



# Annex C: Change of occupancy

© Crown copyright 2015

URN 15D/148

You may re-use this information (not including logos) free of charge in any format or medium, under the terms of the Open Government Licence.

To view this licence, visit [www.nationalarchives.gov.uk/doc/open-government-licence/](http://www.nationalarchives.gov.uk/doc/open-government-licence/) or write to the Information Policy Team, The National Archives, Kew, London TW9 4DU, or email: [psi@nationalarchives.gsi.gov.uk](mailto:psi@nationalarchives.gsi.gov.uk).

Any enquiries regarding this publication should be sent to us at [EnergyEfficiency.Stats@decc.gsi.gov.uk](mailto:EnergyEfficiency.Stats@decc.gsi.gov.uk).

# Contents

- Introduction ..... 4
- Change of occupancy data ..... 5
- Sample selection..... 6
  - Selecting the intervention group ..... 6
  - Selecting the comparison group ..... 7
- Characteristics of sold properties ..... 8
- Impact of change of occupancy ..... 10
- Summary and next steps ..... 12

# Introduction

This annex describes early results from an experimental research project run by DECC for the first time this year, the purpose of which was to investigate 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 structure of this analysis mirrors that of the main impact of measures analyses: an 'intervention group' of properties that changed ownership in 2012 were selected, and their electricity and gas consumption figures in the year before and after the change in ownership were compared to that of similar properties which were not sold in this period: the 'comparison group'. The results show that sold properties' consumption fell substantially, in excess of the generally decreasing trend of domestic energy use.

In households that changed hands in 2012, electricity consumption fell by 1,000 kWh. This was higher than the 300 kWh decrease in the comparison group. In terms of gas consumption, the average decrease was 2,100 kWh, compared to 600 kWh in a matched group of properties that did not change ownership.

# Change of occupancy data

Throughout this analysis, change in ownership was taken as a proxy for change of occupancy, so the two terms are used interchangeably. This, of course, is an approximation, because a change of owner and a change of occupants in a property do not always coincide. However, DECC does not hold personal information on the occupants of these properties, and so cannot track changes of occupancy, whereas information on the sale of domestic properties in England and Wales is available publicly from the Land Registry's Price Paid Database.

The Price Paid Database contains the details of all residential property sales in England and Wales that are sold for full market value and are lodged with the Land Registry for registration. As such, the database excludes sales to or by a company or business, transactions between partners in a divorce, and leases, among others.

Information on property attributes, electricity and gas meter readings, and energy efficiency measures installed were sourced from the same databases as in the other analyses described in this publication. They are discussed in more detail, along with their respective strengths and weaknesses, in Annex A (Quality Assurance) of the main NEED publication.

# Sample selection

This section details the process for selecting the subset of properties in the NEED sample on which the analysis was run. The process follows the methodology for the impact of measures analysis as closely as possible, but there are some important differences because of the nature and different source of the data.

## Selecting the intervention group

According to the Price Paid Database, 654,430 residential properties were sold in 2012. Of these, 632,820 (97 per cent) could be successfully matched to the AddressBase, as described in Annex A, allowing them to be uniquely identified and matched to other information held in NEED, such as energy efficiency measures installed and energy meter readings. A small proportion of records (1,690 or 0.3 per cent) appeared more than once in the database. Duplication may be a result of the property in question having been sold twice in 2012. However, duplication can also occur if two properties (e.g. flats in the same building) are incorrectly assigned the same unique property reference number. To eliminate this potential problem, duplicates were excluded from the analysis, leaving 631,130 properties. Properties that were sold not only in 2012 but also in 2011 and/or 2013 were further excluded from the analysis, leaving 605,030. This was necessary so that electricity and gas consumptions in the full calendar years before and after the sale of the property in 2012 could be compared, in line with the methodology of the impact of measure analyses described elsewhere in this publication.

Of these properties, 93,670 (16 per cent) had been selected for the NEED sample. This pool was further narrowed down by excluding properties that had a record of energy efficiency measures (such as cavity wall or loft insulation, solar panels, double glazing, etc.) installed at any time. In addition, properties that did not have a valid meter reading for any year from 2011 to 2013, or where the difference between the 2011 and 2013 consumption figures was lower than -80 per cent or higher than +50 per cent, were also excluded. The reason for this latter limitation is that such a large change is unlikely to have been caused by a change of occupancy alone and other, unknown, factors may be confounding the results. The requirement for valid meter readings in 2011 also meant that properties built (and sold) in 2012 were automatically excluded.

Some properties had valid electricity meter readings, but not valid gas meter readings or vice versa, therefore two intervention groups were created from the above pool of properties, and analyses were run separately on electricity and gas usage figures. The final sample for the electricity use analyses consisted of 5,020 records, and the one for the gas consumption analysis, of 4,590 records. Table C.1 below provides a summary of the criteria for inclusion in the analyses.

**Table C.1. – Selection criteria for properties in the intervention group**

|                                    |  |
|------------------------------------|--|
| Single change of occupancy         | <ul style="list-style-type: none"><li>- Property was sold in 2012, but not also in 2011 and/or in 2013;</li><li>- Property was not sold more than once in 2012.</li></ul>  |
| Valid energy use figures available | <ul style="list-style-type: none"><li>- Property included in the NEED sample;</li><li>- Electricity use in each year between 2011 and 2013 no less than 100 kWh and no more than 25,000 kWh;</li><li>- Gas use in each year between 2011 and 2013 no less than 100 kWh and no more than 50,000 kWh;</li><li>- Change in electricity/gas use from 2011 to 2013 no less than -80 per cent and no more than +50 per cent;</li><li>- Actual electricity/gas meter reading available in each year between 2011 and 2013 (i.e. estimated readings are excluded).</li></ul> |
| No energy efficiency measures      | <ul style="list-style-type: none"><li>- Property has no record of energy efficiency or microgeneration measures (e.g. cavity wall insulation or solar panels, respectively).</li></ul>   |

### Selecting the comparison group

In line with the impact of measures analysis methodology, a comparison group was compiled for each of the intervention groups (i.e. one for analysing electricity and one for gas use). These were selected from properties that had no records of change in occupancy between 2011 and 2013, but were otherwise matched to the intervention groups on a combination of five variables: geographical location (government office region), building type, property age, number of bedrooms, and energy use in 2011 (baseline). The groupings for the first four of these categories, and for gas use, were identical to those used in the impact of measures analysis, described in Annex A. The electricity consumption bands used were the same as in the analysis of the impact of solar panels on metered electricity consumption described in Annex B.

The number of records in the comparison groups was identical to the number of records in the corresponding intervention groups.

# Characteristics of sold properties

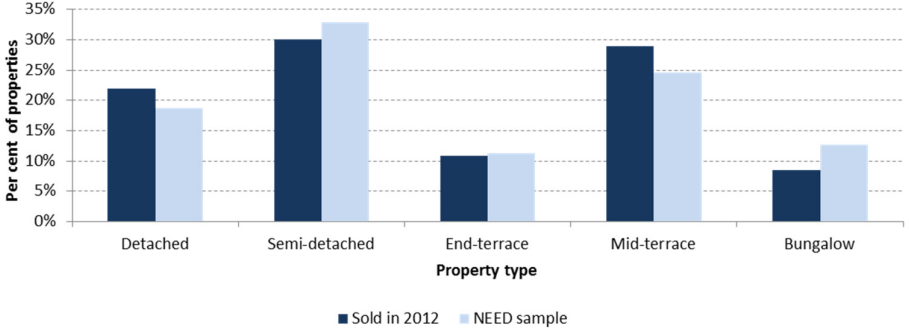
The group of properties selected for the change of occupancy analysis (i.e. the ‘intervention group’) was not representative of the NEED sample and, therefore, of the entire dwelling stock in England and Wales. This is because properties with certain characteristics were more likely to be sold in the year of interest (i.e. 2012). Figure C.1 below shows the degree of overrepresentation and underrepresentation in this group along various property characteristics. In general, properties in the South East and the East Midlands were overrepresented among sold properties (15 and eight per cent of the dwelling stock, respectively, but 19 and 11 per cent of all properties sold in 2012), while those in the North West were the most underrepresented (13 per cent of dwelling stock, nine per cent of sold properties).

**Figure C.1. – Geographical distribution of properties sold in 2012 compared to the housing stock**



Figure C.2 illustrates that, in terms of property types, mid-terrace and detached homes were overrepresented (25 and 19 per cent of dwelling stock, compared to 29 and 22 per cent of sold properties, respectively), and bungalows were the most underrepresented group (13 per cent of dwelling stock, eight per cent of sold properties).

**Figure C.2. – Property types properties sold in 2012 compared to the housing stock**

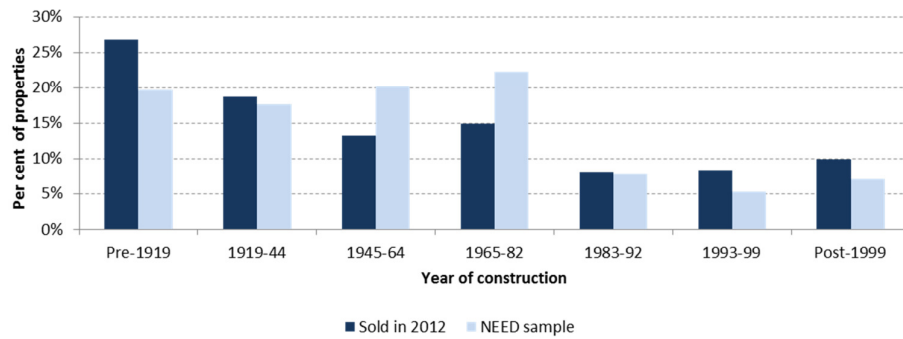


As regards property age, homes built between 1945 and 1982 were underrepresented (42 per cent of the dwelling stock, 28 per cent of all properties sold in 2012). Pre-1919 properties, on



the other hand, were overrepresented in this group, making up 20 per cent of the dwelling stock and 27 per cent of sold properties (see Chart C.3).

**Figure C.3. – Age distribution of properties sold in 2012 compared to the housing stock**



## Impact of change of occupancy

This section outlines the change in electricity and gas consumption for the whole calendar year before and after the properties were sold in 2012. 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.

Tables C.1 below shows average (mean) and typical (median) electricity consumption in the intervention and comparison groups, compared to the same figures for England and Wales. The figures show that the intervention group (and therefore also the matched comparison group) had higher-than-average electricity use. This is probably due to the different building characteristics (e.g. higher proportion of detached houses among sold properties).

**Table C.1 – Annual electricity usage (unweighted) in the years before and after change of occupancy in the intervention group**

|                                    |        | Annual electricity consumption (kWh) |       |
|------------------------------------|--------|--------------------------------------|-------|
|                                    |        | 2011                                 | 2013  |
| Properties sold in 2012            | Mean   | 4,500                                | 3,500 |
|                                    | Median | 3,800                                | 3,000 |
| Comparison group                   | Mean   | 4,500                                | 4,200 |
|                                    | Median | 3,900                                | 3,600 |
| All properties (England and Wales) | Mean   | 4,200                                | 4,000 |
|                                    | Median | 3,400                                | 3,300 |

Similarly, Table C.2 shows average (mean) and typical (median) gas consumption figures. As for electricity, gas consumption in the intervention and comparison groups is higher than the average for England and Wales.

**Table C.2 – Annual gas usage (unweighted) in the years before and after change of occupancy in the intervention group**

|                                    |        | Annual gas consumption (kWh) |        |
|------------------------------------|--------|------------------------------|--------|
|                                    |        | 2011                         | 2013   |
| Properties sold in 2012            | Mean   | 16,300                       | 14,200 |
|                                    | Median | 15,000                       | 13,000 |
| Comparison group                   | Mean   | 16,200                       | 15,600 |
|                                    | Median | 15,000                       | 14,400 |
| All properties (England and Wales) | Mean   | 14,100                       | 13,500 |
|                                    | Median | 12,900                       | 12,400 |

Table C.3 below shows the average (mean) and typical (median) decrease in electricity consumption figures from 2011 to 2013, in the intervention and comparison groups.

**Table C.3 – Summary of observed electricity savings in properties sold in 2012**

|                  |        | Percentage saving | Saving (kWh) |
|------------------|--------|-------------------|--------------|
| Sold in 2012     | Mean   | -16.4%            | -1,000       |
|                  | Median | -17.4%            | -600         |
| Comparison group | Mean   | -5.3%             | -300         |
|                  | Median | -3.9%             | -100         |

While the two groups had very similar consumption figures in 2011 (as a result of the matching process), electricity use fell much faster in the properties that changed hands in 2012. While electricity consumption decreased on average by 300 kWh (five per cent) in the comparison group, properties with new occupants experienced mean savings of 1,000 kWh (16 per cent) on their electricity bill. The typical (median) saving was 600 kWh (17 per cent) in the sold properties, higher than the 100 kWh (four per cent) experienced in the comparison group.

Factors such as buying new, more energy-efficient appliances when moving home may contribute to the decrease in energy use, along with the adoption of new habits. A change in the composition of the household (e.g. number and age of the occupants) will also have a major impact on electricity use, but this effect can act either to increase or decrease depending on the nature of the change.

Similarly, Table C.4 shows the average (mean) and typical (median) decrease in gas consumption figures from 2011 to 2013, in the intervention and comparison groups.

**Table C.4 – 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 (10 per cent) less gas, while those that were still occupied by the same people experienced an average saving of just 600 kWh (three per cent). New owners may choose to install energy efficiency measures when they purchase a property, which would lead to a reduction of gas use. This effect, however, cannot fully account for the energy saving in the case of our intervention group, because it was selected from a pool of properties that have no records of major energy efficiency measures, such as cavity wall or loft insulation. Thanks to the sampling methodology used, the number of unrecorded energy efficiency installations should be similar between the intervention and the comparison group. 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.

# Summary and next steps

This report summarises an investigation into the behavioural drivers of energy consumption, conducted by DECC for the first time this year. A comparison of the electricity and gas meter readings of properties in the year before and after they were sold and, presumably, changed occupants, revealed that the new occupants used substantially less energy than the previous occupants. This drop exceeded the general trend of decreasing domestic energy use.

The results are slightly surprising: a more varied pattern was expected, as some new occupants will be more energy aware than the old ones, but others, less so. Similarly, when the new household is smaller, energy use may decrease, but a larger number of new occupants moving into a property should, in general, increase energy consumption. Such differences across households, however, appear to have been outweighed by a 'moving house effect', which pushed consumption down.

There are several possible explanations for this effect. For example, new owners may be financially stretched after purchasing a new property, and may be more conscious of their energy expenditure. Additionally, the bulk of the drop in energy use typically occurred in the year of moving homes (i.e. in 2012), suggesting perhaps that the new occupants were still in a period of transition, settling into their new properties before resuming their normal energy use behaviours. The purchase of new, more energy-efficient appliances and alterations to the new home that are not recorded in any of the databases that feed into NEED (e.g. converting rooms) may also contribute to the decrease in energy use. It is also possible that the properties remained unoccupied for a while after the sale.

The analysis presented here forms part of DECC's broad and continued research efforts into the drivers of energy use. It contributes important evidence, providing clear evidence for an impact of consumer behaviour. These results will be followed up in various ways. For example, DECC is going to construct a model of gas consumption in the following months, pulling together data available in NEED and from other sources. This model will help identify the major drivers of domestic gas consumption, as well as their interactions and order of relative importance.

DECC welcomes feedback on the analysis described in this annex, and would like to hear about related research projects.

© Crown copyright 2015  
Department of Energy & Climate Change  
3 Whitehall Place  
London SW1A 2AW  
[www.gov.uk/decc](http://www.gov.uk/decc)  
URN 15D/148