



Department
of Energy &
Climate Change

Annex A: Domestic NEED Methodology

21st November 2013

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1. Introduction

This annex outlines the methodology used for analysis of the domestic National Energy Efficiency Data-Framework (NEED), including 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 installation of retro-fit energy efficiency measures (e.g. cavity wall insulation, loft insulation). Although there is a non-domestic version of NEED covering commercial/industrial sectors the methodology used for analysing this is not covered in this document.

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. The data framework matches gas and electricity meter point consumption data, collected for DECC sub-national energy consumption statistics, with information on energy efficiency measures installed in homes, from the Homes Energy Efficiency Database (HEED). It also includes data about property attributes and household characteristics, obtained from a range of sources. Data are matched together for each property.

Estimates of typical consumption for different households and savings from installation of energy efficiency measures are calculated using this property level dataset.

A difference in difference approach is used to estimate savings from installing measures. The approach outlined in this annex builds on the methods used for previous publications with some further refinements.

The key additional refinements for 2013 are:

- 1) to match properties in the intervention group with an equivalent property in the comparator group, in order to be able to provide a better understanding of the typical savings (median), the distribution of savings and uncertainty.
- 2) to weight the savings so that headline savings estimates reflect the full housing stock rather than just the population of households in the intervention group.

The methodology outlined is intended to produce the most robust estimates possible given the data available. However, as with all estimates there is uncertainty around these estimates and savings for individual households will vary. This variation is not reflected in the typical or average saving.

Section 8 of this annex sets out some areas for further development as new data becomes available in future. More information on NEED including latest publications can be found at:

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

2. Background

2.1 Development of the framework

The National Energy Efficiency Data-Framework (NEED) was set up by DECC to improve its evidence base. The Framework was first announced in the Heat and Energy Saving Strategy in 2009 and was developed by DECC, with support from the Energy Saving Trust (EST) and gas and electricity suppliers, in order to assist DECC in its business plan priority to “save energy with the Green Deal and support vulnerable consumers”. The high level aims of NEED are to support DECC:

- develop, monitor and evaluate key policies;
- 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 installing energy efficiency measures.

The first results from NEED were published in June 2011¹. The publication included summary statistics on consumption by property attributes and household characteristics as well as an assessment of the change in households’ gas consumption following installation of retro-fit insulation measures. It covered cavity wall insulation, loft insulation and condensing boilers. Estimates of savings were produced using a difference in difference approach. Developments were made to the methodology in 2012 (estimates published in November 2012²) which looked at the savings for measures installed for each year from 2005 to 2009. Further details of the developments are available in Annex D of the November 2012 publication³.

2.2 Users and uses

NEED has already supported a number of DECC policies, with important consequences. NEED has been used to understand the reduction in consumption (and resulting reduction in energy bills) 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.

NEED has also had a smaller, but still significant, part to play in a range of other DECC policies, for example, the Renewable Heat Incentive and Fuel Poverty. Data on consumption by property attributes, including the distribution of households consumption, has been used to help DECC understand the likely under or over payment if payments for the renewable heat incentive were to be based solely on property attributes available in NEED. It 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. Having this information enables DECC to provide better value for money and understand better the impacts of policy options, for both DECC and consumers.

NEED has also helped DECC understand where further research should be focused. It provides high level results which have highlighted a need for further investigation, for example understanding why households which appear the same in physical property attributes use

¹ http://webarchive.nationalarchives.gov.uk/20130109092117/http://decc.gov.uk/en/content/cms/statistics/energy_stats/en_effic_stats/need/need.aspx

² <https://www.gov.uk/government/publications/national-energy-efficiency-data-need-report-summary-of-analysis>

³ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/65973/6872-blue-report-annex-d.pdf

varying amounts of energy, and understanding how the use of heating controls impacts on the amount of energy households are using.

Externally NEED outputs are also used by a wide range of interested parties, including local authorities, academics and energy suppliers. Examples include:

- Energy UK – with support from DECC statisticians – created a comparison tool (www.comparemyenergy.org.uk) allowing households to enter information about their property and compare their gas and electricity consumption to that of a typical house.
- Committee on Climate Change used the outputs to inform reports, including recommendations to Government.
- Energy companies and academics used the outputs to validate and inform their own research and estimates.
- Energy suppliers use the NEED reports to act as an independent trusted source demonstrating the benefit of installing energy efficiency measures.
- Local authorities use the outputs to help with modelling housing stock and understanding the impact of installing energy efficiency measures.

In future it is anticipated that the role of NEED in development and evaluation of DECC policy will continue to grow. Plans are also in place to publish an anonymised sample of data from NEED in 2014, to further increase utility of the data by facilitating analysis of record level data by external researchers.

This annex sets out the methodology for producing estimates from NEED. It includes a brief background on data sources in NEED and creation of the analysis sample, as well as the methodology used to produce impact of energy efficiency measures (Section 6), including refinements since the 2012 publication.

3. Data sources

NEED is comprised of data from a number of sources. The most important sources for current analysis of domestic data are summarised in Table 3.1⁴.

Table 3.1: Data in NEED

Category	Source	Description
Premises	National Land and Property Gazetteer (NLPG)/AddressBase	Contains a unique identifier for each address in England and Wales which is matched to each of the data sources in NEED and then used to link data together.
Energy consumption	Energy suppliers and Gemserve, Xoserve/Independent Gas Transporters	Gas and electricity consumption data for all domestic and non-domestic meters in GB, 2004-2011 and meter profile for electricity meters. Gas data are weather corrected.

⁴ Further information on all data sources which feed into NEED can be found here: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/209090/Annex_A_-_What_is_NEED.pdf.

Category	Source	Description
Measures installed	Home Energy Efficiency Database (HEED)	Information on energy efficiency measures installed through government schemes (including EEC, CERT and CESP ⁵).
Property attributes	Valuation Office Agency (VOA)	VOA collects property attribute data to inform its function relating to business rates and council tax. The data include floor area, number of bedrooms, property type and property age.
Household characteristics	Experian	Modelled data for household characteristics such as income and tenure.

Quality assurance of all data sources is undertaken before use in NEED. Further details for the main sources of data in NEED are available in Annex B of the November 2012 NEED report⁶.

4. Sample creation

Analysis in NEED is undertaken on a sample of records to represent the full population. 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 2011 and 2012 publications were based on sample of properties in England. In 2013 a new sample was created to cover England and Wales (results from the new sample are comparable to results from the previous sample)⁷.

The sample is made up of approximately four million properties, 17 per cent of the VOA population for England and Wales (one in six households), and was created using stratified random sampling. Four variables were used to ensure the sample was representative: property age, property type, number of bedrooms and local authority (LA). The table below shows the categories used for each of these variables.

Table 4.1: NEED sample stratification

Variable	Categories
Property age	Pre-1919 1919-44 1945-64 1965-82 1983-92 1993-99 Post 1999

⁵ http://www.decc.gov.uk/en/content/cms/funding/funding_ops/funding_ops.aspx

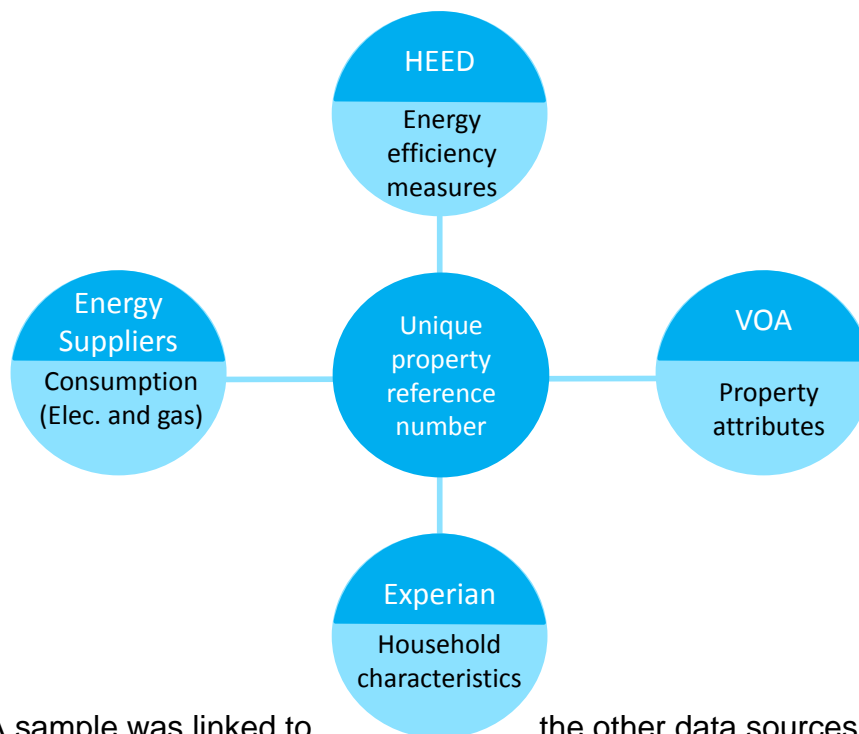
⁶ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/65971/6871-need-report-annex-b.pdf

⁷ More detail on the matched sample can be found in the June 2013 NEED report, Annex B section 2: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/209264/Annex_B_-_Quality_Assurance.pdf.

Variable	Categories
Property type	Detached Semi-detached End terrace Mid terrace Bungalow Converted flat Purpose built flat
Number of bedrooms	1 bedroom 2 bedrooms 3 bedrooms 4 bedrooms 5 or more bedrooms
Local Authority	Each local authority in England and Wales

To create the matched sample, datasets are combined within the framework using the National Land and Property Gazetteer (NLPG) unique property reference number (UPRN) as a spine. Address data from each of the datasets included in NEED are used to assign a UPRN to each record within that dataset. The UPRN is then used to link records from one dataset to the corresponding record in each of the other datasets. Figure 4.1 below shows how this works for the core data used for domestic analysis, although the principle is the same for both the domestic and non-domestic sectors.

Figure 4.1: Structure of domestic NEED



When the VOA sample was linked to the other data sources approximately six per cent of records were lost i.e. properties which could not be found on any of the other data sources. The loss was spread across regions and property types, but most significant in

converted and purpose built flats built post 1999. There was a higher loss in London, where these types of properties are most common⁸.

5. Validation and quality assurance

5.1 Gas consumption data

Analysis of the gas consumption data included in NEED begins by excluding any records with a gas consumption greater than 73,200 kWh as it is assumed these are non domestic properties, this approach is consistent with that of DECC's sub-national statistics publications. Since the gas consumption of the majority of households is less than 50,000 kWh, a further exclusion of properties with a gas consumption greater than 50,000 kWh is then applied to reduce the likelihood of including non domestic properties or domestic properties with invalid consumption. This exclusion results in less than one per cent of records being removed from the sample when looking at gas consumption in 2009, 2010 and 2011.

At the lower end of the distribution, gas consumption values between 1 kWh and 100 kWh are also excluded as they are likely to be households with gas supplies which are not used (or new build properties which are not yet occupied). Properties with a negative gas consumption reading are also excluded. This exclusion results in a further one per cent of records being removed from the sample when looking at gas consumption in 2009, 2010 and 2011. For the impact of measures analysis an additional filter is applied which excludes properties with a gas consumption of less than 2,500 kWh, this is to ensure properties which use gas for non-heating purposes only are excluded.

Consumption readings which are considered to be estimated are also excluded from the analysis. A value is considered estimated if a household has a gas consumption value identical to the previous year or if it is one of a number of suspected estimated readings used by suppliers. These estimated supplier readings were assumed on the basis of values that appear in the data more often than would be expected given the frequency of similar consumption values; improvements to the data supplied mean there were no assumed estimates on this basis for 2011 gas consumption data.

5.2 Electricity consumption data

Electricity consumption in the majority of households is below 25,000 kWh, therefore households with a consumption greater than this are excluded to avoid these having a disproportionate impact on the analysis in NEED. Consistent with gas consumption, this exclusion results in less than one per cent of records being removed from the analysis sample when looking at electricity consumption in 2009, 2010 and 2011. As with gas consumption there are a cluster of values around 1 kWh to 100 kWh, and these have been excluded as they are likely to be households with electricity supplies which are not used (or new build properties which are not yet occupied). This exclusion results in an additional two per cent of records being excluded from the sample. Properties with a negative electricity consumption reading are also excluded.

Consumption readings for electricity which are considered to be estimated are also excluded, and this is based on the reading being the same as the previous years or being one of a number of suspected estimated readings used by suppliers.

⁸ Due to the difficulty with matching energy efficiency measures information on flats to the correct property within a building, estimates of savings for flats are not currently included in the estimates of impact of energy efficiency measures, thus reducing the significance of this data loss on these outputs.

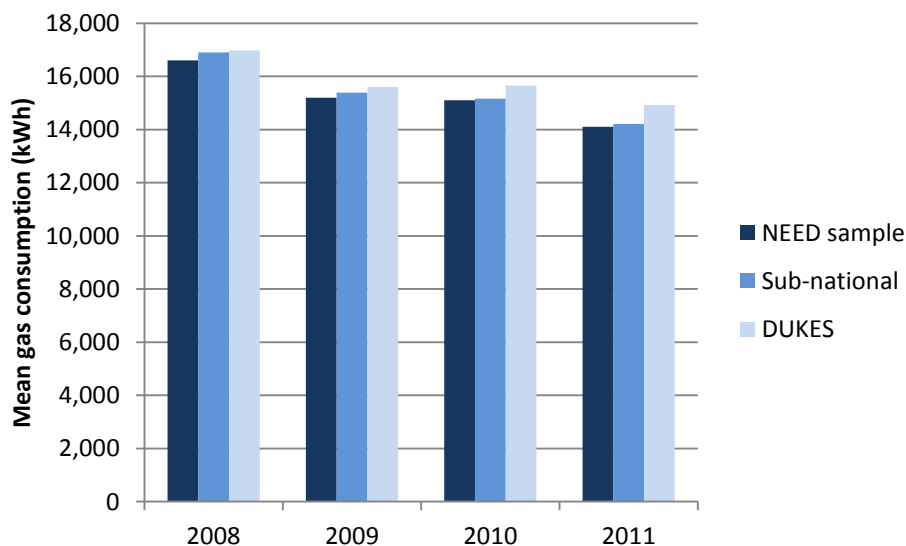
5.3 Comparison with other sources

To check that the NEED sample used for analysis is consistent with the other estimates of domestic consumption published by DECC – and therefore increase confidence in use of the data – the NEED analysis sample has been compared with the data published by DECC in The Digest of UK Energy Statistics (DUKES)⁹ and sub-national consumption statistics.

For gas consumption, the mean consumption is very similar for the published sub-national statistics and the NEED sample, 14,200 kWh compared to 14,100 in 2011 respectively. Both these sources are based on the same input data so it is expected they should be similar. The mean for the NEED sample is slightly lower than the sub-national consumption estimates due to differences with address matching and the further cleansing and validation applied. There is more variation when comparing the NEED sample with published DUKES¹⁰ data, with the mean consumption for 2011 being 800 kWh higher than the NEED sample. Gas consumption data utilised in the NEED sample cannot be exactly reconciled to DUKES data since the consumption data used in DUKES are based on a calendar year whereas the consumption data in the NEED sample covers 1 October to 30 September. Additionally consumption data in DUKES covers the United Kingdom, whereas the NEED sample covers England and Wales. Finally, there are differences because of the different sources of data used for these publications. DUKES estimates are based on aggregate estimates of energy supplied, while NEED is based on information from gas meters on energy consumed.

Figure 5.1 below compares mean gas consumption per household as published in NEED, with DECC's sub-national energy consumption statistics and temperature corrected data based on DUKES.

Figure 5.1: Comparison of estimates of mean gas consumption per household



For electricity consumption the mean consumption is similar for all three sources. The mean electricity consumption for the NEED sample is slightly lower than that published in sub-national statistics. This is due to the NEED sample excluding electricity consumption values greater than 25,000 kWh whereas sub-national statistics includes all domestic profile meters under

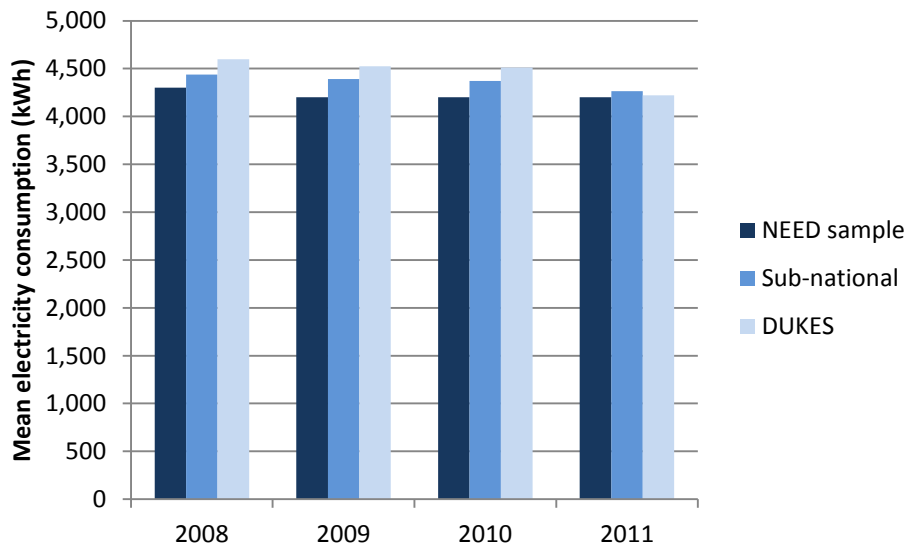
⁹ <https://www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes>

¹⁰ Source: table 3.07, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/238797/domestic.xls.

50,000 kWh which results in more extreme values influencing the mean. There variation between the NEED sample and DUKES results from the different geographic coverage and the difference in the way the data are collected from different sources; as described for gas above.

Figure 5.2 below compares mean electricity consumption per household as published in NEED, with DECC's sub-national energy consumption statistics and data based on DUKES.

Figure 5.2: Comparison of estimates of mean electricity consumption per household



6. Impact of measures methodology

A difference in difference approach is used to estimate the impact of installing retro-fit energy efficiency measures on the amount of gas required to heat a home. This method has been used, with refinements, since the first publication of NEED analysis in 2011. This section sets out the full methodology for the 2013 analysis (measures installed in 2010), including refinements.

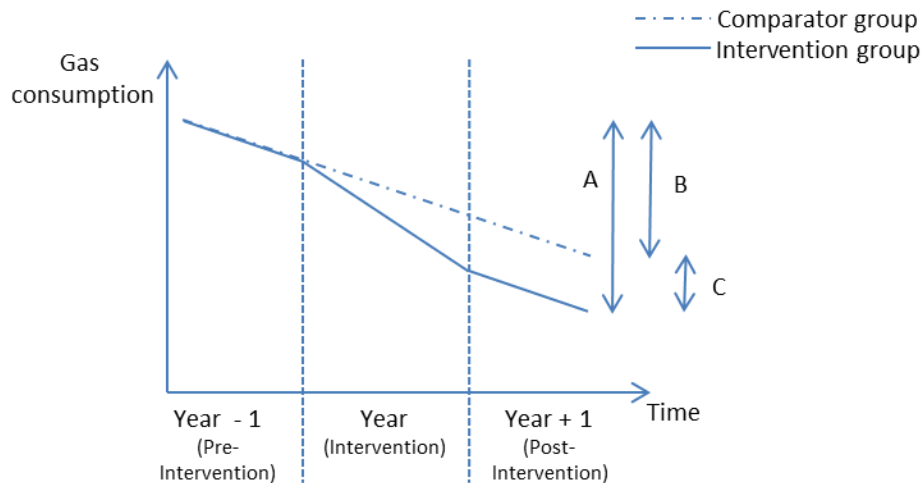
The method compares the gas consumption in properties before and after an energy efficiency measure has been installed with the change in consumption over the same period for similar properties which have not had a measure installed.

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 any energy efficiency measure installed¹¹.

This approach allows an estimate of the mean saving of installing the energy efficiency measure, as shown by C in Figure 6.1, where C is equal to A (the difference, or change, in consumption for the intervention group before and after the installation of the measure) minus B (the difference in consumption for the comparator group).

¹¹ This group has none of the following energy efficiency measure recorded as being installed in HEED: cavity wall insulation, solid wall insulation, loft insulation, condensing boiler, double glazing and draught proofing. These properties may have had a measure installed which has not been recorded in HEED, such as DIY loft insulation.

Figure 6.1: Difference in difference approach



Headline estimates of savings are given as percentage savings. Savings for different groups of properties (e.g. by property type, number of bedrooms and household income) are also published.

An additional step has been undertaken in 2013. Each individual property in the intervention group has been matched with a property with the same attributes in the comparator group. This allows comparison of differences (or savings) for each property allowing more understanding of the typical difference (median), the distribution of savings and uncertainty; not just the mean.

The rest of this section provides details on how the intervention and comparator groups are formed and the weighting applied to savings to get an estimate representative of the whole housing stock; not just the stock which had the measures installed in the period considered.

6.1 Intervention group

An intervention group is created for each energy efficiency measure considered and each year being investigated. Properties in the intervention group had the measure under consideration installed in the stated year, and meet the following conditions:

- had no other significant¹² energy efficiency measure recorded (on HEED) as being installed at any time¹³.
- a valid gas consumption (between 2,500 and 50,000 kWh¹⁴) in the year the energy efficiency measure was installed, and the year before and after installation – since these are the years gas consumption that will be looked at to see how much change there has been.

Properties which meet these criteria are excluded if:

- gas consumption is suspected to be estimated¹⁵.

¹² These are considered to be cavity wall insulation, loft insulation, solid wall insulation, condensing boilers, double glazing and draught proofing.

¹³ See footnote 11, these properties may have had a measure installed, which has not been recorded in HEED.

¹⁴ This range was taken following analysis of the sample and comparison with the range of consumption for properties with gas heating in the English Housing Survey, see November 2012 Annex B section 3.2: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/65971/6871-need-report-annex-b.pdf.

¹⁵ See Section 5 for more information on this.

- gas consumption has increased by 50 per cent or more, or decreased by 80 per cent or more, since it is likely something other than the installation of the measure is causing this change, such as a change in occupants or their circumstances.

Flats are excluded from this analysis because in a large number of cases insufficient address details were available to identify which flat within a building had the energy efficiency measure installed and therefore it is not possible to accurately identify which gas meter relates to the flat which received the measure.

To illustrate the intervention group conditions, the table below summarises the conditions that had to be met for a property record to be included in the cavity wall insulation 2010 intervention group.

Table 6.1: Summary of intervention group conditions, cavity wall insulation 2010

Variable	Condition
Date of installation	Cavity wall insulation recorded as being installed between 1 st January 2010 and 31 st December 2010 (inclusive).
Energy efficiency measures	No record of loft insulation, solid wall insulation, double glazing ¹⁶ , draught proofing or heating measures ¹⁷ being installed (at any time).
Gas consumption	Gas consumption in 2009, 2010 and 2011 between 2,500 kWh and 50,000 kWh (excluding estimated readings).
Change in gas consumption	Change in gas consumption between 2009 and 2011 is between -80 per cent and + 50 per cent.
Property type	Flats are excluded due to insufficient address details being available to identify which flat in a block received the energy efficiency measure.

Applying these conditions reduces the number of records in each sample but is necessary to make the analysis as robust as possible. For example by excluding other energy efficiency measures known to have the biggest impact on gas consumption gives more confidence that any change in consumption is a result of the energy efficiency measure being considered. Following application of these filters, sample sizes remain large, for example 16,050 properties met these conditions for cavity wall insulation in 2010 (and 21,030 for loft insulation in the same year).

The intervention group cannot be analysed in isolation since a change in gas consumption could be down to a number of other factors, such as a change in energy prices, energy efficiency awareness or changes in household size or occupants. Comparing the intervention group with a comparator group with similar characteristics but no record of a measure being installed attempts to control for some of this other variation and provide a more accurate estimate of the impact of the energy efficiency measure.

¹⁶ There is no record of double glazing installations after 2008 in HEED.

¹⁷ There is no boiler information between 1 January 2008 and 31 March 2009.

6.2 Comparator group

As the analysis is carried out retrospectively it is not possible to create a control group in advance of measures being installed. Therefore a comparator group is created retrospectively.

A separate comparator group is created for each measure for each intervention year. All the conditions applied to the intervention group are also applied to the comparator group; with the exception of the installation of the energy efficiency measure being considered. The comparator group is selected from the group of all properties with no record of ever having had the following energy efficiency measures installed (as recorded in HEED): cavity wall insulation, loft insulation, heating measures, solid wall insulation, double glazing and draught proofing¹⁸. As with the intervention group, the gas consumption has to be valid and flats are excluded.

The comparator group was selected using random stratified sampling and is selected to be the same size and have the same characteristics as the intervention group¹⁹. The variables used to select the comparator group were:

- starting gas consumption band²⁰;
- region;
- property type;
- property age; and
- number of bedrooms.

Once the comparator group has been selected, each property in it is matched to an equivalent property in the intervention group (i.e. one that has all the same characteristics). For a property in the intervention group to be matched to a property in the comparator group it has to have the same region, gas band, property age, property type and number of bedrooms.

To test for variation in results the stratified random sample was selected a number of times. The first sample was used for the reported results, with the others used for reassurance that the sample was representative. When re-running the results for cavity wall insulation installed in 2010 using a different seed number there was a 0.1 per cent difference in both the median and mean percentage saving.

6.3 Weighting

From 2013, weighting has been applied to the results in order to mitigate the impact of a biased housing stock in the intervention group – the analysis covers a representative sample of households which have received a measure, however this may not be representative of the full housing stock. The weighting provides a better understanding of the impact of the measure for the general housing stock for England and Wales. Unweighted estimates are also published for comparison.

The weighting factor is calculated for each possible group based on property age, property type and number of bedrooms, and is based on the VOA total housing stock excluding flats. For

¹⁸ This results in possible bias in the comparator group, as households with no measures installed may not behave in the same way as households which have decided or agreed to have energy efficiency measures installed. Further work will be done to look at these differences and determine whether they are significant.

¹⁹ In a small number of cases there is no property with the same combination of characteristics in the group of properties with no measures installed (i.e. the group the comparator group is selected from), this results in a small number of properties being excluded from the matched pairs analysis for each energy efficiency measure. For cavity wall insulation installed in 2010, for example, this resulted in a loss of 90 properties from the intervention group.

²⁰ Gas bands are created using gas consumption in the year before the measure is installed, the lowest gas band is 2,500 kWh to 5,000 kWh, then intervals of 5,000 kWh up to 50,000 kWh.

example group one for cavity wall insulation installed in 2010 would be the total housing stock excluding flats as recorded by VOA, being built pre-1919, detached and 1 to 2 bedrooms. The table below shows the weighting variables and the categories within each variable. It was necessary to group the number of bedrooms variable due to combinations being present in the general population that were not in the population that had the measure installed²¹. The number of bedrooms variable was further grouped for the impact of a combination of measures analysis, with properties with 3 bedrooms being grouped in with properties with 4 or more bedrooms, to form a 3 or more bedrooms category.

Table 6.2: Weighting variables

Variable	Categories
Property age	Pre-1919 1919-44 1945-64 1965-82 1983-92 1993-99 Post 1999
Property type	Detached Semi-detached End terrace Mid terrace Bungalow
Number of bedrooms	1 to 2 bedrooms 3 bedrooms 4 or more bedrooms

The weighting factor weights each record in the sample based on its frequency in the sample relative to how often it should appear if the sample had the same distribution as the total housing stock. For example, if a property type is more common in the sample than the housing stock as a whole then the weight will reduce its contribution, while if the property type is less frequent in the sample than it should be given the general housing stock the weighting factor will increase its influence. A weighting factor is calculated for each group of properties (e.g. one group would be properties built pre-1919, detached, 1 to 2 bedrooms) and then applied to each property in that group. The weighting factor is computed by calculating the proportion of the total housing stock a group accounts for (i.e. the number of records in group g in the housing stock divided by the total housing stock) and multiplying this by the reciprocal of the number of properties in the sample in the same group (i.e. one over the number of properties in the intervention group in group g). The sum of the weights for the sample always totals one. The VOA total housing stock, excluding flats is used for the total housing stock in these calculations.

$$\text{Weighting factor for record } n (w_n) = \frac{\text{Housing stock } g}{\text{Total housing stock}} \times \frac{1}{\text{Sample stock } g}$$

²¹ It was further necessary to manually group the property age and property type variables where the required combinations were still not present in the intervention group population for a small number of cases.

Where: n is the record number in the sample
 g is the group number (e.g. group 1 = built pre-1919, detached, with 1 to 2 bedrooms)
 $housing_g$ is the number of properties in group g in the total housing stock (VOA)
 $sample_g$ is the number of properties in group g from the intervention sample (NEED)

The percentage saving from each measure can then be calculated by summing the weighted percentage saving for each record, to give a percentage saving for the population:

$$Population \% saving = \sum_n (\% \text{ age saving for record } n \times w_n)$$

The weighted percentage savings are then reported as the headline saving for each measure. Unweighted savings for different property types and household characteristics are also provided in the detailed tables published alongside the report.

The weighting had least impact on estimates of savings from installation of loft insulation and boilers, suggesting that these two measures have been installed in a range of properties most reflective of the housing stock. However, due to the policy focus (e.g. support for fuel poor households), other measures may have been installed in a much less diverse stock, for example solid wall insulation has been targeted at low income homes, which are often smaller than typical homes and newer than typical solid wall properties.

6.4 Comparison with previous methodology

The latest report presents findings for 2010 using the methodology outlined in this document. For comparison, headline estimates for measures installed in 2009 (for cavity wall insulation and loft insulation) are presented below using the new methodology and new analysis sample. Alongside them, results published in the November 2012 report are shown for comparison. The impact of weighting is also shown separately.

Table 6.3 shows that under the previous methodology the mean percentage saving for properties having cavity wall insulation installed in 2009 (published in 2012) was 8.6 per cent. The new estimate – based on the approach outlined in section 6 – is 8.2 per cent, a reduction of 0.4 percentage points. When the results are weighted to be representative of the housing stock (not just the properties which had cavity wall insulation installed in 2009) the percentage saving is 7.5 per cent; a total difference of 1.1 percentage points. The most significant change for this measure is due to the weighting.

The typical (median) percentage saving follows the same pattern as the mean, with a 1.2 percentage point difference between the headline weighted percentage saving and the estimate published in 2012.

Table 6.3: Observed savings for cavity wall insulation installed in 2009, previously published results compared with new methodology

		Percentage saving	Saving (kWh)
Mean	Published 2012	-8.6%	-1,700
	New sample	-8.8%	-1,700
	New sample/methodology	-8.2%	-1,600
	Weighted	-7.5%	-1,500

	Published 2012	-9.6%	-1,800
Median	New sample	-9.8%	-1,700
	New sample/methodology	-9.0%	-1,600
	Weighted	-8.5%	-1,500

Table 6.4 shows the equivalent for loft insulation installed in 2009. The difference between the percentage saving published in 2012 for a typical house and the weighted headline results in the latest report is 0.8 percentage points. The weighting appears to have a smaller effect for loft insulation, perhaps suggesting that loft insulation is being installed into properties which are more representative of the complete housing stock.

Table 6.4: Observed savings for loft insulation installed in 2009, previously published results compared with new methodology

		Percentage saving	Saving (kWh)
Mean	Published 2012	-2.4%	-500
	New sample	-2.7%	-500
	New sample/methodology	-1.8%	-400
	Weighted	-1.7%	-300
Median	Published 2012	-2.6%	-500
	New sample	-2.7%	-600
	New sample/methodology	-1.8%	-300
	Weighted	-1.8%	-300

The comparisons above show that the changes made for the most recent publication have reduced the estimates of savings associated with these measures. However, these changes have been made following consultation on the methodology and should produce more reliable results.

7. Revisions policy

On occasions, previously published data will need to be revised, any revisions are made in line with the organisational policy²². Changes to historic data will only be made as part of a new publication, any data revised from the previous release will be denoted with an “r”. Where a large revision has taken place the reasons behind this will be provided.

Any changes to the methodology used to produce analysis would be pre-announced and impact of revisions explained when changes are made. At least one year of data produced by both methods would be published if appropriate.

Where significant changes to most recent data are required as a result of an incorrect figure in a publication these will be made as soon as reasonably possible, with a note on the webpage stating that the output has been revised and which figures have been affected. Reasons for these types of revision would include:

²² <https://www.gov.uk/government/publications/energy-statistics-revisions-policy>

- revised and validated data received from a data supplier; or
- the figure in the publication was incorrect because of a typographical or similar error.

8. Future developments

The methodology outlined in this document is intended to produce the most robust estimates possible given the data available. As with all estimates they represent a point and do not reflect uncertainty. Consumption and savings from installing measures will vary from property to property, including as a result of occupants behaviours and circumstances or property attributes not picked up in NEED. This variation seen by individual households will not be reflected in the typical or average estimates published.

There also continue to be areas for improvement to these estimates, in particular with the availability of new data sources in future, such as Energy Performance Certificates (EPCs) and data from Green Deal and Energy Company Obligation (ECO) installations. From 2012, the main vehicles for the installation of retro-fit energy efficiency measures are the Green Deal and Energy Company Obligation (ECO). DECC will have data for measures installed under these schemes and will be able to use these data for estimates of savings once 2013 consumption data are available.

In addition, DECC also now has access to historic EPC records. While the properties which have had an EPC will be biased towards properties that have been sold or rented more recently, it will provide a valuable source of information on areas such as wall type, main heating fuel and measures installed. This data source will become especially important for NEED when DECC loses access to Valuation Office Agency data in June 2014.

Consumption data by property attributes and household characteristics published in June 2013 demonstrates that the relationship between energy use is complex, but that there is a high correlation between certain characteristics and a household's energy use (for example, size of property or household income). Results provided insight into how each characteristic relates to energy use, but makes no attempt to control for other characteristics. DECC will continue to work to understand more about these areas and expand the analysis undertaken using NEED.

While it is not intended that there will be any change to the methodology itself, it may be possible to make some further developments to improve the estimates and outputs:

- i. Measures not recorded in HEED – DIY loft insulation and most measures installed outside Government schemes are not recorded in HEED. Therefore, it is not possible to know whether properties in the intervention or comparator groups have any of these measures. However, some of this information will be available from the EPC data.
- ii. Heating fuel – data in NEED does not currently provide information on what fuel is used as the main heating fuel in a property. This will allow us to better understand the differences in consumption for households using different heating fuels. It should also enable us to improve estimates of savings from installing energy efficiency measures. For properties with gas consumption, based on analysis of properties in the English Housing Survey, the current assumption is that a property with gas consumption of 2,500kWh or more are using gas for heating and are therefore included in the analysis of impact of measures. For properties without a gas meter it is not possible to tell which properties use electricity as the main heating fuel and which properties use a different fuel such as oil, coal or biomass. Data from the Green Deal and ECO will provide this information for the intervention group and it may be possible to use EPC data to build a similar comparator group. This would improve the estimates for gas and may enable estimates for households which heat their home using electricity rather than gas.

- iii. Wall type – NEED does not currently include reliable information on the wall type of a property (e.g. cavity or solid). This means that while efforts are made to ensure the comparator group is made up of similar properties they may not be suitable for the measure being considered. EPC data should make it possible to build a comparator group with the same wall types. It may also be possible to produce more detailed estimates of consumption including a breakdown by wall type (e.g. sandstone, cavity, system built etc).

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