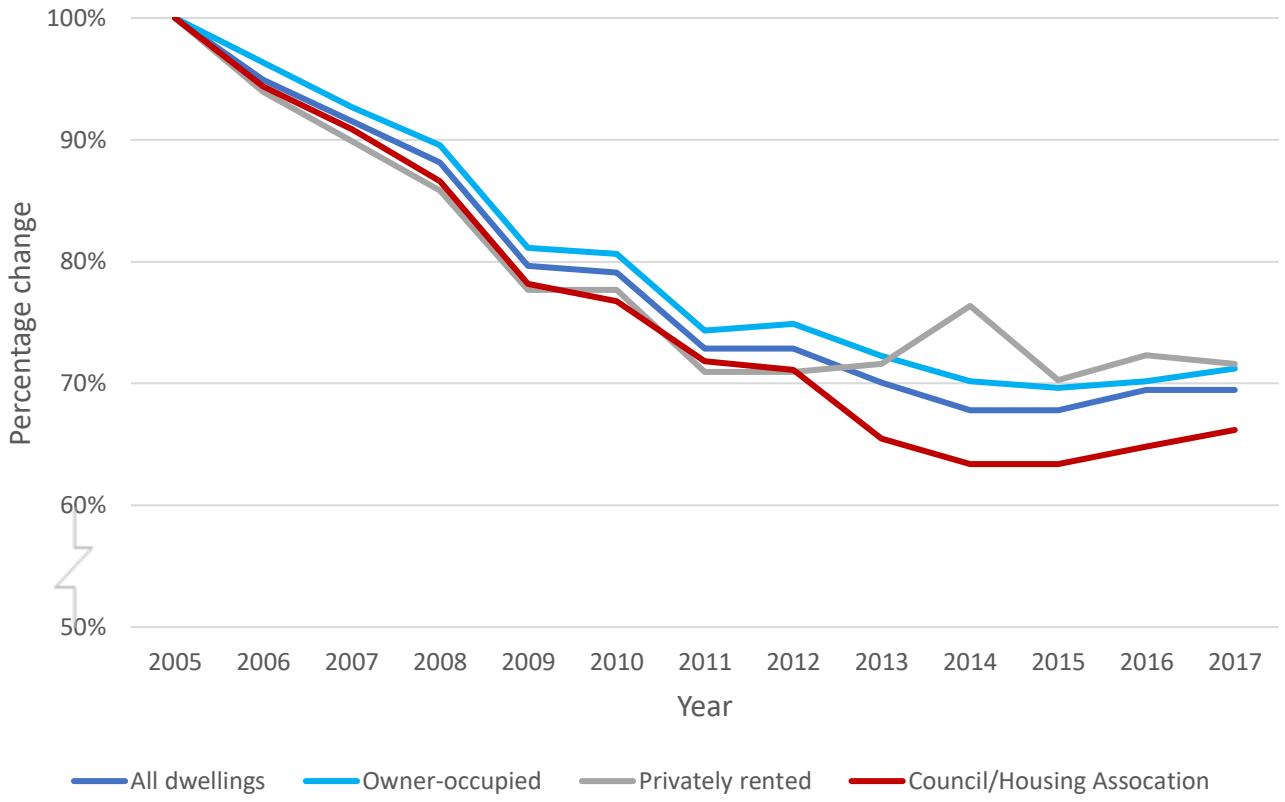


Figure 2.6 shows the trend in consumption of gas since 2005 split by tenure. Over this time council housing and housing association properties have consistently exhibited a faster decline in consumption when compared to owner-occupied properties. It should be noted that the mean gas consumption for private rented properties saw no spike in 2014; only the median saw this spike. This implies that a high proportion of properties increased their gas consumption in 2014, with a minority decreasing their gas consumption to the extent it offset the properties with an increase, when the mean is considered.

The increase in median gas consumption between 2015 and 2017 is highest for these properties (a 4.4% increase against 2.2% for owner-occupied and 1.9% for private rented). This suggests that council housing and housing association properties, and their owners, may be more sensitive to the causes of the increase in gas consumption seen since 2015.

[8] Estimates of households not connected to the gas network: https://www.gov.uk/government/statistics/sub-national-estimates-of-households-not-connected-to-the-gas-network

Scottish consumption

Modelled data from Experian have been used for most property attributes and household characteristics in this analysis. This is with the exception of property type and floor area, where data from the Scottish Assessor (the organisation responsible for valuing properties in Scotland which holds data on property characteristics in Scotland) have been combined with the Experian data.

Table 2: Annual consumption summary statistics for Scotland 2017

(kWh)

	Mean	Standard deviation	Lower quartile	Median	Upper Quartile
Gas	14,300	8,000	8,600	12,800	18,200
Electricity	4,000	3,300	2,000	3,100	4,800

Users should be aware that while the data provided by the Scottish Assessor is considered accurate, the Scottish Assessor data held in NEED was last updated over 3 years ago. This means that properties built more recently than this haven't been included in the analysis used for this report or in accompanying tables. The result is that mean and median consumption figures given here could be higher than they are in reality, because newer properties tend to be more energy efficient. For a more accurate of median consumption between domestic properties see the local authority level Sub-national gas consumption publication[9].

For 2017, the median gas consumption for properties in Scotland was 12,800 kWh with median electricity consumption at 3,100 kWh. The equivalent figures for England & Wales are 12,300 kWh and 3,100 kWh respectively, showing that typical gas consumption in Scotland is 4 per cent higher than in England & Wales.

[9] Available here: https://www.gov.uk/government/collections/sub-national-gas-consumption-data#local-authority-data

Figure 2.7: Median electricity consumption over time by number of adults in household, in Scotland

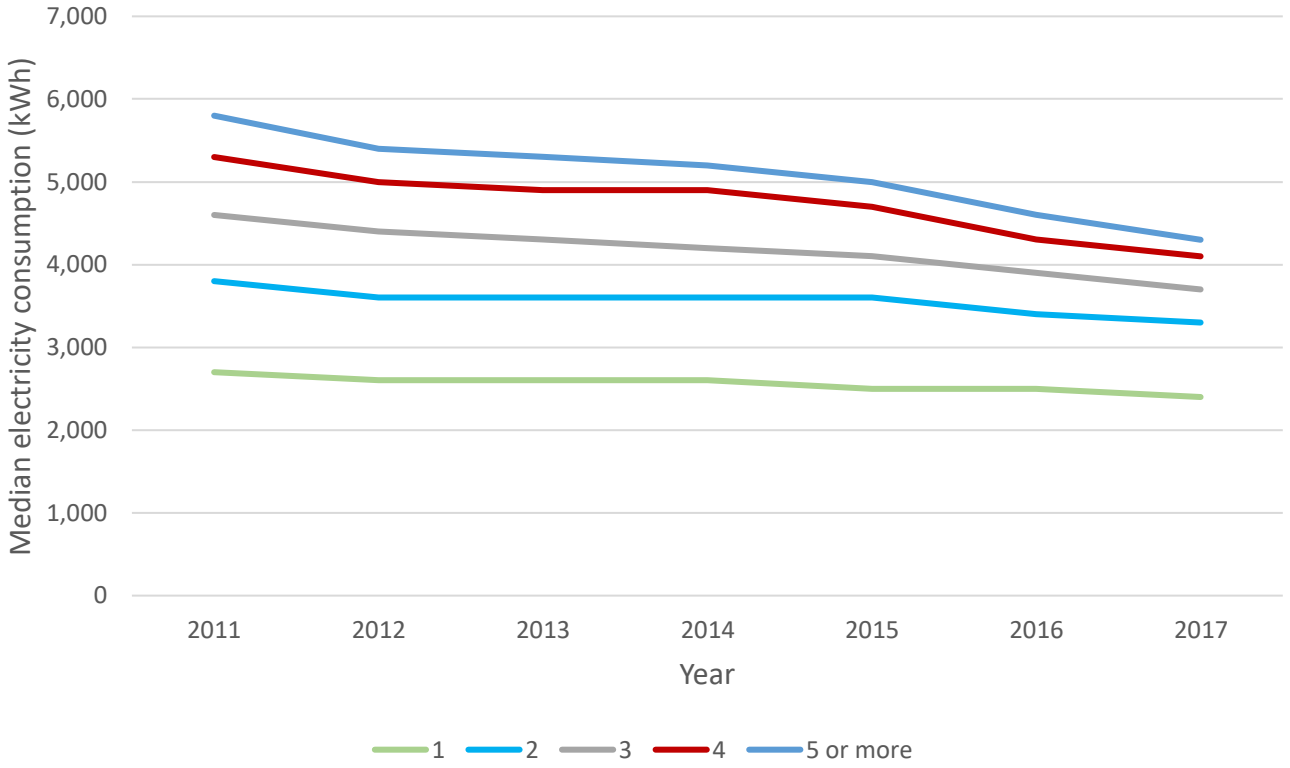


Figure 2.7 shows that the gaps in electricity consumption between households with different numbers of adults living in them have decreased over time. The difference in median electricity consumption between properties with two and five or more adults living in them has halved from 2011 to 2017. In England and Wales in the same time period the decrease was 19 per cent. This shows that the marginal increase in electricity consumption with each additional adult living in a Scottish property appears to be decreasing with time. Note that this doesn't account for the reasons a property might have more adults living in it (e.g. more flats built with a higher number of bedrooms, necessity due to lower income, etc).

Tables breaking down annual consumption figures for domestic properties in Scotland by property and household characteristics are published alongside this report. See Annex B for details of all these tables.

Chapter 3: Impact of energy efficiency measures

This chapter analyses the impact of installing energy efficiency measures on gas consumption for properties in England, Wales and Scotland[10,11]. The analysis compares the gas consumption in properties before and after an energy efficiency measure was installed, with the change in consumption over the same period for similar properties which have not had any measure installed. This method is also applied to solar PV, monitoring the consumption savings in terms of metered electricity rather than gas.

Note that this analysis is only applied to measures which have been installed under government schemes, as the registration from such schemes provides the data on installations. The exception to this are boilers, for which NEED has close to full coverage, as data is supplied by the Gas Safe Register.

New with this year's analyses are estimates for longitudinal impacts, where the savings from the measures after multiple years are estimated. Tables for these are available in the workbook "Impact of measures over time"[12].

Also new are estimates for savings from both gas and electricity for the same measure. For which the sample is drawn using more stringent criteria, as both gas and electricity meter readings have to be suitable for the analysis, rather than only one or the other. This means that the sample size of the intervention group is smaller for these estimates.

Impacts of measures are estimated by comparing consumption changes for an intervention group with a comparator group. The intervention group contains properties which have received the energy efficiency measure being considered (and no other measure as recorded by BEIS in the years preceding or following the intervention). The comparator group contains properties with similar characteristics that have not had an energy efficiency measure installed at any point.

The method used for this has been enhanced since the June 2018 publication; the changes of which are set out and explained in Annex C: Update to impact of measures method. This annex also gives more technical information on the method used and reasons for the methodological choices made.

Due to the improvements in the process used to assess the impacts of measures, there is now a lower cost to identifying savings from measures installed. If data on the installation of other technologies is obtained, specifically the measure type, installation date and property address, then it may be possible to estimate the impact on consumption for those too.

[10] Impact of measures analysis for Scotland is completed separately to England and Wales, and is detailed later in this chapter.
[11] The impact of measures analysis is presented for measures installed between 1st October 2015 and mid-June 2017, as the saving is calculated by looking at the difference between 2017 and 2015 gas consumption (or the equivalent "electric years").
[12] All published impact of measures tables are available here: https://www.gov.uk/government/statistics/national-energy-efficiency-data-framework-need-impact-of-measure-data-tables-2019

Headline tables summarising the results for the 2019 publication are published alongside this document. The energy efficiency measures included in this analysis are:

- Cavity wall insulation
- Loft insulation
- Boiler
- Solid wall insulation
- Solar PV (electricity)

Also note that not all properties where a measure has been installed are included in the analysis:

- Flats, due to insufficient address information when matching meter readings, are excluded to avoid matching flats to wrong meter point readings which would produce inaccurate estimates.
- Where the change in gas or electricity consumption is considered too extreme, or the meter reading is thought to be estimated rather than actual, the property is removed from the sample.

All headline figures in this report 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.

Variations in estimated savings between years

Under both the previous and the new impact of measures method, different results are found for the same measure for different years of installation. There are likely to be several factors contributing to this:

- Any variation between the treated populations which isn't known from the data. This could include age of residents and the number of children in the home.
- Increasing prevalence of measures outside of government schemes. This means that the control group is likely to include properties which have had energy efficiency improvements made that have not been identified in BEIS. All other things being equal, this would lead to a decrease in the savings found using NEED in later years.
- The quality of installations may vary between years.
- The average size of the install may vary between years (e.g.: larger solar panels can generate more electricity).
- The brand or subtype of measure may vary between years. For example, while cavity wall insulation is considered to be a single class of intervention, in reality there are several types of cavity fill (notably bead and mineral wool), which may have different impacts.

- The proportion of the house covered by certain insulation types. For example, sometimes solid wall is installed on only one wall, and on other occasions it's installed on all four walls.

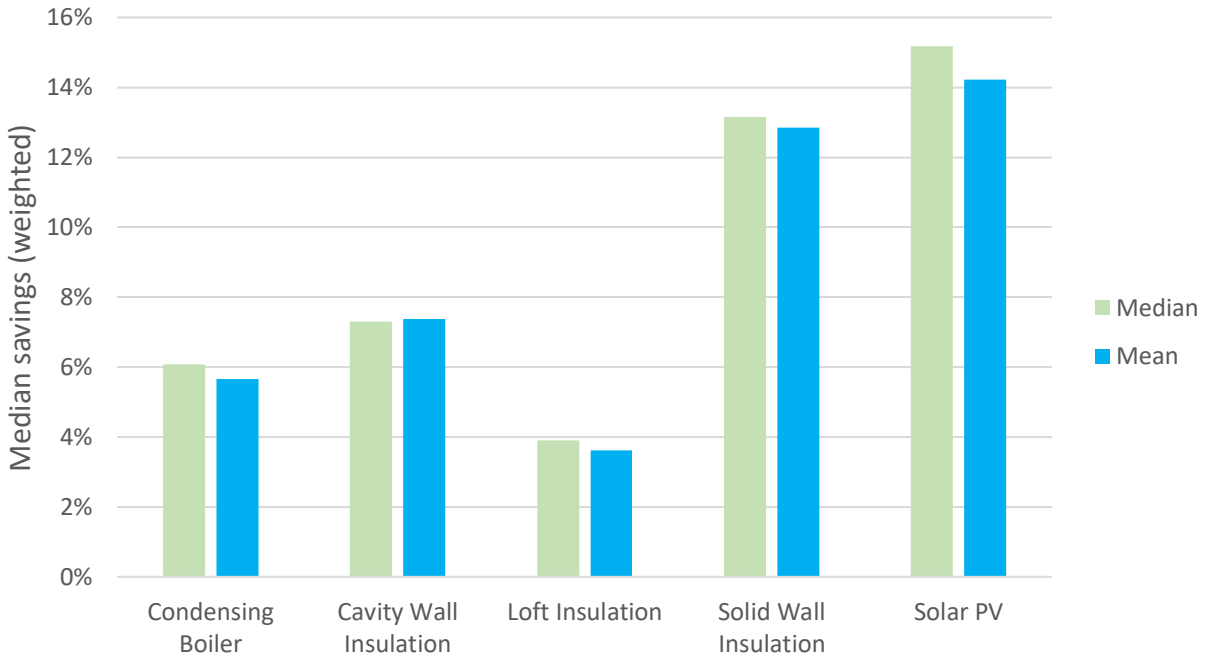
- The results may be different for early adopters of novel measures, because this self-selecting treated population may consume energy in a different pattern to general consumers.

England and Wales

Single measures

Figure 3.1 shows the weighted median savings of measures installed in 2016. Solid wall insulation has the highest gas saving with a median saving of 13.2 per cent.

Figure 3.1: Median and mean gas savings in 2017 for measures installed in 2016, England and Wales (savings are for electricity for Solar PV)



Due to comfort taking these figures will be an underestimation of the "true" savings of the measures (see detail below).

The impact of solar PV will be even more of an underestimate. This is because in addition to comfort taking, an unknown amount of the electricity generated will be exported to the electricity grid rather than used on site (see detail below).

Comfort taking
A known phenomenon when properties become more energy efficient is comfort taking. This is when rather than heating their home to the same temperature after the install, the resident takes advantage of the more efficient home by heating the home to a higher temperature than before the install, or "taking comfort". Homes which were adequately heated prior to the installation of a measure can be expected to take less comfort than

underheated homes. Lower comfort taking means higher metered savings, as residents decide on a balance between heating their homes and saving money. As the impact of measures analysis using NEED is based on metered savings, but doesn't capture the temperature of homes, the true benefit of installing a measure will be higher than the figures presented in this analysis.

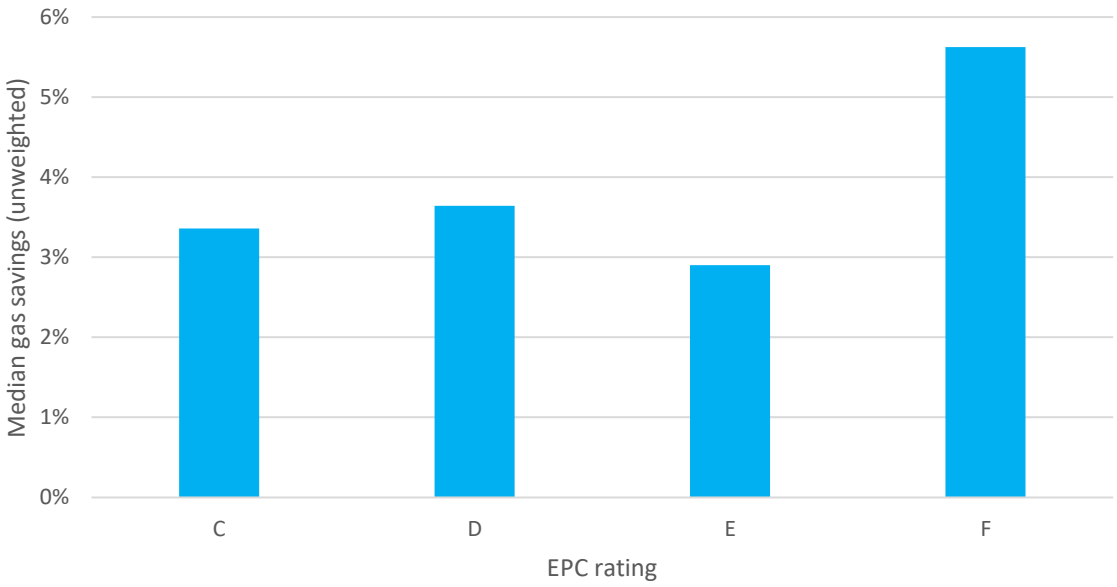
A similar effect can be expected with the installation of solar PV, where some of the benefit will come from less electricity being drawn from the grid (which is detectable in NEED). However, some of the benefit will also come from using more electricity than before the installation due to the free electricity generated. This is analogous to comfort taking for energy efficiency measures. It means that true benefit of installing a solar PV will be higher than the figures presented in this analysis would suggest if considered in isolation.

Figure 3.2 below shows the gas savings broken down by income bands for the installation of a condensing boiler, with the highest savings being seen for income band £15,000 - £19,999.

Figure 3.2: Median gas savings from condensing boiler broken down by income

New to this year's NEED publication are savings estimates broken down by EPC and Office for National Statistics (ONS) supergroup (a profile of the area the property is in, based on Census data). Figure 3.3 shows the gas savings for loft insulation broken down by the EPC rating of the property (EPCs with low sample sizes are excluded from the chart).

Figure 3.3: Median gas savings from loft insulation broken down by EPC rating (unweighted)

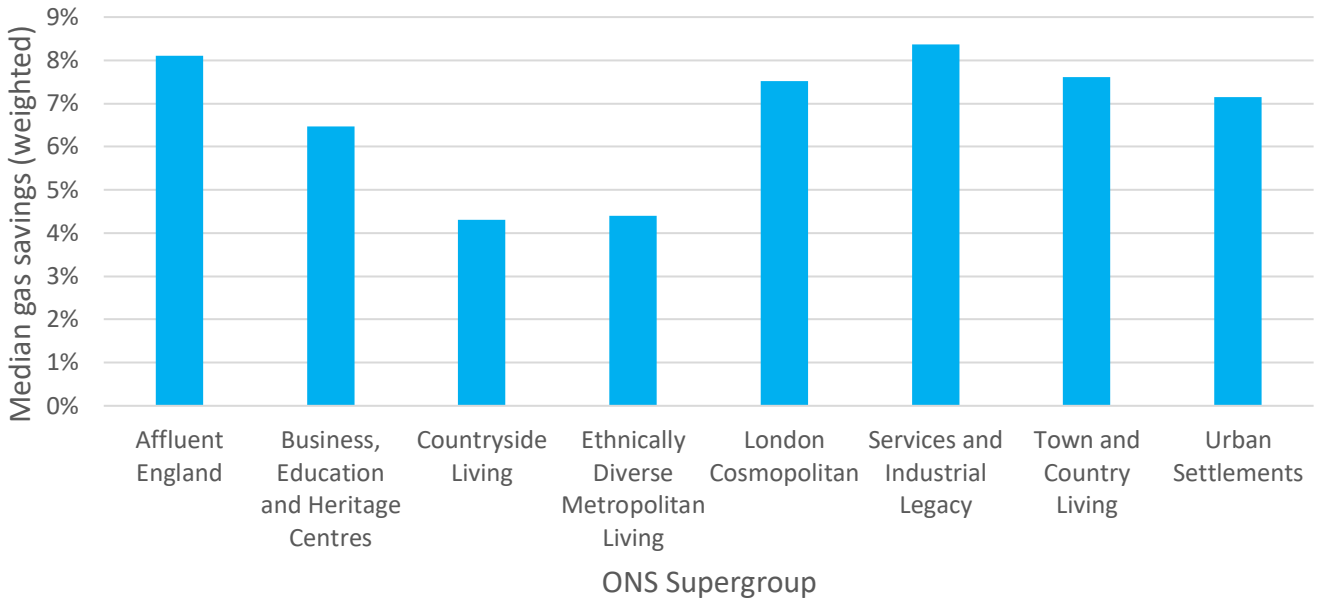


ONS Supergroups[13]
When assessing the 2011 census results the ONS looked for archetypes, or "clusters", of areas where the residents had similar characteristics. This resulted in 8 "supergroups", 15 "groups" and 24 "subgroups". Each supergroup labelled to reflect common lifestyles in that group (e.g. "Countryside Living" and "London Cosmopolitan"). The supergroups of each LSOA are published by ONS.[14] A map of supergroups by local authorities in the UK is shown in Appendix A of the report.

Figure 3.4 below shows the gas savings for cavity wall insulation broken by the supergroup of the property.

[13] A more detailed overview of ONS' Supergroups is available here: https://www.ons.gov.uk/methodology/geography/geographicalproducts/areaclassifications/2011areaclassifications/abouttheareaclassifications
[14] Tables giving the ONS Supergroup for each LSOA are available here: https://data.cdrc.ac.uk/dataset/cdrc-2011-oac-geodata-pack-uk

Figure 3.4: Median gas savings from cavity wall insulation broken down by ONS supergroup (weighted)

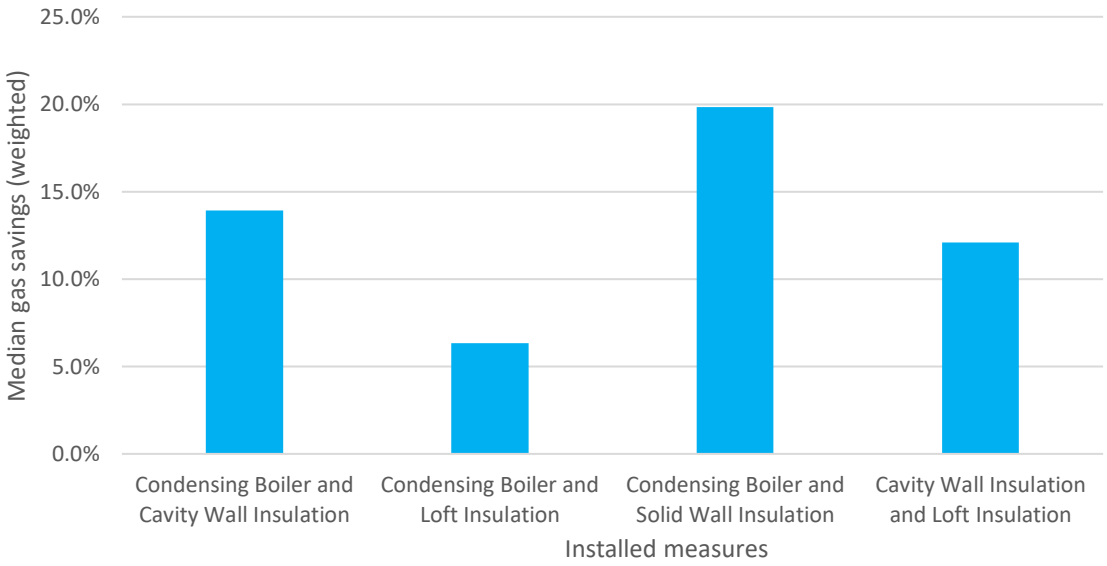


Combinations of measures

Where a large enough number of properties have installed multiple measures in a single year the impact of a combination of measures can be calculated. These are included in the published table “Headline tables impact of measures 2016”.

For measures installed in 2016 the combination of measures with the greatest impact on consumption savings in 2017 was condensing boiler and solid wall insulation, with a weighted median saving of 19.8 per cent. Figure 3.6 below shows the savings from combinations of 2 measures in 2016.

Figure 3.6: Median gas savings from combinations of two measures installed in 2016 (weighted)



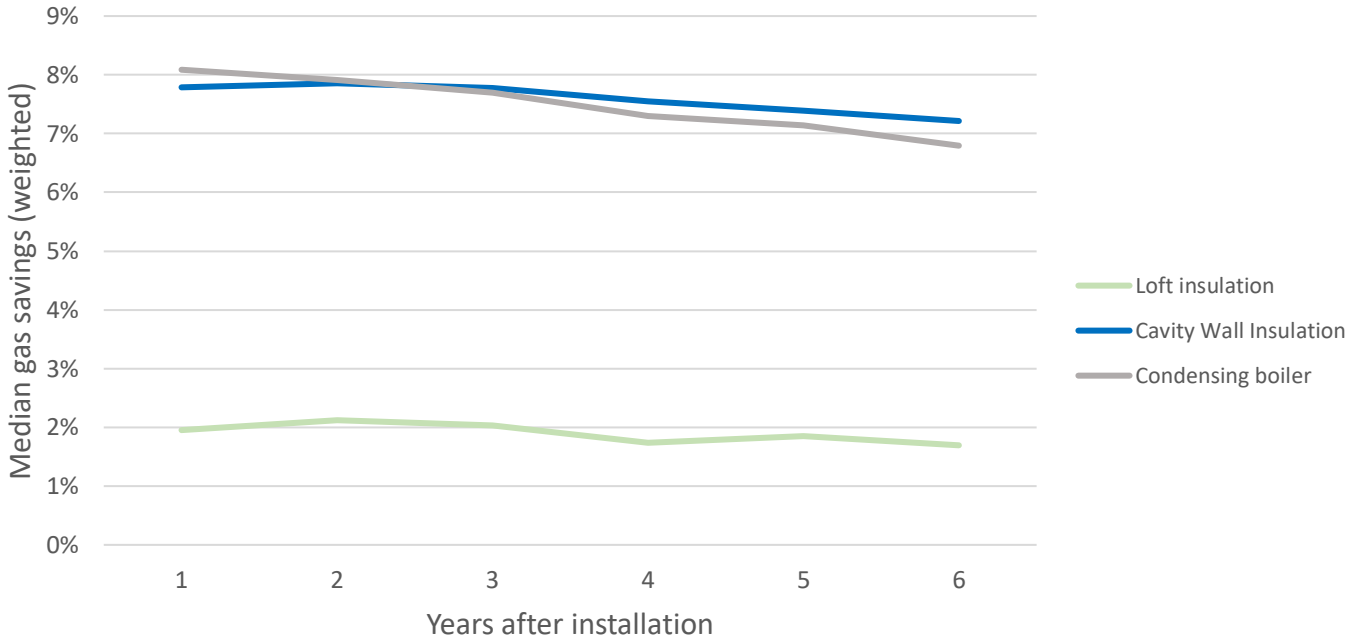
Longitudinal impacts

New in this year's NEED statistics are estimates of the impact of measures over longer periods of time. Estimates of longitudinal savings for measures installed in 2011 and 2012 are published alongside this report in the table "Impact of measures over time". The method used for these estimates was the same as that used for the other impact of measures analyses, except that instead of comparing the year before installation to the year after, the year before is compared to 1 or more years after. More detail on this is given in the methodology note[15] which accompanies this report.

Figure 3.7 below shows the impact of single measures installed in 2011 up to 6 years after installation. The larger gradient in changes for boilers relative to cavity wall or loft insulation suggest a faster degradation in the effectiveness of the new installation. This means that if only the first year of installation is considered for measures installed in 2011 boilers would appear to save the most gas. However once the 3 year mark is reached, cavity wall insulation has higher savings.

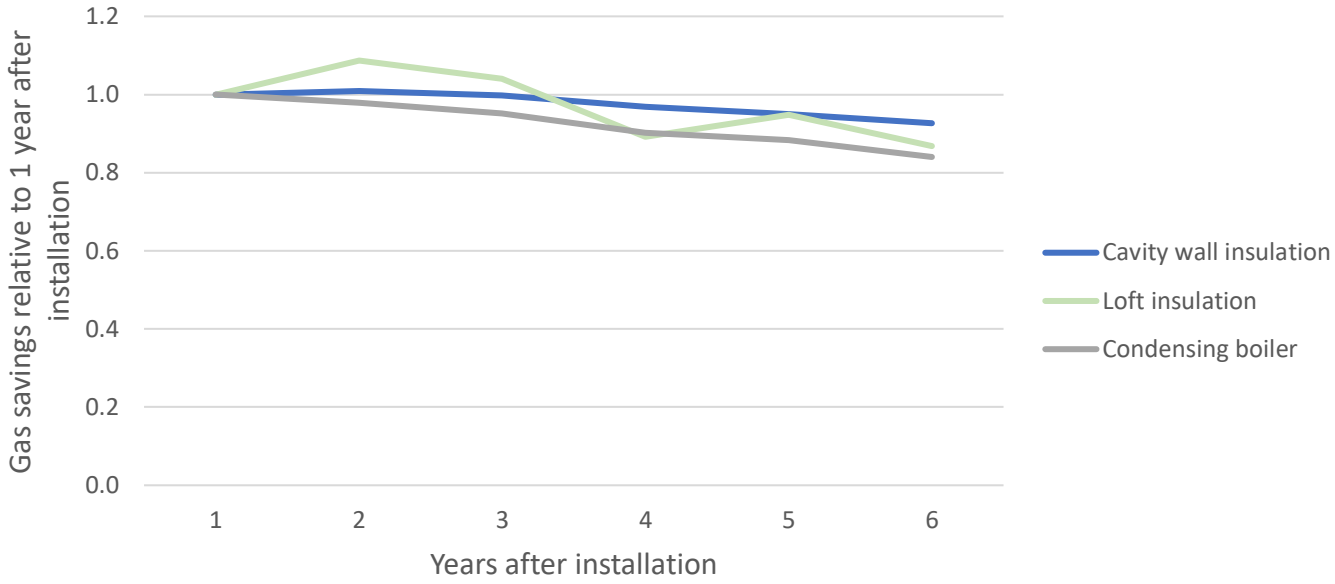
Note that because the savings are based on metered gas use, which is affected by many things not accounted for in the impact of measures process, some fluctuation in the results is to be expected (e.g. for condensing boiler and cavity wall insulation there is a clear downward slope, whereas for loft insulation the line is more erratic). Therefore for savings over time the general direction of trend is more important that the savings in each year.

Figure 3.7: Longitudinal impacts of measures installed in 2011



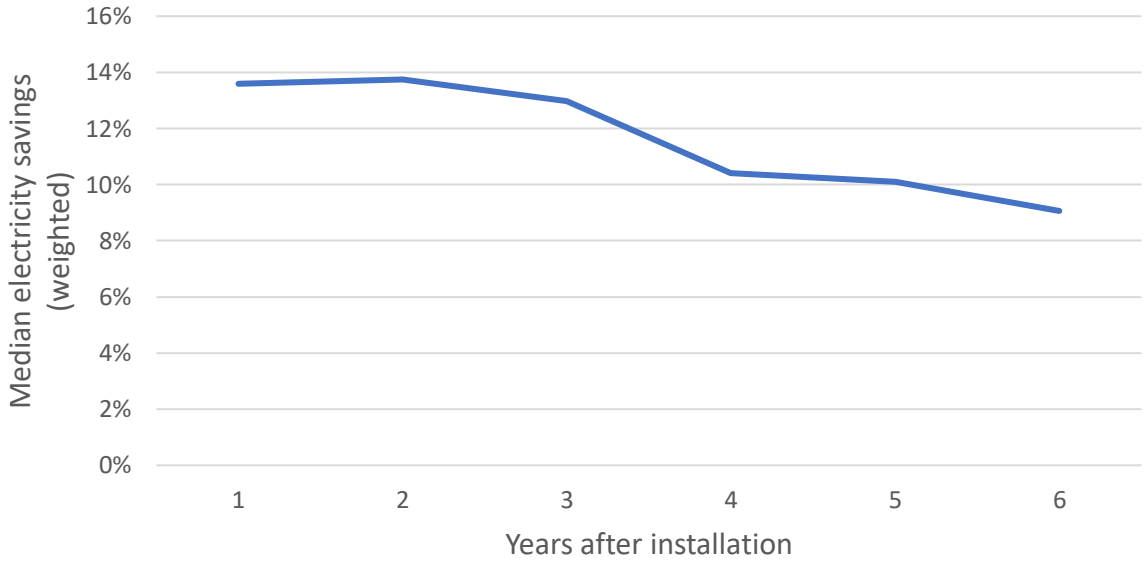
[15] The methodology note can be found here: https://www.gov.uk/government/publications/domestic-national-energy-efficiency-data-framework-need-methodology

Figure 3.8: Longitudinal impacts of measures installed in 2011, with savings shown relative to savings one year after installation



The downward trend in savings from cavity wall insulation and loft insulation has a very low gradient (as shown in figure 3.8), suggesting not only that these measures degrade very slowly, but also that any few or no additional effects from comfort taking appear over time. Given that the average gas consumption for domestic properties in the UK is generally decreasing over time it is possible that better insulated properties would see less metered savings over time from that insulation. This is because other properties from which the comparator group is drawn "catch up" due to higher gas prices and various other reasons. The fact that a much smaller longitudinal change can be seen for cavity wall insulation suggests that this isn't the case for gas consumption. This indicates that the greater reduction in gas savings over time for installations of condensing boilers can be attributed to the degradation of the measure itself.

Figure 3.9: Longitudinal impacts of solar PV installed in 2011



Impacts of solar PV over time are shown in figure 3.9. In this case the reduction in metered savings over time is too large to be attributed to physical degradation of the measure. Sources indicate that degradation of a measure is likely to be below 1 per cent per year, however this

can expected to vary between installations[16]. Unlike gas-saving measures installed in 2016, it is possible that properties in the comparator group "caught up" with the intervention group in their savings, because the average electricity consumption of all domestic properties has decreased over time. This suggests that properties with solar PV are less impacted by electricity price rises and other factors contributing to lower electricity consumption. It also suggests that over time an increasing proportion of the benefit from installing solar PV comes from being able to afford to consume more electricity, rather than from metered savings.

"Other" energy savings

Also new in this years' NEED statistics are estimates for electric savings for all energy efficiency measures (rather than only for solar PV). This was motived by the fact that some gas heated homes are known to supplement their heating with electric heating. This suggests that measures to improve the insulation of a home may save electricity in addition to gas.

Figure 3.10: Median electricity savings for gas-saving measures installed in 2016

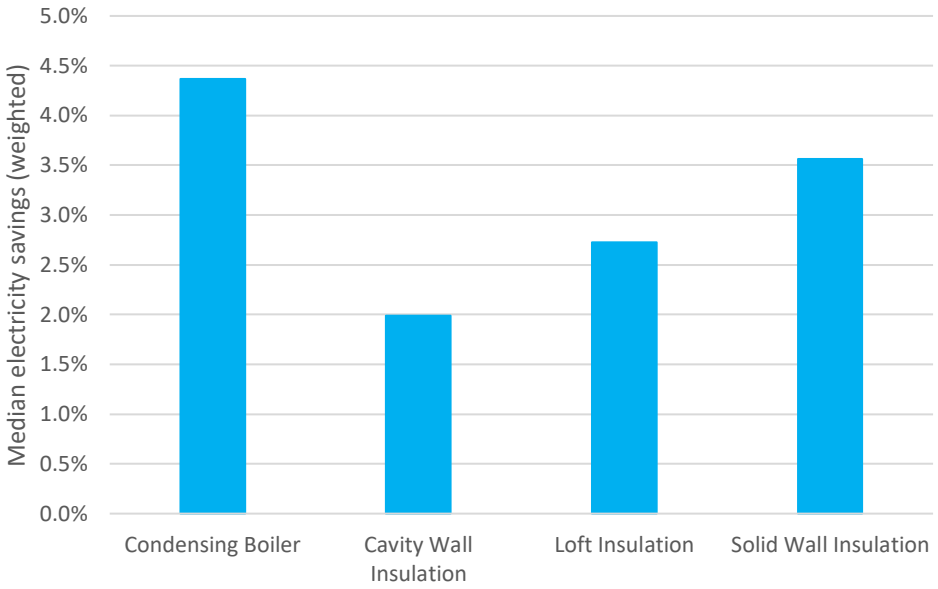


Figure 3.10 above shows the electricity savings for four measures. The data shows that "gas-saving" measures (measures for which the savings were previously expected to be seen in the form of gas), can result in significant electricity savings.

The highest electricity savings are seen from boilers, with a median saving of 4.4 per cent. This is not much lower than the gas savings from boilers (a median of 7.0 per cent). The reason for this saving isn't clear from the data. There are several possible explanations, including that a new boiler incentivises households to heat their home using gas when previously a large proportion of heat was generated by electric heaters.

It should be noted that the intervention group for electricity savings was filtered to ensure reasonable levels of electricity consumption in the years of interest, rather than reasonable

[16] For example: Compendium of photovoltaic degradation rates, Jordan et al, 2016, https://onlinelibrary.wiley.com/doi/abs/10.1002/pip.2744

levels of gas consumption. This means that while there is some overlap between the two intervention groups, they are different.

Scottish measures

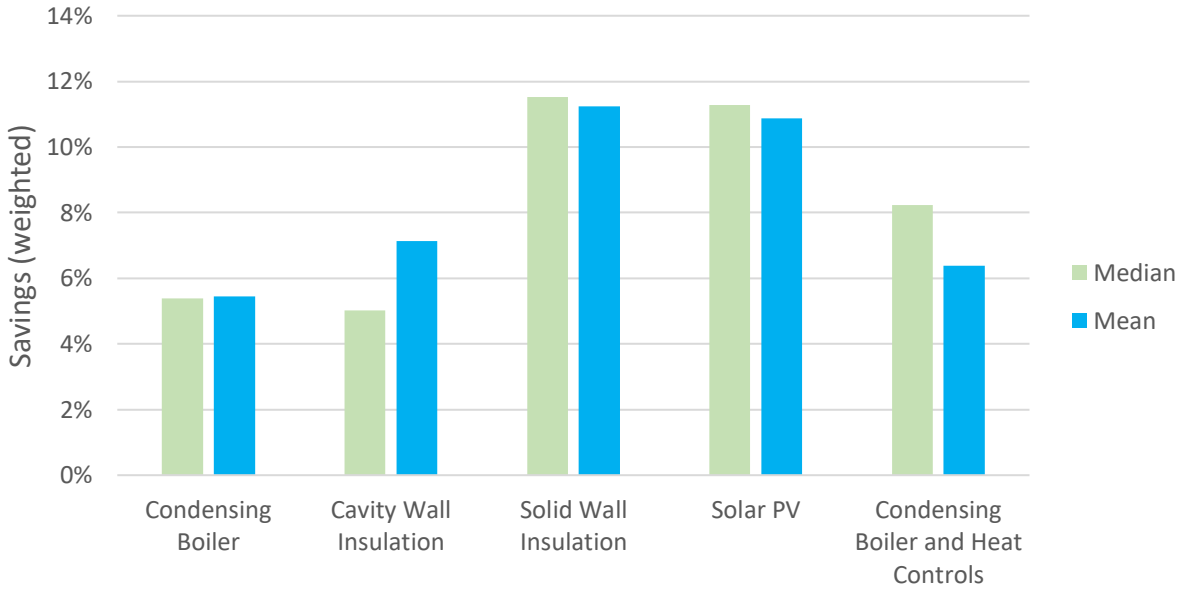
The following section sets out the results for the impact of measures analysis in Scottish domestic properties. Apart from being weighted and paired by slightly different property and household characteristics[17], the method for Scottish properties is identical to that used for properties in England and Wales.

Tables are published alongside this document giving estimated savings for Scottish properties ("Scotland impact of measures 2016").[18]

Single measures

Estimates for the median and mean gas savings from installing various measures are shown in figure 3.11 below, with the exception of solar panels, for which electricity savings are shown. Solid wall insulation can be seen to yield the highest savings. The pattern of savings are similar to those observed for measures installed in England and Wales.

Figure 3.11: Median and mean gas savings in 2017 for measures installed in 2016, Scotland (savings are for electricity for Solar PV)



Combinations of measures

For measures installed in 2016 only one combination of measures met the required sample size for publication (200 properties). This combination was condensing boiler and heating

[17] Property characteristic data is supplied by the Scottish Assessor for Scottish properties, rather than the Valuation Office Agency for English and Welsh properties

[18] The latest impact of measures for Scottish properties can be found here: https://www.gov.uk/government/statistics/national-energy-efficiency-data-framework-need-impact-of-measure-data-tables-2019

controls (included in figure 3.11 above). It should be noted that only some properties with installations are eligible for inclusion in the analysis. That only one combination is included in the analysis doesn't mean that only one combination of installations numbers over 200, rather that this was the case after ineligible properties were removed. Typically 80 to 90 per cent of properties are ineligible (see the accompanying annex "Impact of measures method update", section "Overview of new method" for full details of the eligibility criteria).

Related statistics

Sub-national electricity consumption statistics
Summary statistics of domestic and non-domestic electricity consumption at different geographic levels from local authority to postcode level.
https://www.gov.uk/government/collections/sub-national-electricity-consumption-data

Sub-national gas consumption statistics
Summary statistics of domestic and non-domestic electricity consumption at different geographic levels from local authority to postcode level at different geographic levels from local authority to postcode level.
https://www.gov.uk/government/collections/sub-national-gas-consumption-data

Sub-national total final energy consumption statistics
Summary statistics of domestic and non-domestic consumption of all fuels reported on by BEIS at local authority level.
https://www.gov.uk/government/collections/total-final-energy-consumption-at-sub-national-level

Housing energy efficiency statistics
Monthly statistics on installations under the Energy Company Obligation (and previous schemes.
https://www.gov.uk/government/collections/household-energy-efficiency-national-statistics

Feed-in tariff statistics
Monthly statistics on installations under the Feed-in Tariff.
https://www.gov.uk/government/collections/feed-in-tariff-statistics

Revisions policy

The BEIS statistical revisions policy[19] sets out the revisions policy for these statistics, which has been developed in accordance with the UK Statistics Authority Code of Practice for Statistics[20].

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: energyefficiency.stats@beis.gov.uk

The BEIS statement on statistical public engagement and data standards[21] sets out the department's commitments on public engagement and data standards as outlined by the Code of Practice for Statistics.

[19] https://www.gov.uk/government/publications/beis-standards-for-official-statistics/statistical-revisions-policy
[20] https://www.statisticsauthority.gov.uk/code-of-practice/
[21] https://www.gov.uk/government/publications/beis-standards-for-official-statistics/statistical-public-engagement-and-data-standards

National Statistics designation

National 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 National Statistics was confirmed in February 2015 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[22].

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 BEIS statement of compliance[23] with the Pre-Release Access to Official Statistics Order 2008.

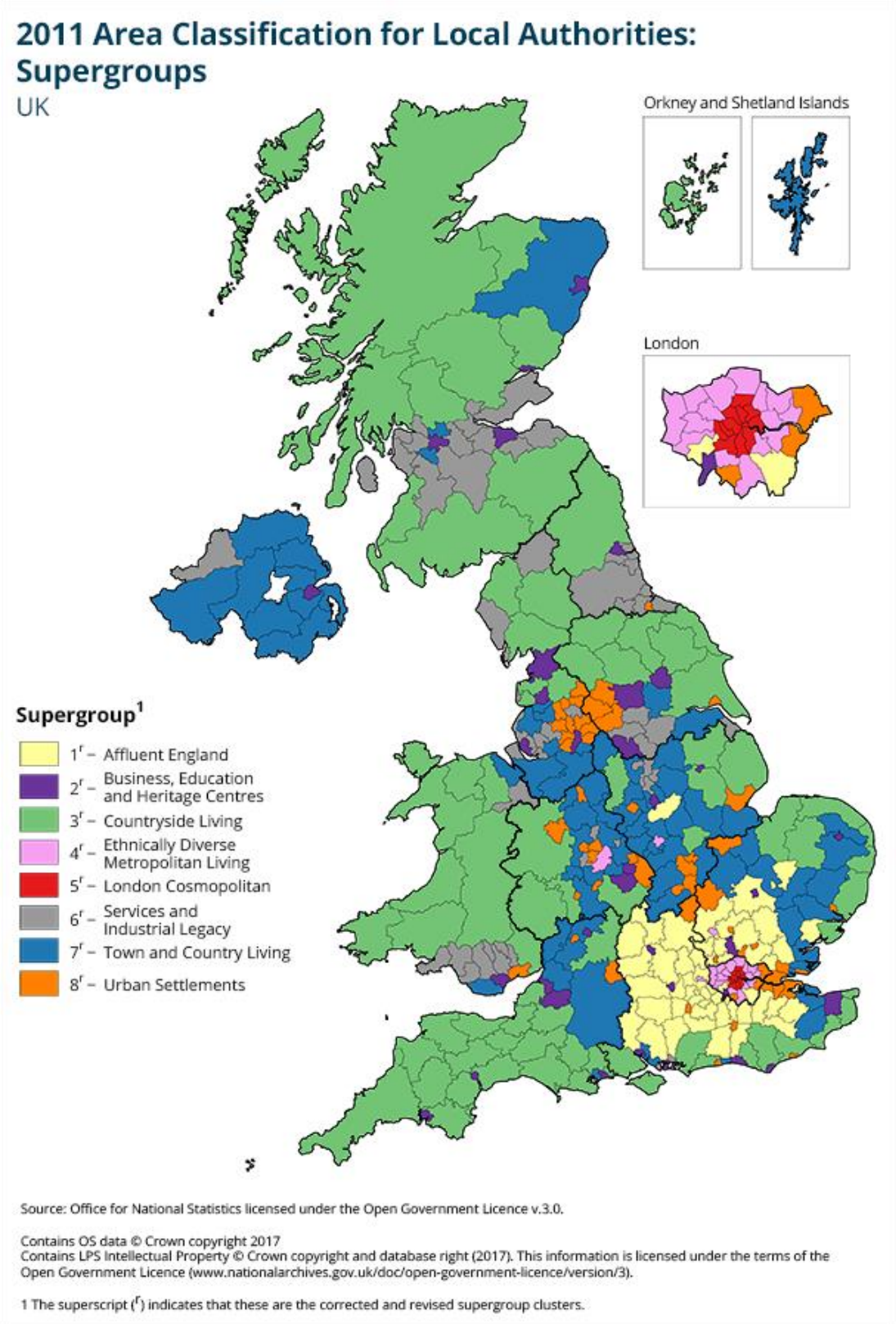
Contact

- Responsible statistician: Adam Bricknell
- Email: energyefficiency.stats@beis.gov.uk

[22] https://www.statisticsauthority.gov.uk/publication/statistics-on-energy-and-climate-change/
[23] https://www.gov.uk/government/publications/beis-standards-for-official-statistics/pre-release-access-to-official-statistics-order-2008-statement-of-compliance

Appendix A: Map of ONS supergroups

The map below shows the ONS supergroup of each local authority in the UK.



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

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