



Annex D: Scotland

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Introduction

Data for Scotland are not included in the NEED analysis in the main part of the report as property attribute data equivalent to that held at the Valuation Office Agency for England and Wales are not currently available to DECC. DECC continues to work with the Scottish Government to acquire equivalent data from the Scottish Assessors. A provisional dataset was delivered to DECC, however, preliminary analysis showed that the dataset did not meet the required quality. While these data are not available, provisional estimates based on modelled data continue to be produced and are presented in this Annex.

These results have been produced using the same methodology used for England and Wales. This includes using the meter point gas and electricity consumption data for properties in Scotland¹, as published in DECC's sub-national consumption publications^{2,3}. It also takes information from the Homes Energy Efficiency Data-Framework (HEED), Energy Company Obligation (ECO), Green Deal, Renewable Heat Incentive (RHI) and Feed-in Tariffs on energy efficiency measures installed in households. The main difference is that modelled data from Experian have been used for property attributes and household characteristics in this analysis, while in the analysis for England and Wales modelled data are only used for household characteristics.

The use of modelled data for property attributes in Scotland allows analysis to be undertaken. However, it also increases uncertainty in the estimates. Therefore these results should be treated as provisional and interpreted with caution. To help reduce uncertainty, the results for Scotland are based on all properties in Scotland that could be matched to valid consumption data, unlike England and Wales where a sample of properties is used for analysis⁴.

Estimates presented in this Annex will be revised if DECC get access to more accurate property attribute data from the Scottish Assessors. At which point DECC will also look to fully integrate Scottish households into NEED.

This annex outlines the domestic gas and electricity consumption statistics for 2013 (and 2011/2012 in the accompanying tables) including consumption by property attributes and household characteristics. It also presents savings in gas consumption for properties installing an energy efficiency measure in Scotland in 2012. Detailed data tables are also being published alongside this annex, these include breakdowns by property attributes and household characteristics (see Annex E for details of all published tables).

Further information on NEED, including its structure, how estimates of domestic electricity and gas consumption by property attributes and household characteristics are produced and the methodology for estimating the saving in gas consumption following the installation of retro-fit

¹ Record level consumption data are not available for non-metered fuels.

² <https://www.gov.uk/government/collections/sub-national-gas-consumption-data>

³ <https://www.gov.uk/government/collections/sub-national-electricity-consumption-data>

⁴ Match rates for England, Wales and Scotland combined are shown in Annex A – Quality Assurance.

energy efficiency measures (e.g. cavity wall insulation, loft insulation) can be found in the domestic NEED methodology note: <https://www.gov.uk/government/publications/domestic-national-energy-efficiency-data-framework-need-methodology>.

Domestic consumption

This section presents analysis of domestic gas and electricity consumption in 2013 (2011/2012 results are also included in the accompanying tables) by property attributes and household characteristics for properties in Scotland. Consumption figures presented in this section of the report are based on all properties located in Scotland with valid domestic gas or electricity consumption⁵ and are rounded to the nearest 100 kWh. All gas consumption data are presented on a weather corrected basis. This means that the consumption for each household has been adjusted to account for differences in temperature and wind in each year within the relevant geographic area. This allows for a more consistent comparison of gas consumption over time, however users should note 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.

Headline consumption

In 2013, the median⁶ gas consumption for properties in Scotland was 13,300 kWh with median electricity consumption at 3,500 kWh. The equivalent figures for England and Wales are 12,400 kWh and 3,300 kWh respectively, showing that typical consumption in Scotland is slightly higher than in England and Wales for both gas and electricity (seven and six per cent respectively). Table D.1 below shows that, as with England and Wales, when looking at the distribution there is a range of consumption as can be seen from the lower and upper quartiles⁷.

The table also shows that mean consumption is larger than median consumption, by 11 per cent for gas and 28 per cent for electricity⁸. Compared with the respective figures of nine per cent and 21 per cent for England and Wales, it shows that there is a significantly larger difference between mean and median electricity consumption in Scotland when compared with the rest of Great Britain. This could be being influenced by the greater proportion of households in Scotland not being connected to the gas network and therefore having to use electricity for a wider range of purposes (17 per cent in Scotland, compared to 10 per cent in England and 15 per cent in Wales)⁹.

⁵ 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.

⁶ 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 higher.

⁷ 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.

⁸ The mean is being influenced by a relatively small number of households using higher consumption which make it larger than the median.

⁹ <https://www.gov.uk/government/publications/sub-national-estimates-of-households-not-connected-to-the-gas-network>

Table D.1: Annual consumption summary statistics for Scotland, 2013, kWh

	Mean	Standard deviation	Lower quartile	Median	Upper Quartile
Gas	14,700	8,500	8,800	13,300	18,900
Electricity	4,500	3,600	2,200	3,500	5,400

Table D.1 also shows that there is more variation in electricity consumption than gas consumption. The standard deviation is 58 per cent of the mean for gas and 80 per cent for electricity (these figures are broadly in line with equivalent figures for England and Wales of 56 and 72 per cent respectively). This is because gas is primarily used for heating and cooking, while electricity can be used for a range of purposes.

In the rest of this chapter, median consumption is 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.

Domestic consumption breakdowns

This section presents domestic gas and electricity consumption by property attributes and household characteristics. It presents the results for Scotland using NEED for these breakdowns and also makes comparisons with results for England and Wales.

For all of these variables, the numbers of households along with mean and median figures for annual consumption (2011 to 2013) are 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 also published alongside this report. The headline and additional tables are published as two Excel documents alongside this annex: Scotland consumption headline tables 2013 and Scotland consumption additional tables 2013.

Property attributes

Figure D.1 below shows the typical (i.e. median) annual gas and electricity consumption for households in Scotland by number of bedrooms – this can also act as an indicator of property size, as there is a strong correlation between the number of bedrooms in a property and the floor area of the property.

Figure D.1: Median electricity and gas consumption, 2013, by number of bedrooms

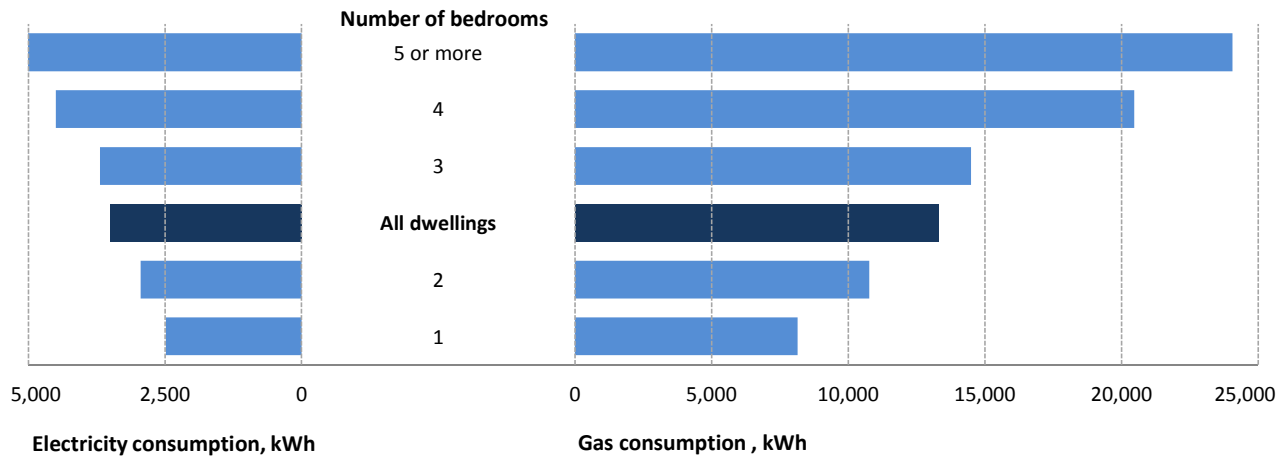
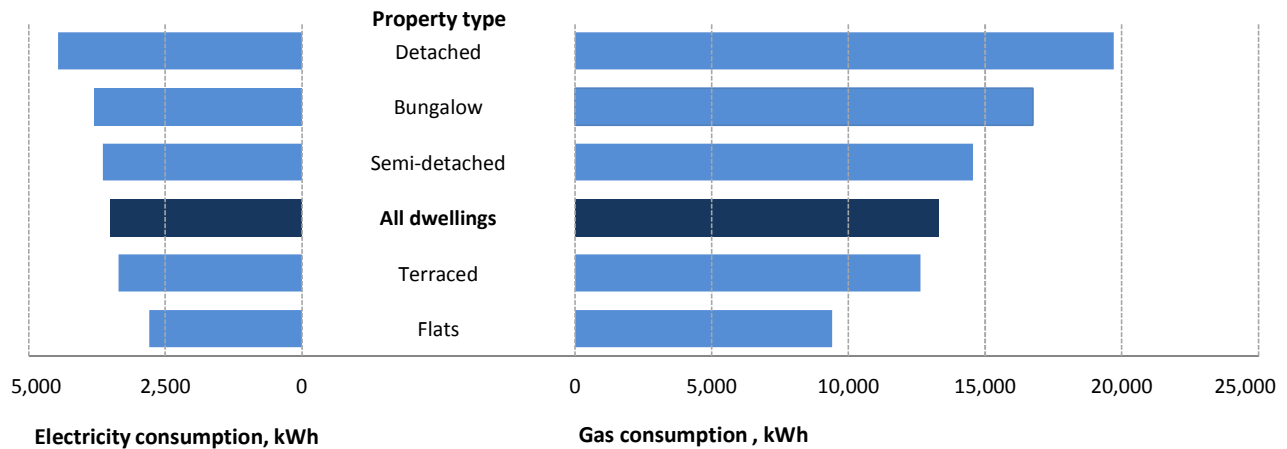


Figure D.1 shows that properties with more bedrooms are typically consuming a larger amount of gas and electricity than properties with fewer bedrooms. Properties with five or more bedrooms typically consumed 24,100 kWh of gas and 5,000 kWh of electricity. The equivalent figures for properties with one bedroom are 8,200 kWh of gas and 2,500 kWh of electricity. When looking at typical consumption for properties in England and Wales by number of bedrooms the same pattern is seen, i.e. properties with more bedrooms typically consume more gas and electricity. However, it should be noted that the difference between the typical consumption of four bedroom properties in Scotland compared with those that have five or more bedrooms is smaller than when comparing the equivalent categories for England and Wales.

Figure D.2: Median electricity and gas consumption, 2013, by property type



Depending on the type of the dwelling, median gas consumption ranges from 9,400 kWh to 19,700 kWh for gas and from 2,800 kWh to 4,500 kWh for electricity. Detached properties have the largest typical consumption for both gas and electricity. Bungalows have the second highest median consumption for gas and electricity at 16,800 kWh and 3,800 kWh respectively, a finding which is not consistent with England and Wales where instead semi-detached properties typically consume the second highest amount of gas and electricity. The reason for this might be because there are more bungalows in Scotland with 3 to 4 bedrooms therefore covering more floor area. Generally, gas and electricity consumption tends to increase the larger the

floor area space. In contrast, in England and Wales, it is semi-detached properties that have more 3 to 4 bedroom properties. The group with the lowest median consumption for both gas and electricity are flats which typically consumed 9,400 kWh of gas and 2,800 kWh of electricity in 2013.

Household characteristics

The household characteristics of household income, tenure and number of adult occupants for Scotland are based on the same source as data for England and Wales. This allows direct comparisons between typical consumption results from Scotland with England and Wales.

Figure D.3 below shows typical gas consumption for households in Scotland, by household income alongside the equivalent results for England and Wales. It shows that for each income band, Scottish households typically consume more than households in England and Wales, with this difference generally getting wider as income increases. Typical consumption of households with an income less than £15,000 in Scotland was 10,800 kWh compared with 10,400 kWh in England and Wales (a difference of 400 kWh or four per cent) and for households with an income over £150,000 typical consumption in Scotland was 27,800 kWh compared with 22,100 kWh in England and Wales (a difference of 5,700 kWh or 26 per cent).

Despite this, consumption exhibited a very similar pattern when comparing Scotland with England and Wales, with typical consumption generally increasing as household income increased.

When looking at electricity, typical consumption for each income band followed a very similar pattern to gas.

Figure D.3: Median gas consumption for Scotland and England and Wales, 2013, by household income

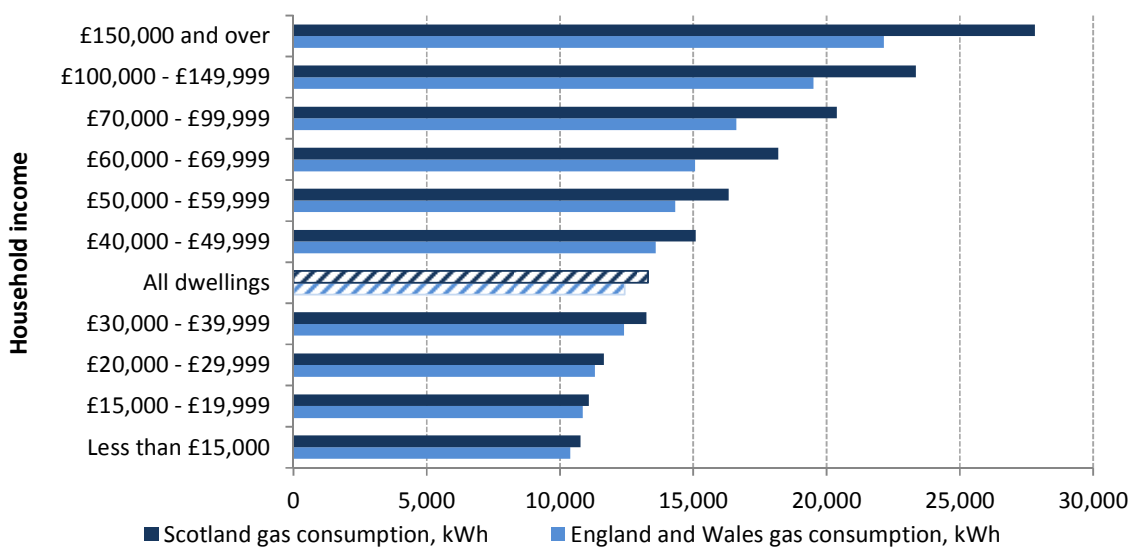


Figure D.4: Median electricity and gas consumption for Scotland, 2013, by tenure

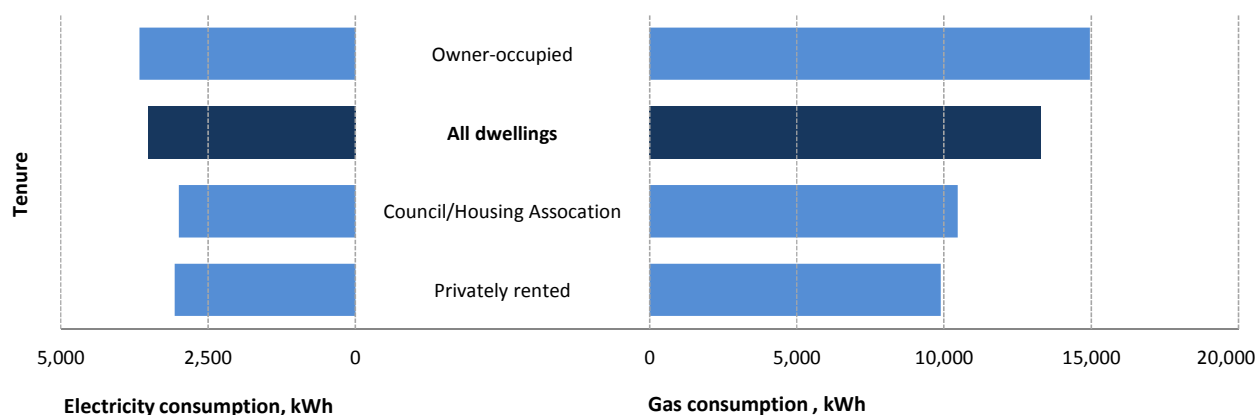


Figure D.4 shows that for owner occupied and council/housing association households, typical gas consumption for Scotland was slightly higher (1,100 kWh and 1,200 kWh respectively) than the equivalent categories for properties in England and Wales. However, typical consumption of gas in privately rented households was slightly less (700 kWh) in Scotland compared with England and Wales. Sixty-nine per cent of privately rented households in Scotland tend to be properties with 1 or 2 bedrooms compared to 49 per cent in England and Wales.

For Scotland and England and Wales, the highest typical consumers for gas by tenure were those in owner-occupied households (15,000 kWh in Scotland and 13,800 kWh in England and Wales). However, for Scotland the lowest typical consumers were those in privately rented accommodation (9,900 kWh) whereas in England and Wales the lowest typical consumption was found in council/housing association households (9,300 kWh).

When looking at typical electricity consumption by tenure, the highest typical consumption was again seen by those in owner-occupied households (3,700 kWh in Scotland and 3,500 kWh in England and Wales). The lowest typical consumption was seen in council/housing association households for both Scotland and England and Wales (3,000 kWh and 2,900 kWh respectively).

Figure D.5: Median gas consumption for Scotland and England and Wales, 2013, by number of adult occupants

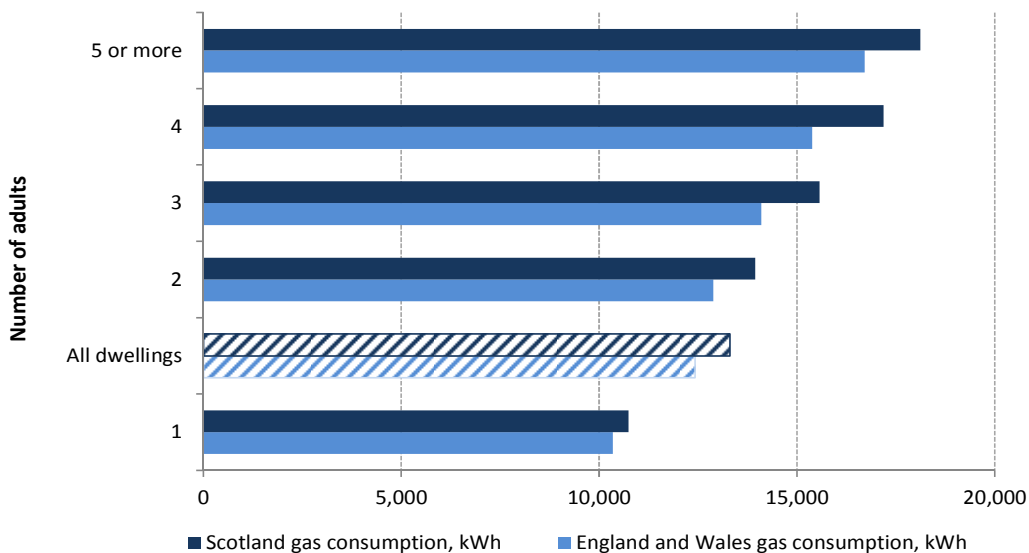


Figure D.5 shows that for each occupancy band, Scottish households typically consumed more gas than households in England and Wales, with this difference generally getting larger as the number of occupants increases. Typical consumption of households with one adult occupant in Scotland was 10,700 kWh compared with 10,300 kWh in England and Wales (a difference of 400 kWh) and for households with five or more adult occupants typical consumption in Scotland was 18,100 kWh compared with 16,700 kWh in England and Wales (a difference of 1,400 kWh).

Despite this however, consumption exhibited a very similar pattern for Scotland and England and Wales, with typical consumption generally increasing with each additional adult occupant, as would generally be expected. Typical consumption for electricity followed a very similar trend to gas.

Impact of measures

This section outlines the impact of installing energy efficiency measures on a household's gas consumption specifically for properties in Scotland. Impact of measures results for England and Wales were first published by DECC in 2011 and have been developed to cover measures installed between 2005 and 2012 in the latest publication. This is the second year results for Scotland have been produced, and cover the impact of installing cavity wall insulation and loft insulation in 2012 and for the first time solid wall insulation.

The methodology used to produce these results is the same as that used to produce results for England and Wales, with the exception of the source for data relating to property attributes. Results for England and Wales use property attribute information held by the Valuation Office Agency (VOA). Property attribute data modelled by Experian has been used as an alternative for Scotland. This contains information on property age, property type and number of bedrooms which allows a representative comparator group to be created in the same way as it has been for analysis related to England and Wales estimates. However, because the property attribute data are modelled there will be additional uncertainty in estimates resulting from this modelled data. Results should be treated as provisional and interpreted bearing in mind this uncertainty.

The domestic NEED methodology which contains detailed information on the impact of measures methodology can be accessed from the following link:

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

Results presented refer to the savings in gas consumption for households using gas as the main heating fuel. Estimates are based on observed savings, so they are savings after comfort taking¹⁰ 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 its four external walls. This means that individuals 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 the number of occupants).

Headline results

This section sets out headline results for the impact of installing a single energy efficiency measure in a household in 2012. It covers cavity wall insulation and loft insulation¹¹.

¹⁰ 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 using the same amount of energy to achieve greater warmth, since the property should retain heat better than before the insulation was installed.

¹¹ Estimates of savings from installations of loft insulation are based on professional installations only, as recorded in HEED, Green Deal and Energy Company Obligation (ECO). It does not cover properties which have had loft

Table D.2 below shows the savings experienced in households' gas consumption for cavity wall insulation and loft insulation installed in 2012. It shows that the typical saving seen for properties installing cavity wall insulation was 9.5 per cent, or 1,600 kWh. Properties installing loft insulation saw a typical saving of 2.7 per cent, which represents a saving of 400 kWh. Typical savings for properties installing solid wall insulation were 16.2 per cent, or 2,300 kWh. However, care should be taken when interpreting the results since the estimates are based on a small sample size of 162 properties.

Table D.2: Summary of observed savings – single energy efficiency measure installed in 2012

Energy efficiency measure		Percentage saving	Saving (kWh)
Cavity wall insulation	Median	-9.5%	-1,600
	Mean	-8.2%	-1,600
Loft insulation	Median	-2.7%	-400
	Mean	-2.1%	-400
Solid Wall	Median	-16.2%	-2,300
	Mean	-11.1%	-2,000

Figure D.6: Summary of observed savings for energy efficiency measures installed in 2012 for Scotland compared with England and Wales (median)

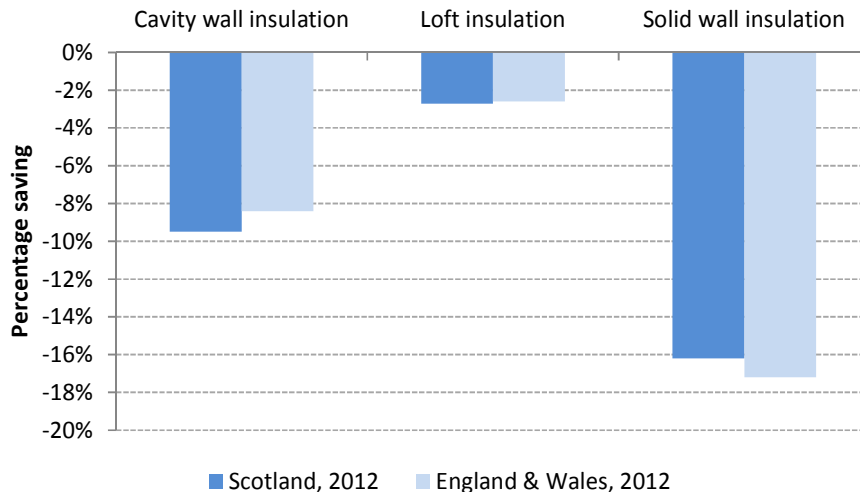


Figure D.6 shows the typical observed savings experienced by properties installing an energy efficiency measure in 2012 for Scotland compared with England and Wales. It shows that the typical saving for properties installing loft insulation is very similar for properties in Scotland and England and Wales, with a difference of less than 0.1 percentage points. However, because the typical gas consumption is higher in Scotland compared to England and Wales, the saving in

insulation installed by the homeowner themselves (DIY loft insulation) or properties which had their loft insulated when built (as built).

kWh is higher for Scotland. For cavity wall insulation, the typical saving for England and Wales is 1,100 kWh compared to 1,600 kWh in Scotland. This year is the first time typical savings have been estimated for properties in Scotland that have had solid wall insulation during 2012. Care should be taken when interpreting the results, including comparisons against England and Wales, since the number of Scottish properties which had solid wall insulation during 2012 and no other energy efficiency measure was relatively small in comparison (162). The analysis also showed that all properties in Scotland which had a condensing boiler fitted during 2012 also had another energy efficiency measure installed. Therefore, DECC were not able use these properties to estimate the typical savings made solely from the installation of condensing boilers during 2012.

Detailed results by property attributes and household characteristics have not been included in this report due to the increased impact the uncertainty surrounding these estimates has on individual groups. The methodology used for calculating the estimates means that any mismatches in properties being matched with similar properties as a result of modelled data not being accurate will be accentuated when results for different breakdowns are considered. However, like results for England and Wales, households experience a range of savings. The actual savings experienced by households will depend on a variety of factors including the consumption in a property before the measure is installed, physical attributes of the property and how householders use energy.

Summary

This annex has outlined the results for Scotland using data available in NEED. The domestic consumption section contains headline domestic gas and electricity consumption figures for properties in Scotland for 2013 (and 2011/2012 in the accompanying tables) based on modelled data produced by Experian. Both the headline figures and additional breakdowns are compared to England and Wales to look for similarities and differences between the two groups.

The impact of measures section presents estimated savings in gas consumption following the installation of an energy efficiency measure in Scotland in 2012. Headline results for Scotland are compared with those for England and Wales, and show that for loft insulation the headline typical savings experienced are very similar. However, the typical savings made on cavity wall insulation are higher in Scotland compared to England and Wales and lower compared to England and Wales for solid wall insulation.

DECC will continue to work with the Scottish Government to obtain good quality property attribute data from the Scottish Assessors. This will then enable further investigation into the preliminary results for Scotland, including reviewing the accuracy of the results presented above and providing more detailed breakdowns for the impacts of energy efficiency measures installed in homes.

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