Department of Energy & Climate Change

National Energy Efficiency Data-Framework

Summary of analysis using the National Energy Efficiency Data-Framework (NEED)

25th June 2015

URN 15D/148

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1. Executive summary

The National Energy Efficiency Data-Framework (NEED) was set up by DECC to provide a better understanding of energy use and energy efficiency in domestic and non-domestic buildings in Great Britain. This publication presents:

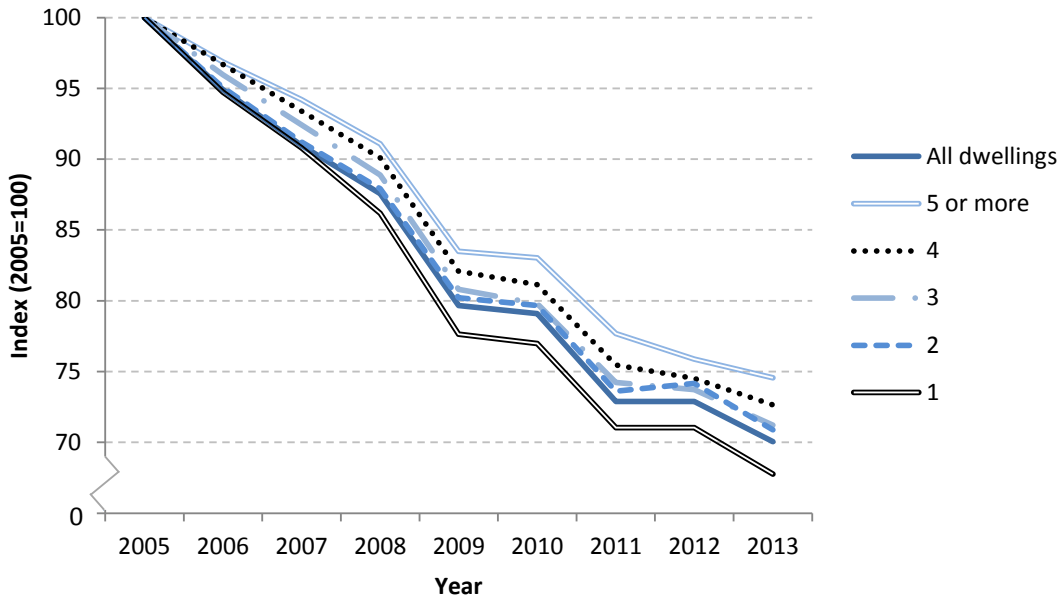
- Analysis of domestic gas and electricity consumption in 2013 by property attribute, household characteristics, geography and socio-demographic classification;
- Analysis of the impact of installing energy efficiency measures in 2012 on a household's gas consumption; and
- A summary of developments to NEED over the last year.

All results produced for this report are for annual consumption based on a representative sample of data for England and Wales unless stated. Results are produced using the methodology outlined in the domestic NEED methodology note published alongside this report[1].

Domestic consumption

Analysis of domestic consumption provides evidence of how energy is used in households. Figure 1.1 shows the trend in median gas consumption for properties by number of adults in a household. It demonstrates that between 2005 and 2013, median gas consumption for all categories follows a similar trend to the change in typical consumption for all dwellings. However, in general, properties with fewer adults showed a greater percentage decrease in median consumption compared with properties with more adults.

Figure 1.1: Median gas consumption by number of adults in a household, 2005 to 2013 (2005=100)



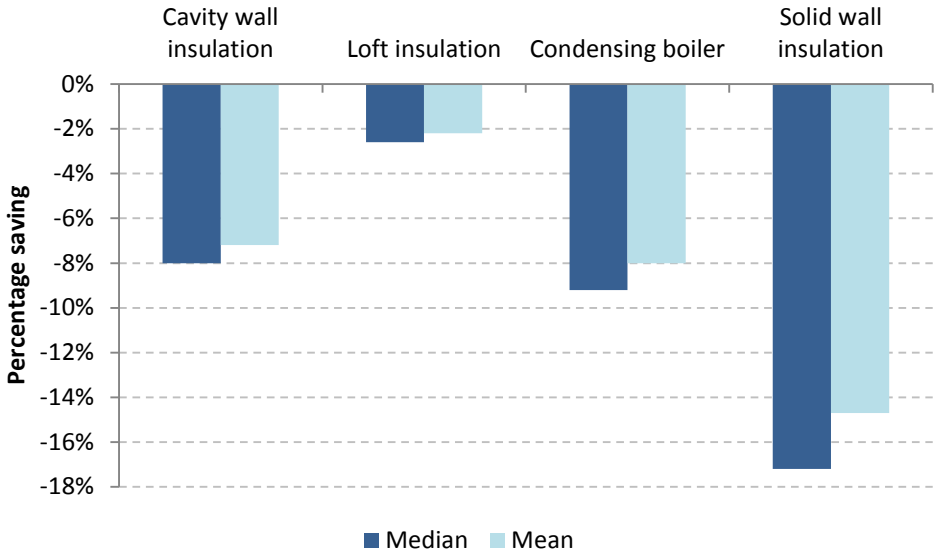
[1] https://www.gov.uk/government/publications/domestic-national-energy-efficiency-data-framework-need-methodology

Although some of the variation in gas and electricity consumption can be explained by variables contained within NEED, there are other factors to consider, for example differences in building construction, differences in performance of heating systems and appliances, and importantly, differences in the behaviours of the individuals within each household.

Impact of measures

Estimates of the impact of installing an energy efficiency measure on a household's gas consumption continue to show that considerable savings can be made by properties installing a single energy efficiency measure, or a combination (for example cavity wall insulation and loft insulation). Figure 1.2 demonstrates the typical savings experienced in gas consumption for properties having either cavity wall insulation, loft insulation, a new condensing boiler or solid wall insulation in 2012.

Figure 1.2: Summary of observed savings for energy efficiency measures in 2012 (median, weighted)



The savings in gas consumption following installation of measures will differ for different households for a variety of reasons, such as household behaviours. The savings presented in this report are observed average savings and reflect what occurs in practice rather than theoretical estimates.

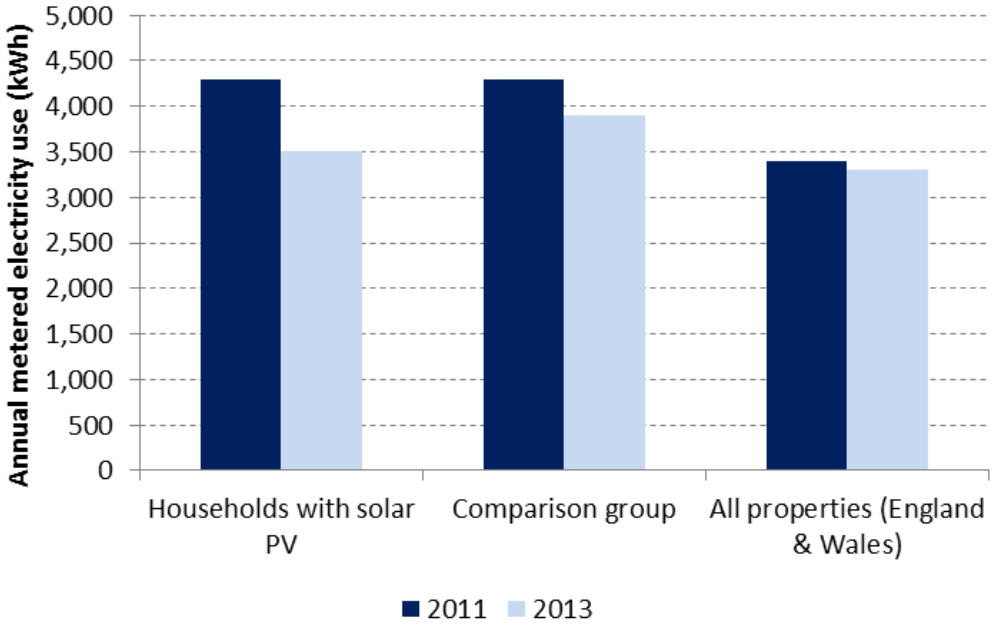
Impact of solar PV installation

For the first time this year, the impact of measures methodology was applied to investigate the impact of renewable microgeneration (solar photovoltaic, PV) technology on households' metered energy use. The analysis also includes a comparison of the distribution of various property attributes (e.g. property type and size) across households with and without solar PV.

The results show that households with solar PV tend to be large, detached properties, typically built in the mid-20th century, and that their geographical distribution across the country is uneven. In terms of energy saving, the installation of solar PV resulted in a considerable decrease in metered electricity use. Figure 1.3 demonstrates typical (median) electricity use in households with solar PV, the comparison group (ie, with no energy efficiency measures

installed at any point), and for all properties in the NEED sample, before and after the installation of solar PV in 2012.

Figure 1.3: Typical metered electricity use (median, not weighted)



The savings in electricity consumption following the installation of solar PV will differ for different households for a variety of reasons. The savings presented in this report are observed average savings and reflect what occurs in practice rather than theoretical estimates. It provides insight into the range of savings experienced and how typical savings vary for different types of properties and households.

Other developments include analysis on the impact that a change in occupancy has on a household's electricity and gas consumption. Further information on these and other developments are covered in Section 5.

2. Introduction

The National Energy Efficiency Data-Framework (NEED) project was set up by DECC to assist in its plan to promote energy efficiency and support vulnerable consumers.

It is a key element of DECC's evidence base supporting DECC to:

- Develop, monitor and evaluate key policies (including the Green Deal and ECO);
- Identify energy efficiency potential which sits outside the current policy framework;
- Develop a greater understanding of the drivers of energy consumption; and
- Gain a deeper understanding of the impacts of energy efficiency measures for households and businesses.

The data framework provides the largest source of data available for analysis of consumption and the impacts of installing energy efficiency measures. This report provides updated domestic/household energy consumption results to include 2013 gas and electricity consumption data. It also includes updated estimates of the impact of installing energy efficiency measures on a household's gas consumption for measures installed in 2012. This report also includes a number of analytical developments which are outlined in Section 5 and the accompanying annexes, such as preliminary analysis of Feed-in Tariff data linked into NEED and analysis of the impact that a change in occupancy has on a household's electricity and gas consumption.

Headline results and key findings are presented in this report, with detailed data tables including breakdowns by property attributes and household characteristics published alongside this report (see Annex E for details of all published tables). In addition to the domestic consumption and impact of measures headline results there are a number of other outputs being published:

- Annex A – Quality Assurance: outlines how data contained within domestic NEED compares with other sources of data.
- Annex B – Electricity use in households with solar PV: presents preliminary analysis on FITs data linked into NEED.
- Annex C – Change of Occupancy: presents preliminary analysis on the impact that a change in occupancy has on a household's electricity and gas consumption.
- Annex D – Scotland: a summary of domestic consumption and estimates of the impact of installing energy efficiency measures on a household's gas consumption for measures installed in 2012 in Scotland.
- Annex E – Data tables: contains details of all published tables.
- Annex F – Summary of Building Regulations: building regulations relating to loft insulation, wall insulation, boiler standards and heating controls.
- Multiple attributes: a table presenting gas and electricity consumption for 2013 by multiple property attributes.

- Table creator: a tool which allows users to create bespoke cross tabulations using gas and electricity consumption data (2005 to 2013) by property attributes and household characteristics.

A domestic NEED methodology note 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) and provides background on the users and uses of the data and details of the revisions policy. This note can be accessed from the following link:

https://www.gov.uk/government/publications/domestic-national-energy-efficiency-data-framework-need-methodology

The statistics presented within NEED were previously assessed by the UK Statistics Authority against the Code of Practice for Official Statistics. The UK Statistics Authority published its report on 12 June 2014: http://www.statisticsauthority.gov.uk/assessment/assessment/assessment-reports/index.html.

The UK Statistics Authority designated these statistics as National Statistics in February 2015, in accordance with the Statistics and Registration Service Act 2007 and signifying compliance with the Code of Practice for Official Statistics following the implementation of a small number of requirements across the range of DECC statistics assessed. These actions were taken forward before the end of September 2014.

Designation can be broadly interpreted to mean that the statistics:

- Meet identified user needs.
- Are well explained and readily accessible.
- Are produced according to sound methods.
- Are managed impartially and objectively in the public interest.

Once statistics have been designated as National Statistics it is a statutory requirement that the Code of Practice shall continue to be observed.

The remainder of this section gives a brief overview of NEED. For any queries or feedback on this publication please email:

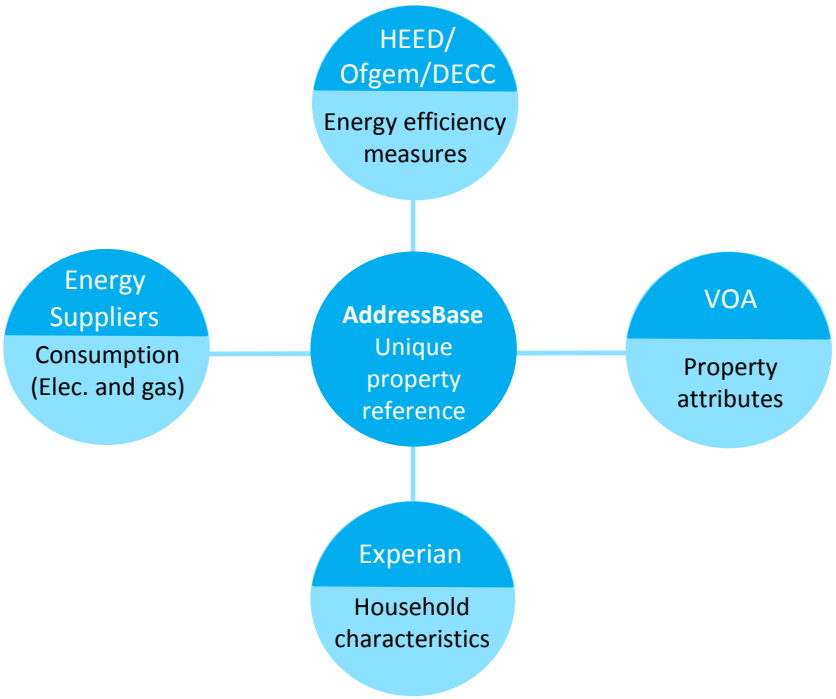
EnergyEfficiency.Stats@decc.gsi.gov.uk

NEED overview

NEED is a framework for combining data from existing sources (administrative and commercial) to provide insights into how energy is used and what the impact of energy efficiency measures are on gas and electricity consumption, for different types of properties and households. The address information in each dataset is used to assign a unique property reference number (UPRN) to each record. Data from different sources can then be matched to each other via the UPRN (Figure 2.1). The principle is the same for both the domestic and non-domestic sector, though different data sources are used.

Six key data sources have been used to analyse domestic energy consumption and the impact of installing energy efficiency measures: meter point electricity and gas consumption data, Valuation Office Agency (VOA) property attribute data, the Homes Energy Efficiency Database (HEED), Central Feed-in Tariff Register[2] and Renewable Heat Incentive (RHI)[3], Green Deal and ECO data held by DECC[4], all of which contain information on energy efficiency measures installed, and data modelled by Experian on household characteristics. In addition to these six main data sources feeding into the framework at a property level there are a number of other indicators that have been assigned to the property based on its geographic location. For example, an index of multiple deprivation and a fuel poverty indicator are assigned based on the Lower Layer Super Output Area (LSOA).

Figure 2.1: Structure of domestic NEED



NEED has supported a number of DECC policies. It has been used to understand the reduction in consumption for households installing energy efficiency measures. To date NEED has looked at savings from a number of measures, including cavity wall insulation, loft insulation, installation of condensing boilers and solid wall insulation. The estimates from NEED were used to inform "in use factors" for the Green Deal. Data on consumption has informed Fuel Poverty analysis so there is a better understanding of actual consumption for different types of properties and households and therefore a better understanding of how policy options will impact on different households.

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[2] Further information on the Central Feed-in Tariff register can be found via this webpage: https://www.gov.uk/government/statistical-data-sets/monthly-central-feed-in-tariff-register-statistics

[3] Further information on the Renewable Heat Incentive can be found via this webpage: https://www.gov.uk/government/collections/renewable-heat-incentive-statistics

[4] DECC collect the Green Deal and ECO data from a number of different sources. Further information on this can be found in the Domestic Green Deal and ECO Statistics Methodology Note: https://www.gov.uk/government/statistics/domestic-green-deal-and-eco-statistics-methodology-note

DECC would like to thank all those who made this analysis possible, including: Energy Suppliers, Gas Safe, the Energy Savings Trust and the Valuation Office Agency.

All analysis of domestic properties presented in this report is based on a representative sample of properties in England and Wales, stratified by local authority, number of bedrooms, property type and property age.

The rest of this report covers:

- Domestic Energy Consumption: analysis of domestic gas and electricity consumption by property attributes, household characteristics, geography and socio-demographic classifications.
- Impact of Energy Efficiency Measures in Homes: analysis of the impact of installing energy efficiency measures on a household's gas consumption.
- Analytical Developments: a summary of development's to NEED over the last year.

3. Domestic energy consumption

This section presents analysis of domestic gas and electricity consumption by property attributes, household characteristics, geography and socio-demographic classifications. It also includes trends in energy consumption between 2005 and 2013. In line with last year's publication, consumption by Fuel Poverty Index[5] (England only), Index of Multiple Deprivation[6,7] and Rural Urban Classification[8] are also published.

All consumption figures presented in this section are based on valid domestic gas and electricity consumption[9] for properties in the NEED sample, and are rounded to the nearest 100 kWh. All gas consumption data are presented on a weather-corrected basis[10]. This means that the consumption for each household has been adjusted to account for differences in temperature and wind in each year. This allows for a more consistent comparison of gas consumption over time. Users should note, however, that the weather correction factor applied to the consumption data is modelled and as such may not entirely remove the effects of extreme weather in a single year.

Results are based on a representative sample of approximately four million properties for England and Wales, with the exception of trends in consumption, which covers only England between 2005 and 2010, and both England and Wales for 2011 to 2013[11]. A sample is used rather than the complete dataset in order to increase processing speed, reduce cost and to ensure that DECC is not processing more data than necessary.

The relationship between energy use and any individual characteristic is complex, but there is a high correlation between a household's energy use and certain characteristics (for example, size of property or household income). This section provides insight into how each characteristic relates to energy use, but makes no attempt to control for other characteristics. The results presented here are consistent with results for earlier years presented in previous reports.

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[5] The definition for Fuel Poverty is introduced in section 2 of the following report: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/211180/FuelPovFramework.pdf.

[6] English Indices of Deprivation: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6871/1871208.pdf.

[7] Welsh Index of Multiple Deprivation: https://statswales.wales.gov.uk/Catalogue/Community-Safety-and-Social-Inclusion/Welsh-Index-of-Multiple-Deprivation.

[8] Rural-Urban Classification for Small Area Geographies User Guide and Frequently Asked Questions: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/239478/RUC11user_guide_28_Aug.pdf.

[9] Valid domestic gas consumption is taken to be values between 100 kWh and 50,000 kWh (inclusive). Domestic electricity consumption is considered valid if it is between 100 kWh and 25,000 kWh (inclusive). Gas and electricity consumption values which are suspected to be estimated readings are excluded.

[10] More information about the weather correction methodology can be found here: https://www.gov.uk/government/statistics/overview-of-weather-correction-of-gas-industry-consumption-data

[11] Results for 2005 to 2013 presented in this report can be considered as a continuous trend. The sample used for England for 2005 to 2010 has very similar mean and median consumption values to the sample used for 2011 to 2013 analysis; the biggest difference in any year is less than 50kWh.

3.1 Headline domestic consumption

In 2013, the median[12] gas consumption for all properties in the sample was 12,400 kWh with median electricity consumption at 3,300 kWh. However, within the distribution there is a range of consumption values, as can be seen from the lower and upper quartiles[13] shown in Table 3.1. The table also shows that mean consumption is larger than median consumption, by nine per cent for gas and 21 per cent for electricity. This is broadly consistent with the difference in averages seen in 2012 (the difference in mean and median in 2012 for gas was 9 per cent and the difference for electricity was 23 per cent). In the rest of this section, median consumption has been used to represent typical consumption. It is a more appropriate measure of typical consumption than the mean because the mean can be influenced by a relatively small number of high-consuming households that are not typical of the rest of the population. The distributions of gas and electricity consumption in 2013 are shown in more detail in Figure 3.1. It shows some of the high-consuming households in the far right tails of the histograms[14], and also that the distribution for both gas and electricity is skewed towards lower consumption values, but that the skew is more pronounced for electricity.

Table 3.1: Annual consumption summary statistics, 2013, kWh

	Mean	Standard deviation	Lower quartile	Median	Upper quartile
Gas	13,500	7,600	8,400	12,400	17,300
Electricity	4,000	2,900	2,100	3,300	5,000

Table 3.1 also shows that there is more variation in electricity consumption than gas consumption. The standard deviation is 56 per cent of the mean for gas and 72 per cent (using unrounded figures) for electricity. The larger variability (or spread of data) for electricity is likely to be due to the wider range of uses of electricity, including the variation between households that use electricity as the main heating fuel and those that do not, as well as the use of electricity for secondary heating.

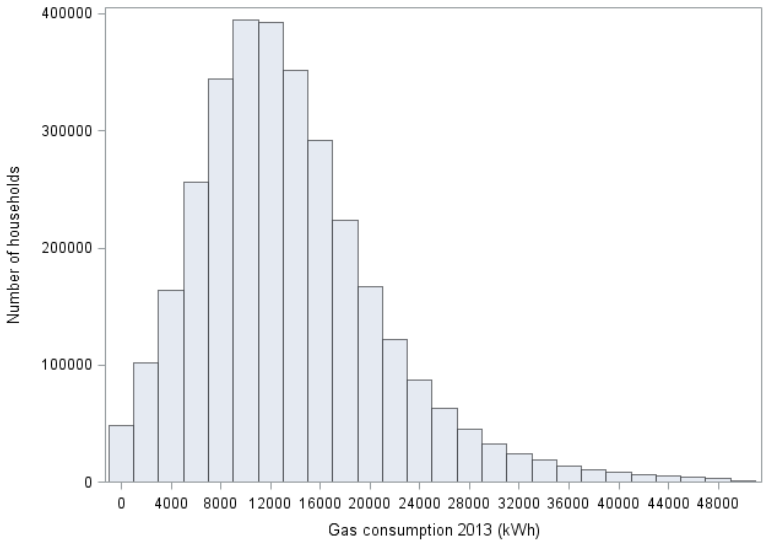
[12] The median is the middle value of the distribution, i.e. the consumption value where half of the households have lower consumption and half have a higher one.

[13] Quartiles (including the median) divide the consumption values into four parts containing the same number of households. The lower quartile is the consumption value where 25 per cent of households have lower consumption and 75 per cent have higher. The upper quartile is the consumption value where 25 per cent of households have higher consumption and 75 per cent have lower.

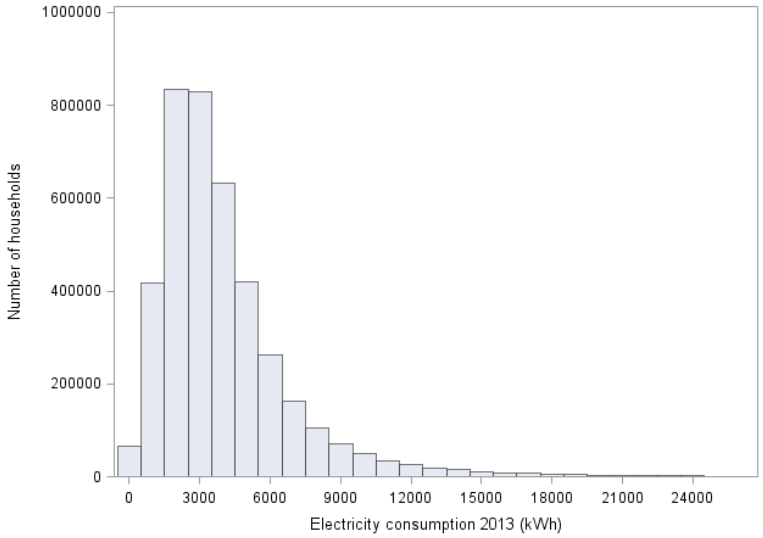
[14] Figures 3.1a and 3.1b show the distributions of gas and electricity in 2013, respectively. It is important to note that the tallest column represents the most common consumption band (mode). Due to the skew of each histogram, the mean and median consumption values can be found in the tail to the right of the mode.

Figure 3.1: Distribution of consumption 2013

(a) Gas consumption (kWh)



(b) Electricity consumption (kWh)



3.2 Domestic consumption breakdowns

This section presents domestic gas and electricity consumption by property attributes, household characteristics, geography and socio-demographic classifications, and highlights some of the findings.

Annex E shows details of all consumption tables available from NEED. For all variables, the number of households in the sample, along with mean and median figures for consumption is included in the headline tables published alongside this report. Additional statistics to describe the pattern of consumption, such as standard deviation and quartiles are included in the additional tables published with this report.

In line with last year's publication, domestic electricity and gas consumption have been published by fuel poverty quintile, index of multiple deprivation quintile and rural urban

classification. These data are available for annual electricity and gas consumption between 2011 and 2013.

Figure 3.2 shows typical electricity and gas consumption for households in 2013, by property type. It can be observed that flats consume the least amount of electricity and gas, in particular purpose-built flats, which consumed 19 per cent less gas in 2013 than converted flats, with typical consumptions of 6,800 kWh and 8,400 kWh respectively. This could be a result of the high proportion of purpose-built flats constructed for social housing, which is known to be more energy efficient[15], and therefore consumes smaller quantities of gas. By comparing property type and tenure it can be seen that 52 per cent of purpose-built flats are council owned or part of a housing association, whereas only 10 per cent of converted flats are part of the 'Council/Housing Association' group, with a greater proportion of converted flats being privately rented or owner occupied.

Figure 3.2: Median electricity and gas consumption, 2013, by property type

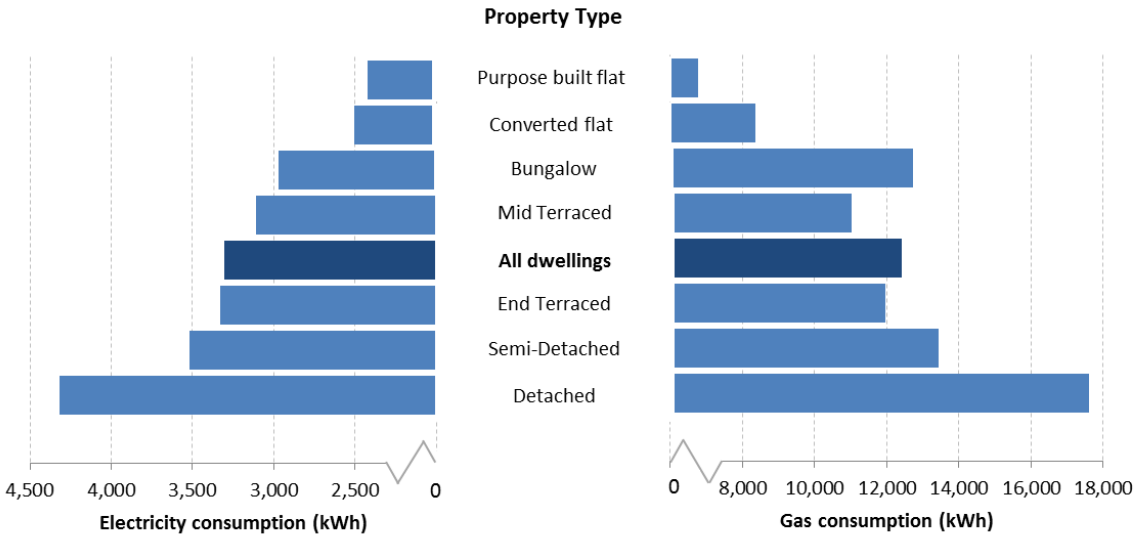


Figure 3.2 also shows that detached houses typically consume more electricity and gas than any other property type. In 2013, a detached house typically consumed 4,300 kWh of electricity and 17,600 kWh of gas, which equates to a consumption of just over one and a half times (159 per cent) more gas and 79 per cent more electricity than a purpose-built flat in 2013. The large difference in gas consumption can be partly explained by the use of gas as a heating fuel and the isolation of a property. As a detached house is not attached to another property, a higher proportion of heat is likely to be radiated from the walls, whereas a flat is surrounded by other flats that also generate heat, which means it is a more efficient property type for keeping the occupants warm. It is also important to note that detached houses are typically the largest property type and therefore will require more gas to heat than a smaller property.

For similar reasons, it can be observed that bungalows typically consume more gas than their typical electricity consumption suggests. Figure 3.2 shows that although a bungalow generally

[15] The energy efficiency of the housing stock has improved between 2005 and 2013 for all households. Figure 2.9 on page 51 of the English Housing Survey headline report 2013-14 shows that in particular properties owned by a housing association have a higher Standard Assessment Procedure (SAP) rating. The report can be found on the following link: https://www.gov.uk/government/statistics/english-housing-survey-2013-to-2014-headline-report.

consumes less electricity than a mid-terraced property in 2013, its typical consumption of gas exceeds that of a mid-terraced property and an end-terraced property.

Figure 3.3 shows typical gas consumption by Index of Multiple Deprivation for England for properties with different numbers of bedrooms. It can be seen from the chart that consumption is higher for properties that are less deprived. For example, households in the least deprived areas with '5 or more' bedrooms typically consumed 29 per cent more gas than properties with the same number of bedrooms in the most deprived band (24,900 kWh for the least deprived compared with 19,300 kWh for the most deprived). This pattern of consumption is seen for each bedroom number band. The pattern seen could be related to the fact that properties in the most deprived areas are more likely to be social housing which is known to be more energy efficient[16], and could therefore be contributing to the lower gas consumption. For the properties with valid gas consumption in 2013, just under half (45 per cent) of properties in the most deprived band are council/housing association properties compared to only four per cent of properties in the least deprived band. In addition to energy efficiency of properties it could also be that households located in more deprived areas are more conscious of the amount they spend on gas and may therefore try to limit the amount they use.

Figure 3.3: Median gas consumption, 2013, by Index of Multiple Deprivation (IMD), kWh

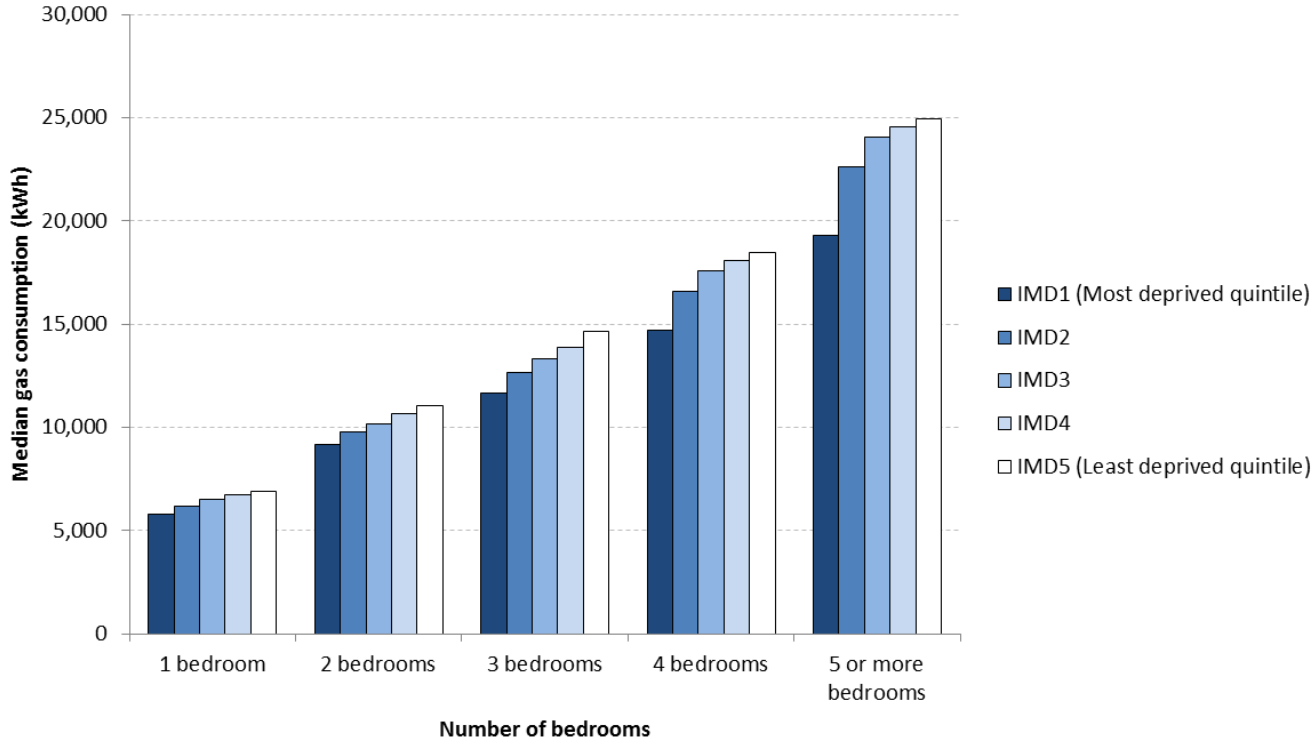


Figure 3.3 was created using data from the NEED table creator tool. This tool is designed to provide users with the ability to create bespoke cross tabulations on electricity and gas consumption by property attributes and household characteristics. Two variables can be selected (e.g. Index of Multiple Deprivation quintile and number of bedrooms) and the table will show the number of observations, mean and median consumption. There is also a choice of

[16] The energy efficiency of the housing stock has improved between 2005 and 2013 for all households. Figure 2.9 on page 51 of the English Housing Survey headline report 2013-14 shows that in particular properties owned by a housing association have a higher Standard Assessment Procedure (SAP) rating. The report can be found on the following link: https://www.gov.uk/government/statistics/english-housing-survey-2013-to-2014-headline-report.

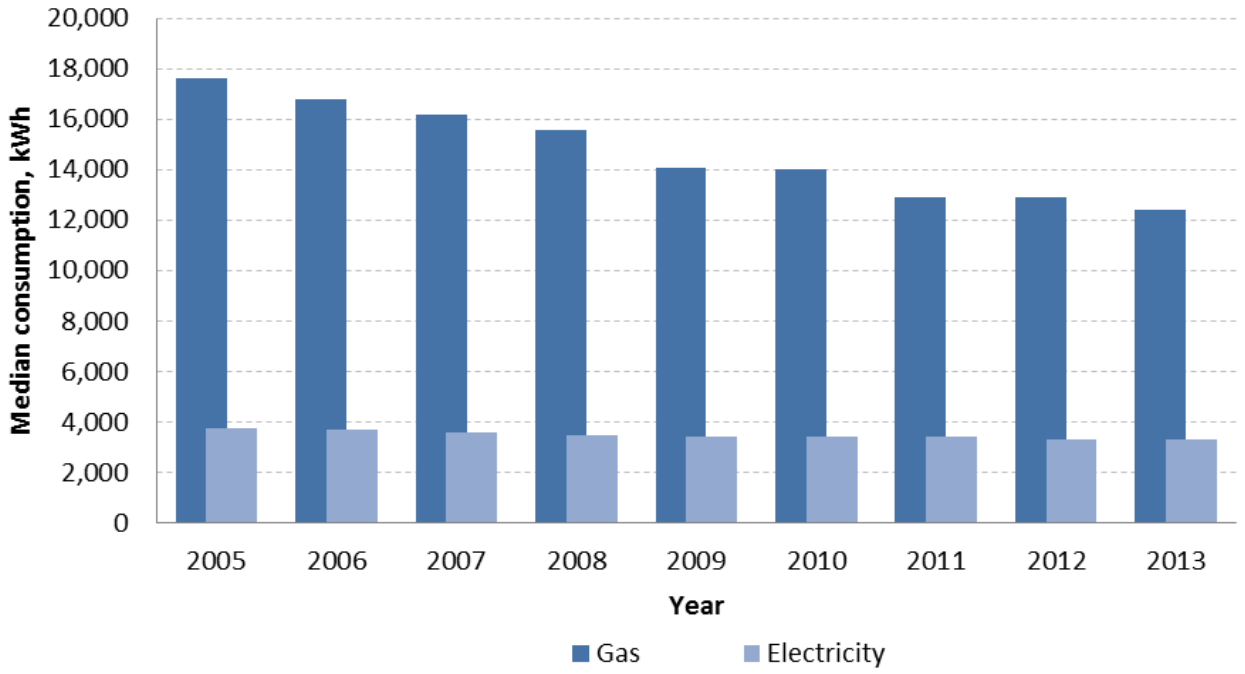
fuel (electricity or gas). Where data are available, data for each year from 2005 to 2013 are included. The data used in the creation of the tables can also be downloaded as a comma separated values (.csv) file for ease of reuse. The tool and data files can be found at the following location: https://www.gov.uk/government/statistical-data-sets/need-table-creator.

3.3 Trends in domestic consumption

This section provides analysis of the trends in median gas and electricity consumption between 2005 and 2013 for different property attributes and household characteristics. Figure 3.4 shows the median gas and electricity consumption for all households in the NEED sample with valid consumption in each year from 2005 to 2013. Data for 2005 to 2010 cover England only and later data (2011 onwards) cover both England and Wales. The gas data used in NEED are weather corrected[17]; the consumption for each household has been adjusted to account for differences in temperature in different years. This allows a more consistent comparison for analysis as it eliminates the fluctuation which would be observed as a result of warmer or cooler weather. Electricity consumption data are not weather corrected because electricity is used for a much wider variety of reasons (and far less often as a heating fuel) so consumption is less affected by the weather. Figures 3.5 and 3.6 respectively show that median consumption for both gas and electricity has been steadily declining over the period.

Median gas consumption has fallen by 30 per cent between 2005 and 2013 (from 17,700 kWh in 2005 to 12,400 kWh in 2013); with median consumption of all households falling year on year, with the only consistency seen in 2011 and 2012, when median gas consumption remained at 12,900 kWh. The largest drop was between 2008 and 2009, with a decrease in median annual consumption of 10 per cent (from 15,600 kWh to 14,100 kWh). Median electricity consumption decreased by 12 per cent between 2005 and 2013, from 3,800 kWh to 3,300 kWh. Between 2012 and 2013 median electricity consumption remained at 3,300 kWh.

Figure 3.4: Median gas and electricity consumption 2005 to 2013, kWh



[17] More information about the weather correction methodology can be found here: https://www.gov.uk/government/statistics/overview-of-weather-correction-of-gas-industry-consumption-data

This reduction in consumption over time could be a result of a number of factors. These potentially include: energy efficiency improvements in households[18], such as new boilers, insulation and more efficient appliances; higher prices and the recession; or changes in the building stock and household composition.

The change in median consumption for the property attributes, household characteristics, geography and socio-demographic classifications follow a similar pattern to that for all dwellings. However, certain households will be more or less affected 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. All changes in consumption are shown as an index relative to a baseline (Baseline year=100)[19].

Trends in domestic consumption by property attributes

Since floor area has been split into different bandings between 2009 and 2010, there is not a complete time series available that covers 2005 to 2013 based on the most recent floor area bandings[20]. However, there is a strong correlation between floor area and number of bedrooms. Information is available for consumption by number of bedrooms that cover the years 2005 to 2013. The following section will focus on typical consumption for properties banded by floor area, from 2010 to 2013.

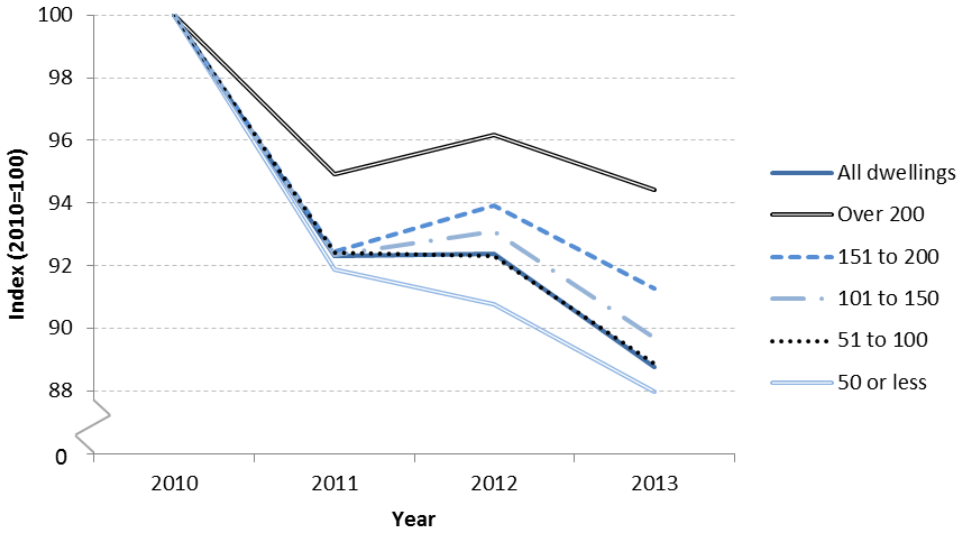
Figure 3.5 shows the trend in median gas consumption between 2010 and 2013 by household floor area. It shows that between 2010 and 2013 there has been a general decrease in typical gas consumption for all household floor area bands. Generally, smaller properties showed the greater percentage decrease in typical gas consumption when compared with larger properties. For example, in 2013 the median gas consumption for a property with an area of '50 or less' metres squared was 12 per cent less than a property of the same size in 2010. On the other hand, a property with a floor area of 'over 200' metres squared only saw a percentage decrease in median gas consumption of six per cent.

[18] The energy efficiency of the housing stock has improved between 2005 and 2013 for all households. Figure 2.9 on page 51 of the English Housing Survey headline report 2013-14 shows that in particular properties owned by a housing association have a higher Standard Assessment Procedure (SAP) rating. The report can be found on the following link: https://www.gov.uk/government/statistics/english-housing-survey-2013-to-2014-headline-report.

[19] Note that the y-axis for these charts does not start at zero in order to allow differences between groups to be seen more clearly.

[20] The most recent floor area bandings are (metres squared): '50 or less', '51 to 100', '101 to 150', '151 to 200' and 'Over 200'. These bandings where changed in 2010 as the former 'Over 250' band had a very small population, which was representative of less than one per cent of the sample for gas between 2005 and 2013.

Figure 3.5: Median gas consumption by floor area, 2010 to 2013



It can also be seen that between 2011 and 2012 there was a slight increase in typical gas consumption for the properties categorised as '101 to 150', '151 to 200' and 'Over 200' metres squared. This growth in typical consumption could be in part explained by cuts to domestic gas prices in early 2012. This meant that gas consumption between 2011 and 2012 remained consistent at 12,900 kWh for all dwellings, as there was less of a financial incentive for customers to conserve gas. The same effect is evident in an increase of median gas consumption seen across most household income bands, especially in more affluent households, between 2011 and 2012.

Figure 3.6 shows the trends in typical electricity consumption between 2010 and 2013. It illustrates the general decrease in median electricity consumption for all sizes of properties during this period. It also shows that larger properties had the greatest reduction in median electricity consumption, between 2010 and 2013, with the two largest property bands experiencing a decrease of six per cent during this period, whereas the two smallest property bands decreased by four per cent between 2010 and 2013. Median electricity consumption remained at 3,300 kWh for all dwellings between 2012 and 2013.

Figure 3.6: Median electricity consumption by floor area, 2010 to 2013 (2010=100)

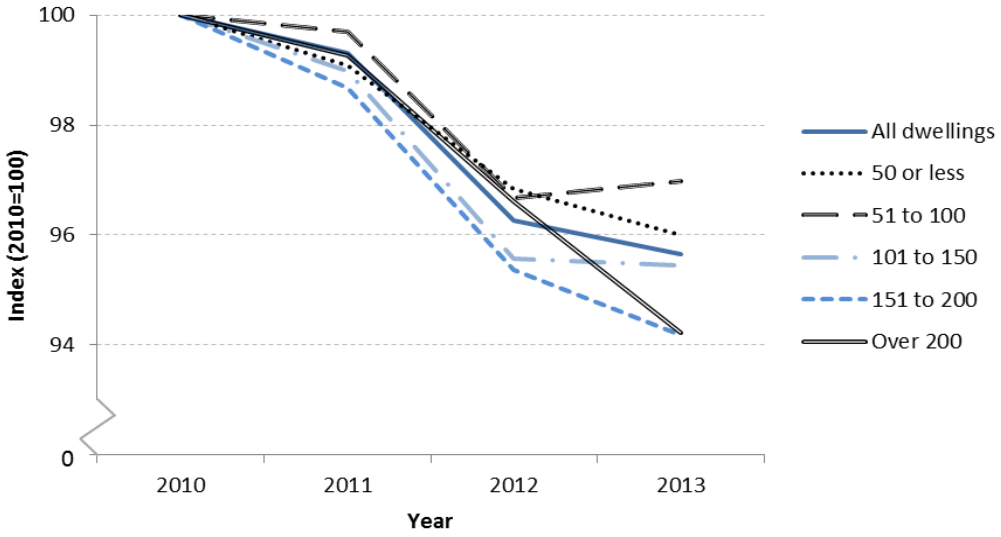


Figure 3.6 illustrates that properties with floor areas of '51 to 100' metres squared increased their electricity consumption between 2012 and 2013 by less than one per cent from 3,000 kWh to 3,100 kWh. Properties with a floor area of 'Over 200' metres squared made further reductions in electricity consumption, decreasing their typical consumption by 3 per cent, between 2012 and 2013.

Trends in domestic consumption by household characteristics

Figure 3.7 shows the trend in median gas consumption for properties by number of adults, using the 2005 median as a baseline (2005=100). It demonstrates that between 2005 and 2013, median gas consumption for all categories follows a similar trend to the change in typical consumption for all dwellings. However, in general, households with fewer adults showed a greater percentage decrease in median consumption when compared with properties occupied with a higher number of adults. For example, in 2013 typical gas consumption for properties with one adult occupant was around 32 per cent lower than in 2005, but for properties with five or more adult occupants, the reduction was approximately 25 per cent.

Figure 3.7: Median gas consumption by number of adults in a household, 2005 to 2013 (2005=100)

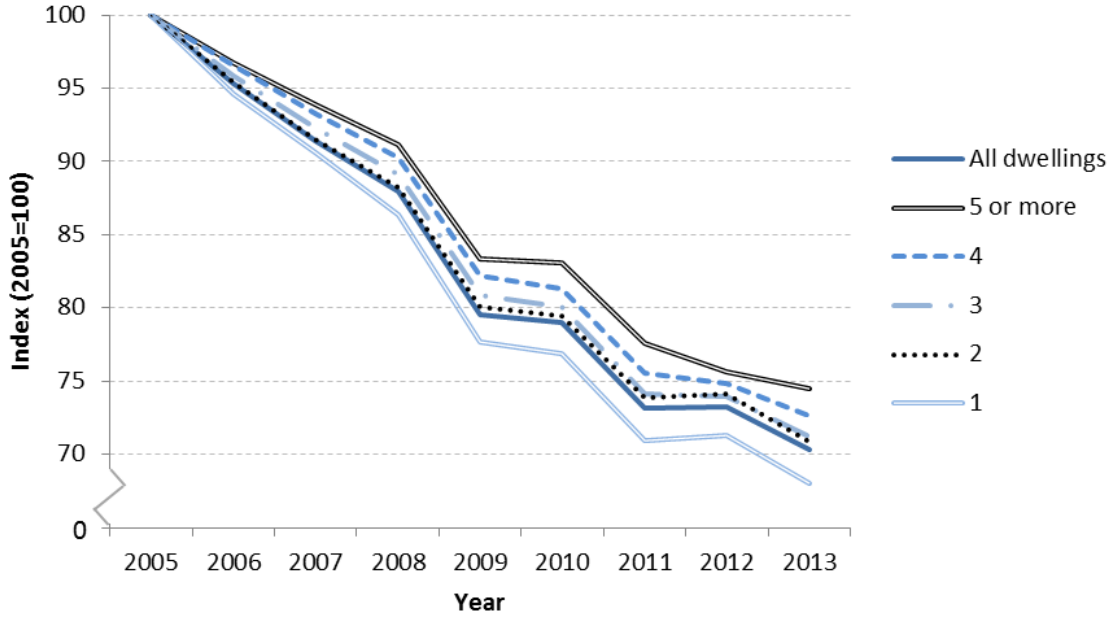


Figure 3.7 also shows that households occupied by two or three adults have seen similar reductions in median gas consumption. It should be noted however, that numbers of children are not included within this analysis, which might account for this slight departure from the general pattern.

4. Impact of energy efficiency measures in homes

4.1 Background

This chapter analyses the impact of installing energy efficiency measures on a household's gas consumption, in England and Wales[21]. The energy efficiency measures included in this section are:

- cavity wall insulation;
- loft insulation;
- condensing boilers; and
- solid wall insulation.

Installing a combination of these measures has also been explored.

It remains important to understand how these measures impact a household's gas use, both to help understand the impact of past policy and help with the effective design of new policies[22].

Results presented in this section refer to the savings in gas consumption for households. All gas consumption data are presented on a weather corrected[23] basis – which means that the consumption for each household has been adjusted to account for differences in temperature and wind each year. Estimates are based on observed savings, so they are savings after comfort taking[24] and do not take into account the quality or coverage of the energy efficiency measure being installed. For example, estimates could include some properties which have only had cavity wall insulation installed in three of their four external walls. This means that individual households have the potential to make a greater saving than the results presented in this report. There is also the potential for households to make smaller savings than those presented here, since there are a number of factors that can impact the amount of gas a household consumes (for example, a change in occupants[25]).

The method used compares the gas consumption in properties before and after an energy efficiency measure has been installed with the change in consumption over the same period for similar properties which have not had a measure installed.

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[21] The impact of installing cavity wall insulation and loft insulation in Scotland are analysed in Annex D.

[22] The impact on domestic electricity consumption following a FiTs installation are analysed in Annex B.

[23] An overview of the weather correction of gas industry consumption data can be accessed here: https://www.gov.uk/government/statistics/overview-of-weather-correction-of-gas-industry-consumption-data.

[24] Comfort taking is where some households take the benefit of the insulation measure through increased warmth rather than entirely through energy saving. For example, a household may have had their thermostat set lower than they wanted in order to lower their gas use, but after installation of an energy efficiency measure they could choose to increase the temperature on their thermostat and use the same amount of energy since their property should now retain the heat better than before due to the improved energy efficiency.

[25] Analysis looking at the impact of a change in occupancy upon household gas consumption has been included in Annex C of this publication.

To do this, intervention and comparator groups are created – with the intervention group containing properties which have received the energy efficiency measure being considered (and no other measure), and the comparator group containing similar properties that have not had a recorded energy efficiency measure installed at any point[26]. The increased number of government schemes[27] included in the analysis this year reduced the number of records in the comparison group resulting in very few (or in some cases no) records for smaller breakdowns. The comparison group has been boosted by using all records from the population dataset which have had no record of an energy efficiency measure installed.

Similarly, the number of solid wall insulation installations has remained low, as has the number of records within the combination of measures datasets. These have also been boosted by selecting all records from the population NEED dataset to conduct these analyses. The population dataset has been used to compile the comparator group, solid wall insulation and the combination of measures datasets to provide a boosted number of properties in the analysis. If the population dataset has been used, this will be clearly indicated at the start of the corresponding section.

Results cover the installation of energy efficiency measures over the period 2005 to 2012. Therefore, the effect of measures installed under GD and ECO in 2013 are not presented in this publication, however properties having measures installed under GD and ECO have been taken into consideration within the comparator group in the analysis. It will be possible to explore the effect of GD and ECO installations within future NEED publications. A more detailed explanation of the methodology used can be found in the Domestic NEED methodology note: https://www.gov.uk/government/publications/domestic-national-energy-efficiency-data-framework-need-methodology.

It should be noted that flats are excluded from the impact of measures analysis due to difficulties with matching information to the correct flat within a building and therefore to the correct annual consumption. Also to note, properties post 1999 are not included in the cavity wall and loft insulation analysis, due to a change in building regulations[28] and the requirement for all properties to have loft insulation and cavity insulation as standard.

All headline figures in this report refer to weighted figures; i.e. the savings have been adjusted to be representative of the complete housing stock rather than just the properties which have had the measure installed through a Government scheme in the year under consideration (the intervention group).

The estimates set out in the rest of this section provide insight into the range of savings experienced and how typical savings vary for different types of properties and households. A negative saving indicates the observed saving in consumption for the intervention group following the installation of an energy efficiency measure, compared to the comparator group.

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[26] This group has no energy efficiency measure recorded as being installed in HEED, Green Deal, ECO, FiTs or RHI. These properties may have a measure installed which has not been recorded in any scheme, for example the homeowner installing their own loft insulation. It should be noted that - with the exception of professional loft insulation - it is equally possible that properties in the intervention group could have installed their own loft insulation, and this will also not be recorded.

[27] Green Deal, ECO, FiTs and RHI measures are included in the analysis for the first time. Results for measures installed in 2013 will be included in the 2016 NEED publication.

[28] Further information about building regulations can be found in Annex F of this publication.

The Domestic Energy Consumption section of this report (chapter 3) presents gas and electricity consumption figures for the representative NEED sample which can help to put results presented in this section into context.

The headline results are presented below and can also be found in Annex E.

4.2 Impact of installing a single energy efficiency measure

This section presents headline results and key findings for the impact of installing a single energy efficiency measure in a household in 2012. Table 4.1 below shows the savings experienced in gas consumption for properties having the following installations in 2012:

- cavity wall insulation – typical savings for properties installing cavity wall insulation were 8.4 per cent (representing a saving of 1,200 kWh).
- loft insulation - typical savings of 2.6 per cent (400 kWh).
- condensing boilers - typical savings of 9.2 per cent (1,300 kWh).
- solid wall insulation[29] - typical savings of 17.2 per cent (2,200 kWh).

Table 4.1: Summary of observed savings (weighted) – single energy efficiency measure installed in 2012

Energy efficiency measure		Percentage saving	Saving (kWh)[1]
Cavity wall insulation	Median	-8.4%	-1,200
	Mean	-7.1%	-1,300
Loft insulation	Median	-2.6%	-400
	Mean	-2.2%	-400
Condensing boiler	Median	-9.2%	-1,300
	Mean	-8.0%	-1,500
Solid wall insulation	Median	-17.2%	-2,200
	Mean	-14.7%	-2,100

(1) Savings in consumption have been rounded to the nearest 100 kWh.

Further information about each energy measure is provided below. Additionally, looking at the savings made by property type provides an opportunity to identify the typical property characteristics which seem to benefit the most from having an energy efficiency measure installed. Detailed data tables including breakdowns by property attributes and household characteristics will be published as part of the 2016 NEED report. A few examples are provided in the following section of how the type of property can help to explain the savings shown.

[29] All figures on solid wall insulation should be interpreted with care since they are based on a much smaller number of records and a less diverse housing stock than other energy efficiency measures presented in this report.

Cavity wall insulation by property type

In 2012, two thirds (66 per cent) of cavity wall insulation installations included in the intervention group were in three bedroom properties. For context about half of the properties (48 per cent) in the NEED sample have three bedrooms[30], in addition the most common type of property in the NEED sample are three bed semi-detached properties, making up 20 per cent of the sample.

Figure 4.1 below shows the observed percentage savings in gas consumption for these three bedroom properties installing cavity wall insulation in 2012 by property type. It shows that when looking at three bedroom properties, detached properties experienced the greatest typical saving, with mid terrace properties seeing the smallest reduction in gas consumption – this pattern has remained unchanged from the 2011 results. It is to be expected that mid terrace properties would see the smallest savings since they only have two external walls, whereas detached, semi-detached and end terrace all have at least three.

Figure 4.1: Observed savings for three bedroomed properties having cavity wall insulation installed in 2012, by property type

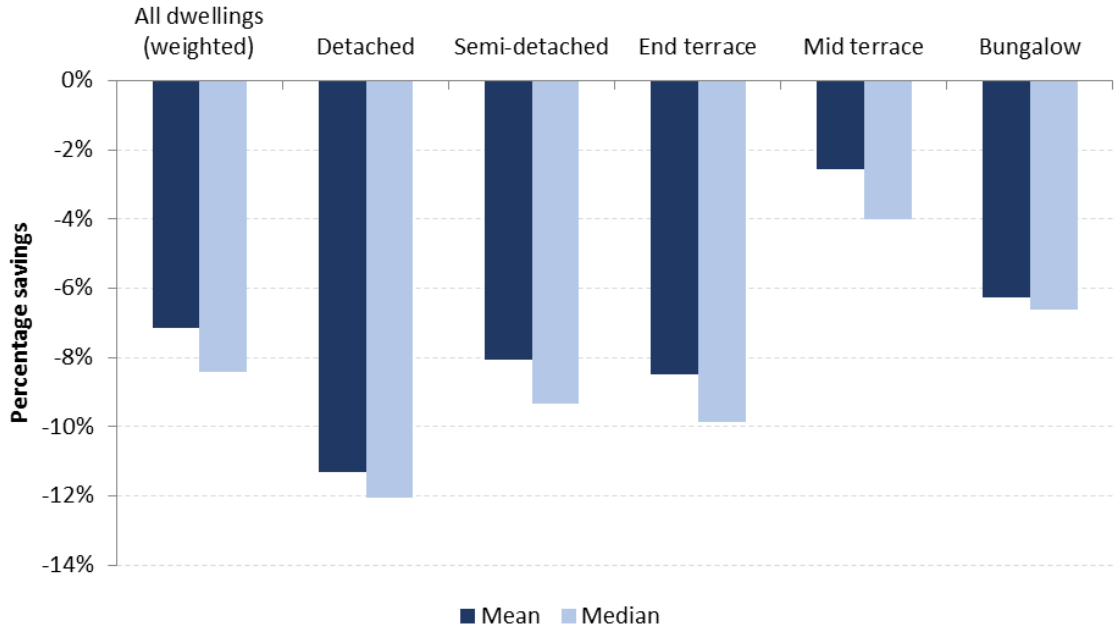
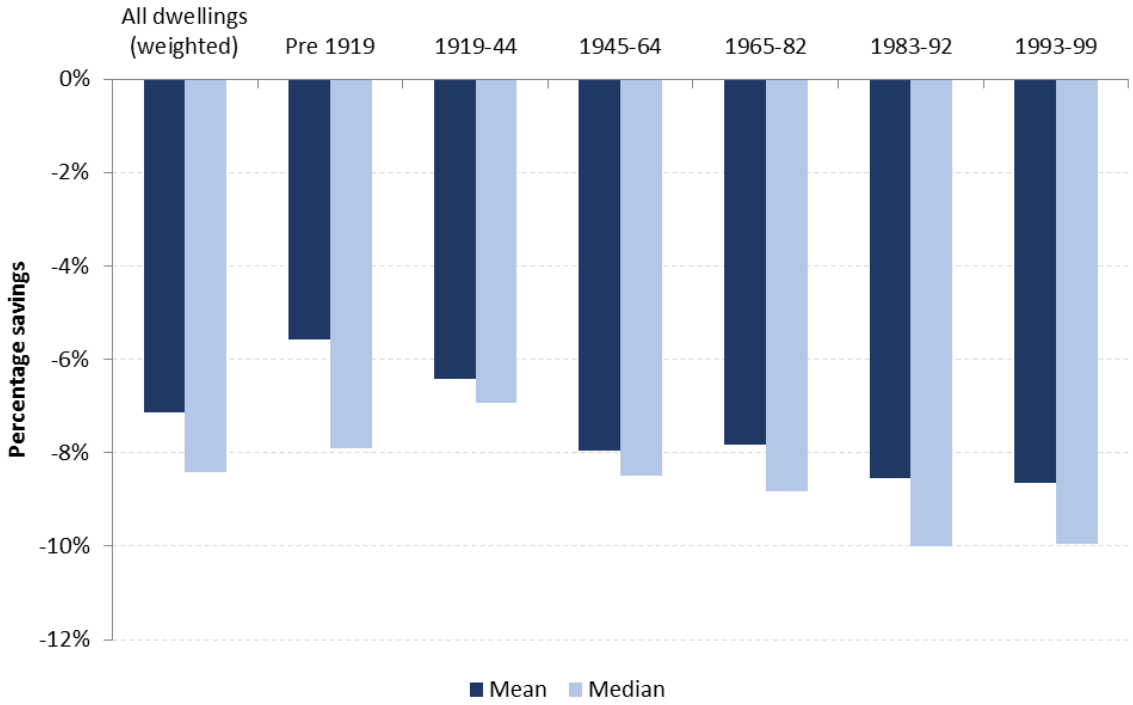


Figure 4.2 shows the observed percentage savings in gas consumption by property age. It shows an overall trend in newer properties experiencing the greatest savings from having cavity wall insulation installed. This could be due to changes in building materials used to meet building regulations[31], impacting the effectiveness of installing an energy efficiency measure.

[30] Based on all properties which have a valid electricity consumption in 2013.

[31] Further information about building regulations can be found in Annex F of this publication.

Figure 4.2: Observed savings for properties having cavity wall insulation installed in 2012, by property age



Loft insulation

Loft insulation installations included in these results cover installations into lofts which had no insulation (virgin loft insulation), and installations into lofts which were already partially insulated (top-up loft insulation). Therefore, households with very little or no existing insulation can expect to save more than the typical savings outlined. Conversely, properties which already have a reasonable amount of loft insulation, or where the existing insulation is being replaced, are likely to experience smaller savings.

It is also possible that these figures slightly underestimate savings because of the potential for DIY loft insulation to be installed in the comparator group, but not in the intervention group. This will mean the comparator group may have experienced some savings as a result of insulation which is not accounted for in the intervention group. Taking into account the prevalence of DIY insulation in the population, this would lead to an underestimate of the savings of less than 100 kWh. Given the scale of the potential issue and the accuracy of reported estimates, no adjustment has been made to the results to account for this, but users should be aware of this possibility when interpreting results.

Condensing boiler

Savings for properties installing a condensing boiler have been presented for the first time. However, there is a lack of availability of data for boiler installations prior to 2009, and therefore historical data have not been included within this publication.

Solid wall insulation

Results for 2012 have been boosted by using all records of solid wall insulation installations from the population NEED dataset as the number of solid wall installations are low when compared with other measures.

There are approximately 1,700 properties included in the impact of a single measure section of this report (for comparison, loft insulation results for 2012 are based on 14,120 measures). There are a number of reasons for this reduced sample size, the first being that not as many properties have received this measure compared to others. In addition, properties which had solid wall insulation are more likely to be excluded from the analysis in NEED. Firstly, solid wall insulation is often installed in flats which are excluded from the impact of measures analysis due to difficulties with matching information to the correct flat within a building and therefore to the correct annual consumption. Secondly, solid wall insulation is often installed in properties which do not have gas as the main heating fuel, and therefore these properties could not be included in this analysis, since record level consumption data are not available for non-metered fuels.

Finally, solid wall insulation is often installed in combination with another energy efficiency measure, such as a new boiler or loft insulation, which means these properties would be excluded from this analysis of purely solid wall insulation alone.

When interpreting the results for solid wall insulation installed in 2012 consideration of the data outlined above should be taken into account. The typical (median) annual percentage saving for solid wall insulation in 2012, when weighted to be representative of the housing stock, is 17.2 per cent, which represents around 2,200 kWh. The mean saving seen was 14.7 per cent, or 2,100 kWh.

Alongside the work being carried out by the DECC statistics team, continued research is also being carried out by DECC in the field to improve understanding of the performance of solid wall properties in the UK housing stock and the effect on energy post-insulation. The research is investigating heat losses through solid walls and other parts of the dwelling, before and after insulation, with the intension to improve models of solid wall dwellings, understand the unintended consequences of solid wall insulation, and improve tools for assessing the energy savings from solid wall properties[32].

4.3 Impact of installing a combination of energy efficiency measures

This section looks at the impact of installing a combination of energy efficiency measures. The number of properties in each combination considered was boosted by selecting the properties in the intervention group from the complete NEED dataset, rather than the sample used for the analysis of the measures individually[33].

The combinations of measures considered in this section are:

- cavity wall insulation and loft insulation;
- cavity wall insulation and a boiler;
- solid wall insulation and loft insulation;
- solid wall insulation and a boiler;

[32] Further information can be accessed here: https://www.gov.uk/government/publications/solid-wall-heat-losses-and-the-potential-for-energy-savings-literature-review

[33] Further details about the methodology used in the impact of measures analysis can be found in the NEED methodology note: https://www.gov.uk/government/statistics/domestic-national-energy-efficiency-data-framework-need-methodology.

- loft insulation and a boiler;
- cavity wall insulation, loft insulation and a boiler; and
- solid wall insulation, loft insulation and a boiler.

The limitations of the data sources as outlined in the impact of a single measure section also apply to data used for the analysis set out in this section. Combinations involving solid wall insulation, loft insulation and a boiler have not been presented in this section due to the small number of records in this group.

Table 4.2 below summarises the median and mean percentage and kWh savings experienced in gas consumption when installing a combination of energy efficiency measures in the same year. Headline figures presented are weighted to be representative of the complete housing stock, rather than just the properties which had the combination of measures installed in the year under consideration.

Table 4.2 shows that the greatest savings can be made by installing solid wall insulation with a condensing boiler (21.3 per cent), followed by solid wall and loft insulation (20.7 per cent). Figures for a combination of all three of these measures (solid wall insulation, loft insulation and a condensing boiler) have not been included as the sample size was very small.

However, there is also a typical saving of around a fifth of annual gas consumption (19.5 per cent) for installing cavity wall insulation, loft insulation and a condensing boiler.

Table 4.2: Summary of observed savings (weighted) – combinations of energy efficiency measures installed in 2012

Energy efficiency measure		Percentage saving	Saving (kWh)
Cavity wall insulation, loft insulation	Median	-11.6%	-1,700
	Mean	-10.0%	-1,800
Cavity wall insulation, boiler	Median	-18.6%	-2,800
	Mean	-15.4%	-2,900
Solid wall insulation, loft insulation[(1)]	*Median*	*-20.7%*	*-2,300*
	Mean	*-17.9%*	*-3,000*
Solid wall insulation, boiler[(1)]	*Median*	*-21.3%*	*-3,200*
	Mean	*-21.7%*	*-3,500*
Loft insulation, boiler	Median	-11.8%	-1,700
	Mean	-10.3%	-1,900
Cavity wall insulation, loft insulation, boiler	Median	-19.5%	-2,800
	Mean	-16.1%	-3,200

(1) Care should be exercised when interpreting the solid wall figures, as these are based on small sample sizes. The combination of solid wall insulation, loft insulation and boiler has not been included as the sample size was very small.

In all but two (solid wall insulation and a boiler, and cavity wall insulation, loft insulation and a boiler) of the combinations above, the saving from installing the measures in combination are slightly higher than the sum of the savings for each individual measure. For example, for the consecutive installation of cavity wall insulation and loft insulation the percentage saving in consumption is 11.6 per cent (Table 4.2). If the installation of cavity wall insulation and loft insulation occur separately the estimated typical savings are 8.4 per cent (cavity wall) and 2.6 per cent (loft insulation). These savings sum to 11.0 per cent, which is approximately 1 per cent lower than the difference shown in Table 4.2 for the installation of both measures in the same year.

4.4 Sustainment of energy efficiency measures

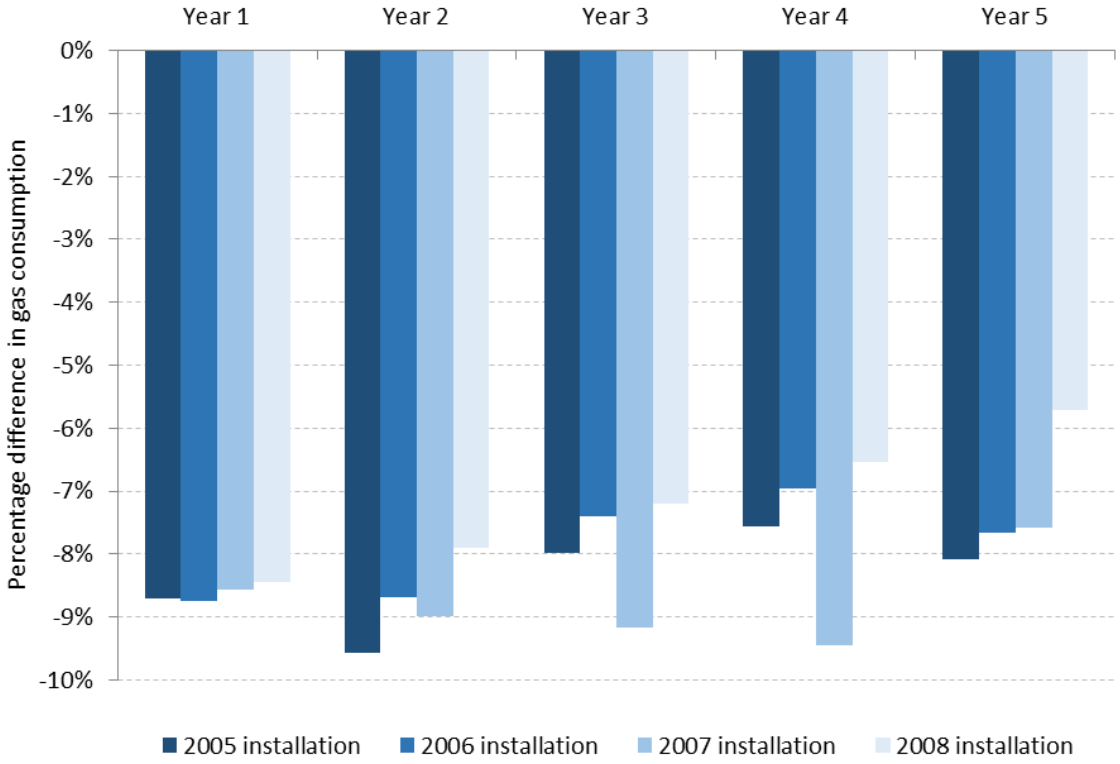
All figures presented in this section are weighted to be representative of the housing stock rather than just properties which had each respective measure installed. The impact of measures analysis primarily compares gas consumption in the year before and after installation of an energy efficiency measure to get an estimate of the annual saving from installing energy efficiency measures. The annual difference in consumption for the intervention and comparator groups has been looked at for cavity wall insulation and loft insulation installed in each year between 2005 and 2008 to analyse whether the savings observed in the year immediately after installation of an energy efficiency measure continue. Analysis for condensing boilers covers 2009 to 2012 only due to the lack of availability of historical data, and analysis for solid walls has not been included in this section.

The time series analysis has been carried out using the same methodology as the 2012 analysis. For example, when looking at the effect of installing cavity wall insulation in 2005, the intervention group includes all properties with a cavity wall insulation installation in 2005 with no other measures installed at any time. Similarly the comparator group also excludes any installations at any point in time.

Cavity wall insulation

Figure 4.3 shows the percentage difference in gas consumption between the intervention and comparator groups for properties installing cavity wall insulation between 2005 and 2008. The biggest difference in median gas consumption is consistently seen in the first few years immediately after installation of cavity wall insulation (years 1 to 4 in Figure 4.3).

Figure 4.3: Percentage difference in gas consumption between the intervention and comparator groups for properties installing cavity wall insulation between 2005 and 2008



For each of the four years looked at, properties which had cavity wall insulation installed typically used between eight and nine per cent less gas than similar properties which did not have a measure installed, in the year immediately after installation of the measure. In each of the four years considered, the overall gap between gas consumption for the two groups then reduces over time, though as demonstrated by Figure 4.3 it does not follow an entirely consistent pattern.

As consumption data is available up to 2013 and measures installed have been looked at between 2005 and 2008 it is possible to compare where these three groups are at five years after installation of the measure. Properties which had cavity wall insulation installed in either 2005, 2006, 2007 or 2008 were typically using between five to eight per cent less gas than the comparator group of similar properties five years after installation of the energy efficiency measure.

Table 4.3 shows the percentage savings in gas consumption after having cavity wall insulation installed in each year between 2005 and 2012. Overall the greatest reductions in consumption occur the first and second years after installation, however as can be seen in the table, there continue to be savings made several years after having cavity wall insulation installed.

Table 4.3: Summary of percentage savings in gas consumption between the intervention and comparator groups for properties installing cavity wall insulation between 2005 and 2012

		Savings after installation (kWh)							
		1 year	2 years	3 years	4 years	5 years	6 years	7 years	8 years
Year of installation	2005	-8.7%	-9.6%	-8.0%	-7.6%	-8.1%	-8.0%	-6.3%	-7.3%
	2006	-8.8%	-8.7%	-7.4%	-7.0%	-7.7%	-7.9%	-8.3%	
	2007	-8.6%	-9.0%	-9.2%	-9.5%	-7.6%	-8.0%		
	2008	-8.4%	-7.9%	-7.2%	-6.5%	-5.7%			
	2009	-8.2%	-8.0%	-7.2%	-8.2%				
	2010	-8.4%	-8.0%	-7.1%					
	2011	-9.2%	-7.7%						
	2012	-8.4%							

It should be taken into consideration that there may be other factors which affect changes in consumption over time. For example, Annex C of this publication explores the effect on household gas consumption following a change in occupancy, which shows an average annual decrease of 2,100 kWh in consumption, compared with a decrease of 600 kWh for the comparison group which had no change of occupancy.

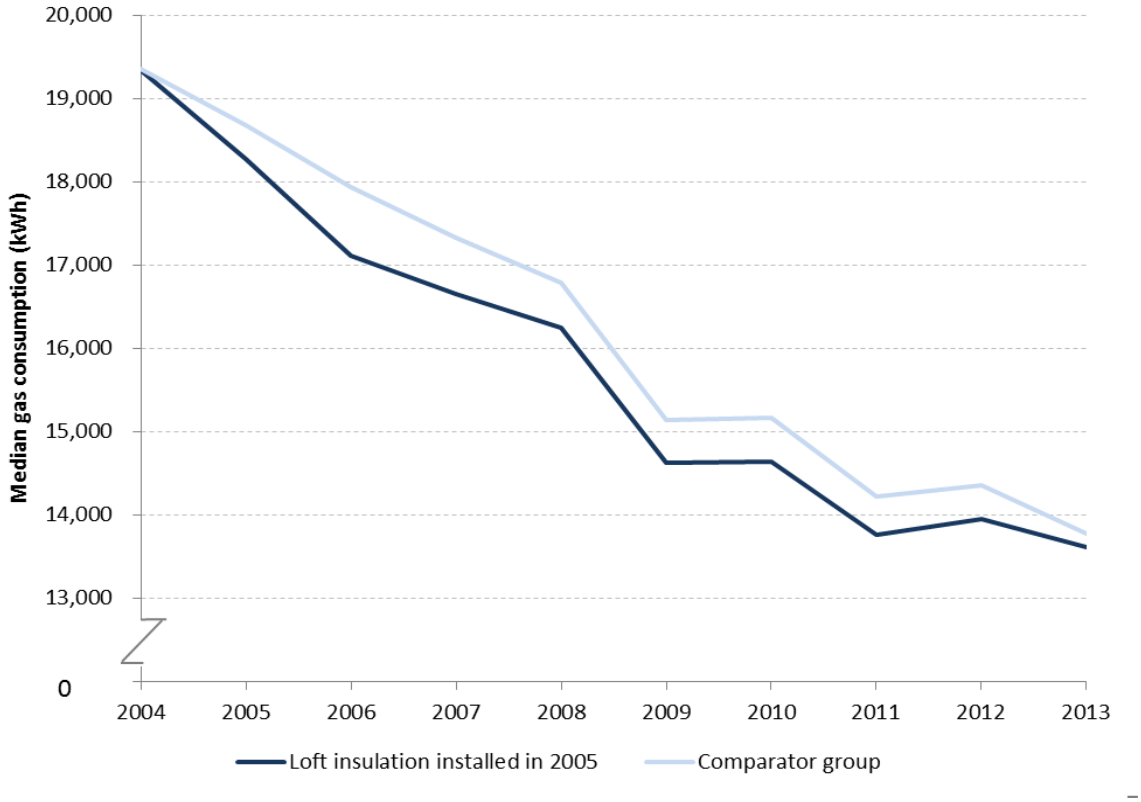
Loft insulation

When looking at loft insulation installed between 2005 and 2012 results follow less of a pattern. Figure 4.4 illustrates the median consumption for the intervention and comparator group for loft insulation installed in 2005.

Figure 4.4 shows that the biggest difference in median consumption for properties installing loft insulation in 2005 and the comparator group was in 2006 – the year following installation. In the analysis here, the median gas consumption the year before installation of the energy efficiency measure is similar, as illustrated when looking at 2004 in Figure 4.4. This is because one of the variables used to select the comparator group was gas consumption in the year before the intervention was installed – to ensure the properties compared were as similar as possible. The consumption for the two groups then diverges in the year that the energy efficiency measure was installed.

Properties which had loft insulation installed in 2005 experienced the greatest savings in consumption within one year of installation - a saving of five per cent compared to the comparator group. There was a one per cent saving in gas consumption eight years after installation of the energy efficiency measure.

Figure 4.4: Loft insulation installed in 2005, long term gas consumption (weighted)



Condensing boilers

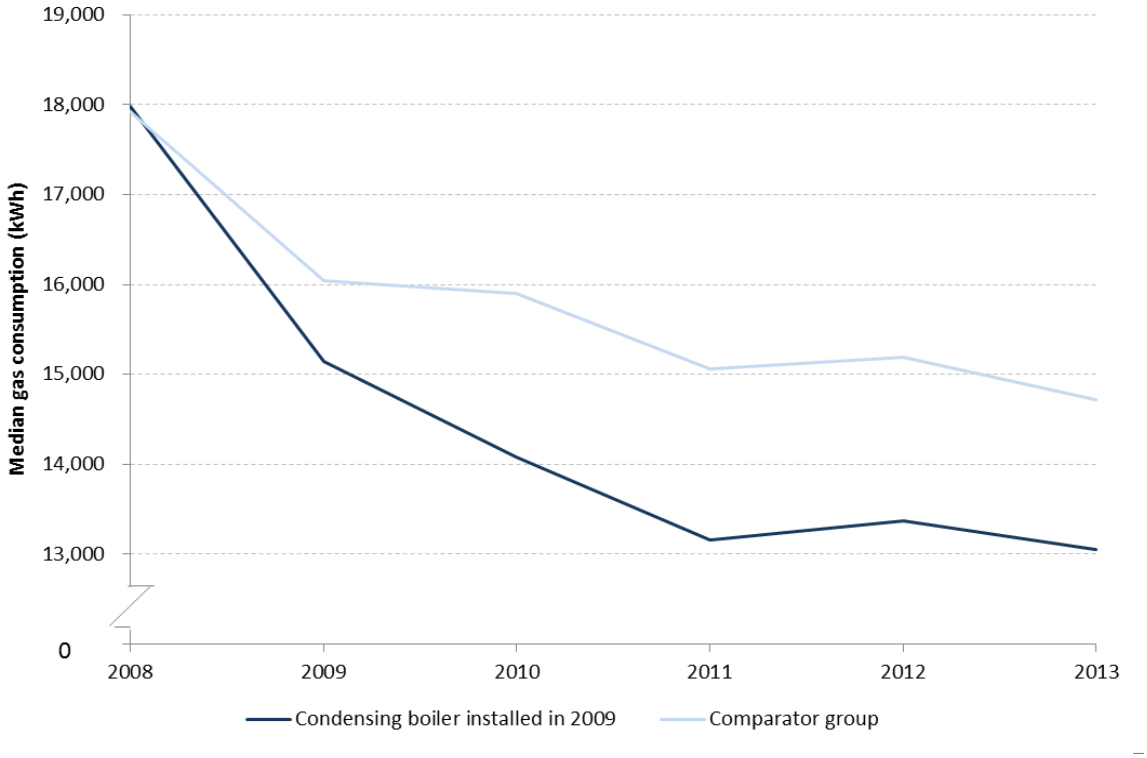
Due to the lack of availability of historical boiler data, this section only considers gas consumption for properties having a boiler installed between 2009 and 2012. Results in this section should be treated as provisional as there may be properties within the control group which have a boiler installed prior to 2009.

Figure 4.5 shows the percentage difference in gas consumption between the intervention and comparator groups for properties installing a condensing boiler in 2009.

Properties which had a boiler installed in 2009 were typically using 11 per cent less gas than the comparator group of similar properties four years after installation of the energy efficiency measure.

More detailed headline figures for the analysis contained in this chapter are available in Annex E. Additional data tables, including breakdowns by property attributes and household characteristics will be published as part of the 2016 NEED report.

Figure 4.5: A condensing boiler installed in 2009, long term gas consumption (weighted)



5. Analytical developments

In addition to the analysis outlined in earlier sections of this report, DECC continues to develop NEED to get increased value from the data it holds. This section summarises developments since the last NEED report in June 2014. More detailed results from some of this new analysis are published in the annexes.

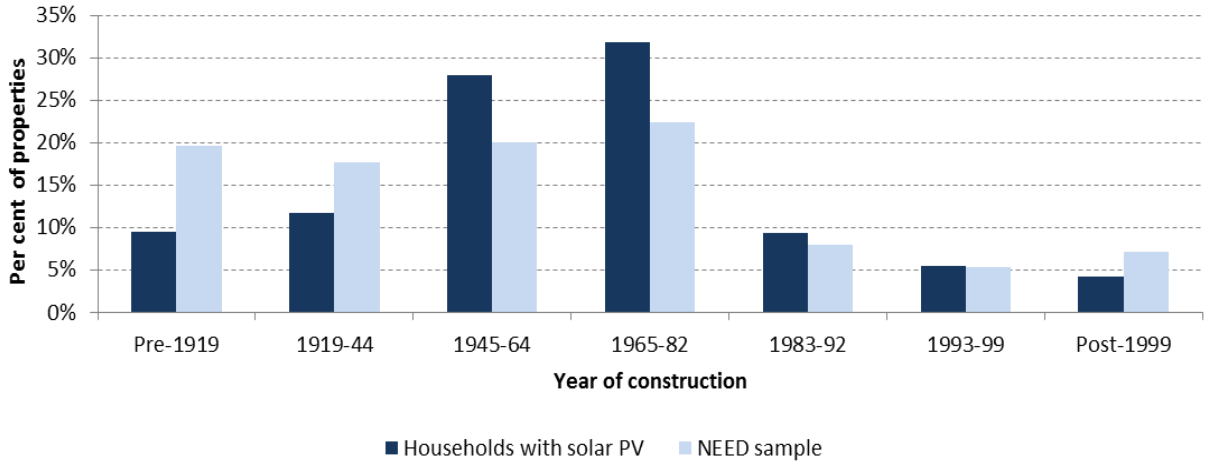
5.1 Feed-in Tariff Analysis

DECC introduced the Feed-in Tariff (FIT) scheme in April 2010 to promote the deployment of a range of small-scale low-carbon electricity generation technologies in Great Britain. The FIT scheme subsidises solar PV, hydro, wind, anaerobic digestion installations below 5 MW, and micro combined heat and power below 2 kW.

The FIT data has been linked to the NEED dataset in an effort to investigate the impact of renewable microgeneration technologies on households' metered energy use.

The majority (60 per cent) of solar PV panels are installed on domestic properties built between 1945 and 1982, which make up 42 per cent of all dwellings (see Figure 3.2). On the other hand, FIT households are underrepresented among very old buildings (21 per cent of properties built before 1944, which comprise 38 per cent of the dwelling stock) and among very young properties (built after 1999).

Figure 3.2: Distribution of building age among FIT households compared to the housing stock



Overall, the results in Annex B reveal that households with solar PV are typically large, detached properties, built between 30 and 70 years ago. Properties of this description tend to have higher energy consumption, and also a larger roof area, which might make the installation of solar PV economically more viable. In addition, microgenerator households are most common in the South of England and in the Midlands, where weather conditions are the most suitable for exploiting solar power.

The results show that households' use of mains electricity (median) fell substantially (by 600 kWh, or 16 per cent) as result of installing solar PV panels compared to a fall of five per cent in similar properties that didn't have solar panels.

5.2 Change of Occupancy Analysis

This analysis investigates the impact that a change in occupancy has on a household's electricity and gas consumption. This project forms part of DECC's continued effort to better understand the drivers of domestic energy use. Some of these drivers are specific to the property, such as floor area and building type, while others depend on the characteristics of the occupants, such as the number of people in the household and the level of energy awareness, among others. While property characteristics typically remain unchanged after a change of occupancy, behavioural differences between the old and the new occupants may lead to a change in energy consumption.

The analysis investigates the change in electricity and gas consumption during the calendar years before and after 2012 (the year the property was sold). In line with the impact of measures analyses, a 'difference in difference' approach is used, i.e. the decrease in energy use from 2011 to 2013 in the properties that changed occupants in 2012 is compared to the decrease experienced by a matched comparison group of properties that were not sold between 2011 and 2013.

Table 3.1 shows the average (mean) and typical (median) decrease in gas consumption figures from 2011 to 2013, in the intervention and comparison groups.

Table 3.1: Summary of observed gas savings in properties sold in 2012

		Percentage saving	Saving (kWh)
Sold in 2012	Mean	-9.7%	-2,100
	Median	-9.8%	-1,400
Comparison group	Mean	-2.7%	-600
	Median	-1.5%	-200

From similar baseline levels in 2011, gas consumption figures decreased in both sold properties and in the comparison group, but at a different rate. By 2013, properties that were sold in 2012 used, on average, 2,100 kWh (9.7 per cent) less gas, while those that were still occupied by the same people experienced an average saving of just 600 kWh (2.7 per cent). Although new owners may choose to install energy efficiency measures when they purchase a property, this cannot account for the energy saving in this case because the intervention group was selected from a pool of properties that have no records of major energy efficiency measures, such as cavity wall or loft insulation. It is possible that the saving is partly due to modifications to the property that are not recorded in any of the databases which feed into NEED, such as room conversions. Changes in the composition of the household and in the circumstances of the old and the new occupants will also contribute to the difference.

Further possible reasons for the observed falls in gas consumption are discussed in Annex C, along with a similar analysis of electricity consumption.

5.3 Data Linkage

This is the first year where DECC have linked and included energy efficiency measures installed under the Feed-in Tariff, Green Deal and ECO schemes to the NEED dataset. The addition of the Green Deal and ECO data have been beneficial to help estimate the typical savings made for energy efficiency measures installed in 2012, by excluding properties which have had measures installed under these schemes from the comparator group. The absence of this data would have influenced the impact of the typical savings made by each measure. The Feed-in Tariff data has also been useful for this reason but it has also helped to extend the analysis carried out in December 2014, on energy usage in households with solar PV installations[34]. A summary of this extended analysis can be found earlier in this chapter and more detailed results can be found in Annex B.

5.4 Scottish Assessors Data

The NEED report published in June 2014 mentioned that Scotland were not included within the main part of the report as property attribute data equivalent to that held at the Valuation Office Agency for England and Wales were not available. Since last year's publication, DECC have worked with the Scottish Government to obtain this data from the Scottish Assessors (Scotland's equivalent of the Valuation Office Agency). Some preliminary quality checks of the dataset that has been provided shows the data does not meet the standards required for the NEED publication. Therefore, DECC have continued to use modelled data but will be working with the Scottish Government to improve the quality of the Assessors data for future use. Further details on the 2013 analysis of household gas and electricity consumption in Scotland as well as the headline estimates of typical savings made in 2012 from installing energy efficiency measures, which now also includes solid wall insulation, can be found in Annex D.

[34] https://www.gov.uk/government/statistics/energy-trends-december-2014-special-feature-article-energy-usage-in-household-with-solar-pv-installations

6. Summary and next steps

The domestic consumption analysis presented enables gas and electricity headline consumption values to be analysed by property attributes, household characteristics, geography and socio-demographic classifications. This means that consumption can be looked at by property type for example, to see which types of property consume the most and how trends in consumption vary for different types of households between 2005 and 2013. The results of this work provide important evidence to DECC and other users on how energy is consumed among different groups of interest.

The impact of measures analysis shows that there are significant savings from installations of all the energy efficiency measures considered in this report and provides further support for the value of installing each of these measures individually or in combination. The longer term savings associated with installing measures have been explored for cavity wall insulation and loft insulation for a wider range of years than previously presented. These findings show that properties continue to experience savings in the years after installation of a measure.

As outlined in the introduction, NEED has developed significantly over the past few years and DECC plans to continue to develop NEED in future to meet the requirements of users inside and outside the department.

The core output from NEED will continue to be the analysis produced in this annual report; with the next publication planned for June 2016 (which will be confirmed on the UK National Statistics Publication Hub). It will cover consumption data for 2014 and the impact of energy efficiency measures installed in 2013.

In addition to the annual National Statistics outputs NEED is also used to support monitoring and evaluation of DECC policies on a more ad hoc basis. Analytical outputs from this work will be made available through future NEED reports and via articles in existing DECC publications[35]. Work planned includes:

- Interaction of household policies: information on households benefitting from a range of DECC policies, including Green Deal, Energy Company Obligation, Renewable Heat Incentive and Feed-in Tariffs will be linked through NEED to provide a better understanding of the interaction of different DECC policies which affect households.
- Scotland: this report includes consumption and impact of measures analysis by property attributes and household characteristics for Scotland. This analysis is based on Experian modelled data. DECC is hoping to gain access to better quality data from the Scottish Assessors. This would provide a more accurate source of property attribute information and enable analysis for Scotland to be more consistent with analysis for England and Wales.

[35] Including statistical publications linked to specific policies or through wider DECC publications such as Energy Trends: https://www.gov.uk/government/collections/energy-trends.

- DECC continues to conduct research into the drivers of energy consumption, both behavioural and otherwise. As part of this effort, a model of gas consumption will be constructed, which will help explore these drivers and establish their relative importance and interactions. Once completed, this model will help DECC better understand patterns in energy use, and can inform the development and evaluation of diverse policies.
- Assessing the feasibility of publishing estimates of sub-national gas consumption without weather correction.

DECC will continue to engage with users to ensure future priorities reflect the views of users and would welcome input by email at: EnergyEfficiency.Stats@decc.gsi.gov.uk.

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