Today's attitudes to low and zero carbon homes

Views of occupiers, house builders and housing associations

Primary Research

NHBC Foundation
Housing research in partnership with BRE Trust

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NHBC Foundation
NHBC House
Davy Avenue
Knowlhill
Milton Keynes
MK5 8FP
Tel: 0844 633 1000
Email: info@nhbcfoundation.org
Web: www.nhbcfoundation.org

Visit the NHBC blog at http://nhbcfoundation.blogspot.com

Follow us on Twitter @nhbcfoundation

Research undertaken by:

Lychgate Projects Ltd
12 Diddenham Court
Lambwood Hill
Grazeley
Reading RG7 1JQ
www.lychgate.co.uk
0118 988 7343

Lychgate

Constructive Research for Building Businesses

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About the NHBC Foundation

The NHBC Foundation was established in 2006 by the NHBC in partnership with the BRE Trust. Its purpose is to deliver high-quality research and practical guidance to help the industry meet its considerable challenges.

Since its inception, the NHBC Foundation's work has focused primarily on the sustainability agenda and the challenges of the Government's 2016 zero carbon homes target. Research has included a review of microgeneration and renewable energy technologies and the earlier investigation of what zero carbon means to homeowners and house builders.

The NHBC Foundation is also involved in a programme of positive engagement with Government, development agencies, academics and other key stakeholders, focusing on current and pressing issues relevant to the industry.

Further details on the latest output from the NHBC Foundation can be found at www.nhbcfoundation.org.

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Glossary

Acronyms

CSH	Code for Sustainable Homes
CHP	Combined Heat and Power
DCLG	Department for Communities and Local Government
EPC	Energy Performance Certificate
FIT	Feed-in Tariff
HCA	Homes and Communities Agency
MVHR	Mechanical Ventilation and Heat Recovery
PV	Photovoltaic (solar electric)
RHI	Renewable Heat Incentive
SIPs	Structural Insulated Panels

Definitions

Enhanced new home	Defined for the purposes of this report as a home built in the last 2 to 3 years to higher standards of energy efficiency than required by the applicable Building Regulations. These include those built to Levels 4, 5 and 6 of the Code for Sustainable Homes (CSH) and its predecessor EcoHomes Very Good and Excellent
Existing home	Defined for the purposes of this report as one which is 5 or more years old
Housing association	Also known as registered provider and social landlord
New home	A home built to the applicable Building Regulations within the last 2 to 3 years
Occupiers	People renting as well as owners of properties. It includes tenants of housing associations and people renting privately
Renewable energy technologies	On-site solutions providing heating or power which are more efficient or emit less carbon than more traditional solutions
Technological features	Renewable energy technologies, controls and other equipment built into enhanced new homes eg rainwater harvesting or grey water recycling
Zero carbon homes	A definition of zero carbon homes is given in section 5

Foreword

The NHBC Foundation was established in 2006 to provide practical and relevant research to support the house-building industry, with particular emphasis on the sustainability agenda. With over 30 publications to date, the NHBC Foundation is now a leading knowledge resource for the industry, focusing on its three core research priorities of zero carbon, risk management and the consumer.

In 2008, NHBC Foundation published NF 9 *Zero carbon: what does it mean to homeowners and house builders?* This innovative research provided a valuable insight into attitudes to low and zero carbon, including climate change, energy efficiency and microgeneration. In the time since its publication, much work has been done in line with the recommendations, but it is clear that in 2012 there is still some way to go.

In the 4 years since this research was published, the UK has undergone significant changes. The impact of the late 2008 recession that lasted officially for 18 months created an ongoing impact on a number of industries, particularly house building and the wider construction sector. A change of Government in 2010 was followed by a number of economic austerity measures, and combined with reduced availability in mortgage lending, slowed the housing market significantly. Official figures from NHBC show a fall of just under 30% in the number of completions between 2008 and 2010.

Positively, consumer awareness of, and engagement with, renewable technologies has gained momentum since 2008. Incentives such as the Feed-in Tariff and the forthcoming Renewable Heat Incentive and Green Deal have all contributed to an increase in domestic use of these technologies especially when utility bills are rising year-on-year. While the level of financial incentive looks set to be cut over the coming years, the commitment to building zero carbon homes remains in place, underlined by the clarification of the zero carbon definition in March 2011. The Government's new Housing Strategy, published in November 2011 expresses hope for the number of new homes built to be increased dramatically, but it is important that they meet the new regulations and provide an energy-efficient lifestyle for their occupants.

At NHBC Foundation's 5th anniversary event in January 2011, the hosted panel debate covered a wide range of issues, but one theme quickly emerged as crucial to the success of this agenda: winning hearts and minds of owners is the way forward to ensuring a sustainable future. Against an uncertain future for the industry, building zero carbon homes that consumers want to buy and live in is vital to the buoyancy of the market.

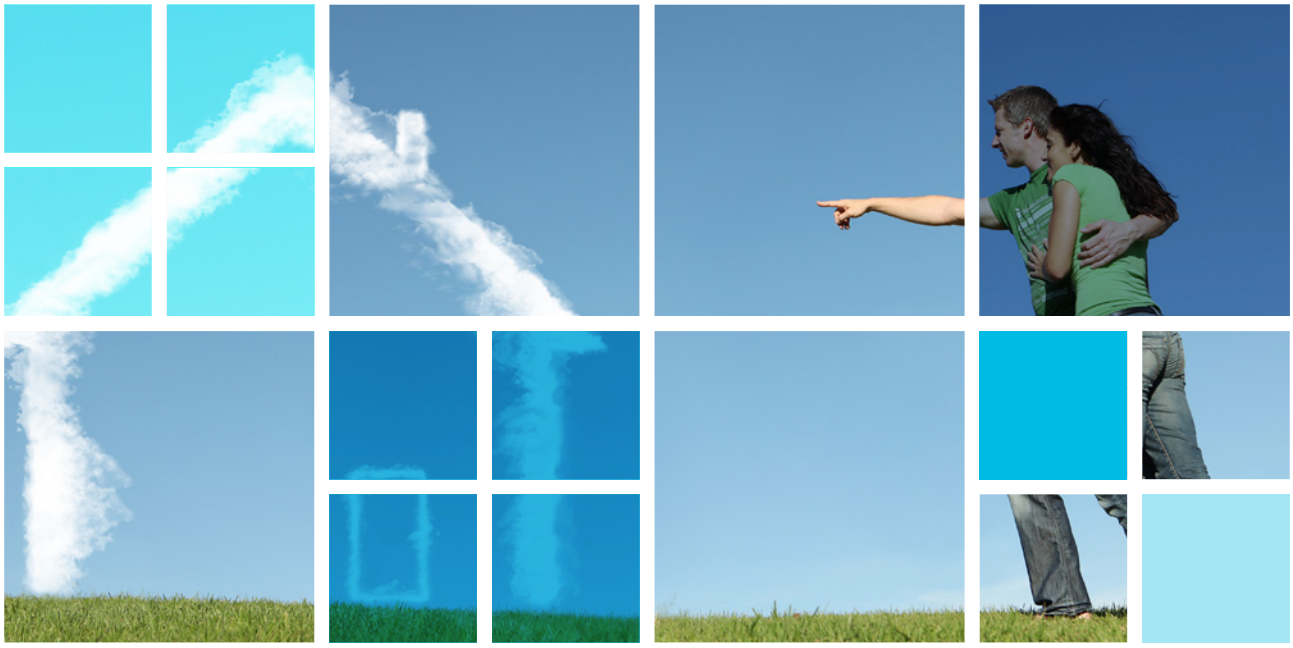
We therefore felt it appropriate for NHBC Foundation to revisit this research now, 4 years on, and to extend its remit. For the first time the opinions of housing associations as owners and their tenants have been included, along with the first independent study of occupiers in high Code for Sustainable Homes Level homes. This both enhances the previous study, and provides a more rounded survey of attitudes across the industry.

I hope that you find this research informative, and look forward to it helping to shape future development of zero carbon homes.

Rt. Hon. Nick Raynsford MP
Chairman, NHBC Foundation

Part 1:
Executive briefing

1 Introduction



Announced at NHBC Foundation's 5th anniversary event in January 2011, this primary research study was commissioned to investigate attitudes to zero carbon housing and technologies in the 4 years since publication in 2008 of NF 9 *Zero carbon: what does it mean to homeowners and house builders?*[1].

NF 9 was published at an important time for sustainable housing, and intervening years have seen the economic and political landscapes of the UK undergo significant changes. The recession, which began in the third-quarter of 2008, ran for 6 successive quarters until the end of 2009. The recovery has been slow, with subsequent quarters posting around 0.5% growth on average, including one-quarter of negative growth in 2010. The recession impacted heavily on the house-building industry, with NHBC statistics showing that from 2008 to 2010, housing completions fell from 148,000 to 103,000, representing a drop of almost 30% in 2 years.

The following areas of concern were raised in the 2008 research as items requiring further consideration: education, development cost and financing, investment in technology, health and safety and central coordination.

Since publication of NF 9, and despite the financially difficult times, much progress has been made to alleviate these concerns. National media campaigns have been run to inform consumers about home energy efficiency and products, both DIY and those requiring a qualified installer, appear more prevalent and increasingly available.

June 2008 saw the launch of the Zero Carbon Hub. The Hub has brought people together and carried out important work to explore the technical and financial aspects of the proposed 2016 requirements. The likely industry skills and knowledge requirements, and how homes might best appeal to consumers are also areas of focus for the Hub and continue to be examined.

Over the last 4 years NHBC Foundation has engaged with a wide range of organisations and published information and guidance addressing such topics as the installation of renewable energy systems on roofs of dwellings, indoor air quality and the Feed-in Tariff (FIT). Current projects include the investigation of overheating in dwellings, a review of building performance test methodologies and an examination of how occupants interact with building control systems.

Following the May 2010 general election, the new Coalition Government's first full budget in March 2011 announced clarification of the zero carbon new homes policy, confirming that it would now solely address emissions resulting from the use of regulated energy – in effect meaning that the house builder would not be responsible for CO_2 emissions arising from an occupant's use of appliances. More information on the revised definition can be found in section 5.

To encourage a reduction in CO_2 emissions from the domestic sector, the FIT was introduced through legislation, providing a financial encouragement for the installation of renewable and low carbon electricity generation equipment. Significant cuts to the FIT payment rates were proposed in October 2011 and the effect of this, at both domestic and industry level, is yet to be felt. The forthcoming Renewable Heat Incentive (RHI) aims to significantly increase the proportion of heat generated from renewable sources, and at the time of printing has been delayed while compatibility with European Union state aid rules is resolved. A consultation on the Green Deal ended on 18 January 2012 and it is anticipated that this initiative will reduce CO_2 emissions from existing homes.

With this constantly changing background and 4 years after the first study, NHBC Foundation considered it important to undertake this new research project, aiming to achieve the following objectives:

- to determine if attitudes to zero carbon homes have changed since the 2008 study by comparing current findings with those of 4 years ago
- to broaden the scope of the research and establish views of major parties including those of housing associations, tenants, and those with experience of occupying an enhanced new home
- to identify any challenges that could impact on the successful delivery of zero carbon homes on a large scale.

Acceptance of the Government's 2016 zero carbon requirements is reliant on an informed industry and engaged occupiers who will want to take advantage of, and benefit from, new energy-efficient homes. Changes to Building Regulations over the past 4 years are leading the way towards delivery of the zero carbon homes policy, but there are very few independent studies assessing how these changes are impacting industry and consumers alike.

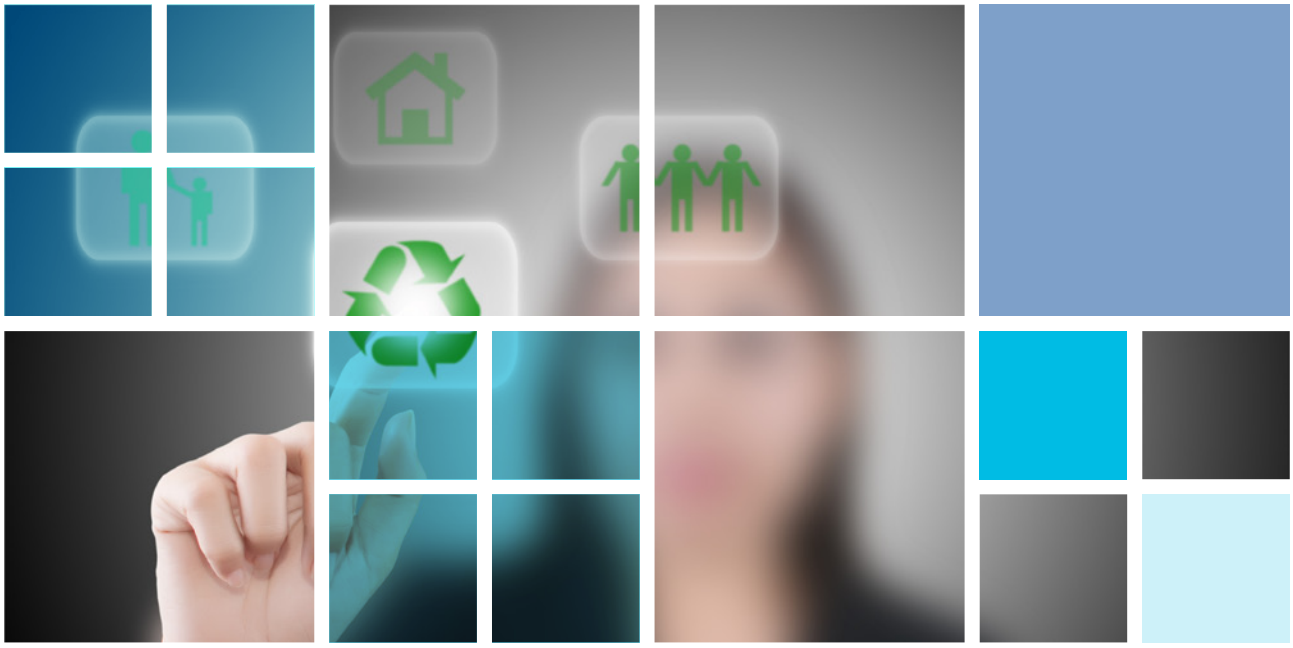
2012 research report

Today's attitudes to low and zero carbon homes reveals the current thoughts, awareness and understanding towards issues such as climate change, the CSH, the 2016 zero carbon definition, airtightness and renewable technologies.

This new research assesses the priorities of industry and the consumer when building or purchasing a new home, and looks at views that could impact upon new homes of the future. Improving on the 2008 study, more rounded findings are presented with the addition of views from housing associations and tenants.

The executive briefing sets the context for the research and presents the key findings, recommendations and revised definition of zero carbon homes. A detailed examination of responses from occupiers, house builders and housing associations is contained in parts 2 and 3.

2 Methodology



The research involved both qualitative and quantitative stages:

- **Stage 1 qualitative**: 7 focus groups were conducted in different regions, engaging 51 respondents in facilitated discussion.
- **Stage 2 quantitative**: interviews with a representative sample of 1,331 occupiers and 101 house builders and housing associations.

2.1 Research with occupiers

- 5 focus groups of occupiers, including some living in enhanced new homes (homes built in the last 2 to 3 years to higher standards of energy efficiency than required by the applicable Building Regulations)
- 300 in-home interviews with occupiers of existing homes at least 5 years old
- 50 in-home interviews with occupiers of new homes (homes built to applicable Building Regulations in the last 2 to 3 years)
- 54 in-home interviews across a number of developments with occupiers of enhanced new homes built in the least 2 to 3 years to higher standards of energy efficiency than required by the applicable Building Regulations
- 927 telephone interviews with occupiers across all tenures and home types.

With the proportion of people renting homes standing at 30%, and expected to increase, occupiers renting homes as well as owners were included in the survey.

2.2 Research with house builders and housing associations

- 2 focus groups with house builders and housing associations
- 101 telephone interviews with house builders and housing associations, whose combined organisations represent about 12% of new homes built and 10% of the managed social housing stock.

2.3 Weighting of results

The results of interviews with occupiers have been weighted in two ways to ensure they are representative of the population:

- New homes built in the last 2 to 3 years represent about 2% of the entire housing stock. Therefore where views of those living in a new home are combined with those living in an older property, a factor is applied to ensure that the combined figure reflects the true proportions in which they occur.
- Occupiers' results are weighted to ensure views are representative of the population by region, age, male/female ratio, occupational group and type of tenure of home.

3 Key findings

The zero carbon agenda has moved on considerably since the publication of NF 9 *Zero carbon: what does it mean to homeowners and house builders?* in 2008[1]. More homes have been constructed to higher energy efficiency standards, increasing collective experience of design, build and occupation of these homes.

Four years on, NHBC Foundation has revisited the study to establish how this increased experience has impacted industry and consumers, and to help guide the Government's 2016 zero carbon requirements.

The 2008 study concluded that occupiers were reluctant to adopt the lifestyle changes associated with low and zero carbon homes, and that focusing on cost-saving benefits would provide the best means of encouraging interest in these homes and the technical features incorporated in them. At that time, house builders were concerned about meeting the sustainability targets and delivering high volumes of affordable and appealing homes.

This current study indicates a positive shift in attitude and engagement by consumers compared with the 2008 findings and identifies areas of concern, raised by both house builders and housing associations. Sections 3.1 to 3.12 give a summary of the key findings.

3.1 Occupiers like their new and enhanced new homes

Levels of satisfaction expressed by those occupying new or enhanced new homes are high, with only 5% of respondents stating they are dissatisfied with the experience of living in their homes. As in 2008, location remains the key consideration when choosing a home. When compared with occupiers' previous homes, those living in new homes consistently prefer features of their new homes to those of their old homes; foremost among these are the design of living spaces

and ability to maintain comfortable internal temperatures. Furthermore, many could not think of anything they dislike about their new home, with most owners of enhanced new homes stating that they would choose another similar home again.

3.2 New and enhanced new homes help occupiers save money on energy bills

Energy efficiency remains a minor consideration for consumers when choosing a home, with small numbers identifying it as a specific feature that attracted them. However, on further questioning, 96% of respondents regard the cost of energy bills as important to them, with most expecting that a new home would have lower energy bills. Over two-thirds of occupiers of new or enhanced new homes stated that they are satisfied or very satisfied with their energy bills, compared with a little over one-third of occupiers of existing homes. Over half say their energy bills are lower in their new or enhanced new home, which was also consistently reported in the focus groups.

3.3 Those looking to move need more information about energy savings

Just over half of all respondents are aware of the mandatory Energy Performance Certificate (EPC). However, of the consumers looking to move or those who had recently moved, only around one-third recall seeing an EPC, a figure that reduced to less than a quarter of respondents in the rental market. Of all those looking to move, or those who had recently moved, just 12% say that the EPC influenced them. Most house builders use the mandatory EPC ratings in their marketing, but very few provide projected energy usage or costs for the home to potential buyers. In most cases, lower energy bills are intimated but not quantified in monetary terms. In general, occupiers say that information on utility bills would be helpful in making a decision about buying a home, rather than simply being told it is energy efficient.

3.4 Some attitude and behaviour change is evident

Most occupiers consider climate change as a global threat, but only one-third consider it a major global threat. Concern about climate change appears slightly lower than in the 2008 study, reflected in an increase in the percentage of people who think there is no evidence for climate change. There appears to be more concern expressed about scarcity of resources, such as oil and gas, than for climate change and few consider energy used in homes to be a major influence on CO_2 emissions. Most occupiers say they are doing more to reduce energy use now than 4 years ago. Unprompted, two-thirds state that they turn off lights and over half say that they have installed energy-efficient light bulbs. Behaviour change is also evident in lower water usage, with many saying they take showers instead of baths to save water. The 'carbon rebound' effect is also evident, with most respondents saying they would spend any money saved on energy bills on things such as a new television or a foreign holiday that would actually increase their carbon footprint. Only a small number would invest savings in additional energy efficiency measures for their home to save even more money on their bills.

3.5 There is confusion about zero carbon homes

Most house builders and housing associations say that their organisations understand the revised definition of zero carbon homes that will apply from 2016. However, further questioning reveals confusion about much of the detail and the associated costs of construction. A high proportion of occupiers associate very energy-efficient homes with contemporary design. However, more than half of

house builders say they will be able to meet the zero carbon requirements by modifying existing more traditional designs – a style preferred by the vast majority of occupiers and a preference that increases with the age of respondent.

3.6 Home valuations do not take renewable technologies into account

An overwhelming majority of house builders that expressed an opinion think that valuers and lenders do not place a premium on new and enhanced new homes when compared to the secondhand market. Valuers and lenders have reported anecdotally that if consumers placed a premium on new or enhanced new homes, then they would follow suit. Findings show that house builders think, or have found, that very few occupiers are prepared to pay a premium for an enhanced new home, when in fact a high number of occupiers state that they would pay a premium when it is directly linked with a saving in energy bills. Interest in paying a premium decreases with age of respondent with the majority of those not interested stating 'payback period' as the main reason. Owners of enhanced new homes with environmentally-friendly features believe that it will make their home more saleable.

3.7 There is some industry scepticism around implementation of zero carbon targets

Approximately half of house builder and housing association respondents consider that the zero carbon requirements will be achieved between 2016 and 2020. Some think it will never happen. Few house builders have experience of building to enhanced energy efficiency standards, such as the higher levels of the CSH, and many will wait until the Building Regulations change before considering the requirements. Most believe that zero carbon homes will have a negative effect on profitability, a factor, that combined with confusion about future requirements, cost and valuation concerns, may be influencing decisions about building to enhanced energy efficiency standards. Estimates of the additional build cost per dwelling required to meet the proposed 2016 requirements vary widely and differ from existing published figures.

3.8 User-friendly terminology would benefit consumers

Description of the home has a strong effect on how occupiers perceive its attractiveness. Almost three-quarters of those asked find the term 'energy-efficient home' the most likely to attract them, far more than those who like the terms 'eco home' and 'zero carbon home' – despite eco home being the most widely recognised. There is some scepticism about the term 'zero carbon' because of doubts about whether any home can be truly zero carbon. Other terminology issues include terms such as 'airtight' and 'greywater recycling'. Fewer than half of respondents think that an airtight home sounds like it would be a positive thing until it is described in an alternative way. Similarly, the term greywater recycling was perceived negatively among the focus groups but when a different description was provided, a more positive response was given.

3.9 Financial incentives could encourage more occupiers to buy or rent a very energy-efficient home

Very few occupiers had heard of the existing financial incentives for renewable technologies such as the FITs or forthcoming RHI. There is an appetite for financial incentives such as lower council tax, stamp duty reduction or an income tax refund to encourage occupiers to move to a more energy-efficient home, suggesting these preferred options could be used to encourage higher take-up.

3.10 Action is needed to help understanding of use and maintenance of renewable technologies

Although a large number of both owners and tenants had been given instructions and/or training on how to use the technologies in their new home, it was widely recognised in each of the focus groups (including house builders and housing associations) that the quality of information is currently inconsistent and often inadequate. Most believe that there is a need for user-friendly information to be provided to owners and tenants on the maintenance and use of the technologies in order to achieve the potential energy and carbon savings and to ensure a safe environment – an opinion reinforced by commitments from 8 out of 10 house builders and housing associations who plan to improve the information provided. A high percentage of occupiers with a solar thermal or solar electric system fitted feel that they benefit from it, but a lesser number feel that they understand how to operate it correctly. When questioned about maintenance and filter changing for Mechanical Ventilation and Heat Recovery (MVHR) units, most respondents with the systems fitted stated that they have not carried out any maintenance. In addition, those with MVHR systems appear to open windows just as much, if not more, than those in homes without the systems, although doing so should generally be avoided.

3.11 Some new technologies attract consumers more than others

Most occupiers perceive reduced energy bills to be the biggest benefit of having technological features fitted to their homes. Most occupiers of existing homes have fitted or plan to fit energy-efficient light bulbs, however very few have solar panels or plan to install them. There is a high level of awareness of solar technologies, but much less so of ground source heat pumps, combined heat and power, MVHR, biomass boilers and air source heat pumps. Over half of people are either slightly or strongly attracted to buying a home with solar panels fitted – either solar thermal or solar electric. Interest declines with age of respondent for solar as well as other systems and there is less interest among those buying in comparison to those looking to rent. Issues raised by consumers across a number of technologies show a strong financial focus, with concerns including potential savings, payback periods and maintenance costs.

3.12 There are concerns about product manufacturers' service

House builders and housing associations have concerns about the abilities of product suppliers to satisfactorily meet their needs. As a result, 45% of housing associations have experience of installing back-up systems and 27% have had to decommission a technology. Less than one-third of house builders and housing associations could think of an example of good service from a supplier. A number of areas were raised where there is scope for improvement including a lack of trained installers (who were blamed for 90% of failures), poor after-sales support and a need for more user-friendly information for occupiers.

4 Recommendations

The overriding recommendation drawn from this research is that the topic of zero carbon homes needs to be simplified – from communications and language to operation and maintenance, for the benefit of both industry and occupiers. This recommendation will be achieved in the ways outlined in sections 4.1 to 4.7.

4.1 Link energy efficiency of new homes to cost benefits

The house-building industry should use the energy efficiency of new homes as an opportunity to emphasise the benefit of lower running costs. This should be the primary message, over and above climate change. Many house builders indicate that they promote some energy efficiency or utility bill information, but it is clear from the research that occupiers want further quantification of running costs for homes and payback periods for technological features.

Recommendations

- The house-building industry should emphasise the lower running costs that result from the energy efficiency of new homes through their marketing materials and sales staff.
- The Government should undertake a review of the EPC, mandatory during the purchase or rental of a home, to ensure they better inform consumer views with accurate, actual home running costs.

4.2 Develop consumer-friendly terminology

Consumers generally are finding it difficult to understand the number of terms that are associated with zero carbon homes. While 'energy-efficient' appears to be the most popular, other references and the names of technologies themselves are struggling to be accepted.

Recommendations

- House builders need to adopt terminology that is user-friendly, engaging and easily understood, appealing to both buyers and renters.
- A lexicon of terminology should be developed that will allow the industry and consumers to benefit from a consistent approach.

4.3 Improve valuation of energy-efficient new homes

The addition of designer kitchens and bathrooms can lead to higher property valuations, whereas fabric efficiency or renewable technologies fail to attract the same level of financial recognition.

Recommendation

- Valuers and mortgage lenders must recognise that new homes, built to higher levels of energy efficiency, save owners money in running costs and need to factor this into valuations and lending decisions.

4.4 Deliver better information for occupiers

There is a very real need to provide improved information to occupiers at two key stages: prior to purchase to help them make an informed purchase or rental choice, and on moving in, so that efficient use of technological features can be explained.

Recommendation

- Urgent further work needs to be carried out by house builders on developing a combination of user-friendly instructions and guides, training and intuitive control systems and the most effective use of each.

4.5 Provide clear information on current financial incentives to stimulate interest in renewable technologies

It is clear from the research that many occupiers have little knowledge of existing financial incentives such as the Feed-in Tariff which aims to encourage the generation and use of renewable electricity.

Recommendation

- To further encourage occupier engagement with renewable technologies and potentially drive aspiration, simple and concise information about current financial incentives should be provided. Taxation breaks such as reduced stamp duty or council tax could also be explored in further detail.

4.6 Work with product manufacturers to deliver reliable technologies to the market

A number of housing associations indicate that they have built in back-up systems in anticipation of technologies failing, or in some cases, have decommissioned systems considered to be unreliable.

Recommendations

- Manufacturers need to develop products that work well in practice, give greater confidence to house builders and housing associations and reduce the need for back-up systems.
- Technical support, including clearer instructions on installation, use, maintenance and improved training needs to be provided to both house building companies and individual installers.

4.7 Improve understanding of zero carbon homes

While understanding of zero carbon homes policy has increased in the past 4 years, it is clear that further clarification of the revised 2016 definition and better communication is needed for house builders and housing associations, responsible for developing the UK's new homes.

Recommendations

- The zero carbon definition has been subject to much change and it has been hard for industry to fully understand the current proposals. The Government needs to confirm the remaining parts of the definition without delay to give the industry the confidence required to engage with and rise to the challenge it presents.
- Continued communication to industry is required to ensure that those responsible for delivery are fully informed.

5 Zero carbon homes defined

5.1 The zero carbon new homes policy

In July 2007, the Department for Communities and Local Government (DCLG) published *Building a greener future: policy statement*[2], confirming the Government's intention for all new homes to be zero carbon from 2016. Progressive tightening of the energy requirements within the Building Regulations would ensure delivery of that policy.

Originally, the term 'zero carbon home' within the context of the policy was envisaged to be 'no net CO_2 emissions resulting from all energy used within a home over the course of a year'. At that time the policy was to address regulated energy use (from space and water heating, fixed lighting, pumps and fans) and unregulated energy use (from occupants' use of plug-in household appliances and cooking). Together these energy uses result in approximately 3.2 tonnes of CO_2 emissions per year for a typical new home, with about two-thirds attributable to regulated energy use and one-third to unregulated energy use. This is illustrated in Figure 1, which also shows the steps in Building Regulations requirements that were anticipated and the comparable level of requirements set by the CSH. It is in this context that the research for NF 9 *Zero carbon: what does it mean to homeowners and house builders?*[1] was carried out in 2008.

In March 2011, Budget announcements stated that the zero carbon new homes policy would solely address emissions resulting from the use of regulated energy – in effect meaning that the house builder would not be responsible for CO_2 emissions they have the least influence over, ie those arising from cooking and the use of appliances by occupants. It is in this context in which data has been gathered for this study. Figure 2 illustrates approximately 1.1 tonnes of CO_2 emissions resulting from the use of unregulated energy which will not be abated by the revised zero carbon new homes policy and also shows the comparable level of requirements set by the CSH (Levels 3 and 5).

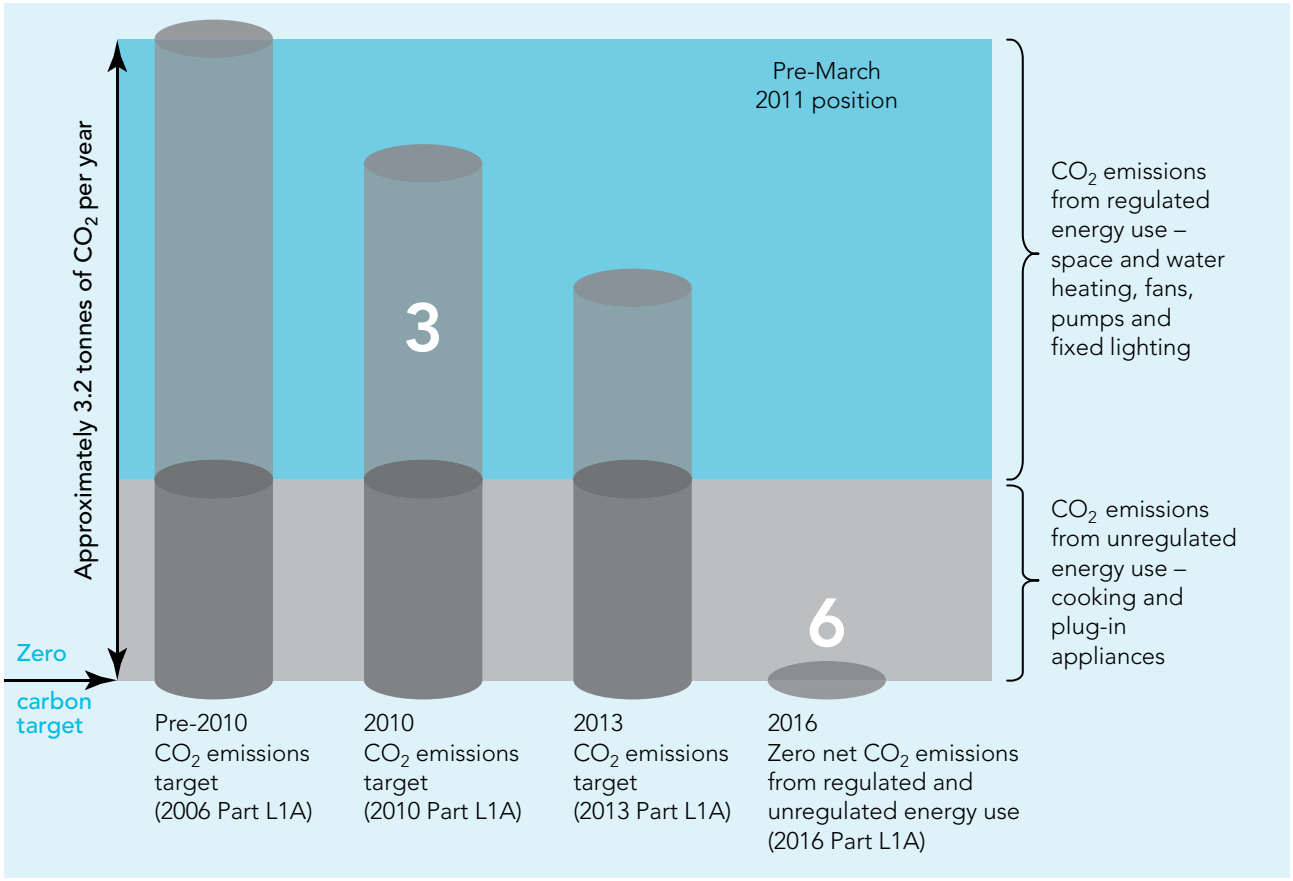


Figure 1 Pre-2011 understanding of the zero carbon new homes policy (source: Zero Carbon Hub, 2011). Numbers 3 and 6 represent relevant Code for Sustainable Homes Levels

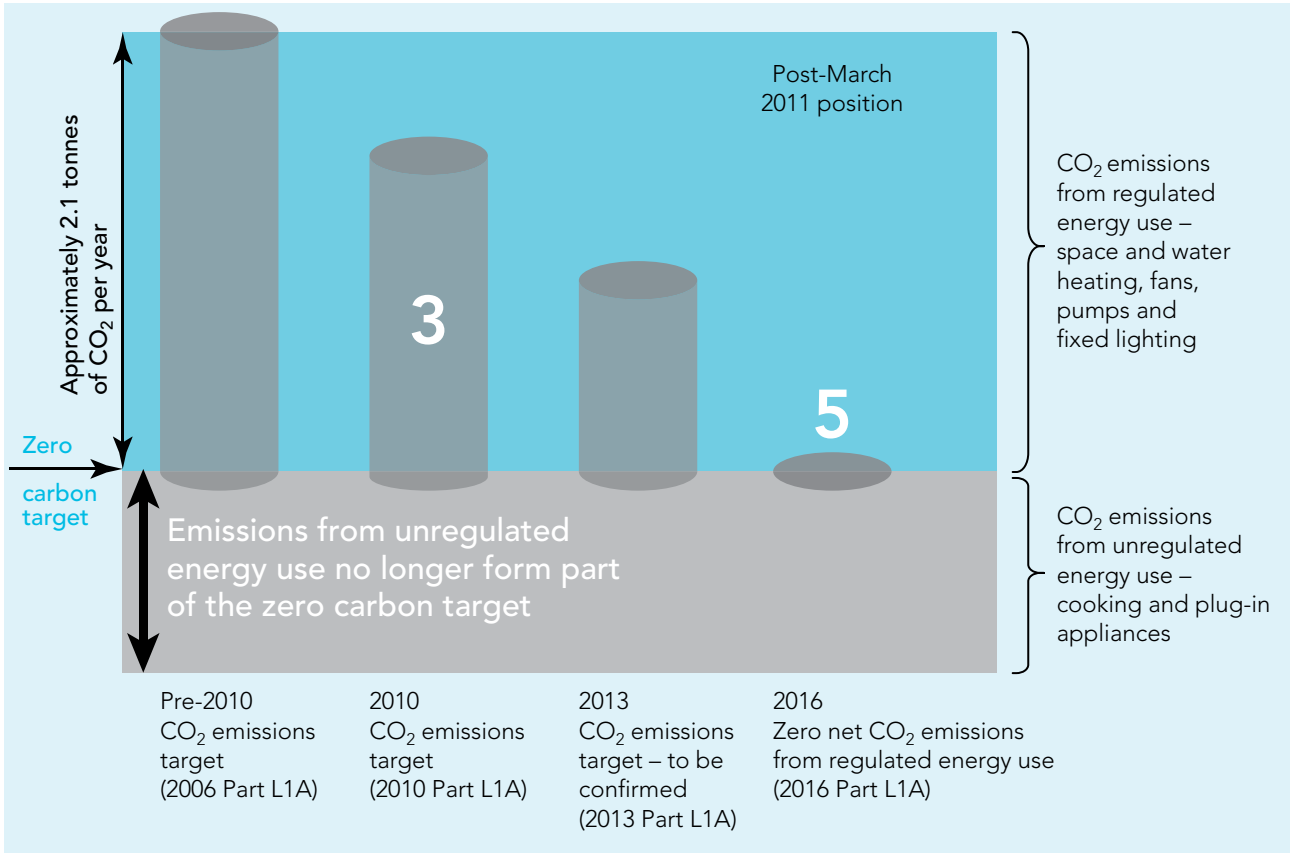


Figure 2 Post-2011 understanding of the zero carbon new homes policy (source: Zero Carbon Hub, 2011). Numbers 3 and 5 represent relevant Code for Sustainable Homes Levels

5.2 The zero carbon new homes policy and the Code for Sustainable Homes

The CSH is a nationally recognised standard for the sustainable design and construction of new homes. It uses 9 categories to rate a new home with the amalgamated scores giving the home a 1 to 6 star rating or CSH Level. In 2008 it became a requirement for new homes to be rated against the CSH and as part of funding or planning requirements it has been common to stipulate achievement of a specific rating against the CSH.

The CSH rates the most sustainable new homes as achieving Level 6 based on assessment against 9 categories:

- Energy and CO_2 emissions
- Water
- Materials
- Surface water run-off
- Waste
- Pollution
- Health and well-being
- Management
- Ecology.

Of the 9 categories, energy and CO_2 emissions relates most closely to the zero carbon homes policy (and to Building Regulations Approved Document L1A[3]), however a direct comparison cannot be made.

The main difference is that currently the CSH requires all CO_2 emissions to be abated at plot/site level. The zero carbon new homes policy is more flexible, allowing a certain proportion of CO_2 emissions to be addressed by measures that are not necessarily on-site, through a mechanism known as Allowable Solutions. Following the March 2011 Budget announcement, the total CO_2 emissions to be addressed by the zero carbon new homes policy are now equivalent to that required by Level 5 of the CSH, as shown in Figure 3.

It is likely that the zero carbon new homes policy and CSH will be aligned in due course, however currently while the total CO_2 abatement is the same, the two standards are achieved in very different ways and are likely to result in different development strategies and costs.

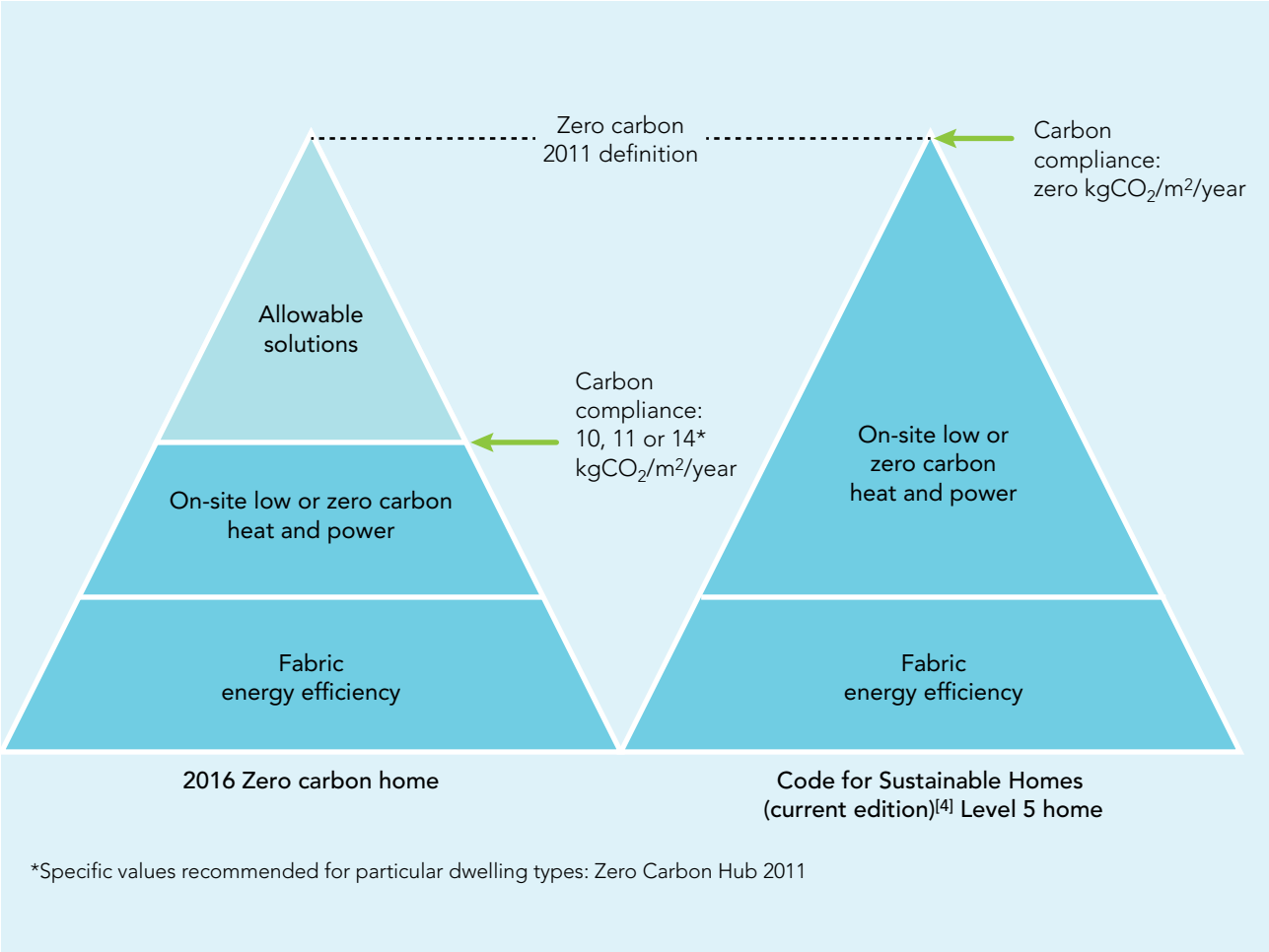


Figure 3 Zero carbon home versus today's Code for Sustainable Homes Level 5 home[5]

Part 2:
Occupiers' attitudes and experiences

6 Introduction

6.1 Objectives

Part 2 reports the results of research conducted with occupiers, including those owning their homes and others renting privately or from housing associations. In order to examine the impact of higher energy efficiency in new homes, and make comparisons, the study encompasses the views of those living in:

- homes that are 5 or more years old (referred to as existing homes)
- homes built in the last 2 to 3 years to the applicable Building Regulations (referred to as new homes)
- homes built to enhanced energy efficiency standards (referred to as enhanced new homes).

The research was designed to investigate:

- requirements when looking to buy or rent a home and the relative importance of energy efficiency
- significance of utility bills and other drivers to reducing energy use
- climate change, lifestyle changes and home improvements to reduce energy use
- attitudes to Government and industry initiatives
- reactions to specific technological features that may be found in zero carbon homes
- willingness to invest in a new home to gain energy-savings
- experiences of those living in new and enhanced new homes.

6.2 Method

The research was carried out in 2 stages:

Stage 1: Qualitative

5 focus groups:

- Existing home owners in Reading, Berkshire and Oldham, Greater Manchester.
- Occupiers of enhanced new homes in Street, Somerset (a private development built by Crest Nicholson, achieving an EcoHomes Excellent rating) and Pontefract, West Yorkshire (owned and managed by Wakefield and District Housing Association, achieving Level 4 of the CSH).
- Occupiers of new homes built to applicable Building Regulations about 2 to 3 years ago in Milton Keynes.

A total of 51 people attended the focus groups.

Stage 2: Quantitative

Existing homes – 300 in-home interviews:

- A representative sample of occupiers of homes built at least 5 years ago. These were designed to be as representative of the population as possible, taking into account region, type of dwelling by region, type of tenure (ownership/renting), respondent's age, occupational group and ethnicity[6]. Life stage group was also captured (for example, family with children at home, retired).

New homes – 50 in-home interviews:

- Occupiers of new homes built in the last 2 to 3 years to the applicable Building Regulations. These were spread across a number of regions. Respondents represent a mix of ages and home types.

Enhanced new homes – 54 in-home interviews:

- Occupiers of enhanced new homes built in the last 2 to 3 years, across 12 developments. 30 of these were with housing association tenants, 19 with owner-occupiers (private and shared ownership) and 5 with people renting private homes. This includes homes built to Levels 4, 5 and 6 of the CSH, and to the previous standard of EcoHomes Very Good or Excellent. Interviews took place in a number of different areas across the UK.

Telephone survey – 927 occupiers:

- A representative sample of members of the public who own or rent a home. These interviews were shorter than the in-home interviews and focused on key questions.

The results of some questions are based on everyone in the survey, ie a total sample of 1,331.

Most of this part of the report is based on 404 in-home interviews, and views from the focus groups. In-home interviews lasted on average 20 to 30 minutes, and each focus group over 2 hours. Results are given separately according to whether respondents live in an existing home, a new home or an enhanced new home.

People renting homes (as well as owners) were included in the survey due to the increasing number of people renting, which now stands at 30%.

6.2.1 Weighting of results to represent the population

Results of the interviews with all occupiers are weighted to reflect national statistics and ensure that results are representative of the UK population. This was achieved by applying weighting factors to the research results for region, respondent age, occupational group and type of tenure. This was undertaken to ensure that 1 group is not over- or under-represented in the results.

Furthermore, a second weighting factor was applied to ensure a representative balance between occupiers of new, enhanced new and existing homes in the 'all' figure in the graphs included in the report. The reason for this is that 1 in 4 of the in-home interviews were with occupiers of new homes built in the last 2 to 3 years, but these represent only 2% of the entire housing stock[7].

6.2.2 Significance testing

Significance testing has been carried out at the 95% confidence level. Results are within a margin of error range of ± 1% to 4% at the 95% confidence level (based on a sample size of 404). This is a low margin of error and shows that the results are a good reflection of the views of the population that they represent. Where the term 'significant' is used in this report to compare figures, this means any difference is significant at the 95% confidence level. Table 1 shows the actual sample results and the weighted results, designed to reflect the population[6].

Table 1 Analysis of interviews: all surveys combined 1,331 respondents

	Actual	Weighted*
Region		
Scotland	7%	9%
England and Wales		
The North East, Yorkshire and Humberside	14%	14%
The North West	13%	11%
East and West Midlands	16%	16%
The South East and East Anglia	22%	23%
Greater London	13%	12%
Wales and the West	13%	14%
Northern Ireland	1%	1%
Occupational group		
ABC1	58%	56%
C2DE	40%	41%
Refused†	2%	2%
Age		
16–24‡	5%	9%
25–34	13%	17%
35–44	20%	19%
45–54	20%	17%
55–64	18%	16%
65+	20%	20%
Refused†	3%	2%
Tenure		
Owner-occupier	71%	70%
Rented	29%	30%
Gender		
Male	48%	48%
Female	52%	52%

* Representative of demographics
† Refused: information not known, hence these appear as refused in weighted column
‡ Telephone survey results are for 16–24 age group. In-home interviews and focus groups research is for 18–24 age group.

The age of homes in the existing home interviews has not been weighted and is shown as a percentage of the 300 interviews as follows (figures in brackets are based on *Survey of English Housing 2007 to 2008*)[8]:

- 1984 to 2006: 16% (16%)
- 1971 to 1983: 15% (1965 to 1984, 24%)
- 1946 to 1970: 32% (1946 to 1964, 22%)
- 1919 to 1945: 16% (19%)
- Pre-1919: 16% (19%).

Life stage analysis is available for the in-home interviews but not the telephone interviews.

6.2.3 Comparison with the methodology of the 2008 survey

The 2008 survey was based on 557 in-home interviews, split between 251 owners of new homes and 306 in older properties. Demographic quotas were not set, but age and occupational group were recorded. Weighting was not applied to the figures combining new homes and existing homes. The study solely focused on home owners – renters were not included.

Some questions have been retained from the 2008 study[1] for comparison purposes, but as sample composition differs and weighting factors have been applied to the current survey, comparisons should be treated only as a guide.

7 Occupier priorities and motivations

Key findings in this section

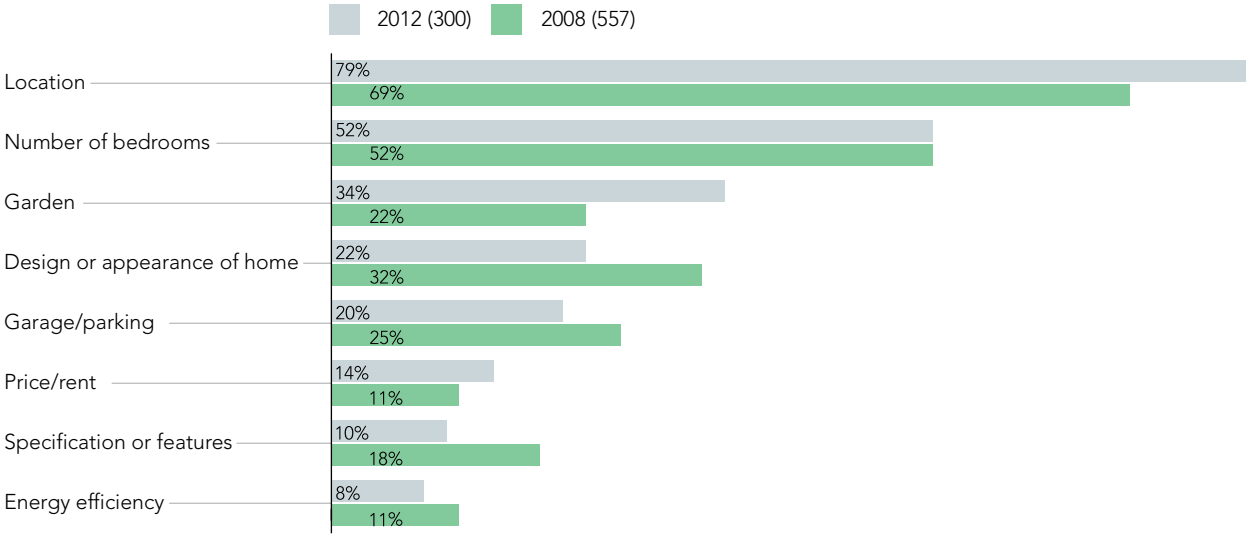
- Home location and number of bedrooms remain the key factors taken into account when looking to move home, showing very similar results to 2008. Unprompted, importance of energy efficiency as an initial consideration remains low.
- When prompted, energy efficiency still remains a secondary consideration, but it ranks higher among those already in a new or enhanced new home.
- Two-thirds of those interviewed regard the cost of energy bills as very important, and this figure rises to 80% for those in enhanced new homes.
- 9 out of 10 occupiers are aware that their bills have gone up in the last 2 years, with just over half of these knowing what the increase has been. 87% say they know the size of their gas and electricity bills.
- Only 12% of occupiers in existing homes are very satisfied with their energy bills, which is in contrast to 46% of those living in an enhanced new home.
- Almost 8 out of 10 occupiers rank the reduction in energy bills as the biggest benefit of homes with technologies such as solar panels. Occupiers appear to be motivated to save money over and above concerns about the environment or scarce resources, which rank much lower at 14% and 6% respectively.
- There has been a slight increase in awareness of EPCs since the last study, now exceeding half of those interviewed. Conversely, two-thirds of those who are looking to move or who have moved recently could not recall seeing one.
- Only 12% of those looking to move or who have moved recently say they understand the EPC and that it has influenced their decision.

7.1 Key factors when looking for a home and the importance of energy efficiency

Occupiers, both owners and renters, were asked to describe, unprompted, the key factors that they would or did take into account, when looking to buy or rent a home (not necessarily a newly built home).

As in the 2008 study, location remains the main factor, followed by the number of bedrooms (Figure 7.1). Only 8% mention energy efficiency unprompted, compared with 11% in 2008, suggesting this is still not a consideration when looking for a home.

Figure 7.1 Key factors that would be (or were) taken into account when looking to buy or rent a home (unprompted)



Based on occupiers of existing homes. Those in new homes were asked 'what attracted you to consider this home', which is reported separately in section 10.2.

All occupiers, including those living in a new home, were subsequently asked to rate the importance of a list of factors out of 5 when looking to buy or rent a home, not necessarily a new home. Results are broadly in line with the 2008 study, with the importance of energy efficiency showing a very small decline (Figure 7.2). Key factors in order of importance are:

1 location

2 number of bedrooms

3 garden (whether the home has one, and its size)

4 design or appearance

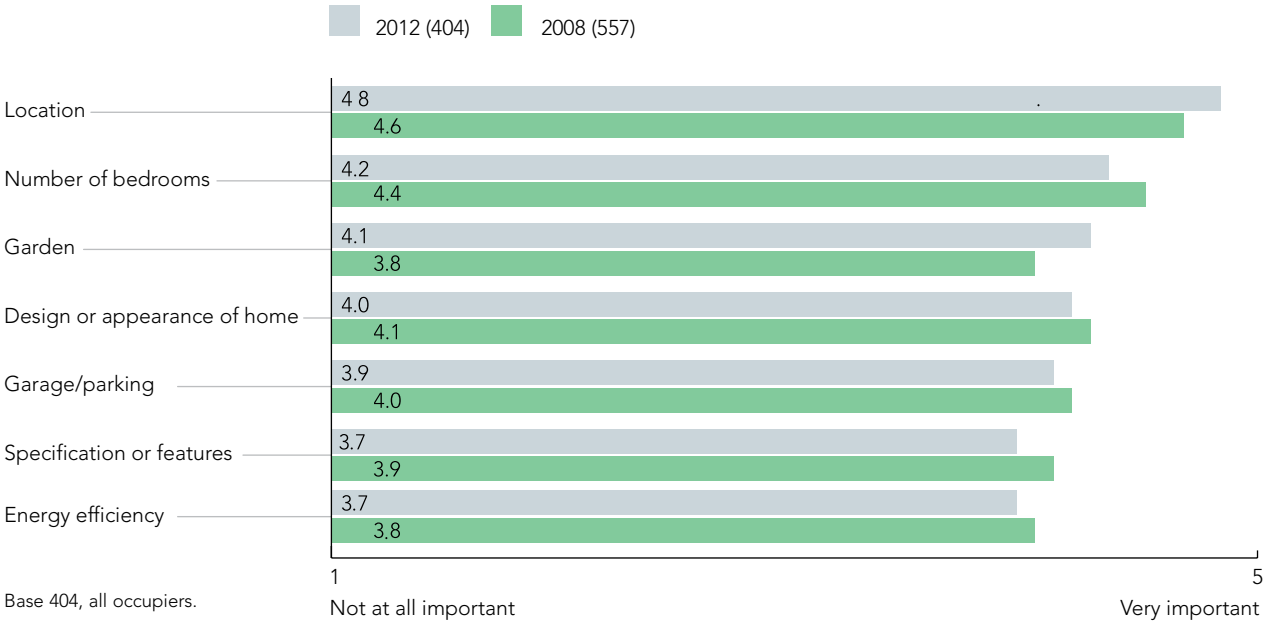
5 garage or parking

6 energy efficiency (joint 6th place)

6 specification or features (joint 6th place).

These results suggest that energy efficiency has not increased in importance when buying or renting a home, and that other factors continue to be of greater concern. However, the conclusion may also be drawn that its importance increases when prompted, as evidenced by the average score of 3.7 out of 5 where 5 is very important. This implies it is a secondary rather than a main consideration.

Figure 7.2 Rating of importance of factors when looking to buy or rent a home



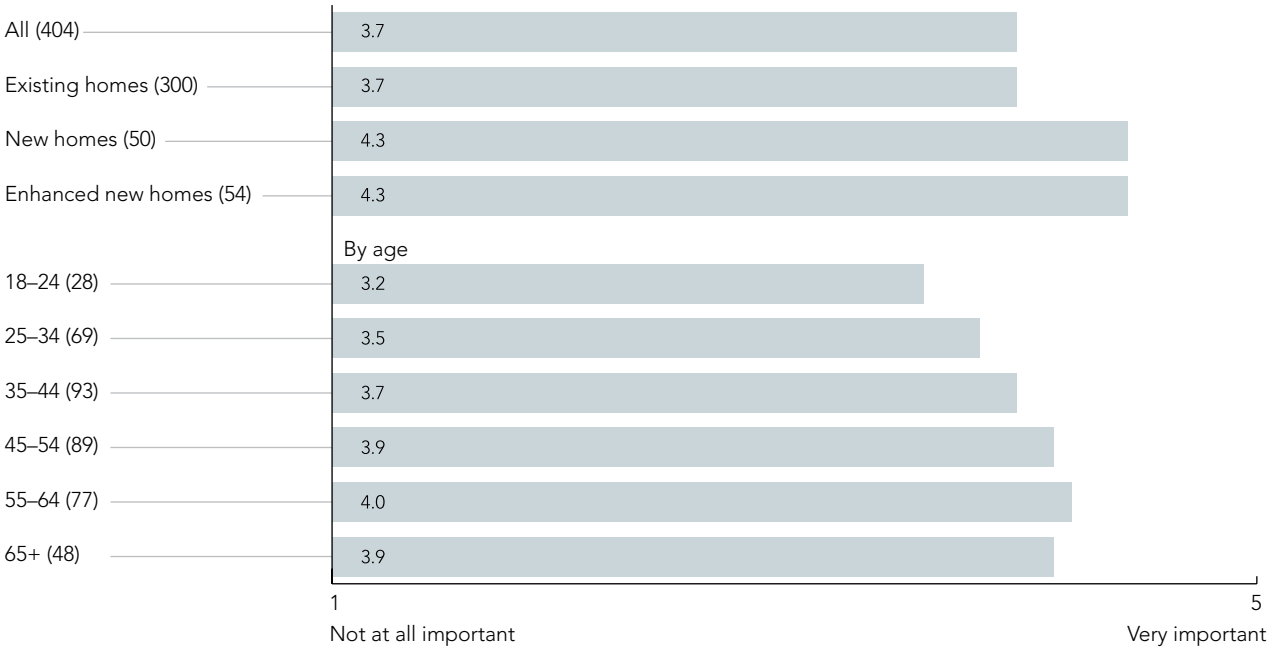
Base 404, all occupiers.

There is a difference in attitudes to energy efficiency between those living in existing homes and those who have moved into a new home built in the last 2 to 3 years (Figure 7.3). Those living in a new home attach more importance to energy efficiency than those living in existing homes.

This was supported by the focus group findings where those coming from existing homes, while attracted by lower energy bills, suggest it is a secondary benefit rather than a primary consideration.

Those aged over 45 place more importance on energy efficiency than those aged 18 to 34.

Figure 7.3 Importance of energy efficiency when looking for a home



Bases in brackets.

Although those in new homes rate energy efficiency as very important in their selection of a home, only 36% actually took utility bills into account when they decided to move to their current home. The difference in these results could be due to an expectation that new homes will have lower energy bills, the view of 83% (see section 9.1).

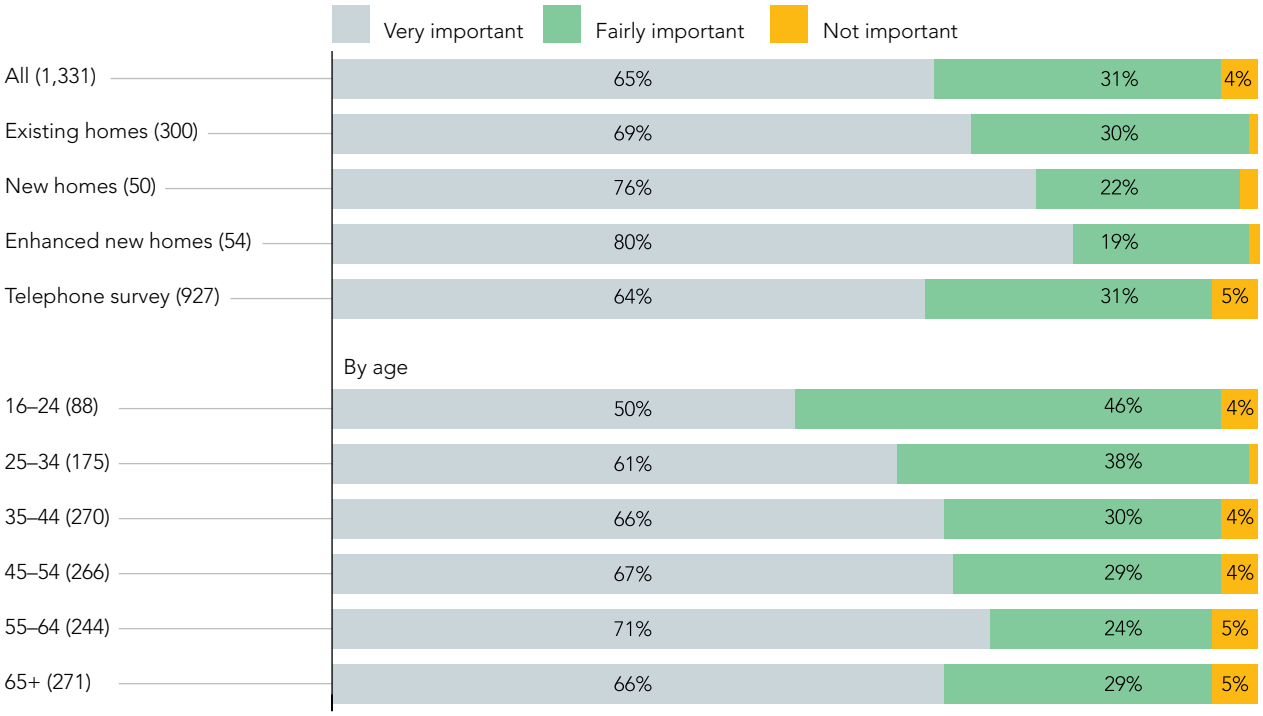
Those looking to move were asked if they would take the cost of energy bills into account when considering homes. Half of this group say that they would do so and it is interesting to note the low importance attached to this in an unprompted question. These results support the view that drawing energy efficiency to people's attention raises the importance of this issue.

7.2 Importance of energy bills

In spite of energy bills not being a main consideration in the choice of home, the research shows that the cost of energy bills is very important to occupiers (Figure 7.4).

Based on 1,331 respondents, 96% say that the cost of their energy bills is important to them.

Figure 7.4 How important is the cost of your energy bills to you?

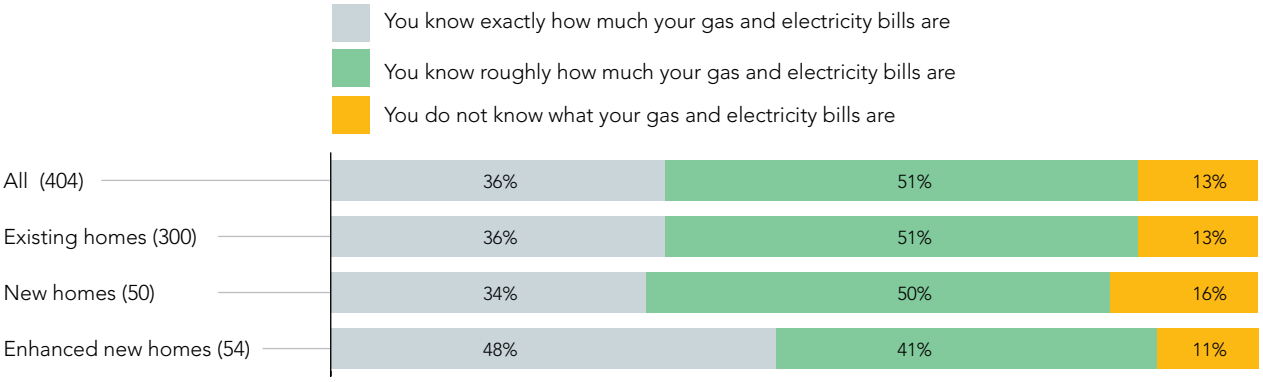


Bases in brackets
The 'all' result above (and throughout all the graphs in part 2) is weighted; see sections 2.3 and 6.2 for an explanation of weighting of results.

36% know exactly what their gas and electricity bills are and about half believe they have a rough idea how much they pay (Figure 7.5). Those in enhanced new homes appear to be tracking their bills most closely.

9 in 10 occupiers interviewed in the home are aware that their bills have gone up in the last 2 years, with just over half of these knowing what the increase has been.

Figure 7.5 Awareness of energy bills

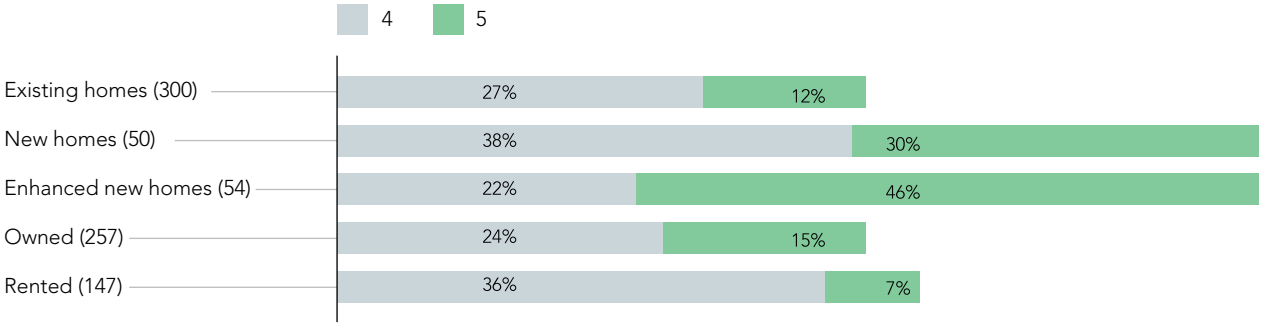


7.3 Satisfaction with energy bills

Those living in new homes are significantly more satisfied with their energy bills than those in existing homes. Given the increasing requirements of Building Regulations for energy performance of new homes, this result shows that the consequential reduction in energy bills is being positively received (Figure 7.6).

Figure 7.6 Satisfaction with energy bills, on a scale of 1 to 5

Figure 7.7 Distribution of those satisfied/very satisfied with their energy bills (score 4 or 5 out of 5)



Although the average satisfaction among those living in enhanced new homes is the same as those in new homes built to the applicable Building Regulations, the percentage who are very satisfied is much higher; the financial benefit is being appreciated more by those living in these enhanced properties (Figure 7.7).

Those owning an enhanced new home are more satisfied with their energy bill than those renting; the average satisfaction is 4.2 and 3.8 out of 5 respectively. In the focus groups with housing association tenants of enhanced new homes in Pontefract, tenants expressed some concern about variable energy bills and were confused about whether or not the installed technological features were working.

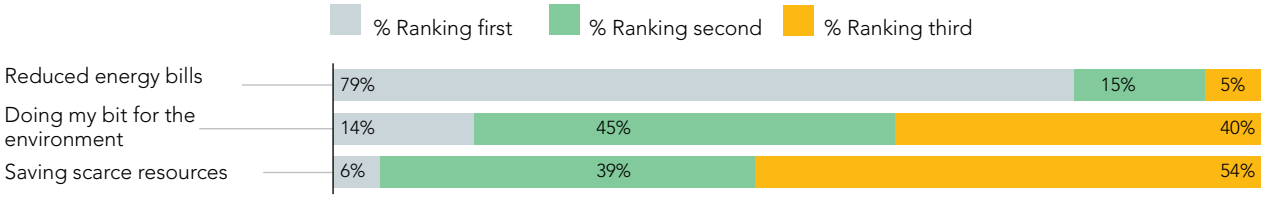
> *'Energy bills have gone up dramatically. Doing something can actually have an impact so people are paying more attention.'* New home occupier

7.4 Interest in saving money or saving the planet

Occupiers were asked to put in order the attractiveness of 3 benefits of living in a home with technological features such as solar panels. The 3 benefits they were asked to rank were 'helping to do my bit for the environment', 'reduced energy bills' and 'saving scarce resources' (Figure 7.8).

Reducing energy bills is seen as the main benefit by 79%, with no significant difference by age, occupational group or life stage. The high percentage who rank this first, points to a greater concern about the direct effect on the individual, rather than about wider concerns.

Figure 7.8 Ranking of perceived benefits of technological features and products incorporated into homes

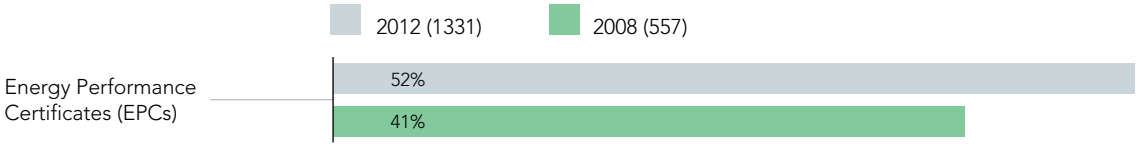


Base 404, all occupiers. 1% said that none of these is of interest.

7.5 Role of Energy Performance Certificates

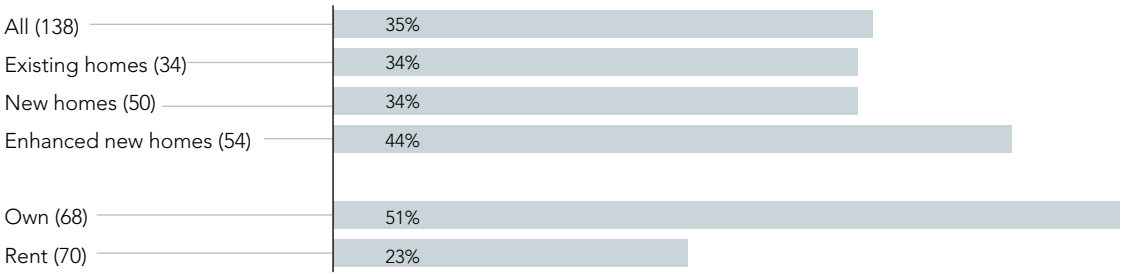
There has been an increase in awareness of EPCs with just over half of occupiers aware of them (Figure 7.9). This has increased from 41% in the 2008 study.

Figure 7.9 Awareness of Energy Performance Certificates 2012 and 2008



The provision of EPCs is mandatory by those selling or letting a home. In the in-home interviews, occupiers looking to move or who have recently moved and those in new homes were asked if they could recall seeing an EPC related to their home or any of the properties they considered (Figure 7.10).

Figure 7.10 Percentage of occupiers recalling an Energy Performance Certificate on viewed properties among those moving, considering moving or in a new home

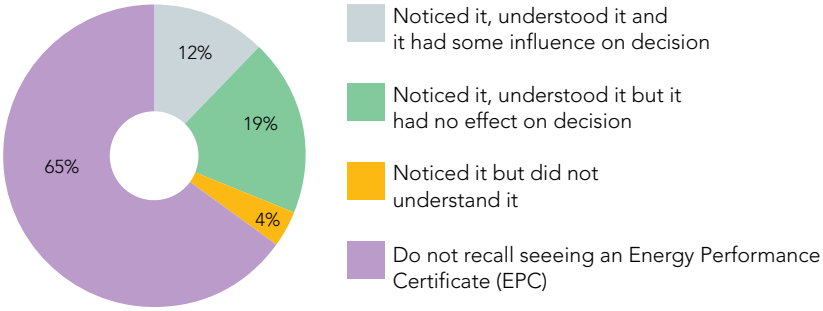


Base 138: those who have moved recently, are considering moving or are in a new home.

35% overall and 44% of those in enhanced new homes recall seeing an EPC (Figure 7.11). Those who own their home are twice as likely to notice an EPC, in comparison to those who are renting.

With only about one-third of those who have moved into an existing home recalling an EPC on properties they have viewed, it appears that the information is not impacting on the intended audience. Of all those looking to move, had moved or are in a new home, only 12% say the EPC influenced them.

Figure 7.11 Effect of Energy Performance Certificate among those moving, considering moving or in a new home



Base 138: those who have moved recently, are considering moving or are in a new home.

A higher proportion of those in new or enhanced new homes understand the information in an EPC. This may be because people in newer properties are more likely to have had this drawn to their attention during their purchase process.

Those who have moved to a new or enhanced new home most commonly interpret the information in the EPC to mean that utility bills will be lower; however, they state a preference for the information presented to reflect the actual cost of the bills.

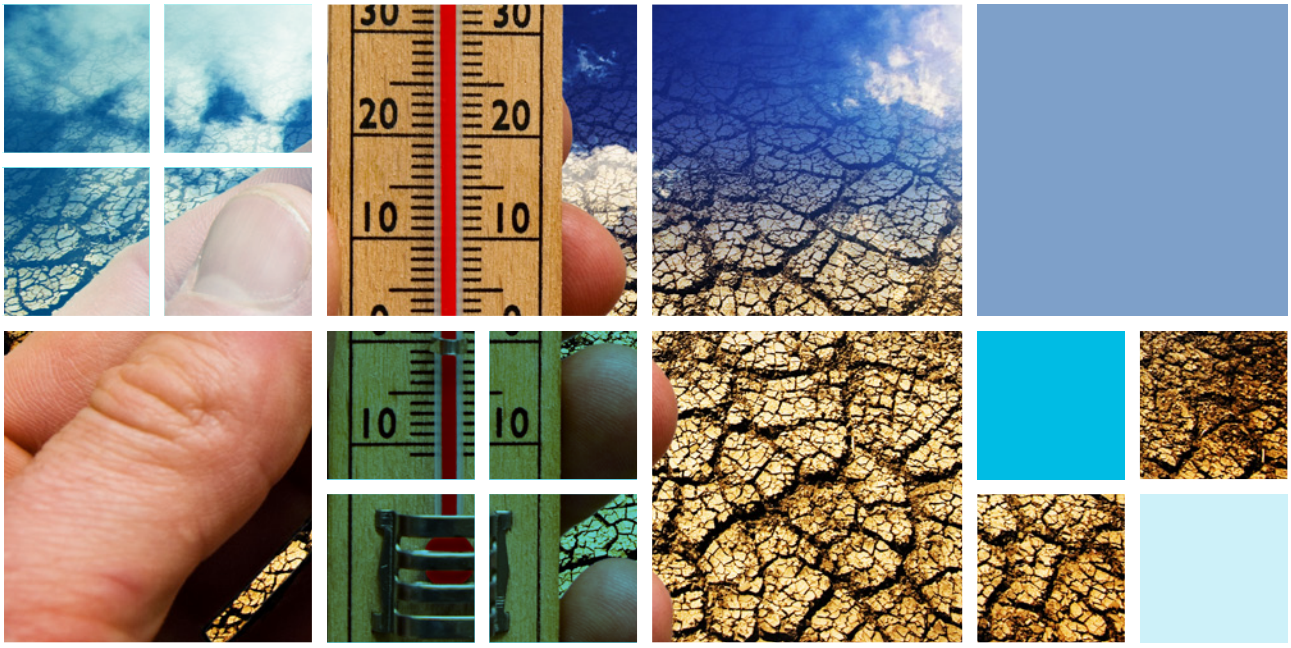
> *'I remember I have seen ratings A, B and C but I don't know what it means, it doesn't equate to anything. Even if we knew how they calculated it, how does it relate to us?'* New home occupier

> *'It has a bunch of numbers which say how efficient the property is. It gives it a score but it doesn't explain what that score means.'* Owner of an existing home looking to move

Other recent reports have found that EPCs in their current form have little impact on consumer decision-making and have made a number of suggestions for improvement to their clarity, credibility and comparability[9]. These reports conclude among other things that the current EPC is too long, the language too technical, there is confusion between the 2 graphs included in it and it does not provide the information required by buyers or tenants. Recommendations include informing consumers of the costs and financial benefits of the property's energy efficiency to enable comparison between homes.

The difficulties of illustrating typical running costs for a home were well recognised during focus groups. To take account of the challenge of differing occupancy levels and lifestyles, respondents suggested looking to the model adopted by the automotive industry; taking a series of 'typical', but well understood 'driving' cycles to illustrate fuel consumption.

8 Attitudes to climate change and lifestyle adjustments



Key findings in this section

- Almost 8 out of 10 of those interviewed believe that climate change poses some level of threat to the world, and almost half in the 25 to 34 age group believe it is a major threat.
- Views on climate change have varied little from 2008, however, the percentage of those stating no evidence for climate change has doubled from 5% in 2008 to 10% in this study.
- The main sources of CO_2 emissions are thought to be industry, cars and planes, with only 22% stating energy use in homes as 1 of their top 3 choices. Almost as many (20%) believe that livestock has a similar influence on CO_2 emissions as homes.
- When asked to compare the importance of climate change with scarcity of resources, more than double the number of respondents express concern about the scarcity of resources. One-third say they are equally concerned.
- 70% say they are doing more to be environmentally-friendly than they were 4 years ago. As in 2008, the focus groups reveal that people want to take steps to be environmentally-friendly, but only where it does not have an adverse effect on their lives, or cost money.
- There is strong evidence of behaviour change to reduce energy use. Over two-thirds of respondents state they turn lights off, a figure that rises to 91% when prompted. Unprompted, 2.5 times more people mention turning off their lights compared to results from 2008.
- Occupiers are also doing more to reduce water usage than in 2008, with increases shown for all identified water reduction measures.

- A higher proportion of those living in enhanced new homes are taking steps to reduce their carbon footprint outside the home than occupants of other properties.
- There is evidence of what is known as the carbon rebound effect; only 15% would spend money saved on their energy bills by investing in more energy efficiency measures to reduce their CO_2 emissions further, whereas the majority of the remainder would spend any savings in a way that would probably increase their carbon footprint.
- Although most owners of older properties have made energy-saving improvements to their homes, there appears to be little enthusiasm to do more in the next 2 years. The main influence which could encourage further improvements is the potential to reduce energy bills. However, there is also interest in taxation breaks to encourage investment in energy-saving measures.
- There has been a positive shift in interest for investment in energy-savings since 2008. Now, equal numbers of occupiers of existing homes would spend a £10,000 windfall on energy-saving measures, as would upgrade the kitchen or bathroom. Owners of new homes appear less interested in energy-saving measures, probably because requirements of current Building Regulations already make their home energy-efficient.

8.1 Perceived threat of climate change

With almost 8 in 10 occupiers believing that there is a threat to the world from climate change, the message from Government and scientists appears to have been understood. Just under half of occupiers are of the opinion that the threat is major, particularly those who live in enhanced new homes (Figure 8.1). While these people may already be more environmentally conscious, the research suggests that people who are living with features to reduce energy consumption become more conscious of their environmental impact. Other findings support this.

Only 10% feel there is no evidence for climate change.

Analysis by age shows that those in the 25 to 34 age group are significantly more likely to see climate change as a major threat. These younger occupants are likely to fit the 'first time buyer' profile, and findings suggest that they are receptive to the climate change/fuel efficiency message.

The majority of respondents to the 2008 study also believed that climate change was a threat, although levels have slipped back slightly (Figure 8.2).

Figure 8.1 Views on climate change in 2012

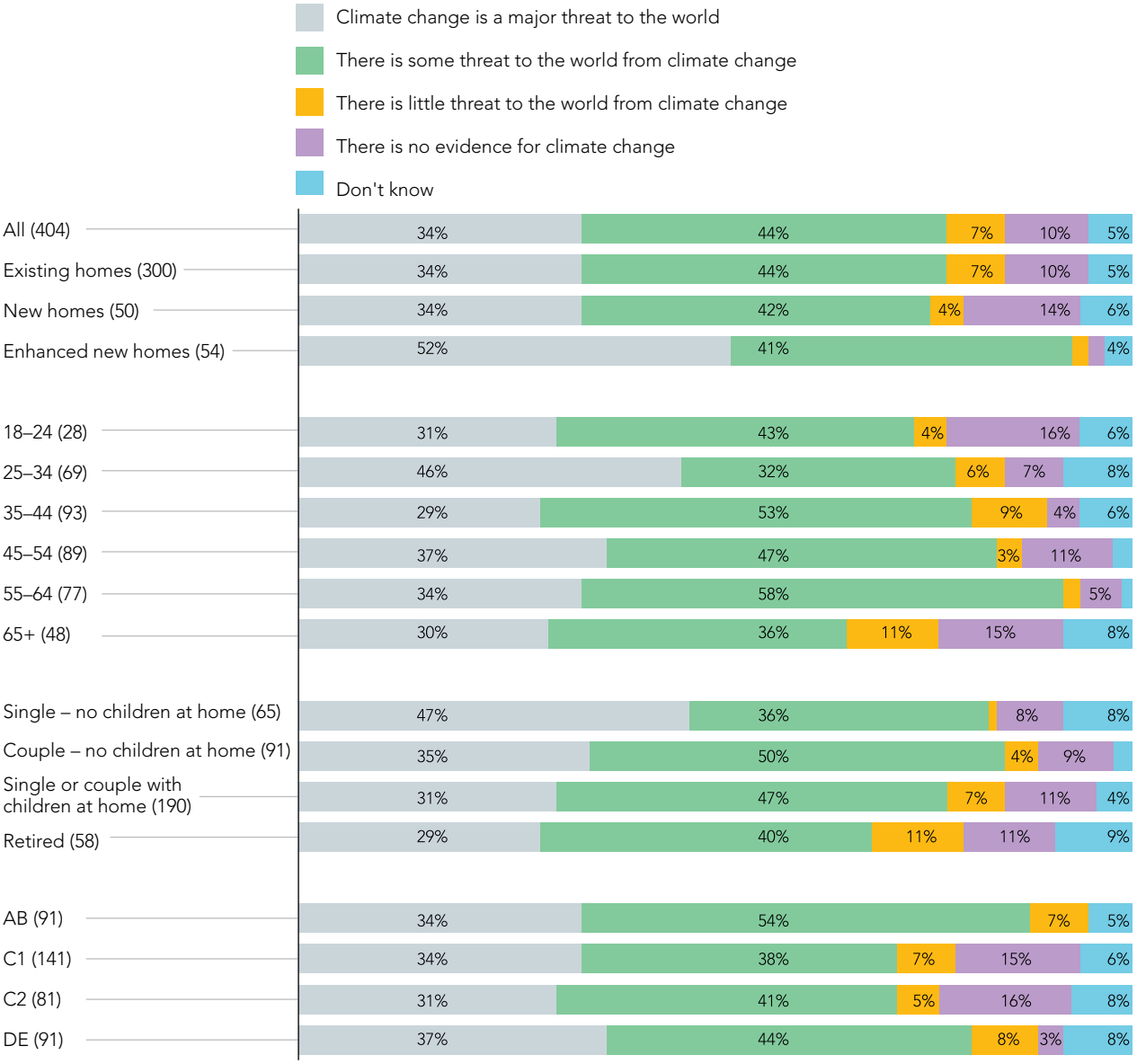
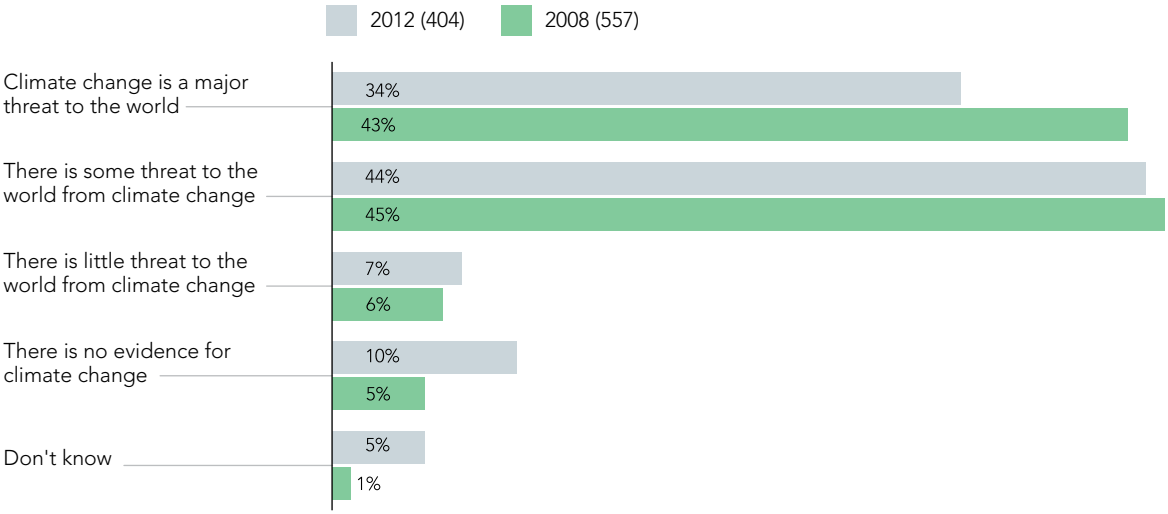


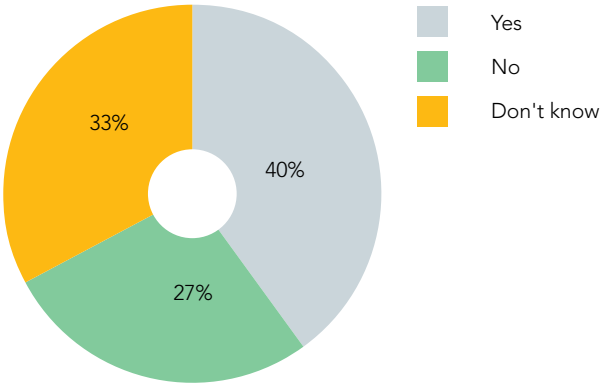
Figure 8.2 Views on climate change in 2012 and 2008



8.2 Perceived causes of climate change

40% believe that CO_2 emissions are the cause of climate change, but this represents a slight fall from 45% in 2008 (Figure 8.3).

Figure 8.3 Do you consider CO_2 emissions to be the main cause of climate change or not?



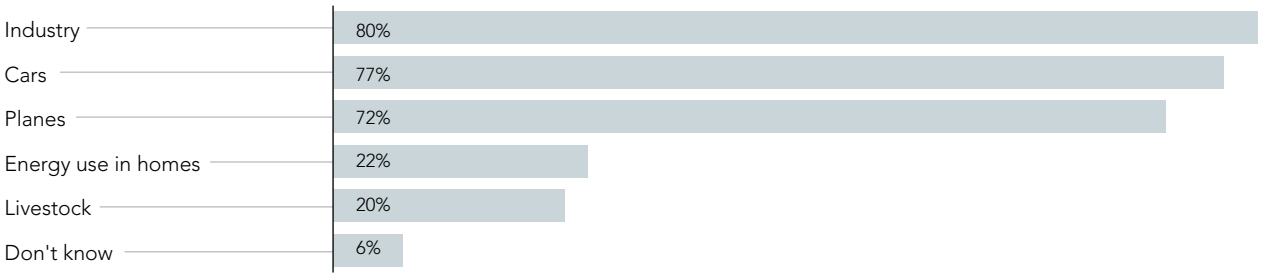
Base 404, all occupiers.

Again those in enhanced new homes are more likely than those in existing homes to believe that CO_2 emissions are the main cause of climate change (52% compared with 38%).

When asked which of a number of contributors have most influence on CO_2 emissions, the main culprits are thought to be industry, cars and planes (Figure 8.4). Only 22% feel that energy use in homes is one of the three main causes of CO_2 emissions, similar to the proportion who consider livestock to be a main cause.

This result identifies the need to broaden awareness of the contribution that housing makes to national CO_2 emissions, and the part that occupants can play in meeting reduction targets.

Figure 8.4 Which 3 of these do you feel have most influence on CO_2 emissions and climate change?

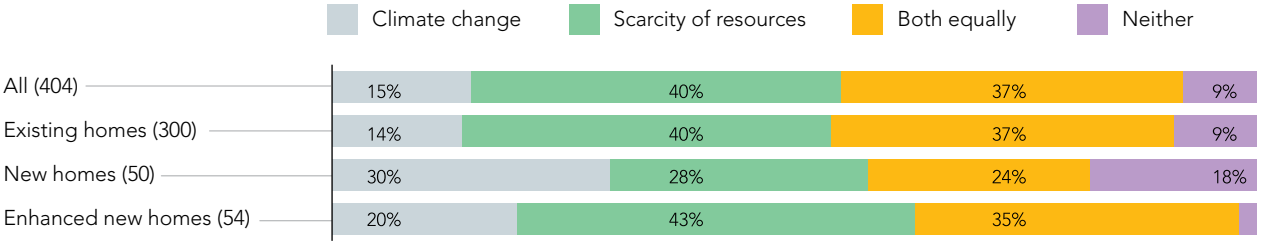


Base 404, all occupiers
Percentage giving each answer as one of their top 3. Adds to less than 300% as some were unable to give 3 answers.

8.3 Main concern – climate change or scarcity of resources

While climate change is acknowledged to be a threat to the world by most, more respondents are concerned about the threat posed by scarcity of resources (Figure 8.5).

Figure 8.5 What are you most concerned about, climate change or scarcity of resources?



8.4 General attitude to lifestyle changes

With concerns about the threat of climate change and scarcity of resources, to what extent are occupants adapting their lifestyles to reduce the threat?

The focus groups conducted at stage 1 (qualitative) show that people are willing to change their lifestyles only to the point where it starts to have an adverse effect on their lives, it costs money, or the disadvantages outweigh the benefits. Examples include parents who would rather walk their children to school but find they do not then have the time to get to work, or the person who prefers to take the train but drives instead because it is less expensive. Most respondents do not go further because it is difficult to see the impact on the planet in the wider context, or because the effort of the individual is considered to be ineffectual.

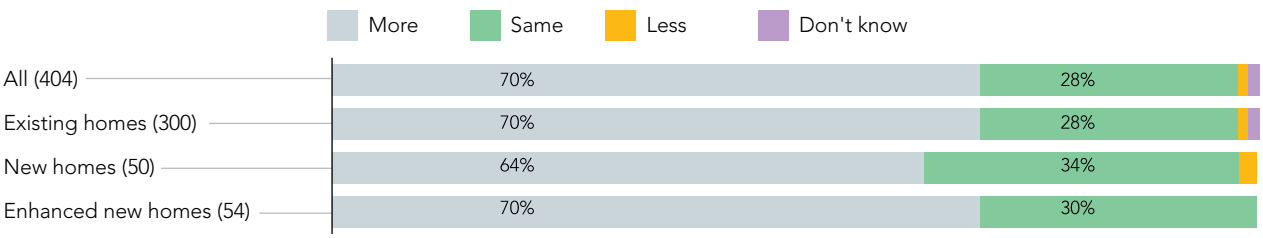
> *'You hear about globalisation and some countries are happily polluting the planet. What little we do, what impact are we having?'* New home occupier

> *'I don't think that the environment is, when it comes to the practicality of life, as high in some people's priorities as perhaps the media suggests it should be. We have a way of life that perhaps is more important than giving something up to be more energy-efficient. People will still jump in the car and go half a mile down the road rather than walk, and yet they will go out and buy energy-efficient light bulbs.'* New home occupier

> *'I'd walk everywhere if I didn't work. But I do work so I haven't got time.'* Owner of existing home.

In spite of these concerns, 70% of occupiers think they are doing more than they were 4 years ago to be environmentally-friendly (Figure 8.6).

Figure 8.6 Do you think you are doing more, the same or less than you were 4 years ago to be environmentally-friendly?



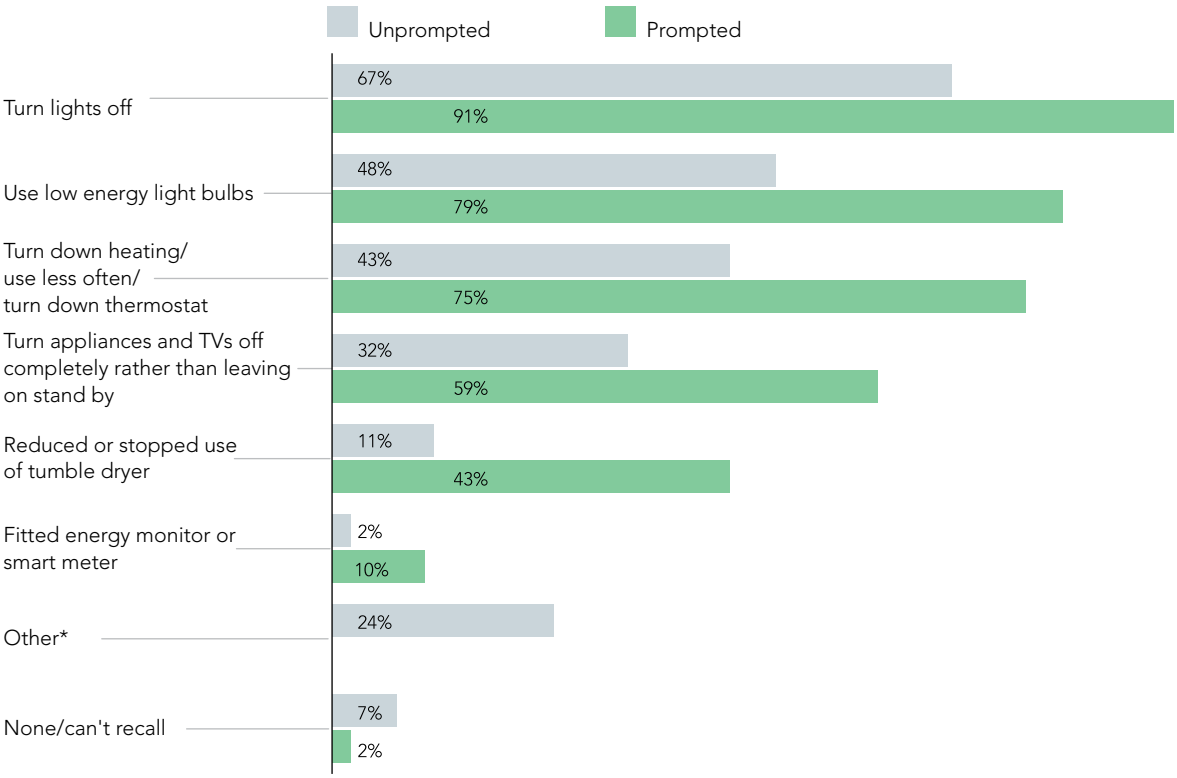
As in 2008, focus group respondents recall recycling as the main environmentally-friendly action taken. This is predominantly because many local authorities encourage it and provide easy to use facilities and home collections.

8.5 Energy-saving measures in the home

Questions asked during the in-home interviews about environmentally-friendly actions focused on steps taken to save energy and reduce water usage in the home (Figure 8.7).

The most common actions undertaken to reduce energy use are turning off the lighting, using low energy light bulbs and turning down the heating thermostat. Figure 8.7 shows unprompted and prompted recall of actions taken.

Figure 8.7 Steps taken in the home to reduce energy use

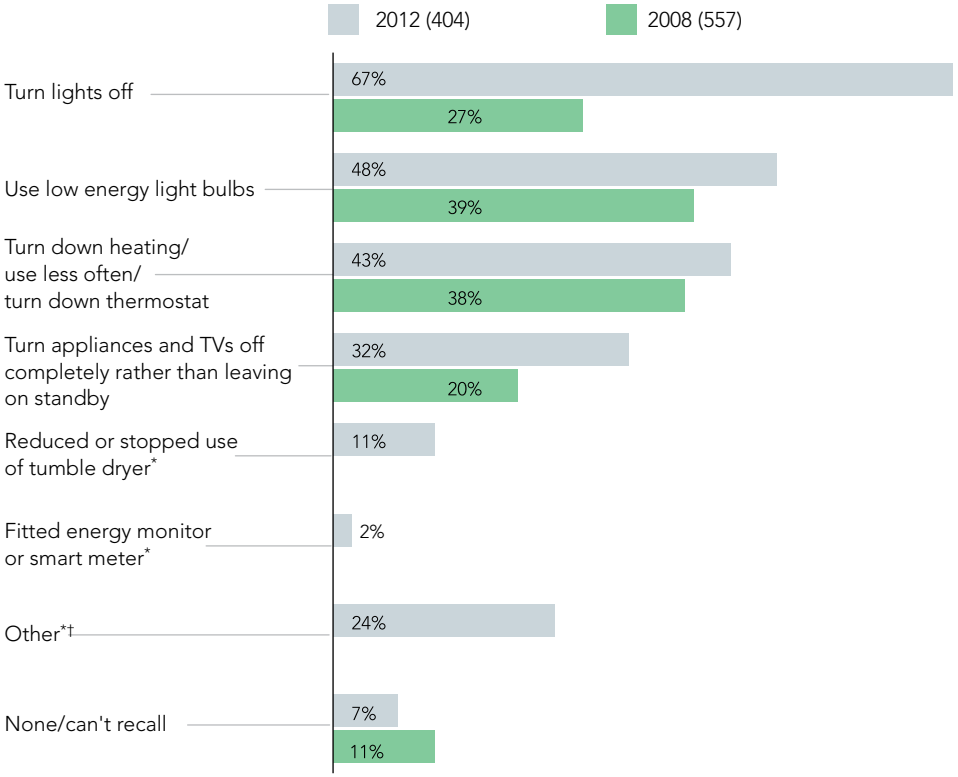


Base 404, all occupiers.

*Other includes: Put extra layers of clothing on, use shower not bath, switch off plugs, use a wood burner.

Energy-saving actions have increased since the 2008 study; particularly turning off lights, which was mentioned by a much lower proportion of respondents in the previous study (Figure 8.8). There has been an increase in unprompted recall of other actions, with only 7% saying they are doing nothing, down from 11% in 2008.

Figure 8.8 Steps taken in the home to reduce energy use (unprompted) 2012 and 2008



*Not listed as an option in 2008

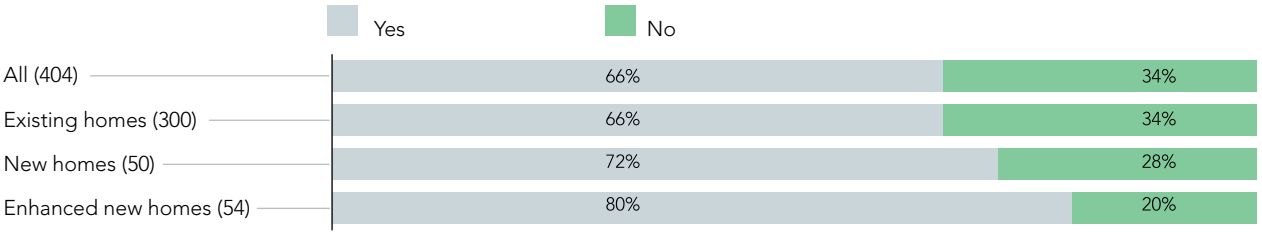
† Other includes: Put extra layers of clothing on, use shower not bath, switch off plugs, use a wood burner.

A slightly higher proportion of people in new and enhanced new homes are taking some of these actions when compared to those in existing homes.

When prompted, 43% of all occupiers indicate that they have reduced or ceased use of their tumble dryer. A further question identifies that those never using it has risen from 1% in 2008 to 14% in this survey. Ownership of tumble dryers in new homes has fallen from 75% in 2008 to 63% in 2012, indicating that the provision of alternative drying capabilities in a new home could appeal to occupants.

The proportion who turn appliances off rather than leaving them on standby has increased since the last survey; up from 20% to 32% (unprompted). However, interest in a single switch to turn off all non-essential appliances (as found in some hotel rooms) has declined from three-quarters to two-thirds, although this still represents the majority (Figure 8.9). Those in enhanced new homes are more interested in this feature than those in existing homes.

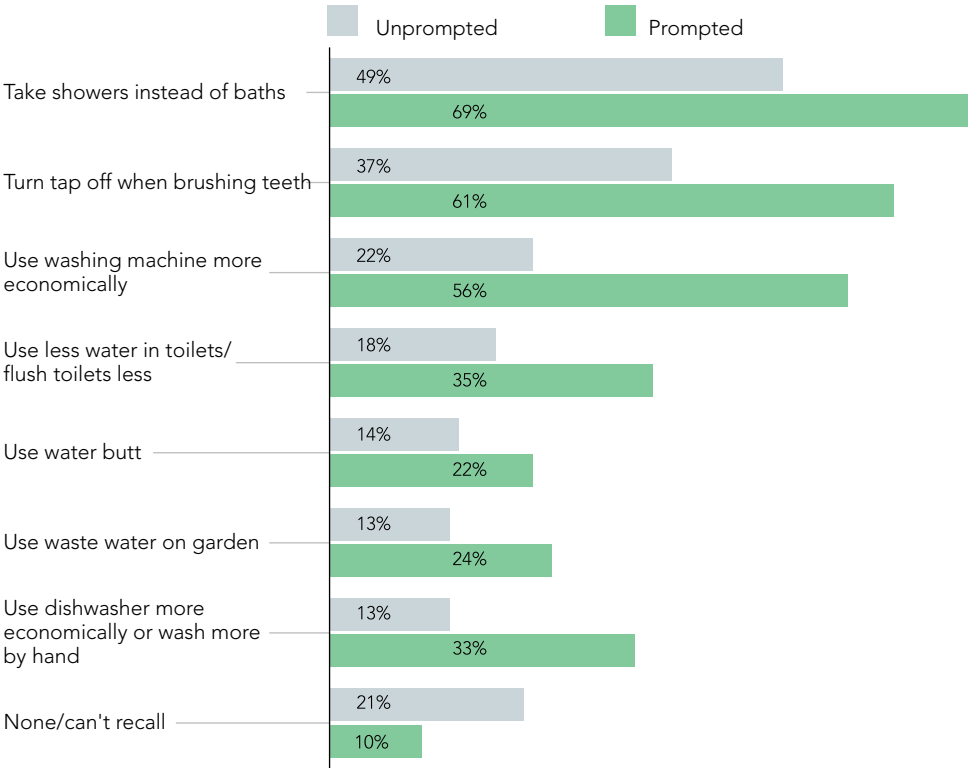
Figure 8.9 Interest in a central switch that would turn off all appliances like computers and TVs, leaving on fridges and freezers etc



8.6 Water-saving measures in the home

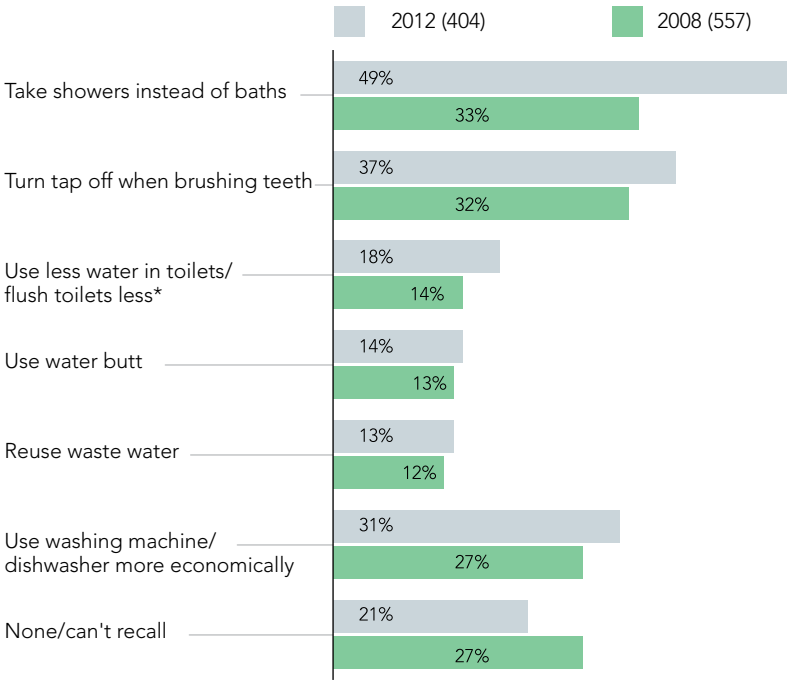
The main steps taken to reduce water use in the home continue to be taking showers instead of baths and turning off the tap when brushing teeth, the same as in 2008 (Figures 8.10 and 8.11). However, the percentages saying they are taking these actions, unprompted, have increased.

Figure 8.10 Measures taken in the home to reduce water use



Base 404, all occupiers.

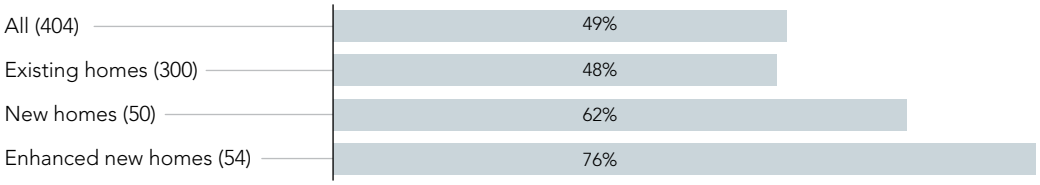
Figure 8.11 Measures taken in the home to reduce water use (unprompted) – 2012 and 2008



*Option was having dual flush toilets in 2008.

People living in enhanced new homes are significantly more likely to be saving water by showering instead of having baths (Figure 8.12).

Figure 8.12 Those reducing water use by taking showers rather than baths in new and existing homes (unprompted)

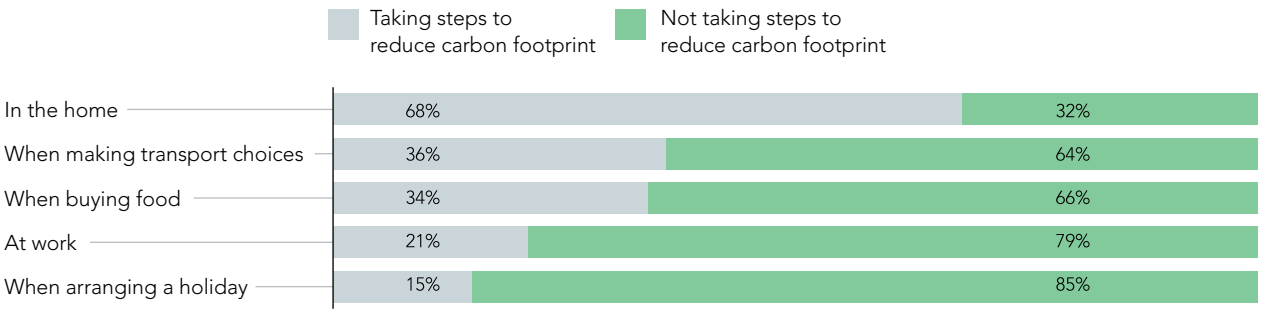


'All' figure is weighted to reflect the ratio of new to existing homes.

8.7 Steps taken beyond the home

In spite of people's belief that they are doing more to be environmentally-friendly than they were 4 years ago, it appears that beyond the home, actions to reduce carbon footprints are not pursued as enthusiastically (Figure 8.13). Respondents now are statistically significantly less likely to change behaviour to reduce their carbon footprint when making transport or holiday choices, or while at work. This is perhaps surprising given respondents' views that cars and planes are contributing more to climate change than energy use in the home, but illustrates that people will make small changes that are practical and do not significantly affect their lifestyles. Reducing energy use in the home has the direct benefit of cutting energy bills, which has been shown to be important to occupants.

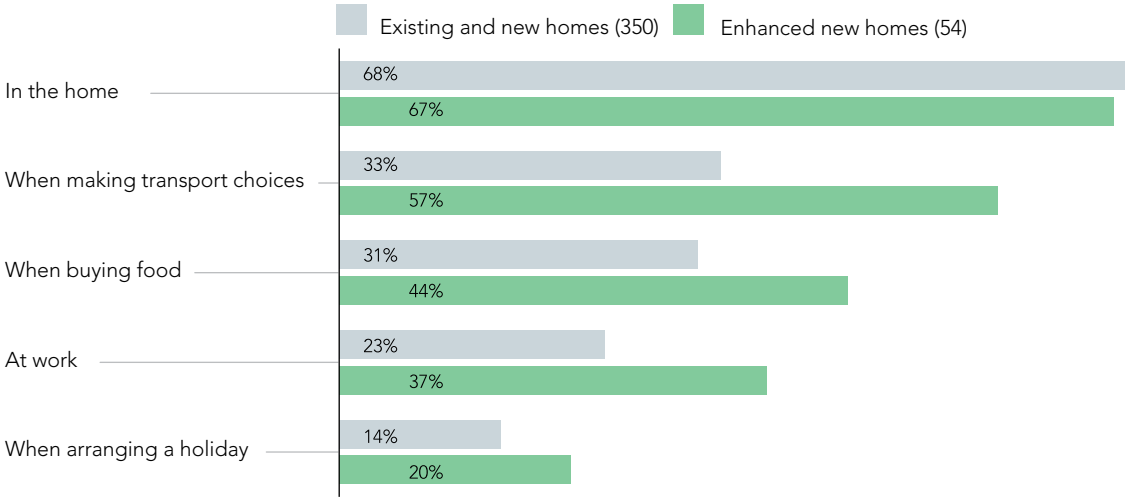
Figure 8.13 Proportion taking steps to reduce their carbon footprint



Base 404, all occupiers.

Those living in enhanced new homes are more environmentally conscious in their wider lives (Figure 8.14).

Figure 8.14 Proportion taking measures to reduce carbon footprint – difference between those living in enhanced new homes and other homes



Respondents were given 5 options and asked which best explains why they take steps to be environmentally-friendly:

- you have to
- you care about the planet
- it's healthier
- it's cheaper
- it's easier.

The main answers, or reasons for taking steps to reduce carbon footprint are that it is cheaper and that people care about the planet (Table 2).

Table 2 Main prompted reasons for taking steps to reduce carbon footprint

In the home	When making transport choices	When buying food	At work	When arranging a holiday
It's cheaper	It's cheaper	Care about the planet	Care about the planet	Care about the planet
Care about the planet	Care about the planet	It's healthier	Have to	It's cheaper

In the focus groups, occupiers were questioned about their awareness of the term 'carbon offsetting' and only a few were aware of the term. Awareness of those who knew the term came from booking flights or from large supermarket's information. None had taken up the option as they did not understand how the money would be used, or had little faith that their contribution would be solely invested in offsetting measures.

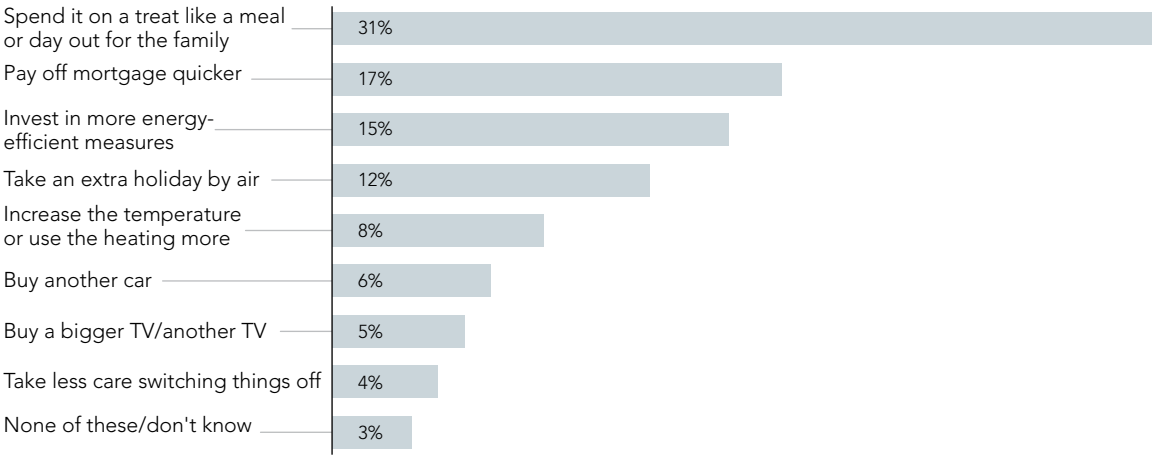
8.8 Spending the savings made on energy bills

A report published by the UK Energy Research Centre in 2007[10] identifies the carbon rebound effect. This is described in 2 ways: 1) the *direct rebound effect* which is an increase in consumption of energy services due to efficiencies in these services reducing the price, and 2) the *indirect rebound effect*, where savings through improved fuel efficiency are spent on other energy intensive measures such as overseas flights. NHBC Foundation recently investigated the carbon rebound effect in the publication *How occupants behave and interact with their homes* (NF 35)[11].

A question was therefore included to test how occupiers would spend savings made through improved energy efficiency (Figure 8.15).

The most likely way of spending savings that might accrue through energy efficiency is on additional treats for the family. Some answers concur with the carbon rebound effect, namely that 35% will most likely spend the savings on taking an extra holiday by air, increasing the temperature or using the heating more in the home, buying another car or TV or taking less care to switch off appliances; actions that would actually increase their consumption of energy.

Figure 8.15 Most likely ways of spending money saved as a result of lower energy bills



Base 404, all occupiers.

8.9 Improvements to existing homes

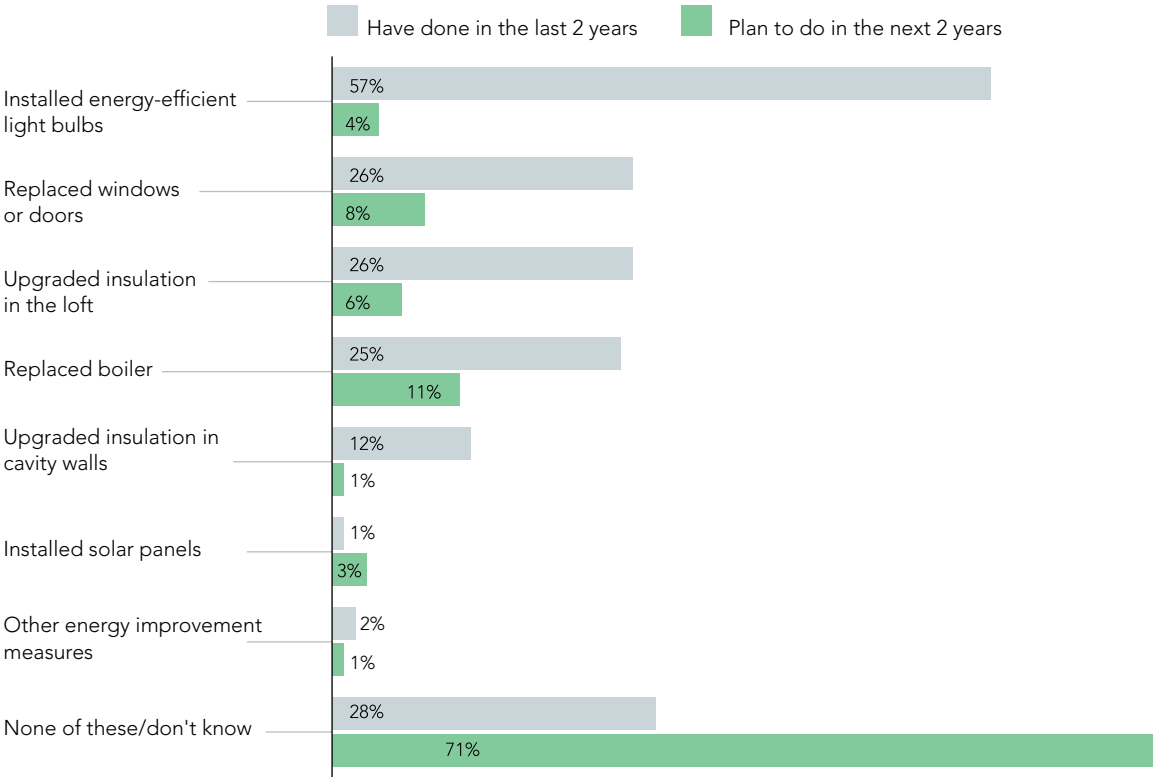
Those occupying new homes are using energy-saving measures and changing lifestyles and personal habits more than the occupants of existing homes. Yet it is the occupants of the vast stock of older properties across the UK who are widely recognised as being key to making significant contributions to the carbon reduction target. This group will be the main target for the Government's Green Deal[12].

This study identifies the extent to which occupiers of existing homes already take measures to improve energy efficiency.

Occupiers of homes aged 5 years or over were asked which of a list of home improvements they have undertaken in the last 2 years or plan to undertake in the next 2 years (Figure 8.16). One-quarter have replaced windows or doors, upgraded loft insulation or replaced the boiler, but only 1% have installed solar panels and 3% plan to do so.

Over one-quarter of occupiers have done nothing and 7 in 10 indicate that they have no plans for improving energy efficiency in their homes in the next 2 years. However, results in section 8.10 show that, where savings can be quantified or financial incentives provided, then there appears to be a willingness to undertake the necessary investment.

Figure 8.16 Improvements undertaken in last 2 years and planned, percentage of homeowners



Based on owners of existing homes – properties at least 5 years old (204)
Other energy improvement measures includes new roof, draught proofing etc.

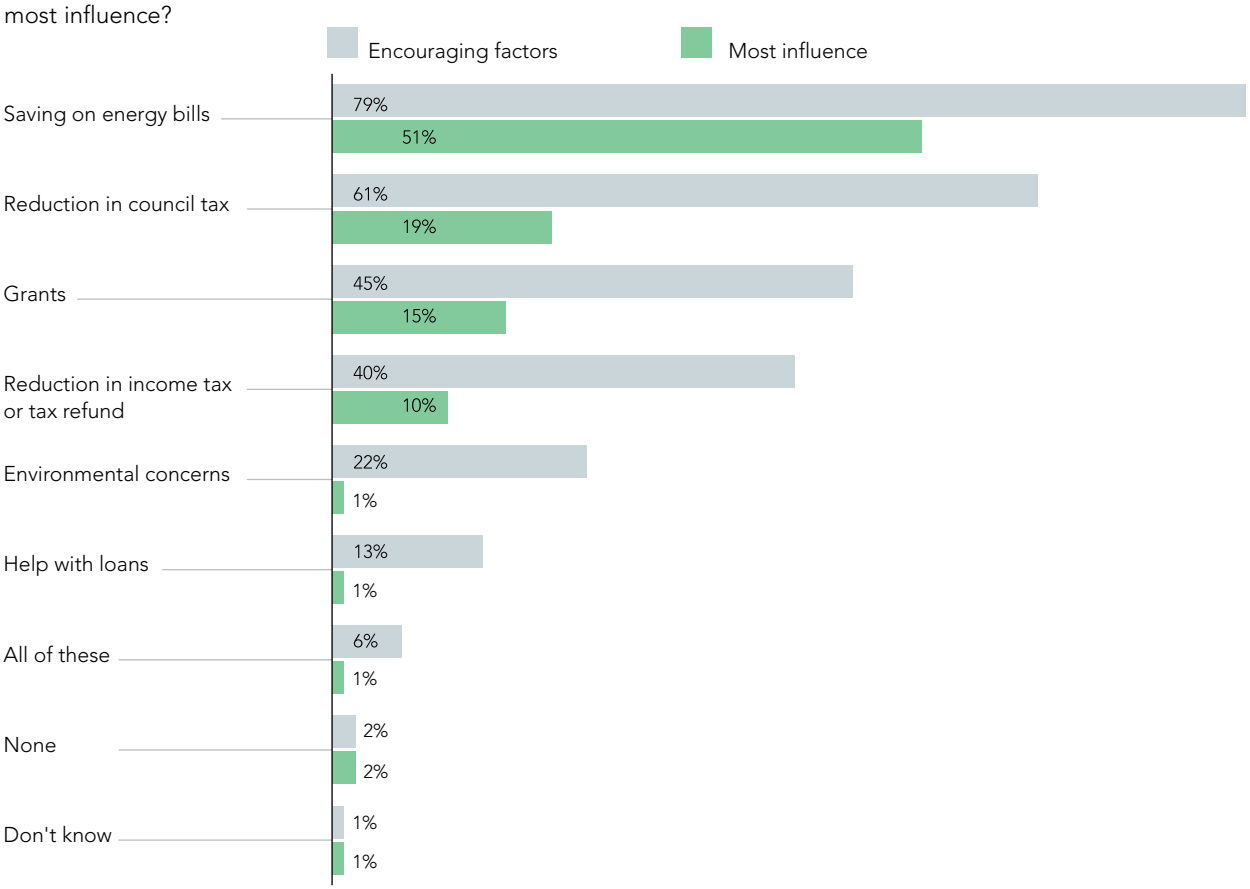
8.10 Factors that would encourage investment in energy-saving measures in the home

The factor that is most likely to encourage homeowners to take energy-saving measures in their homes is the resultant savings to be made on energy bills (Figure 8.17). Help with loans ranks very low on the list. Homeowners will need information on savings relative to the cost to make informed decisions about investment in energy-efficiency measures.

Similar results were found in the 2008 study, when 42% said the main factor that would encourage them to save energy and reduce CO_2 emissions was saving money.

> *'Energy bills have gone up dramatically. Doing something can actually have an impact so people are paying more attention.'* New home occupier

Figure 8.17 Which of these would encourage you to take energy-saving measures in your home? Which would have most influence?



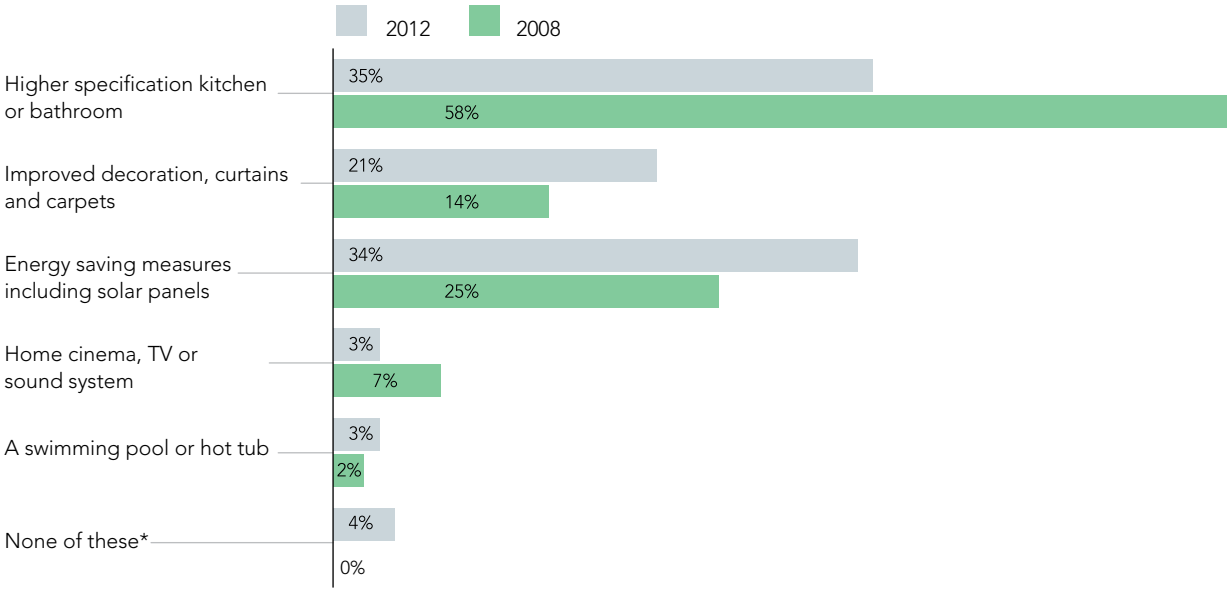
Based on owners of existing homes – properties at least 5 years old (204).

8.11 Spending a £10,000 windfall on home improvements

Interest in investing in energy-saving measures among those in existing homes has grown since the 2008 survey (Figure 8.18). If a homeowner were to have £10,000 to spend on improvements, equal numbers of existing home owners would spend the money on energy-saving measures as would spend it on a higher specification kitchen or bathroom. This represents a change in views compared to 2008 and could be timely for the arrival of the Green Deal initiative.

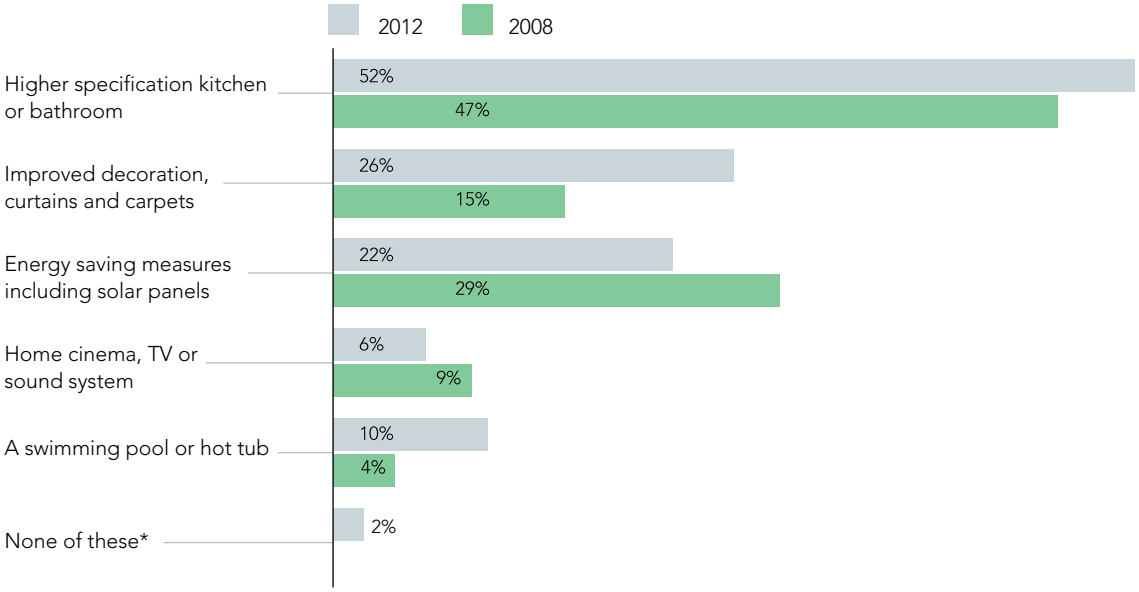
However, among owners of new homes there is greater preference for a new kitchen or bathroom rather than energy-saving measures (Figure 8.19). New homes are already likely to incorporate energy-saving features and owners appear to be satisfied with their home's energy performance, being less likely to seek to improve it.

Figure 8.18 If you were buying a home and were given £10,000 to spend on it, which of these would you be most likely to spend it on? (existing home owners)



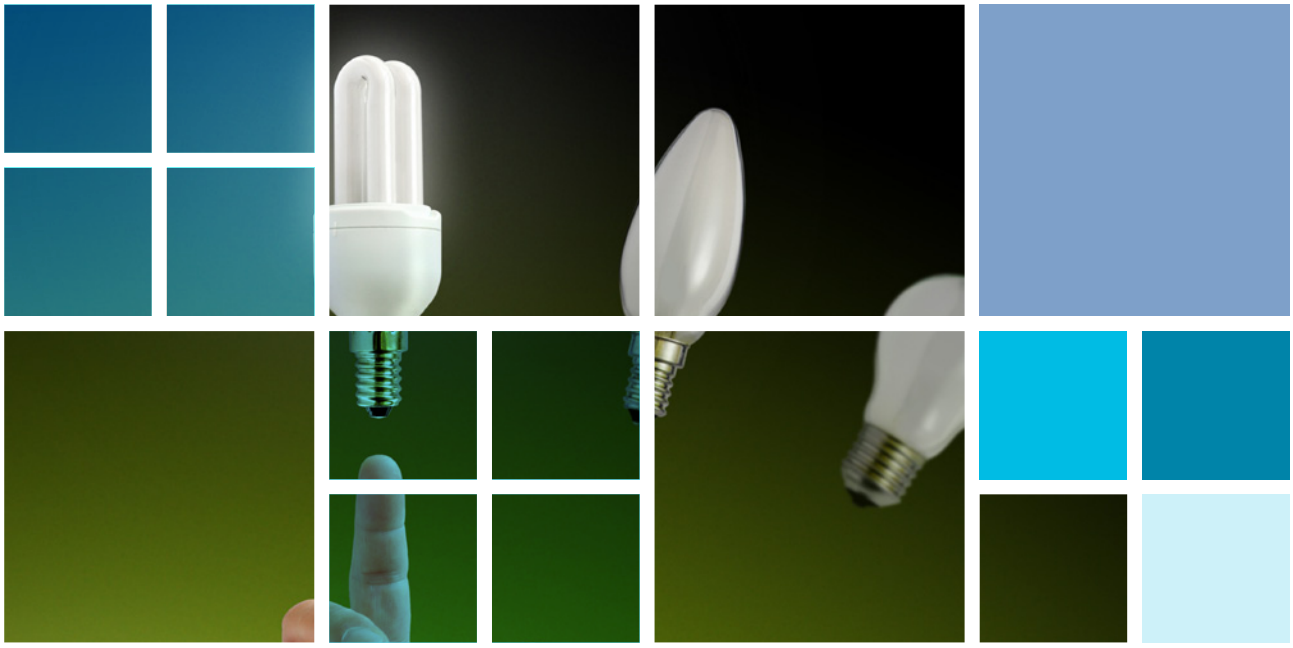
Owners of existing homes – properties at least 5 years old
Base: 2012: 300, 2008: 306
Adds to over 100% where some gave more than 1 answer
* Not listed as an option in 2008.

Figure 8.19 If you were buying a home and were given £10,000 to spend on it, which of these would you be most likely to spend it on? (new home owners)



Base: 2012: 50, 2008: 251
Adds to over 100% where some gave more than 1 answer
* Not listed as an option in 2008.

9 Attitudes to energy-efficient and zero carbon homes



Key findings in this section

- 8 out of 10 occupiers expect new homes to have lower energy bills than similar older properties. In this context, a home described as 'energy-efficient' is attractive to 7 out of 10 people.
- Half the respondents state they would find a new home more attractive if it reduces energy bills by up to 30% compared to their current home.
- More information about the estimated cost of energy bills would be helpful in making a decision about buying or renting a home, rather than simply being told that the home is energy-efficient. Almost two-thirds want to see estimates of approximate cost of bills, but only 15% find the EPC rating useful.
- Occupiers of properties without renewable technologies have a high awareness of both solar thermal and solar electric panels, but there is much lower awareness of other technologies such as MVHR, CHP, biomass boilers and ground source heat pumps.
- Solar panels, both thermal and electric, are equally as attractive to occupiers of new or existing homes. 55% say that solar panels make the home more or a lot more attractive, with only 15% deterred by them.
- Maintenance of technological features and the effect on the home's purchase price were raised unprompted as concerns by those interviewed. User-friendly operating, maintenance and servicing instructions are considered to be very important, along with approximate costs of servicing the technologies.

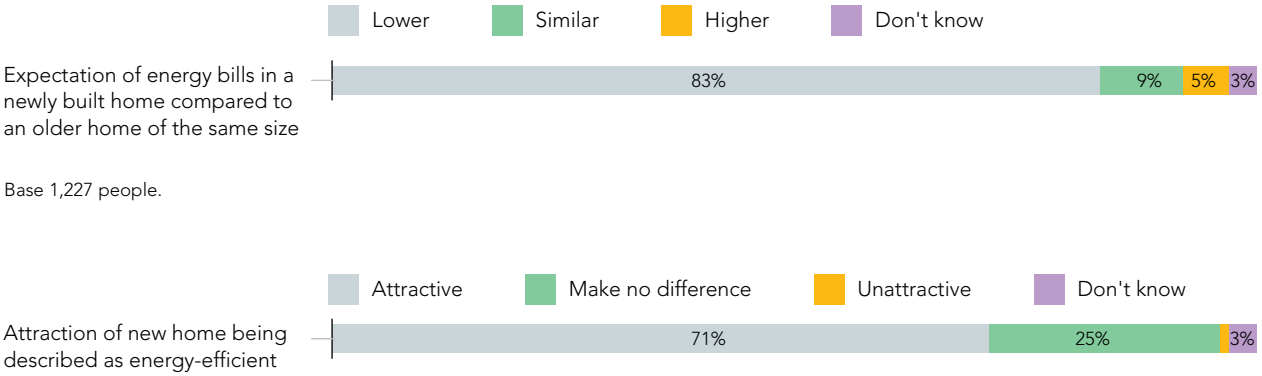
- Occupier response to features of the home varies dependent on the terminology used. Over one-third think that the term 'air tight' sounds like it would have a positive effect on their living comfort. However, when described in an alternative way, the positive response rises to almost three-quarters. Only 9% state they are most likely to be attracted to a new home that is described as zero carbon and 13% by eco home. In comparison, 73% state they are most likely to be attracted by the description 'energy-efficient'.
- Traditional house design continues to be the overwhelming preference of those not living in an enhanced new home, with only 15% preferring contemporary design. 56% associate contemporary designed homes with increased energy efficiency, but respondents' enthusiasm for contemporary design depends on age, with fewer of those interviewed aged 45 or over advocating it.
- Since 2008, there has been an increase in interest in a home that generates its own heat and power by means of technologies such as solar panels; however, for some homeowners this appears to be a discouraging factor. Those renting do not appear to have the same concern. This discouragement also appears to increase with age of the respondent, peaking at 65 years and over.
- 69% say they would consider paying a premium on the house purchase price to save £750 per annum on energy bills. This willingness to pay a premium declines with age, with those aged 18 to 34 most interested.
- Of those who would not be prepared to pay a premium for an energy-efficient home, over half cite payback period as the reason why.
- Reinforcing results on factors that would encourage occupiers to take energy-saving measures, occupiers not living in enhanced new homes say that lower energy bills combined with taxation breaks would encourage them to buy or rent a very energy-efficient home.

9.1 Expectation of energy bills in a new home

Changes are being introduced to the Building Regulations to improve the energy efficiency of new homes, with the aim of achieving zero carbon new homes from 2016. Are occupiers who form the prospective market for house builders aware of the energy performance benefits already delivered in new homes?

Across all the surveys in this study, and based on a sample of 1,227 people, 83% expect a new home to have lower energy bills than an older home of the same size (Figure 9.1). This indicates that people are aware of this significant benefit of a new home. Furthermore, 71% of occupiers say that if a newly built home were described as energy-efficient, this would make it attractive to them. Given the importance of energy bills to occupiers, these results highlight the potential for promoting the energy efficiency of new homes.

Figure 9.1 Expectations and attraction of energy efficiency in a new home



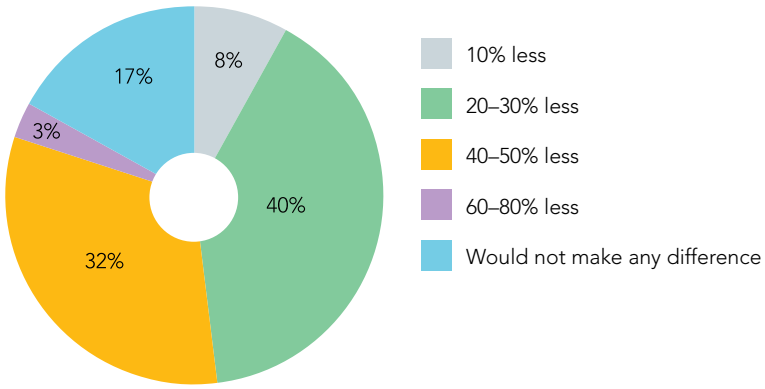
Base 1,227 people.

Base 1,297 people including those in new homes where they were made aware that the home is more energy-efficient than most homes.

'We take it for granted that with advances in building techniques that the quality of the build and the efficiency of new homes improves as time goes by. So if you are coming from an older property you take it as a given that the new house you are moving into is far more efficient than the house you are moving from.' New home occupier

When asked how much lower energy bills would have to be for a new home to increase its attractiveness, 40% state 20 to 30% less than their current home and 32% state 40 to 50% less (Figure 9.2). Based upon the differential in energy performance between the newest homes and much of the existing stock, this expectation is achievable.

Figure 9.2 How much lower would the energy bills have to be for a new home compared to your current home to make it attractive to you?



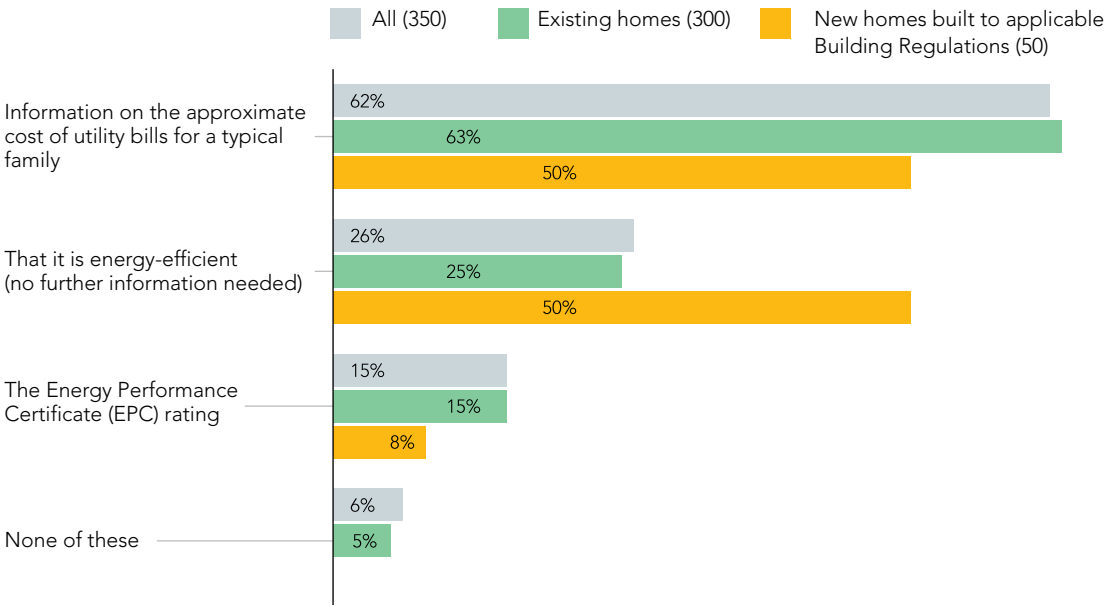
Base: 300 occupiers of existing homes that are at least 5 years old.

9.2 Information about energy efficiency that would be useful

Results in part 3 of this report show that information provided by house builders about their new homes varies (see section 17.2). Most mention energy efficiency in their marketing materials and provide the details of the EPC. Only 29% of house builders provide the approximate estimated cost of energy bills (Figure 9.3).

However, 6 in 10 occupiers, particularly those in existing homes, would like to know the approximate cost of utility bills for a typical family, to allow realistic comparisons to be made. Only 15% find the EPC alone the most useful of these options.

Figure 9.3 If you were looking to buy or rent a home, which one of these would be the most useful to know about its energy efficiency, to help in your decision?



Occupiers of enhanced new homes were not asked this question
'All' figure is weighted to reflect the ratio of new to existing homes.

'If there was an average cost to run the house it's probably something we would have paid more attention to than the Certificate'. New home buyer

'When you are going around looking at different show homes, very rarely would the sales person say "look at how efficient our houses are"'. New home buyer

9.3 Awareness and attitudes to energy and water-saving features

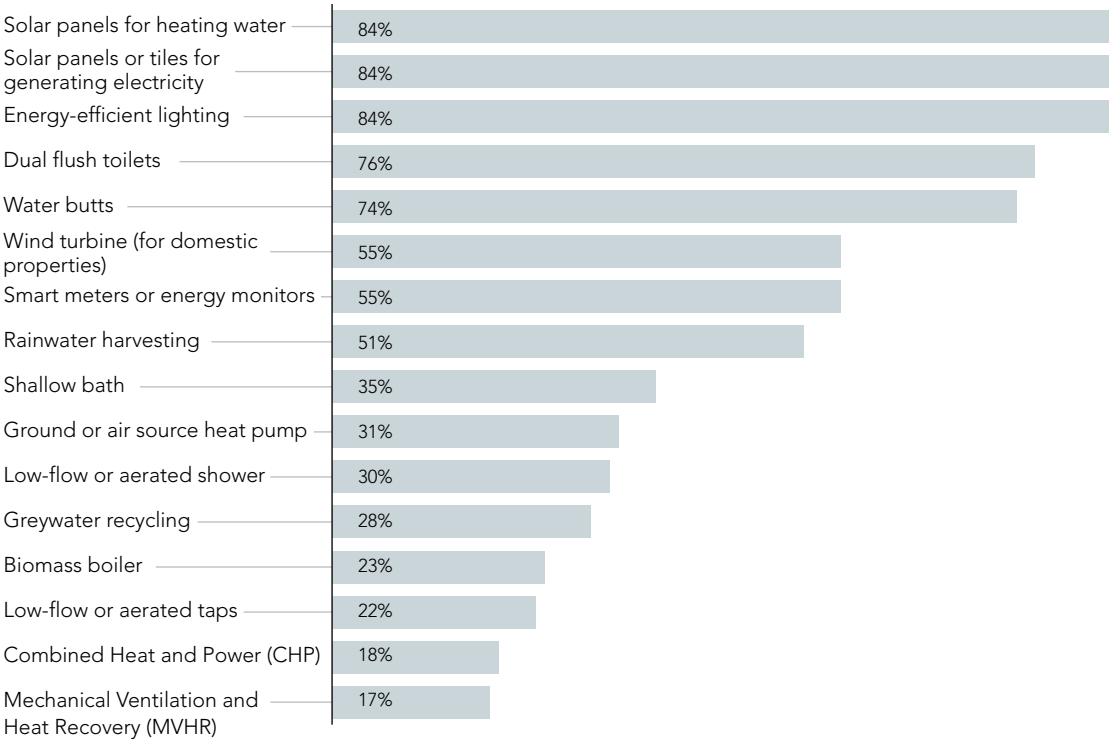
A number of technological features are likely to be incorporated into zero carbon homes to achieve the target reductions in carbon emissions and water consumption requirements of future Building Regulations. Some of these features are more familiar than others to occupiers. Introducing technological features of which there is low market awareness risks confusion. The survey maps awareness and in order to inform and reassure potential purchasers, it identifies features that would benefit from the provision of more information.

Of the technological features examined (Figures 9.4 and 9.5), there is least familiarity with Mechanical Ventilation and Heat Recovery (MVHR). In focus groups, when described as a system for efficiently circulating air, introducing fresh air from outside while retaining the heat from the expelled air, participants were much more comfortable with the term. The findings show that these systems present a considerable educational challenge and that more user-friendly terminology is required.

Other technological features where there is low familiarity include ground or air source heat pumps and greywater recycling. Again when tested in focus groups, 'greywater' has strong negative perceptions, while 'waste water re-use' is generally positively received for specific functions such as toilet flushing. Similarly with biomass boilers, low awareness seems to be caused mainly through a lack of ability to relate the term to a known technology. In focus groups, when described as a wood chip/pellet burning boiler, a less negative response results. These findings highlight the potential for developing market resistance through the use of confusing, complex technical terminology.

Another concern is the low awareness of low-flow or aerated taps and showers, and shallow baths. If knowledge of these increasingly common measures is not widespread, then further education of potential purchasers and new occupants may be needed.

Figure 9.4 Percentage of occupiers aware of technological and energy saving features



Base: 350 in an existing or new home excluding those in highly energy-efficient homes who were not asked this question.

In the 2008 study, homeowners were asked whether they were aware of solar panels, ground source heat pumps and CHP. Awareness of solar panels was high at 80%, a similar level to the current study. However, only 13% were aware of ground source heat pumps; this has now increased to 31%. Awareness of CHP continues to be low, increasing slightly from 4% in 2008 to 18% in 2012.

In the current research, when asked which of these products would be most attractive (Figure 9.5), the top 3 emerge as:

- solar panels or tiles for heating water and generating electricity
- energy-efficient lighting
- dual flush toilets.

Figure 9.5 Percentage that would find feature attractive in a home they were considering buying or renting (main ones mentioned by more than 20%)

Base: 350 in an existing or new home excluding those in highly energy-efficient homes who were not asked this question.

To test for negative reactions, participants were asked which of these would be most likely to put them off, 65% state that none would do so. It would now appear that potential purchasers are prepared to consider new technological features, however, wind turbines were mentioned most frequently as a potential deterrent.

While 28% are aware of greywater recycling, these respondents interpret the term as meaning dirty water from the bath, sink or washing machine generally be re-used. An explanation that re-use of the water is limited to flushing toilets, results in 50% thinking that this sounds better than when the term 'recycling' is used.

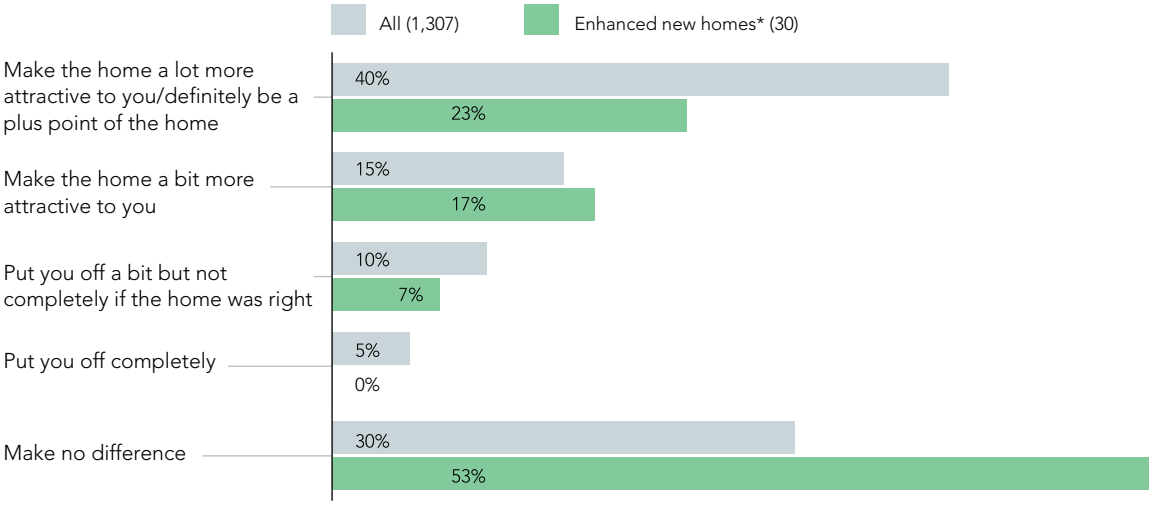
9.4 Effect of solar panels on potential interest in a home

To test the impact of solar panels more widely, 1,307 respondents in both the telephone and in-home interviews were asked what difference solar panels would make for a home that they were considering purchasing (Figure 9.6). 55% state that solar panels would make the home more attractive, and 30% that they would make no difference.

Those already living in an enhanced new home with solar panels were asked what effect these products had on their initial interest in their home. 40% say that they made the home more attractive although over half say they made no difference.

Analysis of these results by age shows that those aged 65 and over are more likely to be deterred by solar panels than those in other age groups; 20% of those aged 65 and over are put off by them compared to 10% of those aged 16 to 34. However, the majority in all age groups say that solar panels make the home more attractive.

Figure 9.6 Would solar panels on the roof of a home you were considering buying or renting…?

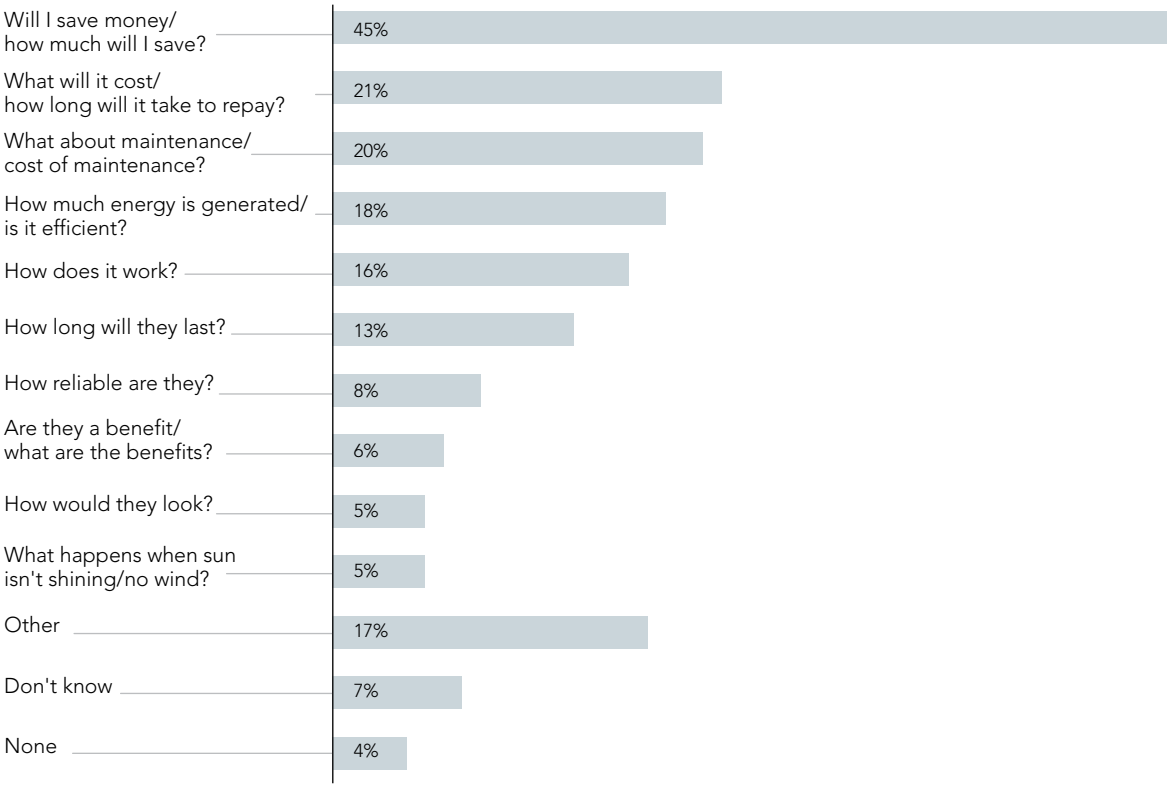


*Those with solar panels were asked what effect they had on their initial interest in the home
Excludes 24 people in highly energy-efficient homes who did not have solar thermal or photovoltaics (PVs).

9.5 Concerns and information requirements for zero carbon homes

Occupiers were presented with a list of potential environmental features found in enhanced new homes and were asked what questions they might have about these (Figure 9.7). The main questions occupiers have are about how much money they may save and what the initial financial outlay and maintenance costs may be.

Figure 9.7 If you saw a home advertised with solar panels and some of these other environmental features (shown on a card), what questions might you have? (Unprompted)



Based on 350 in existing and new homes (not enhanced new homes).

'It's a good idea and it's the way forward, but I'd be a bit concerned about maintenance and if it broke down, what the costs of that would be.' Owner of existing home

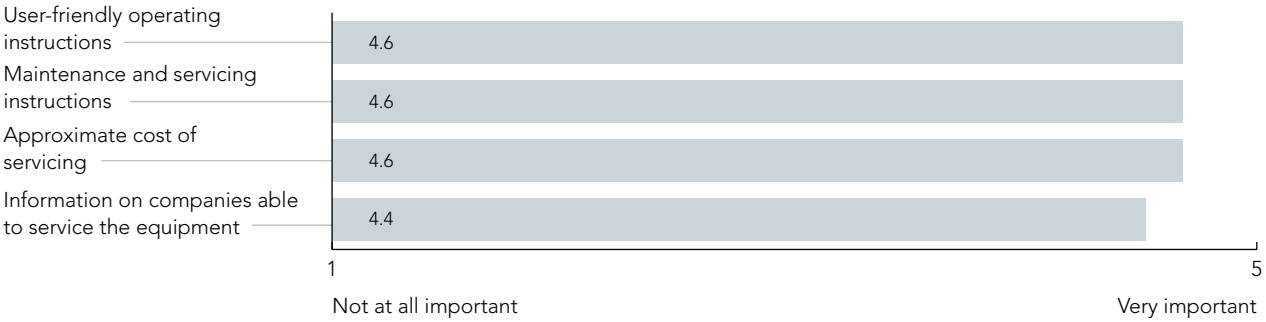
'Your only main issue (at the moment) is your boiler, isn't it? There's nothing else really that costs a lot to put right.' Owner of existing home

Respondents were prompted to indicate the importance of having certain information relating to the technological features of zero carbon homes (Figure 9.8). These include user-friendly operating and maintenance instructions, estimates of cost for servicing and information on companies able to provide this. Rating the importance of each out of 5, all result in average scores over 4, emphasising how important each is.

Housing associations are aware that tenants can fail to operate equipment properly if not provided with easy to understand instructions (described in part 3 of this report). Homeowners place a high level of importance on having understandable information about using and maintaining these systems, which manufacturers and builders need to make sure is available.

Section 10.9 gives the satisfaction among occupiers of enhanced new homes with the information provided to them about the new technological features.

Figure 9.8 Importance of information about technological features of zero carbon homes



Base: 404, all occupiers.

9.6 Air tightness

To achieve the increasing levels of energy efficiency required by the Building Regulations, new homes generally need to be built to a higher standard of air tightness. In zero carbon homes and those built to standards such as Level 4 and above of the CSH, this may result in the provision of MVHR systems to provide ventilation, fresh air and prevent condensation and mould growth.

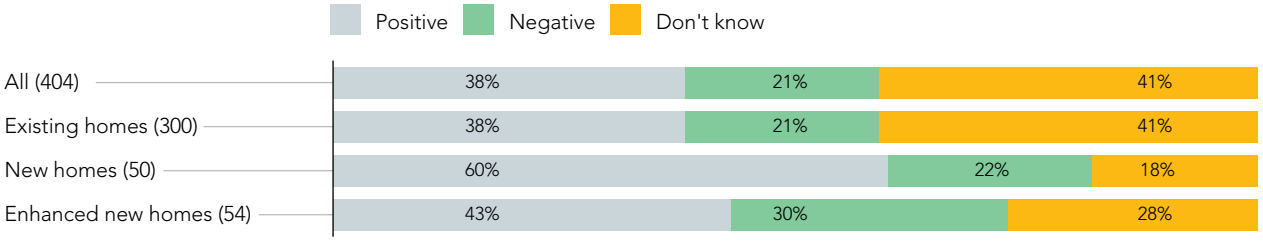
In the 2008 study, homeowners had not come across the term 'air tightness' and it prompted concerns about health issues and a lack of fresh air. Focus group discussions for this study also reveal similar concerns about a lack of air and the quality of the internal environment. However, some do appreciate the benefit of reduced loss of heat.

In-home interviews with occupiers of existing homes reveal that 21% have heard of the term air tightness and 38% think that this would have a positive effect on their comfort of living in a home (Figure 9.9). Only 21% think it would be a negative factor.

To test if the term air tightness is causing the issue, it was alternatively described as 'resulting in a home with no leaks or draughts, preventing heat escaping and keeping costs down' (Figure 9.10). This almost doubled the positive response, with 74% of those in older properties saying they think this would have a positive effect on their comfort of living in the home. This supports the earlier findings that terms used in marketing technologies need to be easy to understand and should clearly describe the features of a home to potential buyers and tenants.

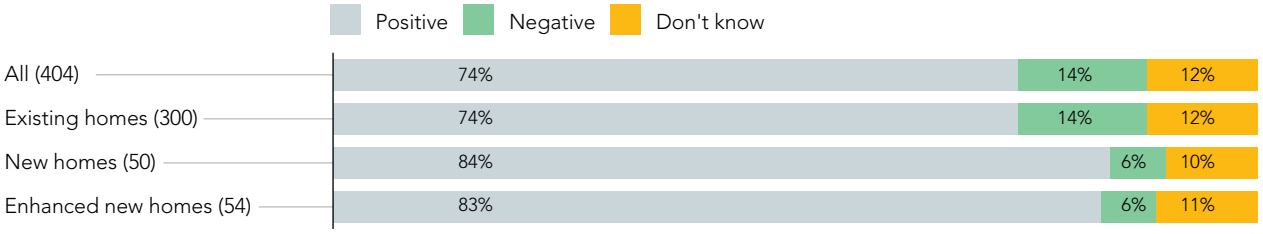
Occupiers of new homes are more familiar with the term air tightness than those in older properties and more positive about its effects.

Figure 9.9 Does being air tight sound as if it would have a positive or a negative effect on your comfort of living in a home?



'All' figure is weighted to reflect the ratio of new to existing homes.

Figure 9.10 If it were described as resulting in a home with no air leaks or draughts to prevent heat escaping and to keep costs down, would this have a positive or negative effect on your comfort of living in the home?



'All' figure is weighted to reflect the ratio of new to existing homes.

Further analysis shows that those aged under 35 are more comfortable both with the term air tightness and the concept.

Sections 10.11 and 10.12 describe experiences of people living in new homes; whether rooms are too hot or cold, and whether they open windows when they have controlled ventilation systems.

9.7 Awareness of terms associated with energy-efficient homes

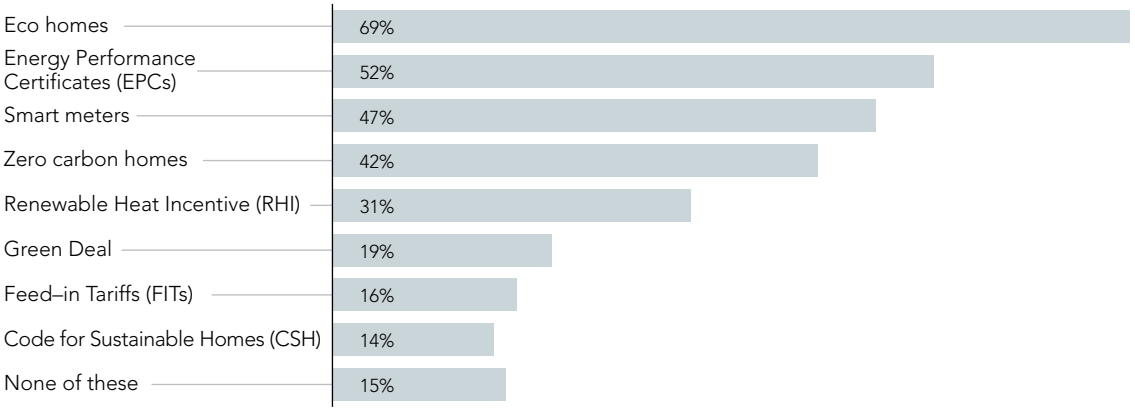
Various terms are used by the industry to describe energy-efficient homes or are associated with the drive towards energy efficiency. Awareness of some of these terms was tested with occupiers, across the entire sample of 1,331 people (Figure 9.11).

The terms 'eco homes' and 'EPCs' are the most familiar to people, awareness of the latter having increased by just over one-quarter since 2008 (Figure 9.12). However, in spite of 52% having heard of the term (as shown in section 7.5) the majority do not recall seeing an EPC on a home they had considered and a very low percentage say the EPC influenced them.

42% are familiar with the term 'zero carbon homes', but awareness appears to have declined since the 2008 study.

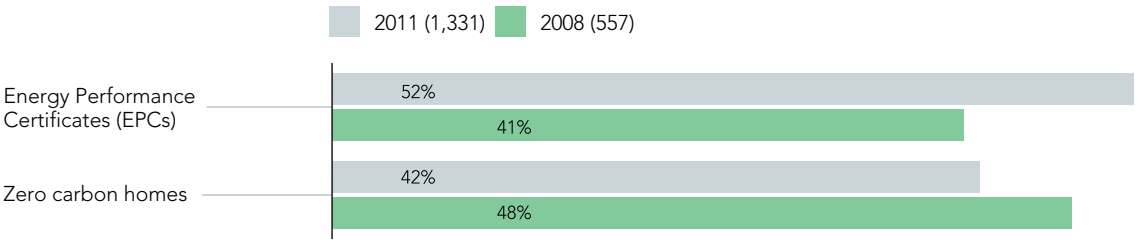
The Green Deal has not yet been launched, but perhaps as a result of media coverage, 19% are aware of this term. However, coverage of changes to the FIT at the time of conducting the research does not appear to have developed widespread awareness of the term.

Figure 9.11 Which of these have you heard of?



Base: 1,331 in-home and telephone interviews.

Figure 9.12 Awareness of terms 2008 and 2012



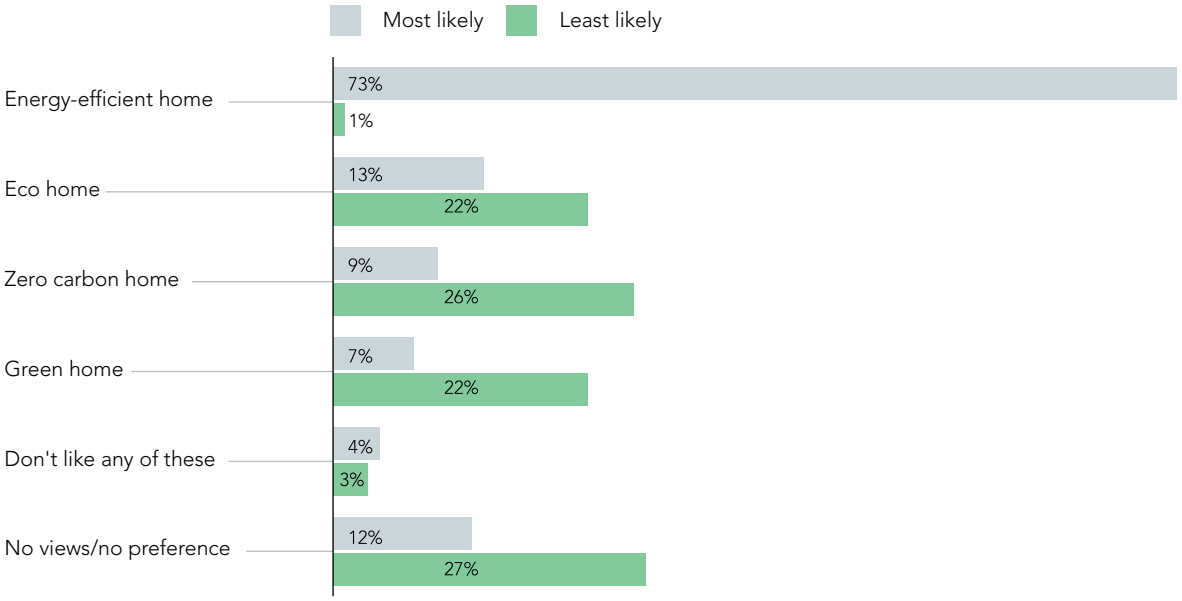
9.8 Preference for terms used to describe zero carbon homes

As is the case for air tightness, the name used to describe a new home may have a positive or negative impact on potential buyers (Figure 9.13).

Respondents were given a number of terms and were asked which would be most and least likely to attract them to look at a new home. By a significant margin, the term 'energy-efficient home' has greatest appeal. This again emphasises the need for clear descriptive terminology, capable of being understood by the home-owning public and reinforces the need to avoid using confusing house-building industry terminology.

A similar result emerged from focus groups with occupiers. 'Green home' and eco home is thought to convey an impression of an ultra-modern, slightly alternative home, with an expectation that it incorporates environmentally-friendly, non-traditional materials. There is some scepticism about applying the term 'zero carbon' to homes because of doubts that homes can be truly zero carbon.

Figure 9.13 Terminology most and least likely to attract occupiers to look at a new home



Base 350 in existing homes and new homes built to applicable Building Regulations (occupiers of enhanced new homes were asked a different question).

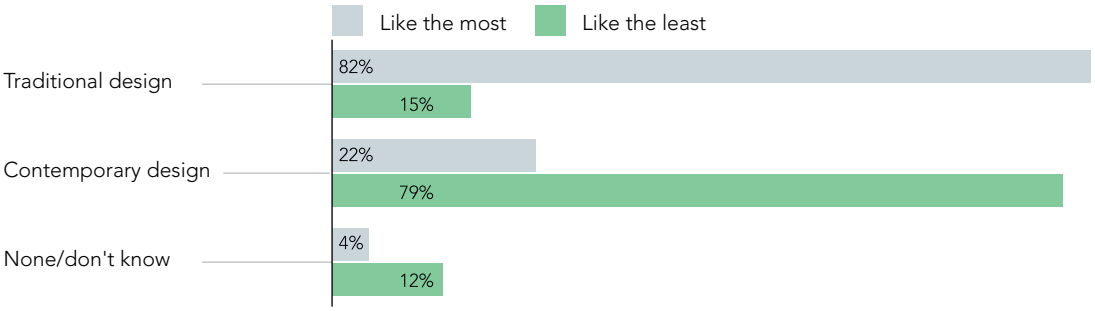
6 in 10 of those living in an enhanced new home prefer the term 'energy-efficient home' to describe it; and most of the rest prefer 'eco home'. The term least favoured is 'zero carbon home'. Focus group discussions support the premise that occupiers prefer clear, easy to understand terms. The impact of higher energy prices is likely to increase attraction of 'energy efficiency' in house marketing terminology.

9.9 Appeal of traditional and contemporary designs

Many enhanced new homes have been built to contemporary designs, some incorporating mono-pitch roofs to facilitate the installation of solar panels. However, it is possible to build to the same energy efficiency standards by using more traditional designs.

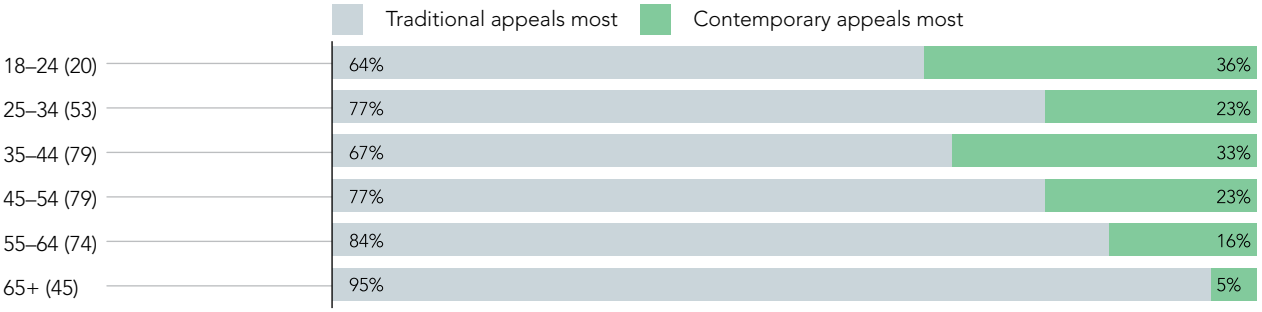
Pictures of different styles of homes were shown to occupiers during the in-home interviews (Figure 9.14). The reactions are very similar to those found in the 2008 study, showing that there continues to be a preference for traditional over contemporary designs (Figure 9.15).

Figure 9.14 Percentage preferring traditional or modern designs



Base 350 in existing homes and new homes (not enhanced new homes)
Adds to over 100% as some gave more than 1 answer.

Figure 9.15 Appeal of contemporary and traditional house designs by age of respondent



The majority in all age groups prefer a traditional design, with those aged 55 and over being least attracted by a contemporary design.

Residents living in a development of enhanced new homes in the South West were involved in one of the stage 1 qualitative focus groups. Most commented that the contemporary appearance of their homes is a positive factor which had attracted them. Several spoke of the development having a 'Mediterranean' feel, which is widely liked.

The research shows that a high level of energy efficiency is more likely to be associated with a contemporary home design than a traditional appearance (Figure 9.16). The preference for a home with lower energy bills, combined with a more traditional design, underlines the need to reinforce the energy performance of these types of homes to potential buyers, particularly those in the older age groups.

Figure 9.16 Type of design associated with a home that is very energy-efficient

Base 350 in existing homes and new homes (not highly energy-efficient).

9.10 Interest in buying and paying a premium for a zero carbon home

All respondents were asked how interested they would be in buying or renting a home that generates a lot of its own electricity or heat through features such as solar panels (Figure 9.17). Across 1,277 respondents, results are positive, averaging a score of 3.5 out of 5. Half score a 4 or 5, showing they would be fairly or very interested.

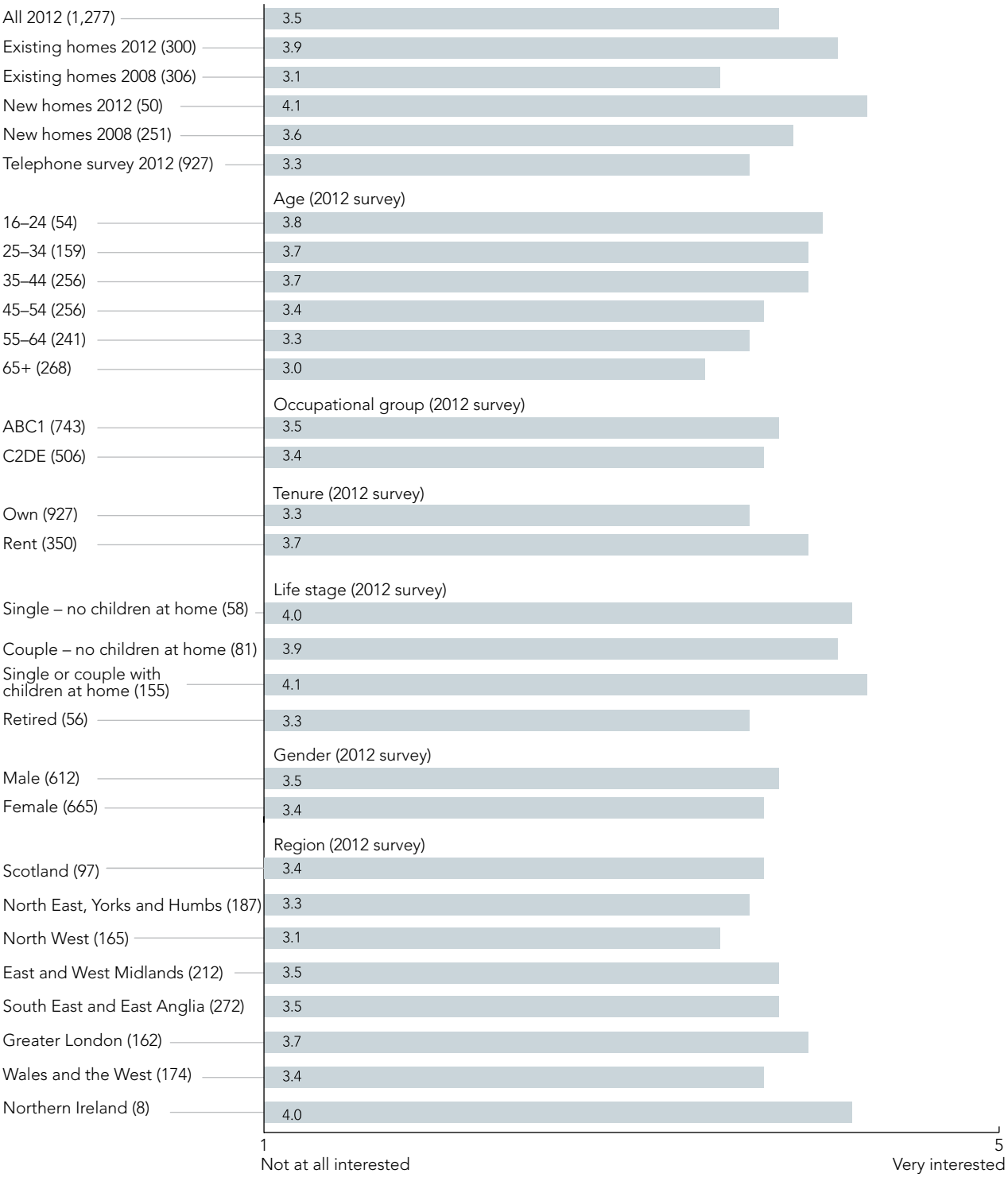
During in-home interviews, energy features that may be included in homes built to enhanced and zero carbon requirements were discussed at length. Respondents are very positive about the prospect of buying homes incorporating these features, more so than in the shorter telephone interviews. As in-home interviewees had more time to think about the impact of the features during questioning, this raises the prospect that, while initial reactions may be less positive, when given information about the benefits and time to absorb them, opinions become more positive.

Interest declines with age of respondent, showing that highly energy-efficient homes are more likely to appeal to those under 45. Those aged over 65 are significantly less interested in principle than other age groups. However, earlier results show that the importance of the cost of energy bills increases with respondent age. One explanation for this contradiction could be that those above 45 are generally less confident or positive about the technological features of new homes, or have concerns about the payback period.

People renting properties show a significantly higher level of interest than those owning homes. Those in the North West appear less interested than others.

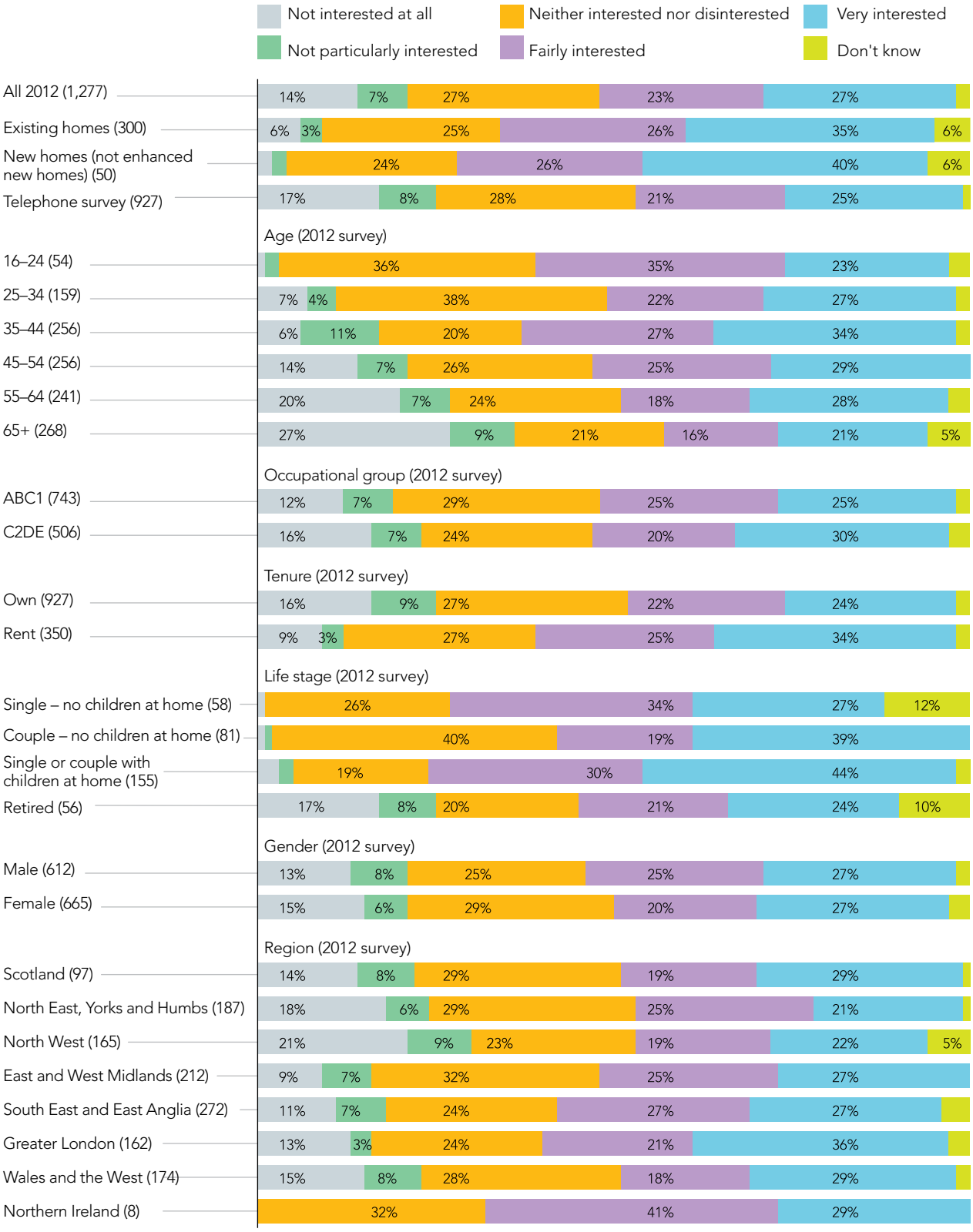
Interest in buying or renting homes with energy-related technological features such as solar panels has increased since the previous study, particularly among those in existing homes (Figure 9.18).

Figure 9.17 By 2016 all new homes will have to generate a lot of their own heat and electricity by means of the technologies discussed (in previous questions). How interested would you be in principle in buying or renting a home which included some of these products?



Base of 1,227 excludes those in enhanced new homes, not asked this question
Life stage data unavailable for telephone survey results, figures based on in-home interviews
Question in 2008 was about interest in buying a home with microgeneration technology, which was explained to them
Comparable 'all' figure not available for 2008 as ratio of new to existing homes differed
Northern Ireland not interviewed in the telephone survey.

Figure 9.18 Interest in buying or renting a home with products for generating heat or electricity. Level of interest by score out of 5

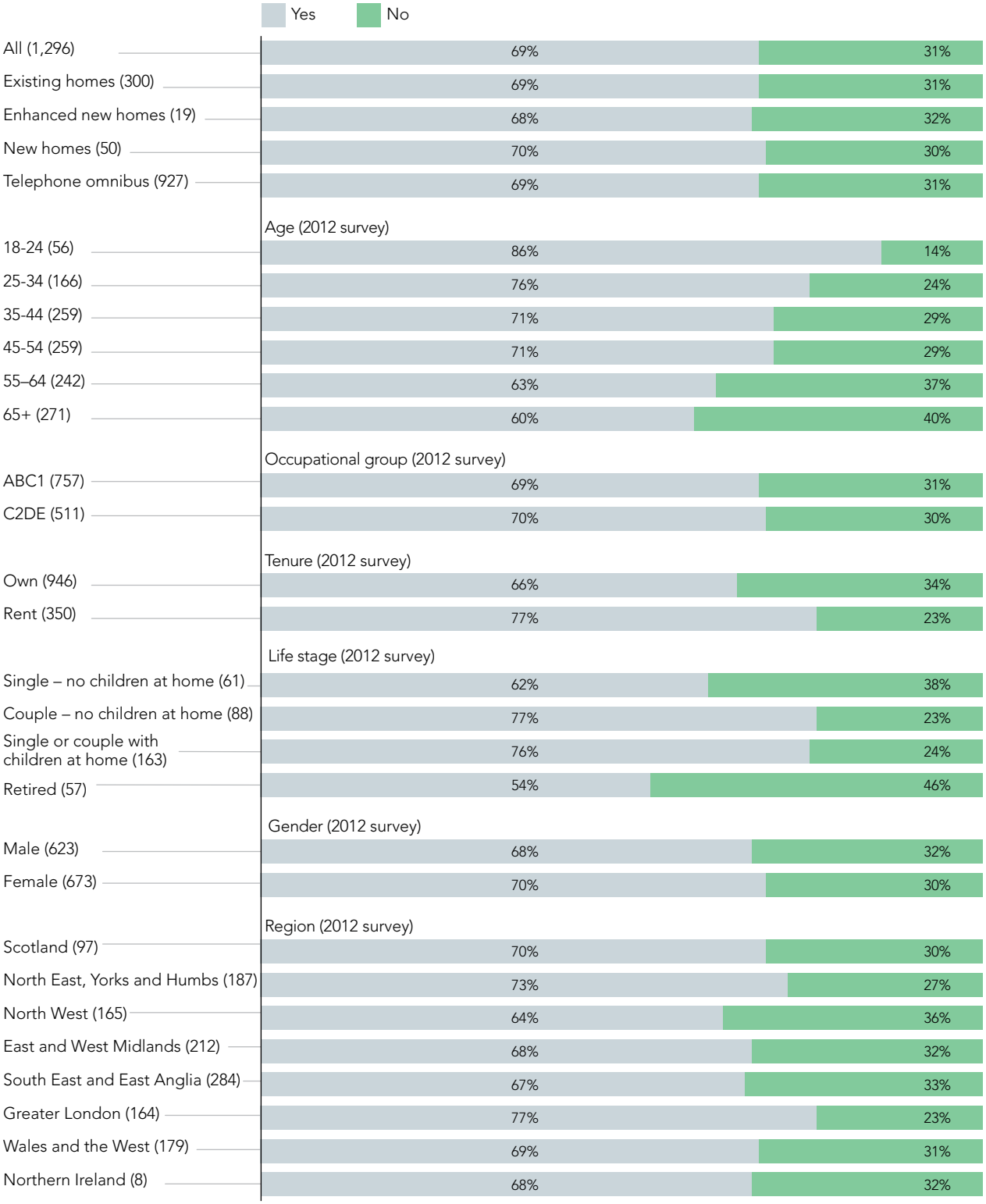


Footnotes for Figure 9.17 also apply to Figure 9.18.

The house-building industry is concerned about the additional costs of building zero carbon homes, believing that home buyers will be unwilling to pay the premium necessary to recover additional costs. Furthermore, experience suggests that valuers and mortgage lenders are not willing to incorporate a premium for new homes, with or without these additional technological features.

To test house builders' perceptions about occupiers' lack of willingness to pay a premium, respondents were asked whether they would consider paying more for a home that saved them money on their energy bills (Figure 9.19). Figures were included that are believed to be realistic, ie would respondents pay an additional £10,000 for a home that saved £750 per annum on energy bills?

Figure 9.19 If the price of an energy-efficient home were £10,000 more than another similar home that was not so energy-efficient, but it offered to save you £750 a year on your energy bills compared to the other home, would you consider paying this?



In enhanced new homes, this question was not asked of housing association tenants
Life stage data unavailable for omnibus results, figures based on in-home interviews.

69% of occupiers say they would consider paying this premium. This underlines the need to link extra initial cost to ongoing savings. Willingness to pay a premium for energy-saving features declines with age, again contrary to the increase in the importance of energy bills revealed in this study.

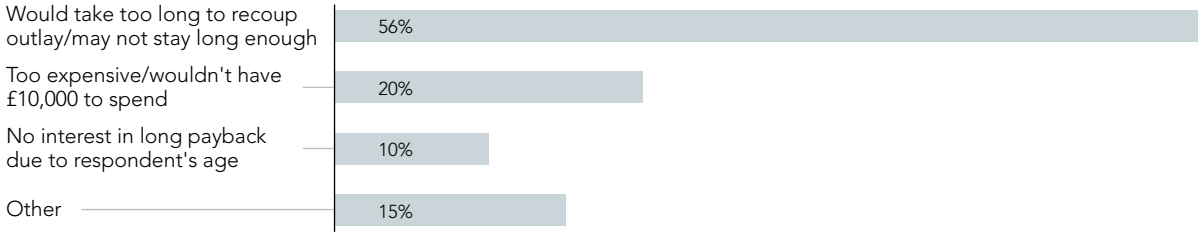
The illustration given in the interview question (Figure 9.19) equates to a simple payback period of 13 years. This result is more positive than focus group findings, where several people felt that a payback period of over 10 years is not acceptable. A suitable period is thought to be related to perceptions of the average length of occupation of a home, ie about 7 to 8 years. This is supported by the wider in-home survey where the average ideal payback period is given as 7.9 years.

The *Survey of English Housing 2007 to 2008*[8] states that in fact the average length of time owner-occupiers have lived in their current homes is 11.9 years, higher than occupiers themselves estimate or expect.

Based on this range of figures, and reaction to the example given during the interview, a simple payback period of up to 13 years is likely to be considered.

Those people in the survey who say they would not pay a premium at all give the length of time to recoup any outlay as their main reason for not doing so (Figure 9.20).

Figure 9.20 Main reasons for unwillingness to consider paying a premium to gain energy-savings (unprompted)



Base 103 who would not consider paying £10,000 more for a home to save £750 per year in energy costs.

Many factors have changed since the 2008 study, making it difficult to draw comparisons; the details of the definition of zero carbon, the anticipated build costs, savings and payback period associated with improved energy efficiency, not forgetting the continuing world economic downturn. Results of the 2008 survey showed that 46% of new homeowners and 36% of owners of older homes would pay an additional £700 for a home to gain a saving of £50 per annum, which at the time related to savings expected from homes built to CSH Level 1 when compared to a home built to requirements of the applicable Building Regulations.

The 2012 survey investigates a simple payback period similar to that put before respondents in the 2008 survey, this time with a considerable increase in the initial outlay – increased to £10,000. Findings of the 2012 survey imply that interest has grown in making a higher initial investment to gain future savings.

In the 2008 study, moving from current practice to CSH Level 6 was estimated to cost £35,000, with a resultant saving of £400 per annum in energy bills. It is perhaps not surprising that only 4% said they would consider paying this premium.

9.11 Incentives that would encourage interest in an energy-efficient home

A question was included in this study to identify attractiveness of a range of financial incentives intended to encourage interest in an energy-efficient home (Figure 9.21). Reductions in day-to-day expenses such as energy bills and council tax appear more attractive than one-offs such as stamp duty. The relatively low result for the FIT correlates with the low levels of awareness.

Figure 9.21 Which 3 of these incentives would most encourage you to buy or rent a very energy-efficient home?

Base 350 occupiers of new homes (excluding highly energy-efficient) and older properties
Answers do not add to 300% as some gave 2 answers only.

10 Experiences of occupiers of new and highly energy-efficient new homes

Since the 2008 study, according to figures published by the DCLG[14], over 5,000 homes have achieved a post-construction certificate for Levels 4, 5 or 6 of the CSH.

The experiences of 54 people living in enhanced new homes were sought for this study, including homes constructed to Levels 4, 5 and 6 of the CSH and some achieving its predecessor rating, EcoHomes Very Good and Excellent. The experiences of these occupiers provide a useful background for house builders and housing associations as they examine the issues around designing, promoting and managing zero carbon homes.

In the enhanced new homes sample of occupiers, 30 were housing association tenants, 19 were owner-occupiers (private and shared ownership) and 5 were renting private homes.

For comparison purposes a sample of 50 people living in new homes (built 2 to 3 years ago to the applicable Building Regulations) was also included.

Key findings in this section

- Occupiers of new homes (built 2 to 3 years ago to applicable Building Regulations) and enhanced new homes (built to higher levels of energy efficiency) are generally very satisfied with the experience of living in them, with both occupier groups scoring them with a similarly high level of satisfaction.
- Energy-related features are not a main attraction when first considering the home, however they add to its appeal when savings on energy bills are considered. 57% find that their gas and electricity bills are lower than their previous home.

- Overall, there is a high level of positivity for new build homes. All categories show an improvement from the previous home to the newly occupied home, with most citing design, comfortable temperature and amount of daylight as the best features.
- Confirming other findings in this study, those living in new and enhanced new homes still regard location as the key factor taken into account when choosing their home. 23% also state that they were attracted by the home being new build.
- 65% say the features of the home that make it energy-efficient made it more attractive to them, with no major difference in result between homeowners and tenants.
- More than half of those in new homes and enhanced new homes say that their energy bills are lower or a lot lower when compared to their previous home. Water usage figures are also encouraging for enhanced new homes, with 44% commenting the bills are lower in their new home.
- 9 out of 10 occupiers with solar electric and 8 out of 10 with solar thermal feel they benefit from having this technology fitted to their home. Other technologies do not score as highly, but encouragingly MVHR and CHP benefit their users according to 78% and 71% respectively.
- Where energy-efficient features have been fitted, there is a spread of understanding of how to operate each type. Results range from 86% with CHP to 70% with MVHR.
- Occupiers of new and enhanced new homes are generally satisfied with the information given to them about the energy efficiency features in their home. There is a discrepancy between homeowners and tenants of rented properties, with 100% of homeowners recalling being given written information, training or both compared to only 66% of tenants.
- Only 17% of occupiers in enhanced new homes where MVHR is fitted have carried out maintenance. One-third of tenants believe this is the landlord's responsibility.
- There is a high level of satisfaction that new and enhanced new homes stay warm in winter but less so that they stay cool in summer. Two-thirds of enhanced new home occupiers are satisfied with year-round comfort levels compared to those in other new homes; but there is some evidence that bedrooms on upper floors become too hot.
- Those with MVHR systems appear to open their windows just as much, if not more than those without. 87% of these are also keeping the system running when windows are open.
- Among those living in enhanced new homes, two-thirds say that the experience has made them take more steps to be environmentally-friendly outside the home, which confirms the findings from enhanced new home occupiers who take more steps to reduce their carbon footprint.
- 79% of enhanced new home occupiers believe the technical features of their home will make it more saleable, and 76% would choose another similar new home again.

10.1 Satisfaction with the home

Occupiers of enhanced new homes and new homes built to applicable Building Regulations are almost equally as satisfied with the experience of living in their homes (Figure 10.1). Satisfaction scores of both groups average over 4 out of 5, a high result by research standards. Only 5% are dissatisfied, giving a score of 1 or 2 (Figure 10.2).

Figure 10.1 How satisfied are you with the experience of living in this home on a scale of 1 to 5 where 1 is very dissatisfied and 5 is very satisfied?

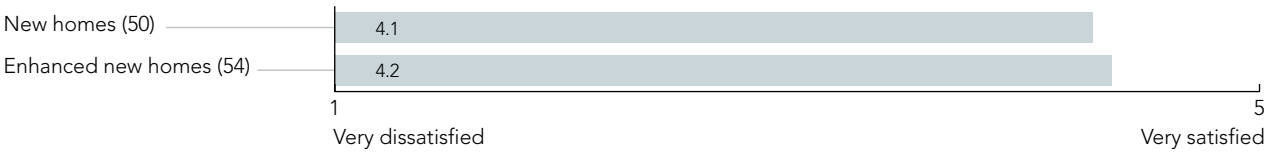
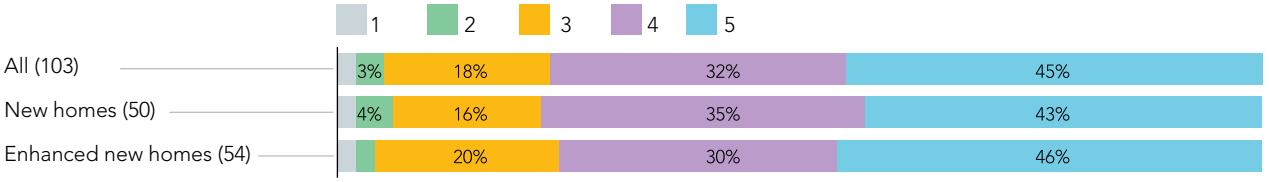


Figure 10.2 How satisfied are you with the experience of living in this home on a scale of 1 to 5 where 1 is very dissatisfied and 5 is very satisfied? Percentage giving each score



A main feature liked by occupiers of new homes about their homes is the space, particularly mentioned by those in enhanced new homes (Table 3).

Table 3 Main likes and dislikes of new homes among occupiers (unprompted)

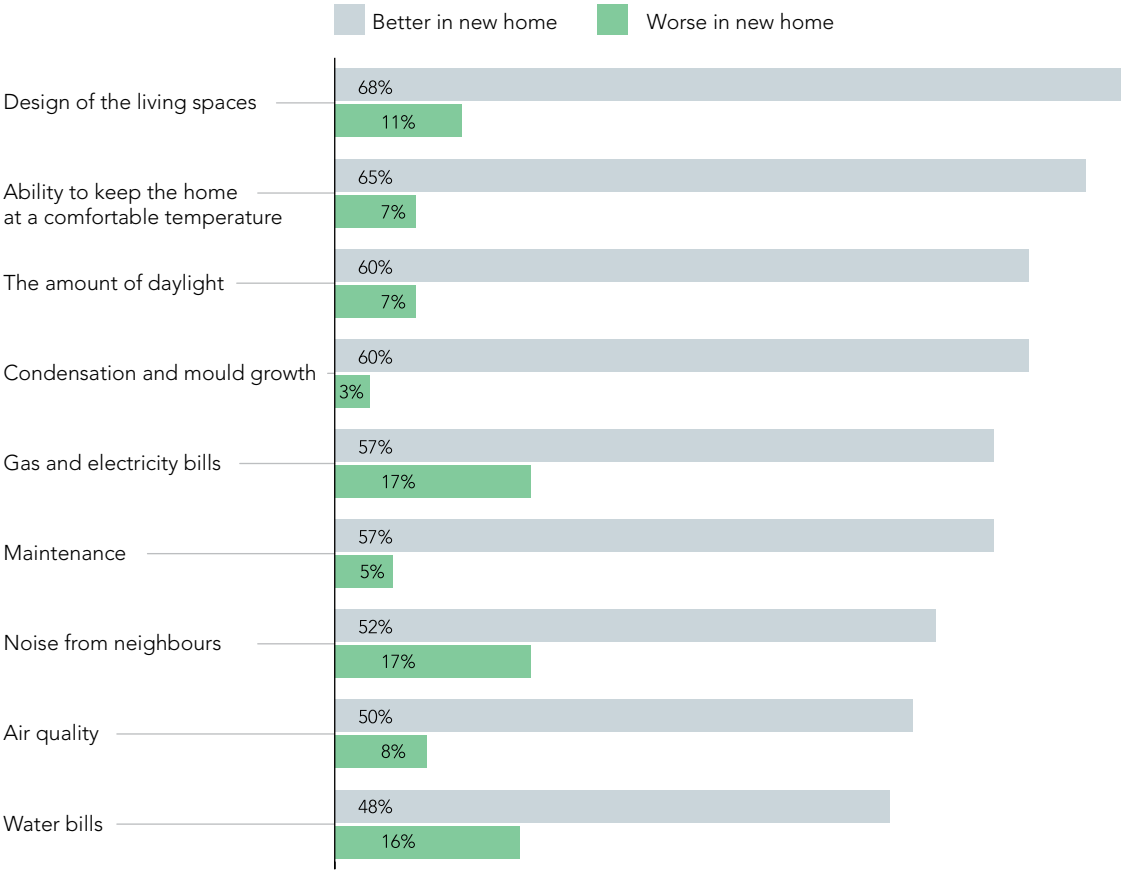
	New home	Enhanced new home
Main likes		
Space/size	36%	56%
Location	18%	22%
New	18%	19%
Cheaper energy bills	6%	13%
Main dislikes		
None	34%	43%
Lack of parking	10%	7%
Small garden	8%	7%

'The scheme itself attracted me and also the "eco aspect" and the upstairs decking, and a double space garage and a garden. I have two teenagers so having that much space to put people in different places was absolutely brilliant.' Occupier of highly energy-efficient home

'The rooms are all the same temperature, good and solidly built, low bills, we like the design of upstairs, the doors are wide and there are no draughts.' Occupier of highly energy-efficient home

When prompted with a list of factors that may be considered to be benefits of a new home, the majority state that these are better in the new home than in their previous one (Figure 10.3). Design of the living spaces and the ability to keep the home at a comfortable temperature are mentioned most as being better than previous homes.

Figure 10.3 Are these features better or worse in your new home than your previous home?



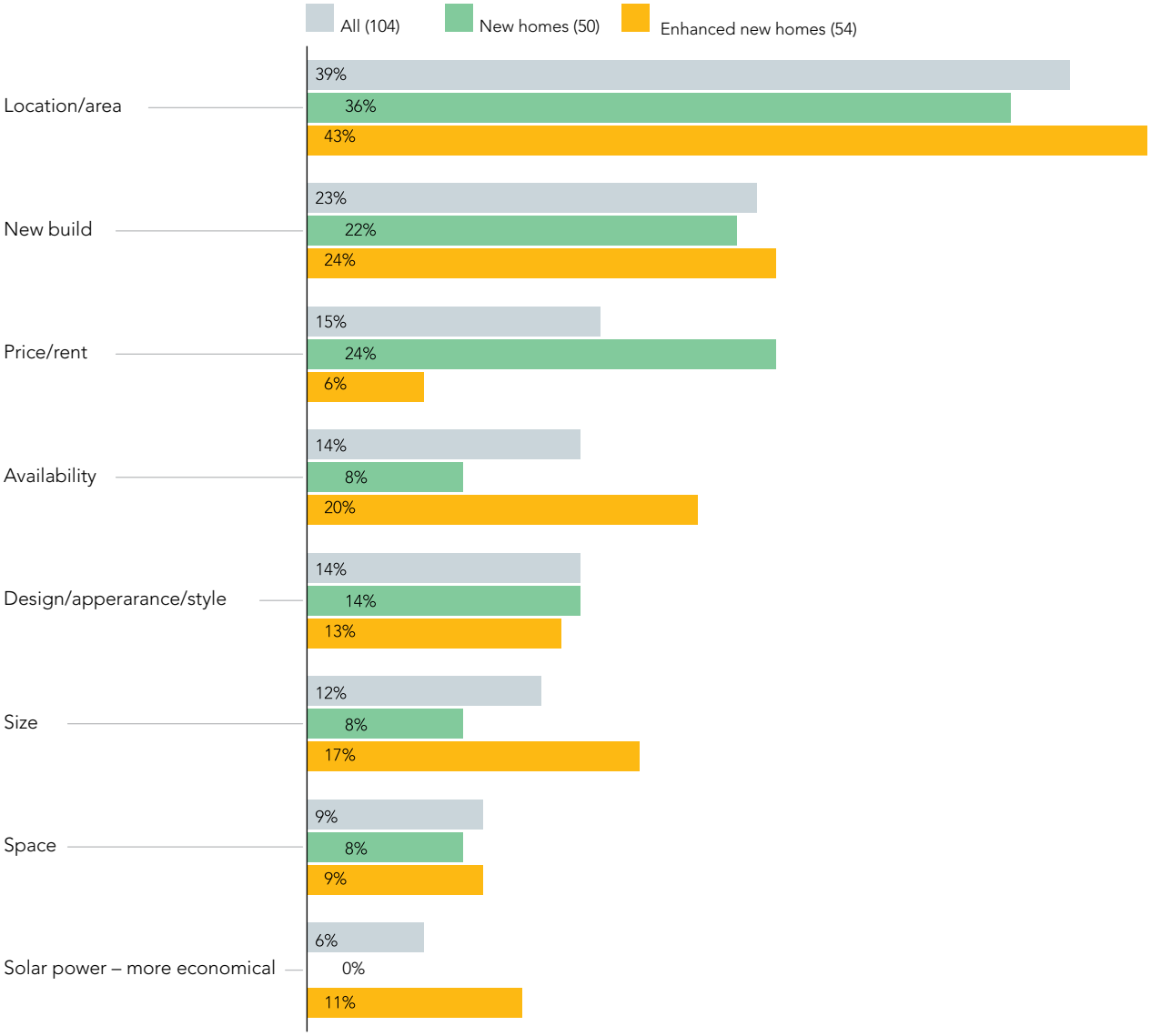
Base 104
Balance to 100% is those saying 'not applicable', 'this is first home' and 'same as former home'.

10.2 Role of energy efficiency when choosing the home

Those living in new and enhanced new homes give location, design, size and space as the main reasons for choosing their home (Figure 10.4). This is similar to the expectations of occupiers generally, although the number of bedrooms is mentioned far less as a consideration, unprompted.

The fact that the home is new build is cited by 23% as an important factor.

Figure 10.4 What attracted you to consider this home? (Unprompted)



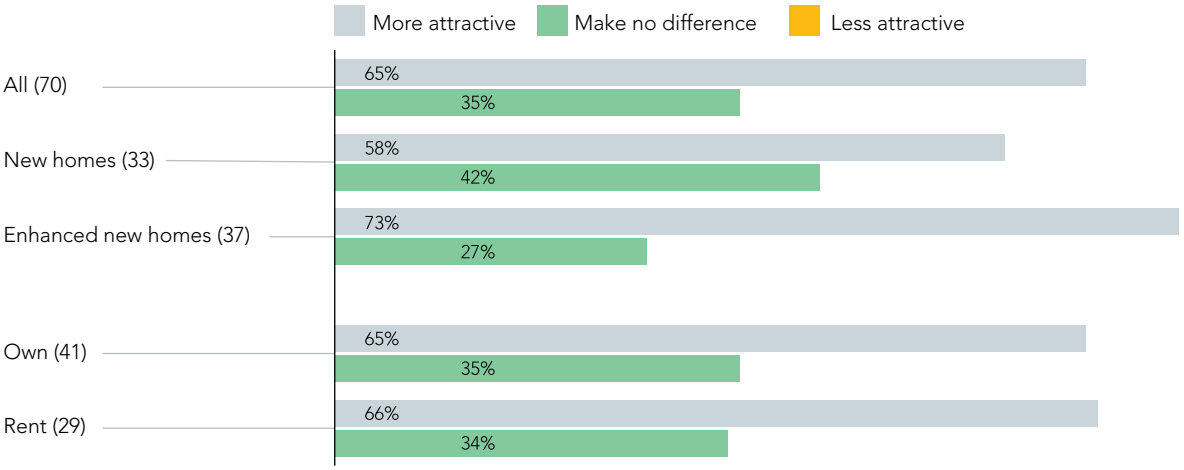
Factors mentioned by more than 5% of respondents are shown.

Energy efficiency is barely mentioned in this unprompted question as a reason for considering the home; 11% of those in an enhanced new home say that solar panels making the home more economical to run attracted them.

Rather than being a main driver, energy efficiency is a secondary attraction for the majority, increasing the appeal of the home. When prompted, 65% say that the energy-efficient features of the home did make it more attractive to them (Figure 10.5). No-one regarded these features as a negative factor. The appeal is that savings could be made on energy bills, mentioned unprompted by almost all.

This result supports the finding (in section 9.2) that effective promotion of the energy performance of a new home will enhance its appeal, ideally with running costs presented in comprehensible monetary terms.

Figure 10.5 Did the features of the home that make it energy-efficient make it more attractive, less attractive or make no difference to you? New home occupiers

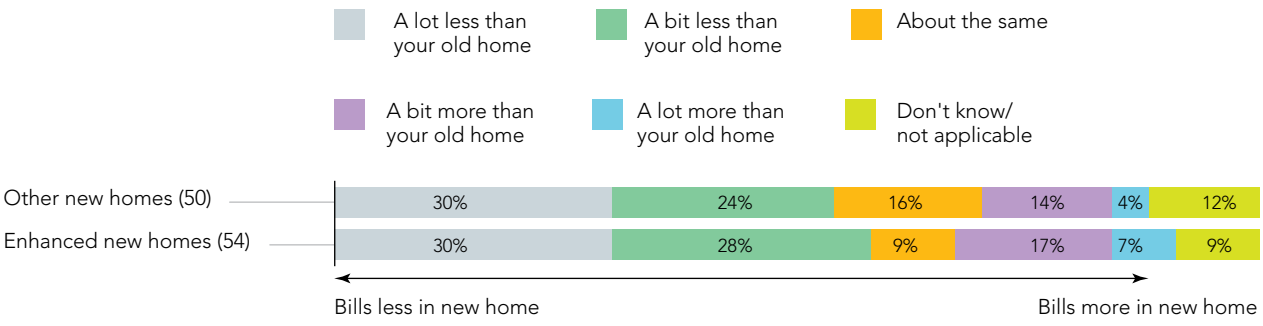


No-one answered 'less attractive'.

10.3 Satisfaction with energy bills

Section 10.1 shows that 57% of people find their gas and electricity bills to be better in their new home than in their previous home. When questioned further, 30% say they have found their bills to be a lot lower (Figure 10.6). There is little difference in the results between those in enhanced new homes and those in new homes built in the last 2 to 3 years to applicable Building Regulations.

Figure 10.6 Comparing energy bills in the new home with previous home

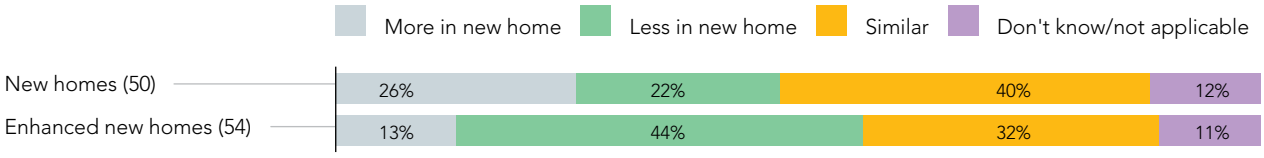


Results in section 7.3 show that occupiers of new homes, and particularly enhanced new homes, are much more satisfied with their energy bills than those living in existing homes (46% very satisfied in enhanced new homes compared with 12% in existing homes).

10.4 Water usage

Water efficiency requirements for dwellings were introduced in Approved Document G 2010[13]. The new homes built to applicable Building Regulations in this survey are therefore unlikely to have such features, as these would not have been a requirement of earlier regulations. However, enhanced new homes are more likely to have water-saving products such as low flow taps. These differences are shown in the findings, with more occupiers of enhanced new homes noticing reduced water usage compared to their previous home (Figure 10.7).

Figure 10.7 Comparing water usage in the newly occupied home with previous home



10.5 Perception of whether a price premium has been paid for the home

Those owning an enhanced new home were asked whether they believe they paid a premium for it.

Of these 19 owners, just over half think that they paid more for their home because of the energy-saving features. 15 of the 19 owners (79%) think that these features make the home more saleable.

Among the 35 who are renting, predominantly from housing associations, 37% think that they are paying more rent for the home than other similar properties because of the energy-saving features. If they were to move and be offered a similar home again, 54% of the tenants state that they are prepared to pay a premium in rent to gain the energy-savings and other benefits.

10.6 Technological features of the homes

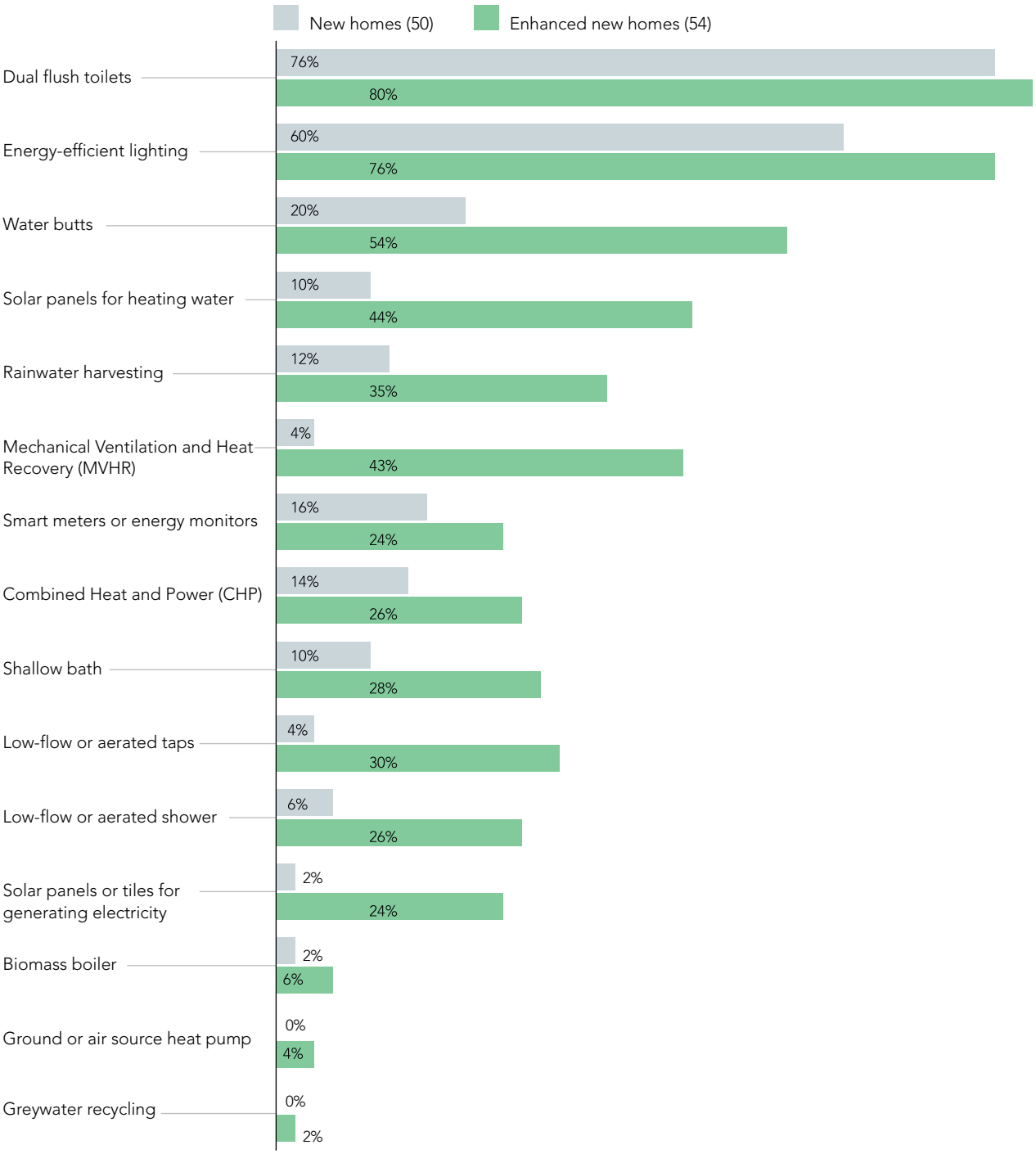
Questions were included in the in-home interviews with occupiers of new and enhanced new homes to identify what sort of technological features occupiers thought were in their homes. To limit any issues with terminology, some features were described (for example an MHVR system was described as being evident by grilles in the ceiling in most rooms, not just the bathroom, bringing in fresh air and taking out stale air, and recovering heat).

The most common features in the new homes across the sample are dual flush toilets and energy-efficient lighting. As expected due to the more stringent requirements, enhanced new homes, particularly those built to the CSH, have more technological features than new homes built to the applicable Building Regulations. This includes features such as water butts, solar panels, MVHR and low flow or aerated taps and showers.

Several people say they have rainwater harvesting systems and 1 person that they have a greywater recycling system.

Solar thermal panels for heating water have been more commonly installed in enhanced new homes than solar electric panels or tiles; these being described to occupiers as solar panels to generate electricity. 7 people say they have both types of panel.

Figure 10.8 Technological features identified by occupiers as being in their homes



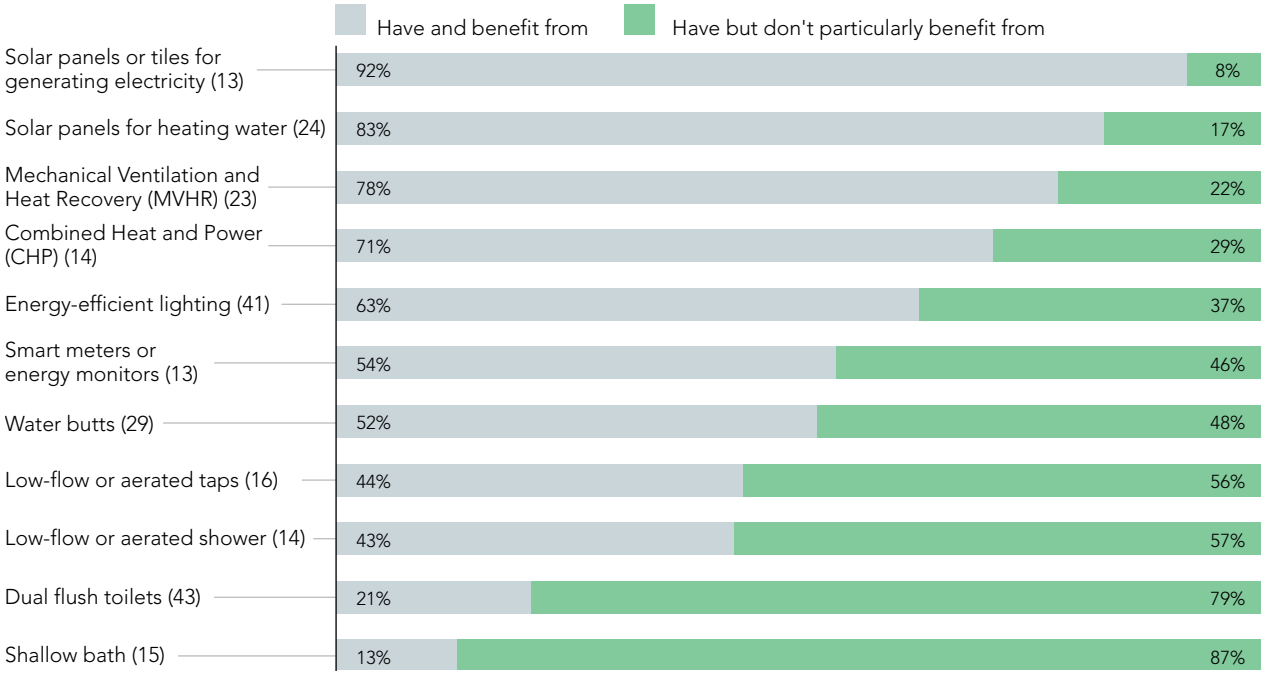
10.7 Are technological features benefiting occupants?

Among those who have technological features installed in their homes, the majority find that they are benefiting from the energy-related features (Figure 10.9). Most identify financial savings as the benefit.

> *'We haven't had the gas turned on for heating since February. We've only used the hob to cook on, that's the only gas we've used. We've even had the gas company knocking on the door asking us to prove our meter reading!'*
> Occupier of enhanced new home

Water-saving measures are not perceived to be delivering benefits in the same way. In the focus groups, some new home occupiers expressed irritation with features such as shallow baths. This negative could outweigh any positive impact from lower water bills.

Figure 10.9 Which (of the features you have) do you feel you particularly benefit from?



Based on those having each type of product, numbers in brackets
7 people say they have both solar thermal and solar elecctric panels
Features identified by fewer than 5 occupiers are not shown.

In the focus groups, some told of removing aerated heads on taps and showers to increase water flow. Others mentioned changing light fittings requiring the use of specific energy-efficient bulbs to allow use of lower cost bulbs. However, this behaviour does not appear widespread and very few in the survey say they have done this; 9% of those with dual flush toilets and 2% of those with energy-efficient lighting say they have modified these features in some way.

A further concern in the industry around solar panels is that they could cause an increase in occupiers' use of electricity, because it is perceived to be free. None of the 30 people with solar thermal or solar electric panels think they have increased their hot water or electricity consumption as a result. However, 17% say they are running more appliances during the day than they were previously.

10.8 Satisfaction with operation and maintenance

In the focus group at stage 1 (qualitative), occupiers of privately owned enhanced new homes seemed happy with the operation and maintenance of the installed technological features. However, it became apparent that some were more aware than others about the correct operation and maintenance of features, for example the need to change filters in MVHR systems.

Tenants of housing association properties attended a separate focus group, and expressed concern that they did not understand the features of their homes. Indeed some had doubts about whether they were working properly. The information provided to them at occupation was considered unhelpful, difficult to understand, and in some cases not relevant, including such material as installation instructions and technical manuals.

In the survey of occupiers of enhanced new homes, questions were asked about satisfaction with operation and maintenance (Figure 10.11). Answers show a high level of satisfaction, but, as was evident in the focus group, occupiers may not in fact have a correct understanding of how to look after the technological features of their homes. This is supported by the results of research with housing associations (see part 3), who show concerns that tenants do not understand the correct operation of energy-related features.

In housing association and privately rented properties, responsibility for maintenance typically rests with the landlord. There is a legal duty to perform an annual safety check on gas appliances, usually incorporating a service, but this driver does not generally exist in the case of other energy-related systems.

Although occupiers of enhanced new homes are happy that they understand the benefits, owners are slightly less satisfied than those renting that they understand how to operate these features and seem less confident that they understand the maintenance requirements.

Figure 10.11 Satisfaction with operation and maintenance of technological features

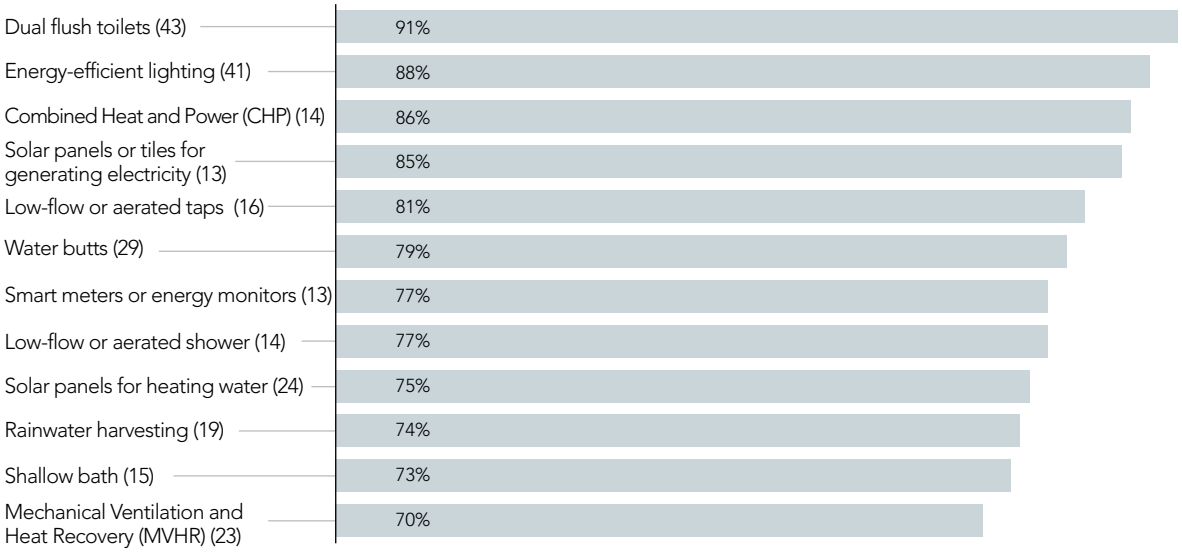
*Owners only.

Although based on a small sample, occupiers aged 65 and over of enhanced new homes are far less satisfied that features are easy to operate and that they understand how to operate them.

While the majority believe they understand how to operate the technological features of their homes, the system that appears to be least understood is MVHR; 3 out of 10 with this system say they do not understand how to operate it (Figure 10.12).

3 people say they have a biomass boiler of which 2 say they do not understand how it works. This is likely to be a communal boiler that does not require operation by individual occupiers. 2 have ground or air source heat pumps but do not understand its operation.

Figure 10.12 Of the features you have in your home, which do you feel you understand how to operate? Main features



Based on those having each type of feature, numbers in brackets
Features identified by fewer than 5 occupiers are not shown.

10.9 Satisfaction with the information provided about the technological features

All new homes built in the last 2 to 3 years are generally more energy-efficient than older properties. The occupiers of new homes were asked how satisfied they were with the information given to them about the energy-saving features when they were buying or renting the home (Figure 10.13).

While satisfaction with information is generally good, those in enhanced new homes, with more technological features, are less satisfied than those in new homes built to the applicable Building Regulations. Further analysis reveals this is due to lower satisfaction levels among those renting, largely housing association tenants, who account for most of the enhanced new home occupiers. One-third of those renting enhanced new homes are unable to recall any information or think that none has been provided (Figure 10.14).

Housing associations themselves express concerns about their tenants' use of technological features. Views are that the operation of some features is too complex for tenants to understand, with a lack of straightforward controls for some user groups (see part 3 in this report). Although based on a small sample, results show that indeed it is the 65 and over age group who experience most difficulty with operation of some features in a home.

Figure 10.13 How satisfied are you with the information you were given about the energy-saving features in your home when you were buying or renting it?

Equipment installed in enhanced new homes is typically more complex than occupiers are used to, and ensuring understanding of operation and maintenance is clearly important.

39% of the occupiers of enhanced new homes were given written information only. When satisfaction with the information is analysed against the type of instruction given, it can be seen that satisfaction is highest among those who were shown how to use the equipment, and even higher among those who were both shown and given written instructions (Figure 10.15).

Figure 10.14 When you bought or rented the home, were you shown how to use the features we have been discussing, or were you given any written instructions?

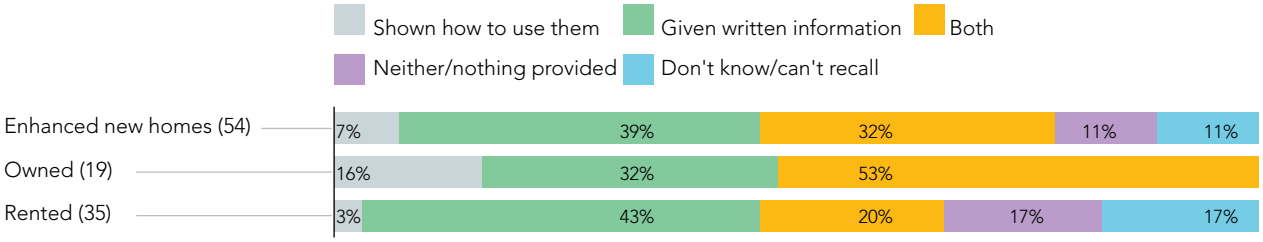


Figure 10.15 Satisfaction with operating instructions according to form in which information was provided, among occupiers of enhanced new homes

Discussions with occupiers in focus groups and research with housing associations reinforces the need for ongoing demonstration of how equipment works, backed-up by user-friendly operating instructions, to encourage correct maintenance and for the benefit of subsequent occupants.

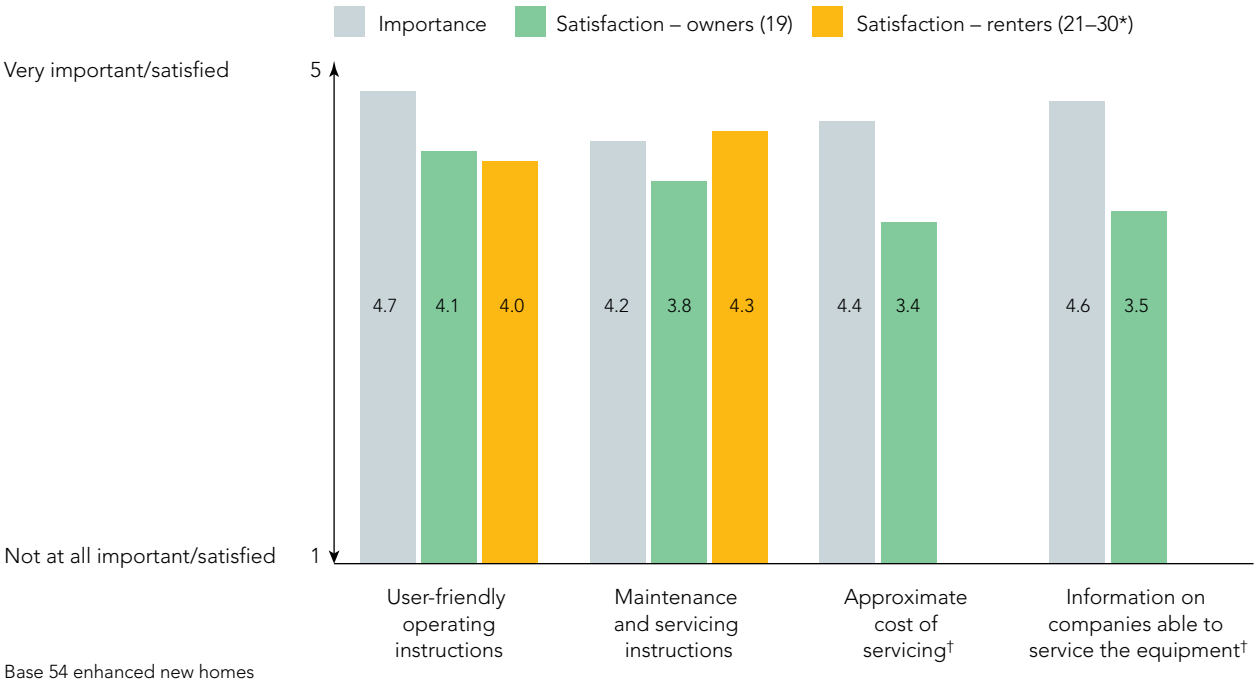
> *'I thought they went through it a bit too quickly actually. It was very fast, I couldn't take it all in, I'd love to have had a print out with all the information for the air system in the house, everything.'* Occupier of enhanced new home

> *'We did have all the manuals but some of them are so complex that in the end you were just grabbing workmen off the site and saying, "how does this work?" '* Occupier of enhanced new home

Asked how important it is to have user-friendly operating and maintenance instructions, approximate servicing costs and information on companies able to service the equipment, all those in enhanced new homes regard this as very important. Occupiers of existing homes were also asked this question, and their answers are similar (see section 9.5).

When received, satisfaction with operating, maintenance and servicing instructions is high (Figure 10.16). However, owners of enhanced new homes are less satisfied that they have advice on the cost of servicing and where to go for this service.

Figure 10.16 Key information about technological features in highly efficient homes – importance and satisfaction



Base 54 enhanced new homes
* Some tenants unable to comment
† Owners only.

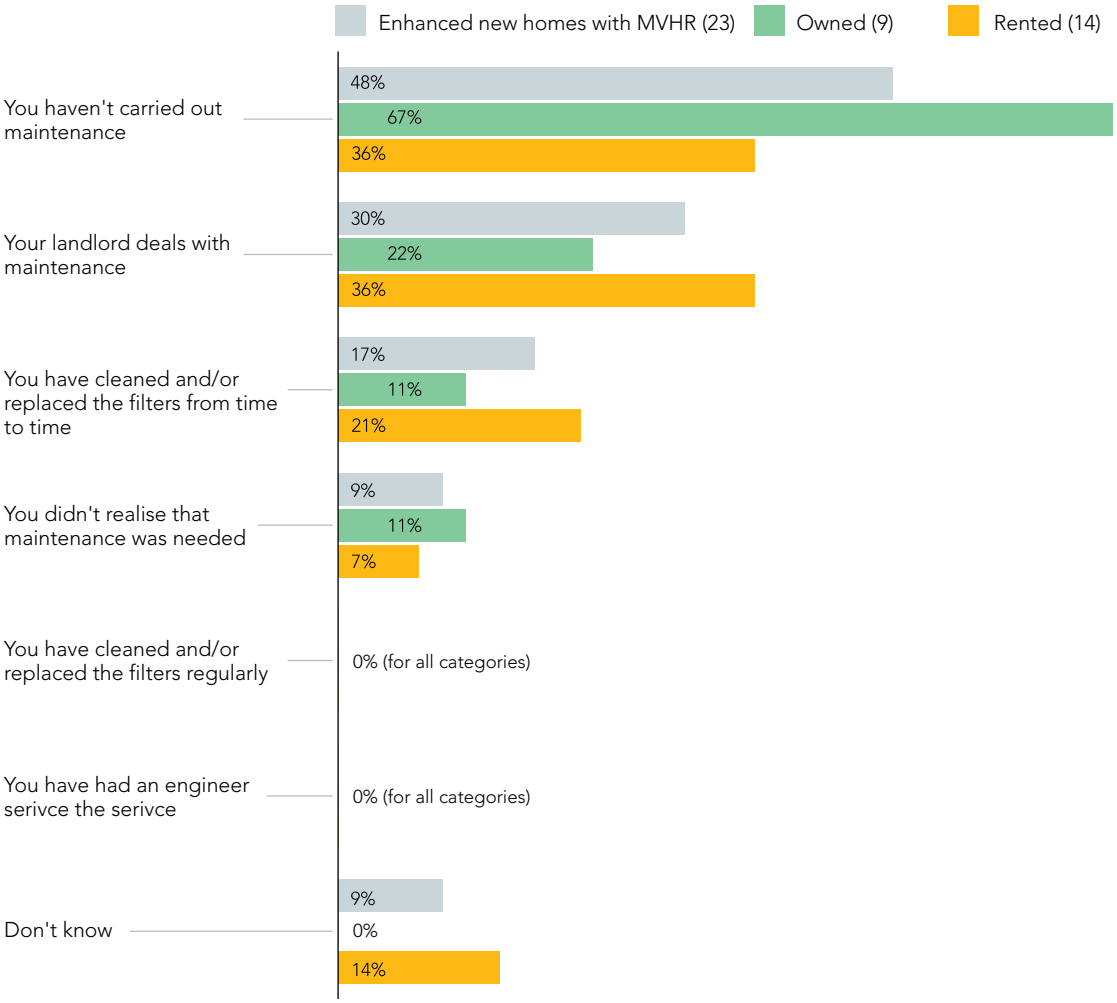
Analysis by age again shows that people aged 65 and over are far less satisfied with the operating and maintenance instructions than those in other age groups. Results also show that this age group do not find technical features easy to operate. This certainly emphasises the importance of clear information, as well as the importance of having features that are easy to use.

10.10 Servicing and maintaining equipment

The extent of maintenance undertaken by those living in enhanced new homes was examined during the in-home interviews. Only 1 of the 54 enhanced new home occupiers could confirm that the equipment which came with the house, other than the boiler, had been serviced regularly.

Among the 23 occupiers who could identify an MVHR system within their home, very few have carried out any maintenance even though all have lived in their homes for over 9 months (Figure 10.17). The responsibility for regular MVHR system filter cleaning in rented and housing association properties appears to be an emerging grey area.

Figure 10.17 Maintenance of MVHR; which applies?



Base 23 enhanced new homes with MVHR
Landlord in owned homes applies to shared ownership.

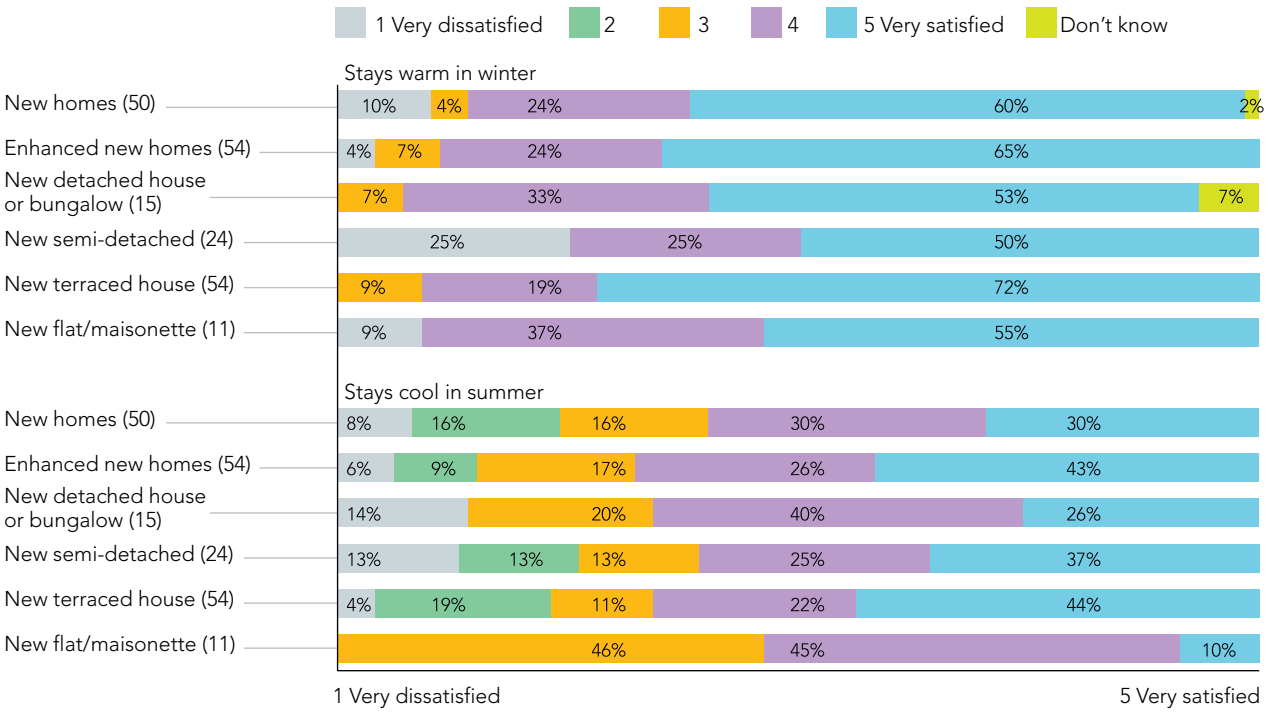
10.11 Temperature comfort levels

Given the air tightness requirements for new homes and increased levels of insulation, questions were included to identify occupiers' comfort levels in their homes (Figures 10.18 and 10.19).

Occupiers of new homes and enhanced new homes are very satisfied that their homes stay warm in winter, but are less satisfied that they stay cool in summer.

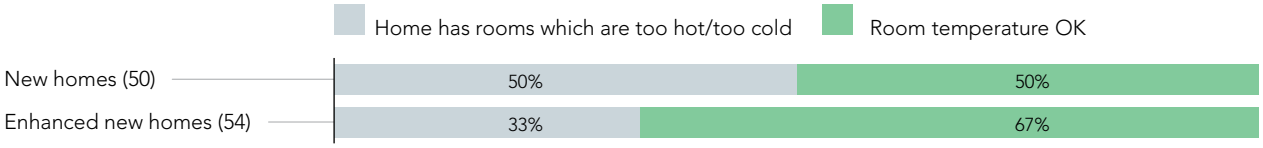
Figure 10.18 Satisfaction that home stays warm in winter and cool in summer

Figure 10.19 Satisfaction that home stays warm in winter and cool in summer – distribution of scores



A higher percentage of those in new homes built to applicable Building Regulations find that some rooms are too hot or too cold compared to those in enhanced new homes (Figure 10.20). This may be attributable to the higher incidence of MVHR systems incorporated into enhanced new homes.

Figure 10.20 Percentage finding rooms too hot or too cold



Respondents identify bedrooms, particularly those on the third or top floor as rooms that tend to become too hot.

These results show that enhanced new homes, built to highly energy-efficient standards can produce more comfortable living environments for occupiers in terms of temperature than those built to applicable Building Regulations 2 to 3 years ago.

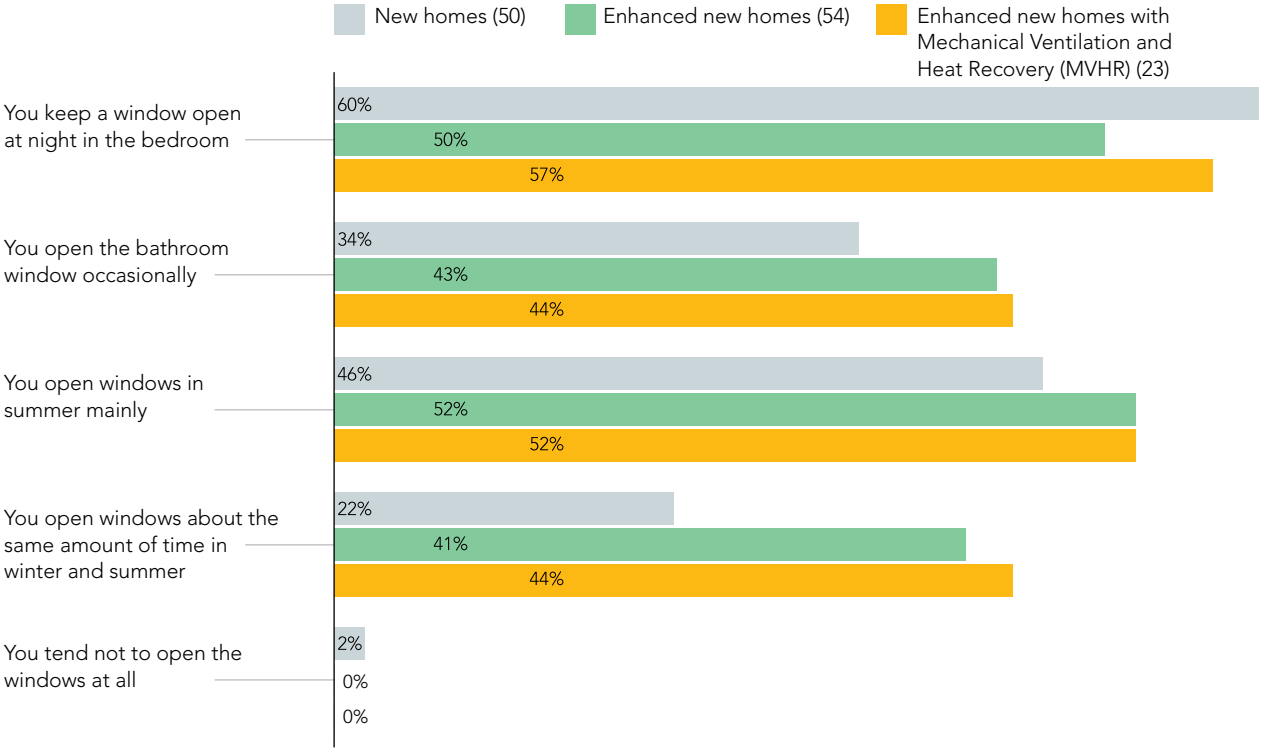
> *'The ground floor is too cold and the third floor is too hot'* Occupier of new home

> *'The front bedroom window is open constantly'* Occupier of new home

10.12 Opening windows and operating Mechanical Ventilation and Heat Recovery systems

53 of the 54 occupiers in the sample of new and enhanced new homes tend to open their windows on an occasional basis (Figure 10.21). Those with MVHR systems appear to open their windows just as much, if not more than those without. Occupiers with MVHR in their homes should not need to open windows as much and doing so is likely to have an adverse effect on energy use.

Figure 10.21 Which of these applies to how you use your windows?



Respondents could choose multiple options.

The main reason for opening windows appears to be for fresh air (83%), rather than because the home is too warm. Almost everyone, 93%, thinks that it is very important for them to be able to open a window.

Focus group discussions, with occupiers who have MVHR systems, identified how the system is used to provide a fresh air boost but also illustrated occupants' desire to have a window open, to eliminate smells for example. Some also turn off the MVHR in summer because of a perception that it is using electricity unnecessarily. Most (87% of occupiers with MVHR systems) keep the systems running all or most of the time, but all are opening windows as well.

> *'We shut ours (ventilation system) off in April because we can open windows if we need to be cool. It's using electricity to run.'* Occupier of enhanced new home

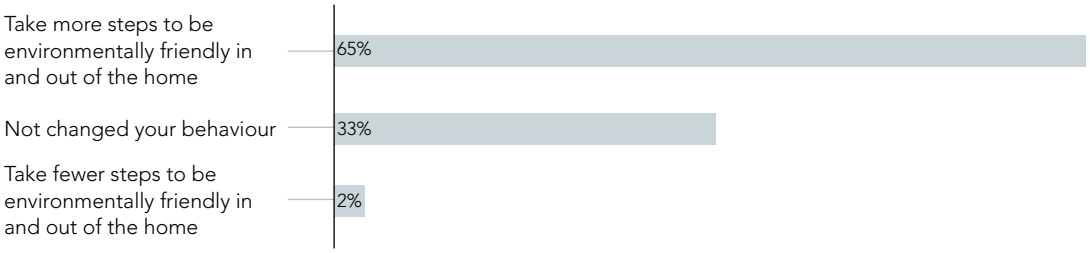
10.13 Effect of living in the home on occupants' attitude to the environment

Living in an energy-efficient home appears to make occupiers more conscious of their environmental choices (Figure 10.22).

Two-thirds of those living in an enhanced new home feel that this style of living has caused them to take more steps to be environmentally-friendly, both inside and outside the home. Figure 10.23 shows that 60% of those who were not attracted to the home by its energy-related features feel that they are taking more steps to be environmentally-friendly as a result of living in it.

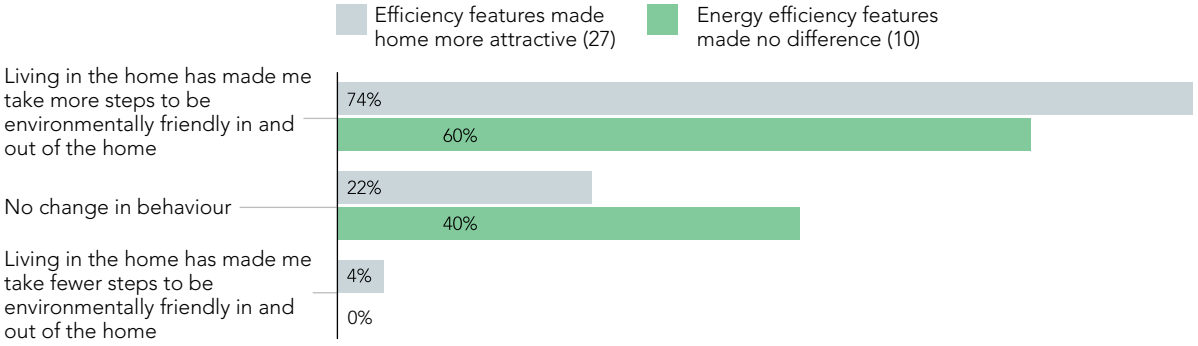
Results in section 8.7, which looks at lifestyle changes, also show that those living in enhanced new homes are actually more likely to be taking steps to reduce their carbon footprint outside the home than those living in new or existing homes.

Figure 10.22 Perception of behaviour change within and outside of the home



Base 54 enhanced new home occupiers.

Figure 10.23 Effect of home on attitude to the environment according to whether energy efficiency features were important or not when choosing the home



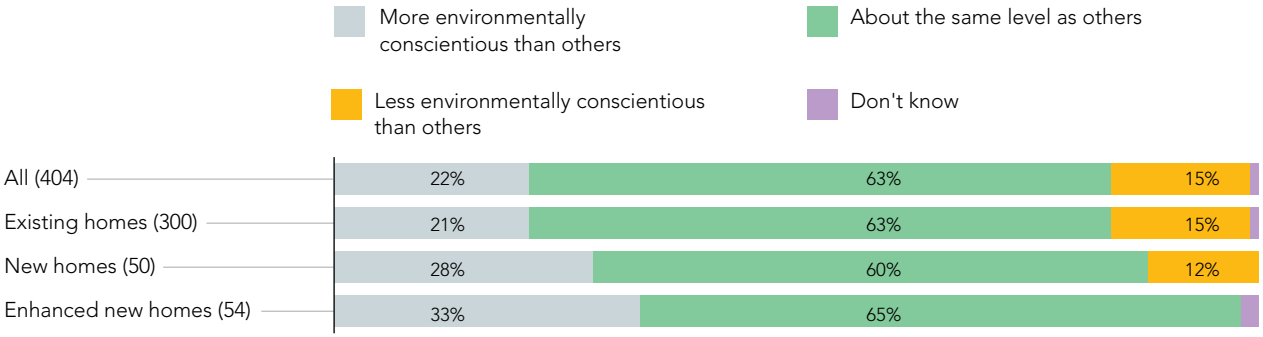
Base 37 enhanced new home occupiers – housing association tenants excluded.

69% of those in an enhanced new home feel that the features of their home have a positive impact on reducing carbon emissions.

> *'We liked the 'eco' factor, that was quite important. Even now we haven't got a tumble dryer, we've got a special plug that when you turn your telly off, everything turns off, we buy all the eco powder and washing liquid. We've got this thing, we live in an eco house, we might as well try and recycle and do things.'* Occupier of enhanced new home

A higher proportion of people in enhanced new homes feel they are more environmentally conscious than the norm (Figure 10.24).

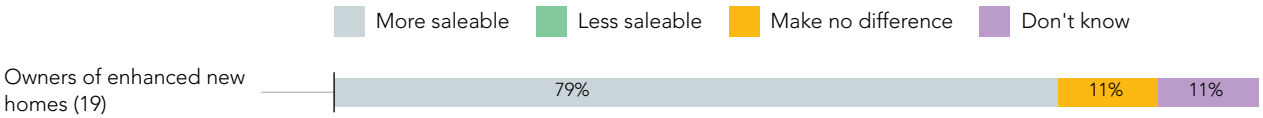
Figure 10.24 Level of environmental awareness by age/energy efficiency of home



10.14 Effect on saleability

Those owning an enhanced new home believe that the features of the home that make it environmentally-friendly will make the home more saleable (Figure 10.25).

Figure 10.25 Perceived effect of environmentally-friendly features on saleability?

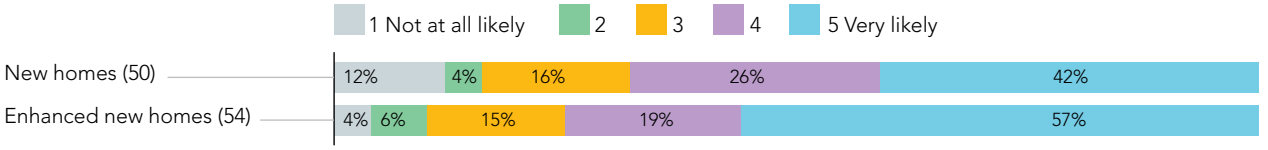


10.15 Likelihood of choosing another similar home

Occupiers of enhanced new homes, renters and owners, are very likely to choose another similar home again, and more likely to do so than those living in a new home built 2 to 3 years ago to the applicable Building Regulations (Figures 10.26 and 10.27). Owners of enhanced new homes are particularly likely to invest in another one.

Figure 10.26 Likelihood of choosing a newly built home again

Figure 10.27 Likelihood of choosing a newly built home again



Percentage giving each score.

Part 3:
House builders' and housing associations' attitudes and experiences

11 Introduction

11.1 Objectives

This part of the report examines house builders' and housing associations' attitudes including their:

- experience of building to high Levels of the CSH
- expectations, understanding and preparation for the zero carbon target
- experience with technological features and manufacturers
- perceptions of home buyers' and occupiers' attitudes and experiences
- anticipated effect of the Homes and Communities Agency (HCA) 2011 to 2015 funding framework on housing associations' intentions to build to high CSH Levels
- attitudes to climate change and the desirability of reducing carbon emissions from homes.

11.2 Methodology

The research was carried out in 2 stages.

Stage 1: Qualitative

- 1 focus group with house builders held in the Midlands region and attended by 11 people representing a mix of company size.
- 1 focus group with housing associations based in and around London, attended by 7 people, all with experience of building and managing homes built to various Levels of the CSH.

Stage 2: Quantitative

- 101 in-depth interviews by telephone; 70 with house builders and 31 with housing associations. In some organisations, more than 1 regional office was interviewed; 62 distinct house builders and 26 housing associations were included.
- This research focused on house builders constructing more than 50 homes per year.

Interviews were conducted at the organisations' head office and regional branches.

The number of new homes built in 2010 by the regional offices of the house builders interviewed was just over 15,500, representing 12% of all new homes completed in that year (private and public sector)[7].

Interviews with housing associations were with large and medium organisations. Those interviewed manage in total some 513,000 homes, which equates to just over 10% of the total housing stock managed by social landlords[6].

Job titles of those interviewed representing house builders include construction director, development director, technical manager, technical director and managing director. In housing associations, interviewees include development manager, development director, technical manager and sustainability manager.

11.3 Comparison to the methodology of the 2008 study

In 2008, 100 house builders were interviewed. Since the original study, a large number of homes have been built to low carbon standards for housing associations. It was considered an important objective of this study that the experiences of housing associations were captured, so this group is an important addition to the 2012 research.

12 Perceptions of the need to reduce carbon emissions in homes

Key findings in this section

- Most house builders and housing associations agree that it is desirable to reduce carbon emissions from new homes as well as from the existing stock.
- 74% of housing associations have undertaken retrofit work to their existing housing stock to reduce carbon emissions.
- House builders feel that new homes are being disproportionately targeted over older housing stock.

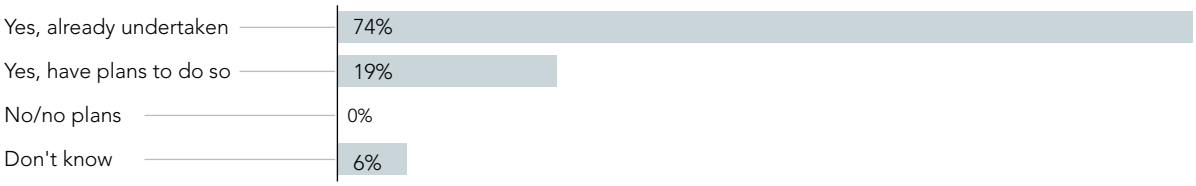
The intention of the zero carbon new homes policy is the reduction of carbon emissions from new homes. This study found that 76% of the house builders and 84% of housing associations interviewed think that taking steps to reduce carbon emissions from homes both old and new is a desirable step.

The majority of organisations have taken steps themselves internally to reduce carbon emissions in their work-related activities.

The existing housing stock in the UK of some 27 million homes[6] is far larger than the pool of new homes, with some 418,000[7] new homes completed in the period 2009 to 2011 (estimate for 2011). About 18%[6], some 5 million of the total stock of homes, is rented by social landlords and another 10 to 15% is rented privately.

Interviews with housing associations were with large and medium organisations, managing just over 10% of the social housing stock. 74% of these organisations have already undertaken some retrofit works to their existing stock of homes to reduce carbon emissions (Figure 12.1). This is, at least in part, driven by regulatory requirements.

Figure 12.1 Do you have any plans or have you undertaken retrofit works to existing stock to address carbon emissions?



Based on 31 housing associations

House builders in the focus group said that more should be done to improve the performance of the existing stock and expressed the view that new homes are being unfairly targeted when the stock of older properties is far greater.

> *'If we genuinely believe we have to cut CO_2 emissions, why, if we have an industry that's building say roughly 200,000 houses a year, we've got land stock I understand of somewhere around 25 million in the UK, so even if we go zero carbon tomorrow it will take 250 years to replace the land stock. Why don't we say "let's have some certainty", let's tax on square footage, not on the number of units and just say it's a pound per square foot tax, and every householder of the 25 million properties has to insulate their loft and get their houses up to a decent standard. Then we will cut CO_2 far more drastically over 10 years than by concentrating on new build.'* House builder

The Government's forthcoming Green Deal aims to encourage improvements in the privately owned housing stock, however, several house builders are unaware of this initiative.

13 Experience of building to the Code for Sustainable Homes

Key findings in this section

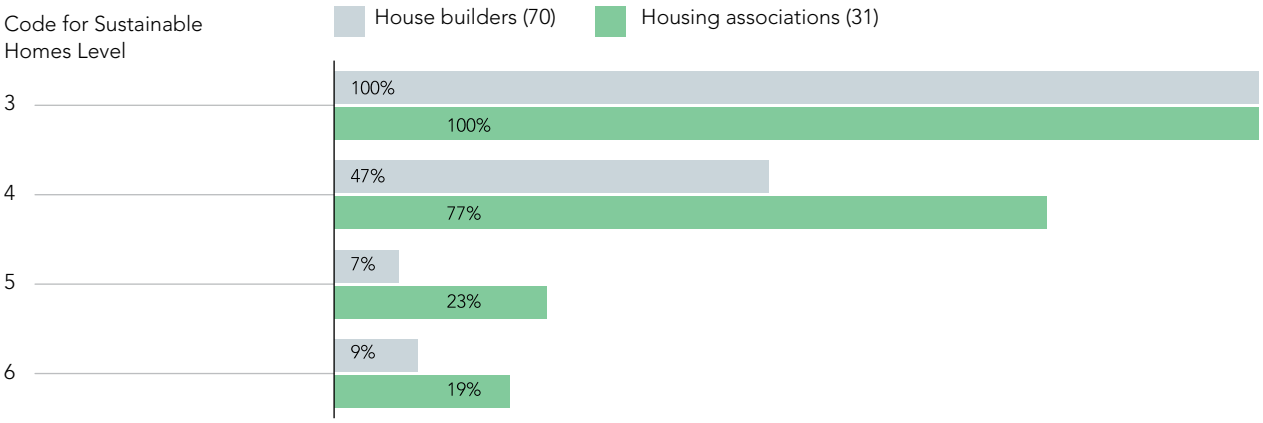
- Few house builders have experience of building to very high levels of energy efficiency, with only 11% having built homes to CSH Levels 5 and/or 6. Housing associations have more experience at high CSH Levels.
- Smaller house builders have least experience of building to CSH Levels 4 and above when compared to large and medium companies.
- Housing association requirements have been the main drivers for house builders to build beyond applicable Building Regulations, while HCA funding requirements have been the main driver for housing associations.
- Only 19% of house builders plan to build to energy efficiency standards beyond applicable Building Regulations if not required to do so, compared to 55% of housing associations. These results indicate that policy and regulation will be the main drivers for the housing industry to build to higher levels of energy efficiency.

13.1 Extent of experience

This research has measured the extent to which the house-building industry already has experience of building highly energy-efficient homes.

Housing associations have more experience of building to higher Levels of the CSH than house builders, which might be expected due to funding requirements of the HCA. 84% of housing associations state that they have experience of CSH Level 4 and above compared with 47% of house builders (at regional office level). Only 7% of house builders have experience of building to CSH Level 5 and 9% to CSH Level 6 (or 11% in total with experience of one or the other).

Figure 13.1 Experience of building to Levels of the Code for Sustainable Homes. Regional offices



Note that organisations may have experience of more than 1 Code for Sustainable Homes (CSH) Level hence the figures add to over 100%.

Experience of different CSH Levels varies across different regional offices of the same company. Figure 13.1 shows the experience by regional office. Of 10 organisations where 2 or 3 different regional offices were interviewed, only 2 have the same build experience.

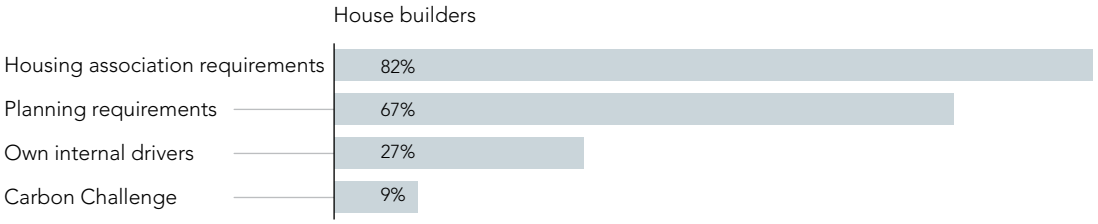
By size of house builder, small house builders have the least experience of building to CSH Level 4 and above (Figure 13.2).

Figure 13.2 Experience of building to Code for Sustainable Homes Level 4 and over by size of house builder

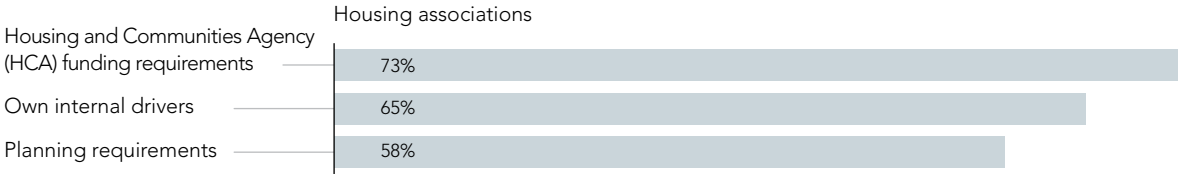
13.2 Drivers to build to high Code for Sustainable Homes Levels

HCA funding requirements appear to be a main driver for housing associations, but planning requirements and internal policy also play a role for over half of them. For house builders, it is housing association and planning requirements which are the main drivers (Figure 13.3). Few have been driven to build to higher Levels of the CSH, generally beyond current Building Regulation requirements, because of internal policies or initiatives such as the Carbon Challenge.

Figure 13.3 Which of these has driven you to build beyond the applicable Building Regulations?



Based on 33 (those building to Code for Sustainable Homes (CSH) Level 4 and above)
Adds to over 100% as more than one driver given by some.



Based on 26 (those building to Code for Sustainable Homes (CSH) Level 4 and above)
Adds to over 100% as more than one driver given by some.

13.3 Likelihood of building to standards beyond Building Regulations prior to the introduction of the zero carbon target

Everyone in the house builder focus group said that they would not build to standards beyond the Building Regulations unless required to do so by a client or a planning requirement. Quantifying this in the telephone interviews, just over three-quarters of house builders do not expect to build beyond Building Regulations or Level 3 of the CSH unless they are required to do so. However, just over half of housing associations expect to build to higher standards, prompted by funding and/or planning and political requirements, particularly around London (Figure 13.4).

In spite of this intention, 58% of housing associations feel that the 2011 to 2015 HCA funding framework will have a negative effect on their plans to build to higher CSH Levels in the coming few years (Figure 13.5). The reduced availability of funding as well as the framework requirement to build only to Level 3 of the CSH is likely to constrain investment in higher performance. Local planning or political initiatives may produce variations.

Figure 13.4 Do you plan to build to a standard beyond the applicable Building Regulations, or Code for Sustainable Homes Level 3 even if not required to do so for funding or any other external reasons?

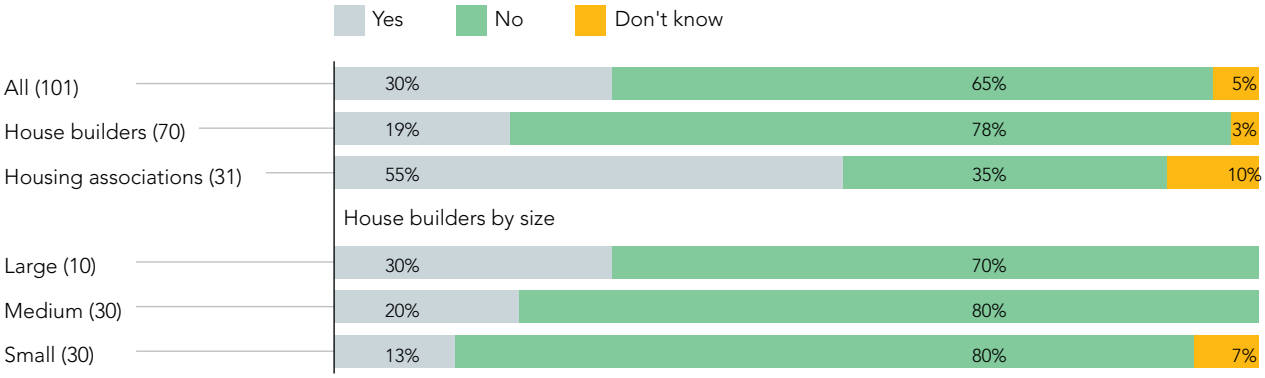
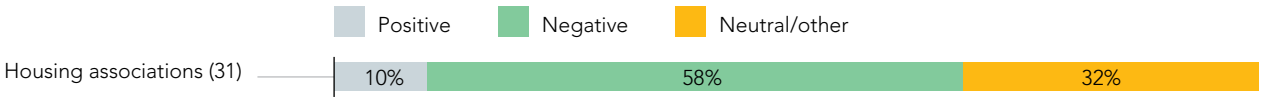


Figure 13.5 Housing associations – how do you feel the new HCA funding framework will impact on any plans to move towards higher Code for Sustainable Homes Level construction? (Unprompted)



These results indicate that policy and regulation will be the main driver for the housing sector to build to higher levels of energy efficiency. In the current market, house builders do not anticipate building to higher levels than required by applicable Building Regulations.

14 Expectations and preparation for the zero carbon target

Key findings in this section

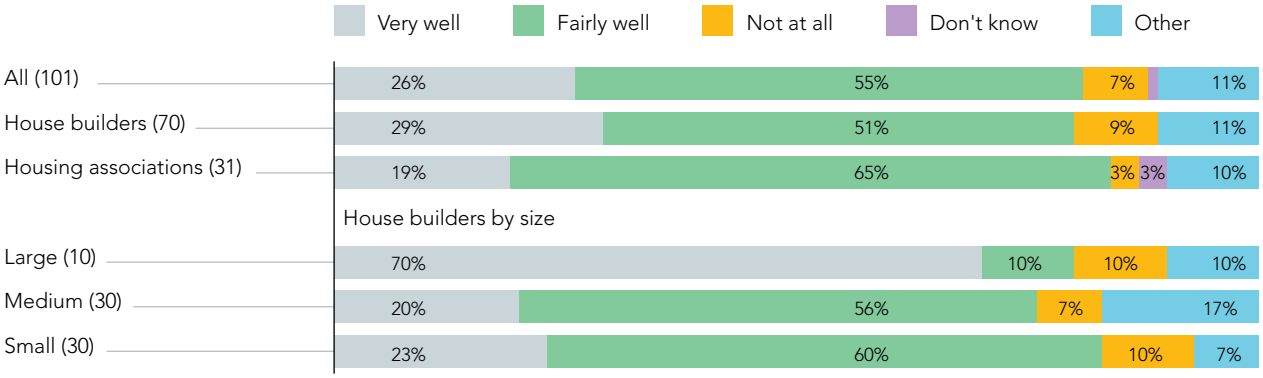
- 81% of house builders and housing associations feel that their organisation understands the new 2016 definition for zero carbon homes fairly or very well.
- Further questioning reveals that 61% of house builders and 55% of housing associations believe domestic plugged-in appliances are included in the revised definition of the 2016 zero carbon standard, demonstrating confusion about the scope of the requirements.
- Both house builders and housing associations appear to be sceptical about achieving the zero carbon target. Approximately half of house builder and housing association respondents consider that the zero carbon requirement will be achieved between 2016 and 2020. 14% of house builders think that the target will never be achieved.
- Less than half of house builders and housing associations have heard of the Allowable Solutions aspect of the zero carbon homes policy.
- Unprompted, 8 out of 10 expect the 2016 zero carbon requirements to increase build costs, and this is their greatest concern. Also unprompted, 31% of house builders expect the requirements to increase house prices, and 20% expect reduced profits – which is confirmed by subsequent prompted questioning where 82% expect a negative effect on profitability of the industry.
- Both house builders and housing associations have high levels of confidence in their technical ability to build zero carbon homes, and there seems to be an improvement in confidence levels since 2008.

- Cost expectations of moving from current Building Regulations to the 2016 zero carbon requirements are around £20,000 per home. Expectations vary widely and differ from existing published figures. There is little difference in cost expectation between house builders and housing associations.
- In the house builders focus group some expressed a view that non-traditional home designs will be necessary to achieve the energy requirements of a zero carbon home. When questioned further, almost 6 out of 10 house builders expect to be able to modify existing home designs rather than having to produce new ones to meet the target.

14.1 Understanding of the zero carbon homes policy

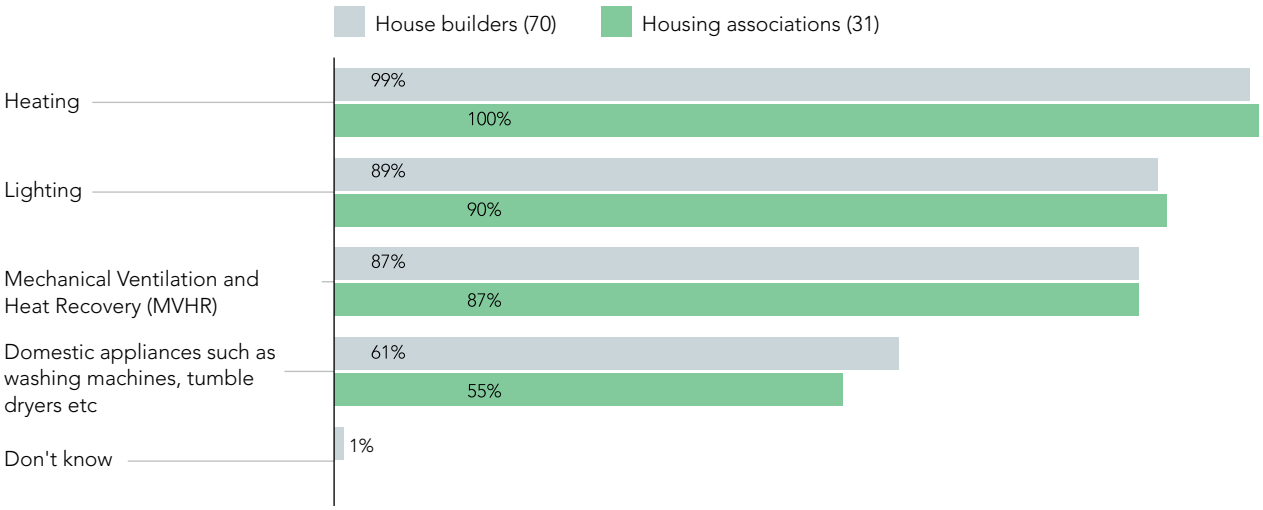
The majority of house builders and housing associations feel that they understand what is likely to be required by the zero carbon new homes policy fairly well, particularly housing associations and large house builders (Figure 14.1). Even among the small house builders, only 10% say that they do not understand it.

Figure 14.1 How well do you feel your organisation understands the revised definition of zero carbon homes planned for 2016?



Construction of zero carbon homes is expected to be required from 2016 to mitigate CO_2 emissions from regulated energy use – the energy used to provide space heating and cooling, hot water and most lighting, as set out in the Building Regulations Part L1A[16]. Energy consumed by domestic appliances is excluded from the Building Regulations (see section 5 in Part 1). However, of the 81% of house builders and housing associations who feel they understand the requirements of the zero carbon policy, 64% identify CO_2 emissions from domestic appliances as being included (Figure 14.2).

Figure 14.2 Identification of contributors to CO_2 emissions that will have to be taken into account to meet the expected 2016 zero carbon Building Regulations

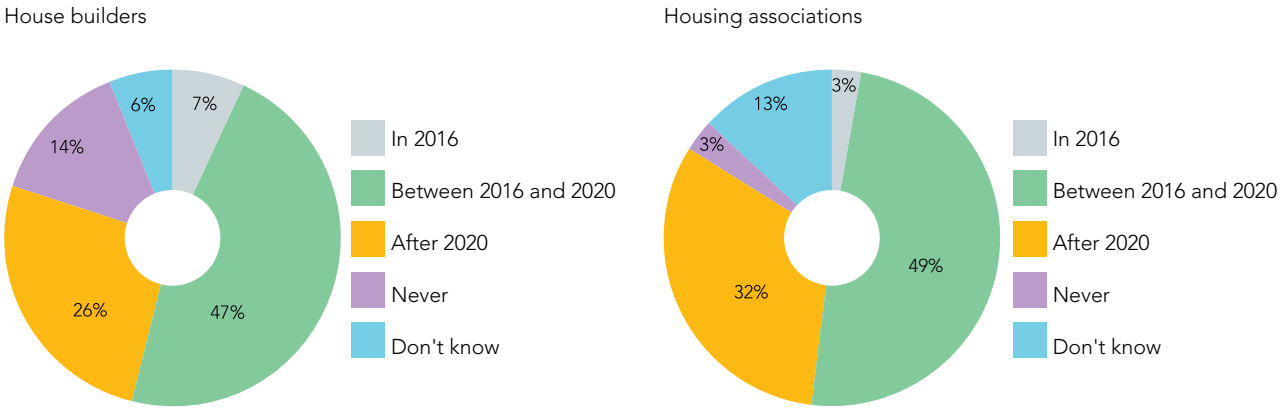


Under the zero carbon homes policy, it is expected that carbon abatement measures, not necessarily on-site, will be made available to house builders to assist in meeting the target. These measures are known as Allowable Solutions. Questioning reveals that 58% of housing associations and 54% of house builders have not heard of the term. Among those who are aware, 60% understand Allowable Solutions to mean offsetting of carbon emissions by measures that could be off-site.

14.2 Expectations of when the zero carbon target will be achieved

Only 7% of house builders and 3% of housing associations believe the target of zero carbon will actually be achieved in 2016 (Figure 14.3). The majority expect this to happen between 2016 and 2020 and 26% of house builders and 32% of housing associations after 2020.

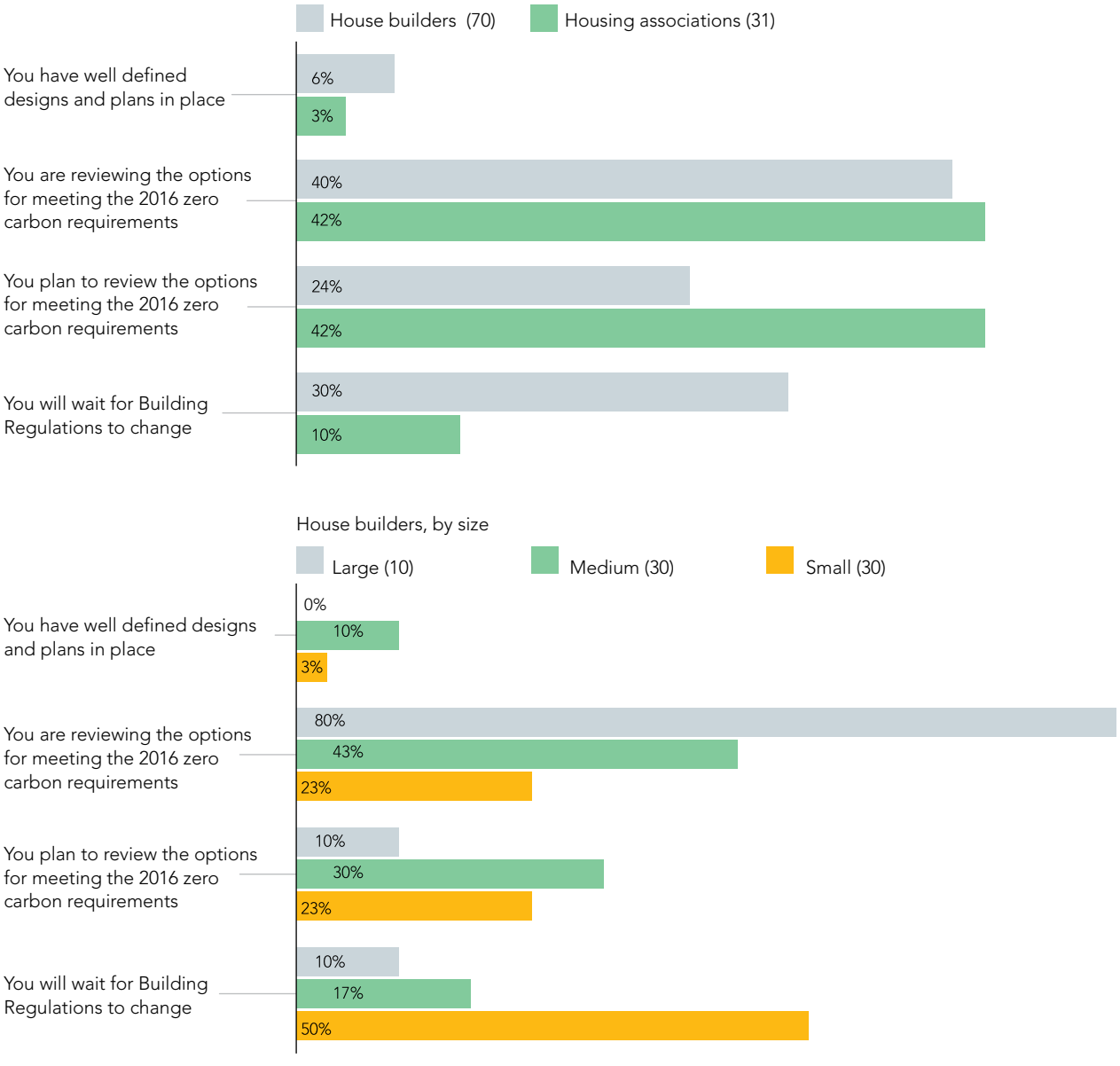
Figure 14.3 Respondents' views about when the 2016 zero carbon target will be achieved (options prompted)



14.3 Preparation for zero carbon homes

Although few house builders or housing associations already have well defined plans in place for addressing the 2016 zero carbon homes requirements, most of the large house builders are reviewing the options (Figure 14.4). However, 30% of house builders, predominantly the small ones, intend to wait until the Building Regulations actually change before they consider how they will meet these targets.

Figure 14.4 Which of these best describes your position with regard to building to the planned 2016 zero carbon requirements?

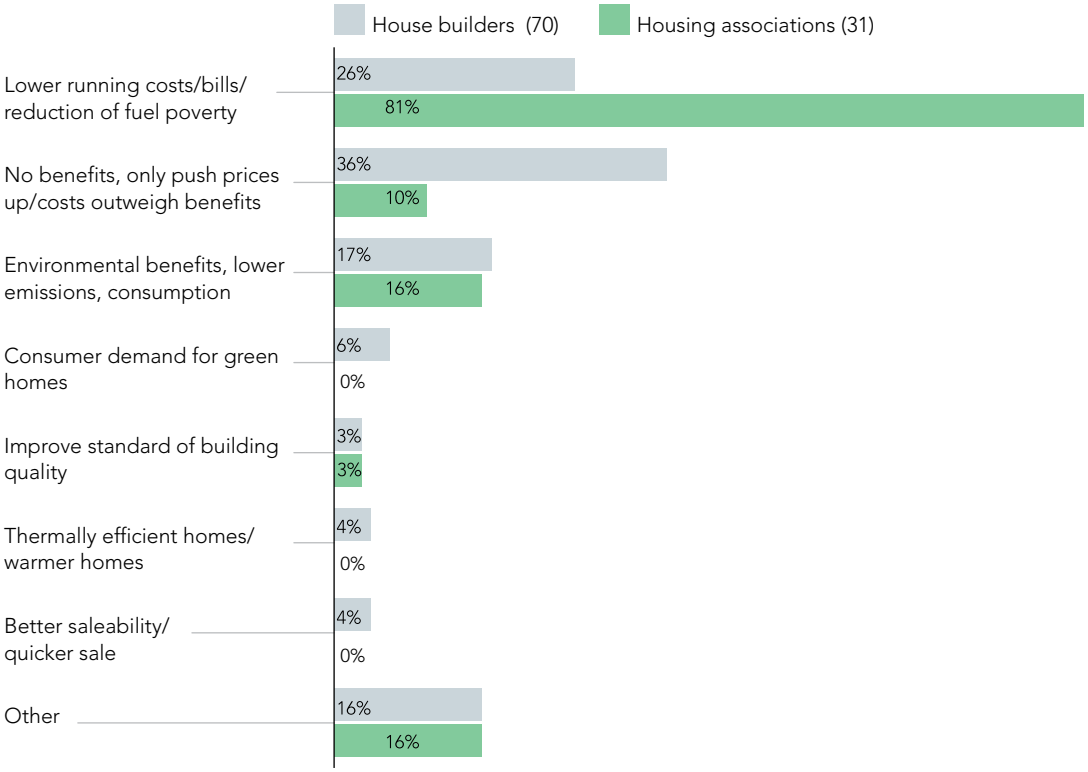


14.4 Anticipated benefits of building to zero carbon standards

House builders and housing associations differ fundamentally in terms of their ongoing relationship with the occupiers of their homes; the former usually being limited to warranty commitments, while the latter manage and maintain homes in the longer term.

Housing associations, most of whom have experience of building to CSH Level 4 and above and of managing these homes, are positive about the benefits of the zero carbon target to UK housing; of those interviewed, 81% comment unprompted about the benefits of lower running costs and reductions in the number of occupiers in fuel poverty (Figure 14.5). House builders, however, are more sceptical with over a third believing there will be no benefits. 26% do, however, recognise (unprompted) that running costs will be lower.

Figure 14.5 What benefits, if any, could building to the 2016 zero carbon requirements bring to the housing market/ affordable housing market? (Unprompted)



Other includes: better waste management, reduced maintenance, increased speed of construction
Adds to over 100% as more than one answer given by some.

With house builders failing to recognise possible benefits from building zero carbon homes, they are unlikely to be promoting them positively to prospective purchasers. This finding is supported by evidence of low levels of reference to energy efficiency or EPCs in online property advertising and other property media.

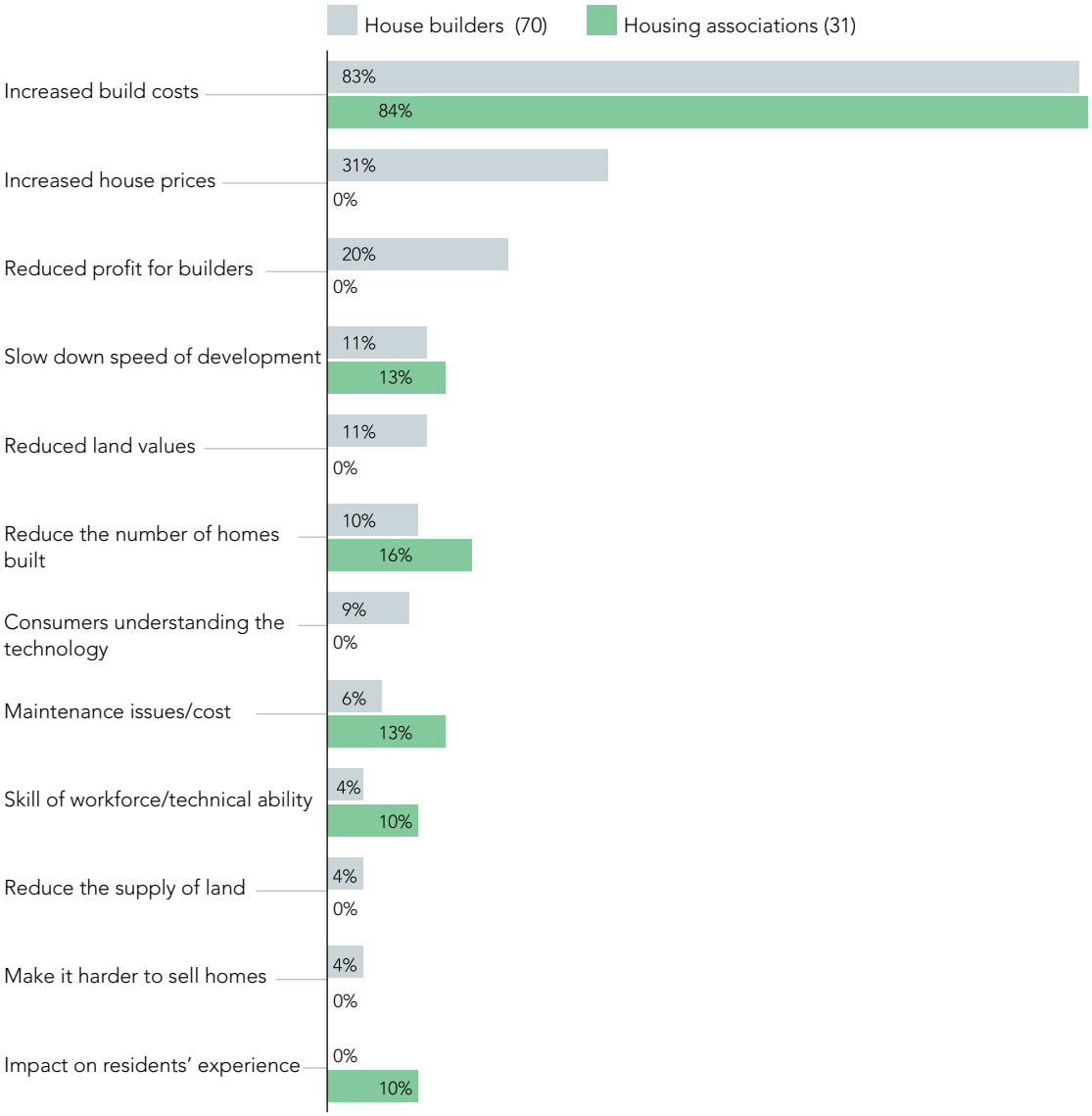
14.5 Anticipated concerns about building to zero carbon standards

House builders in the focus group raised particular concerns about the effect of building zero carbon homes, even under the revised definition, on:

- build costs
- land values
- the rate of housing development
- prices of homes, with purchasers unwilling to pay a premium
- mortgage availability with valuers unwilling to attribute value to new or energy-efficient homes and technological features.

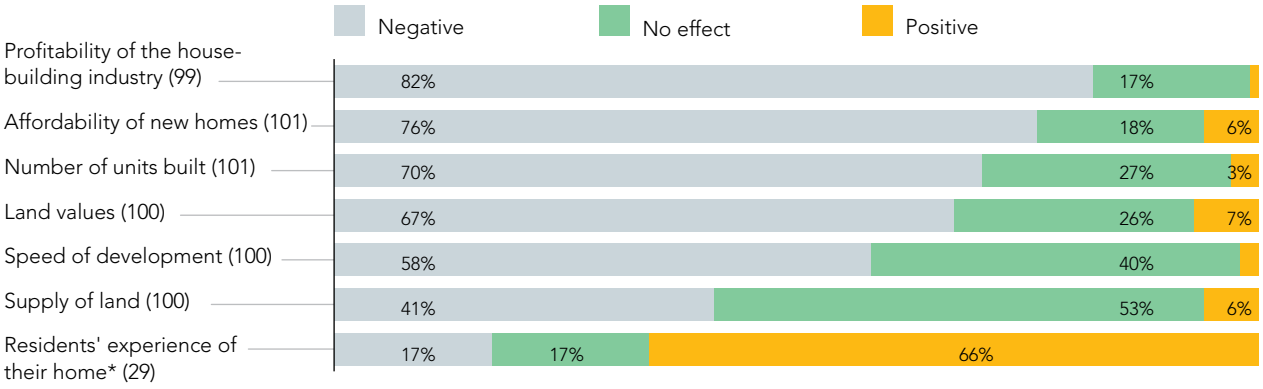
Telephone interviews indicate that over 8 in 10 house builders and housing associations have real concerns about the effect on build costs; this is twice as many as in the 2008 study (Figure 14.6).

Figure 14.6 What concerns, if any, do you have about the effect on the housing market of building to the 2016 zero carbon requirements? (Unprompted)



This unprompted concern about the impact on build costs breaks down into further detail, when prompted. Concerns about the negative effect on profitability in the industry, the affordability of new homes, the number of units built, land values and the speed of development all emerge (Figure 14.7). Housing associations, having the broadest experience of residents living in these homes, recognise that there will be positive impacts for their tenants.

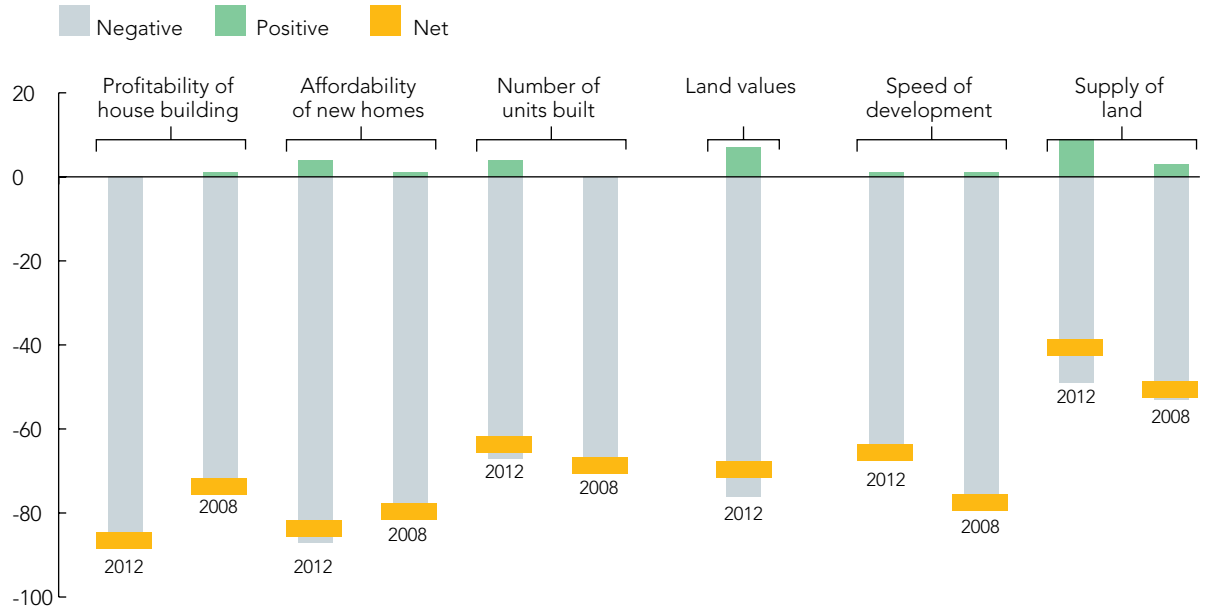
Figure 14.7 Will the 2016 zero carbon requirements have a negative effect, no effect or a positive effect on…?



*Asked of housing associations only.

By offsetting those who think that the 2016 zero carbon targets will have a positive effect against those expecting a negative impact, this gives an overall net view to compare with the 2008 findings (Figure 14.8). This shows little change in the generally negative views, and a deteriorating position around impacts on profitability and affordability.

Figure 14.8 Net percentage of house builders predicting positive or negative impact of zero carbon 2016 target



Net figure = percentage predicting positive minus percentage predicting negative
2012 base 70, 2008 base 100. Effect on land values not included in 2008 question.

'New build may become uncompetitive against a second hand housing market'. Large house builder

'In my opinion it is introducing technologies into a home and making it more difficult to maintain. A lot of the new technologies are not understood by either the homeowner or on site.' Small house builder

'I think it can help construction. It can help speed the process of factory built types of construction by producing a better quality of product with more factory built elements in the construction.' Medium house builder

'Fuel poverty will be alleviated, the allowable solutions could be reinvested in the improvement of existing stock, it would result in affordable rents.' Housing association

'The benefits are more for the residents; their fuel bills will be less. For us as the provider of the housing, we don't really benefit, in fact there will be more maintenance and we are having to train up on new technologies.' Housing association

14.6 Confidence in ability to build zero carbon homes

Confidence is low among both house builders and housing associations that they will be able to build zero carbon homes profitably/affordably (Figure 14.9). While from a technical viewpoint both are more confident that they can achieve what is required, levels are still not particularly high. 52% of house builders are fairly or very confident that technically they can build zero carbon homes, but only 16% are confident they can build them profitably (Figure 14.10).

'We have no direction at all at the moment so we are doing the minimum to meet the Regulations and waiting to see what comes out of the Zero Carbon Hub negotiations with the Government on buying carbon offsite through allowable solutions. I don't see a way through it at the moment.' House builder

Figure 14.9 Confidence in ability to build technically and profitably

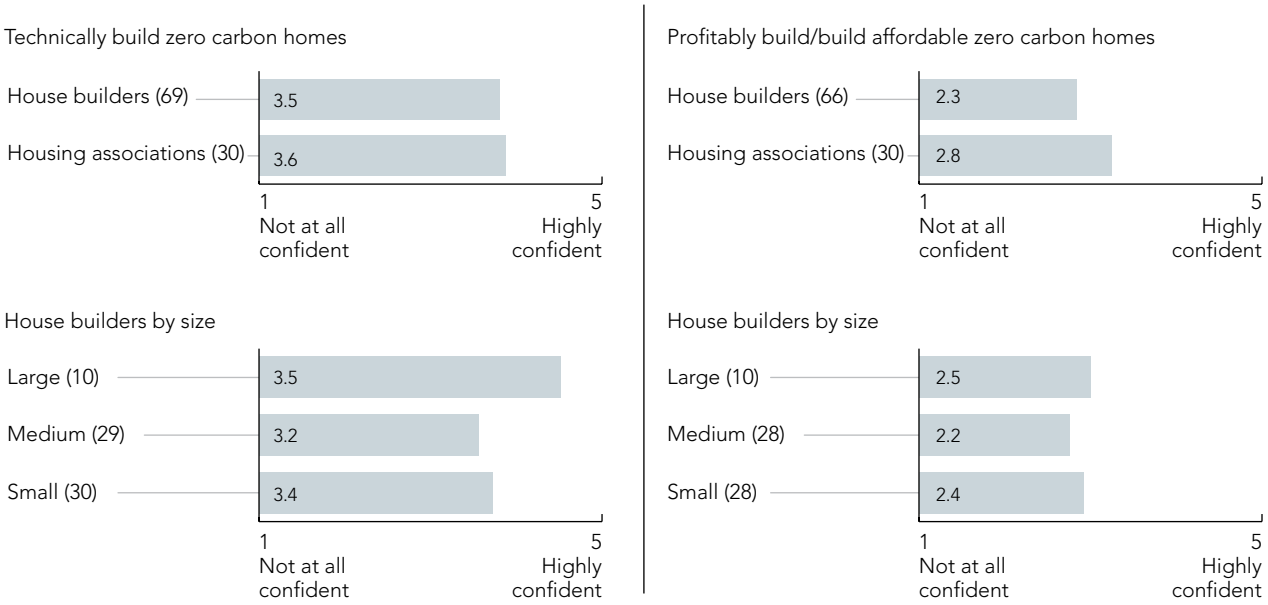
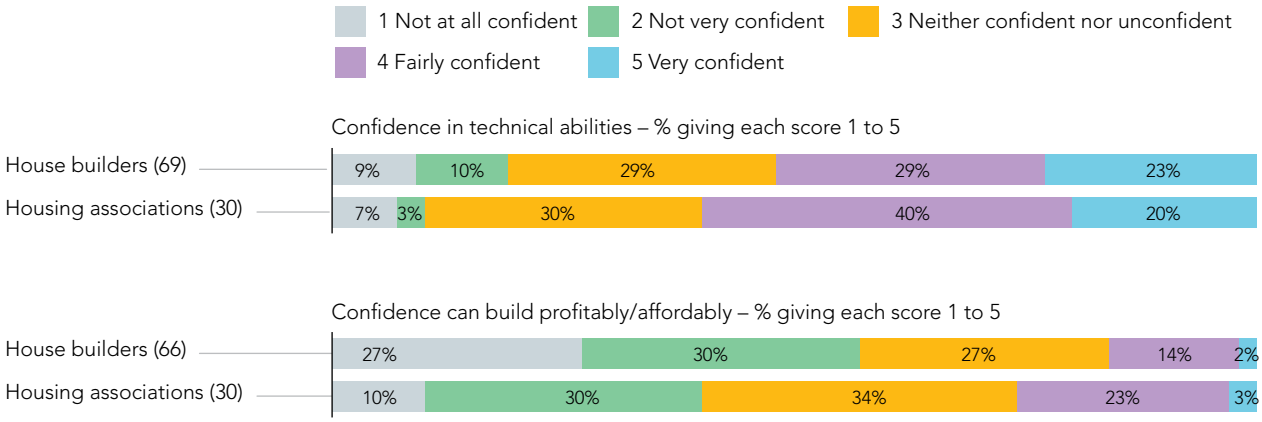


Figure 14.10 Confidence in ability to build technically and profitably



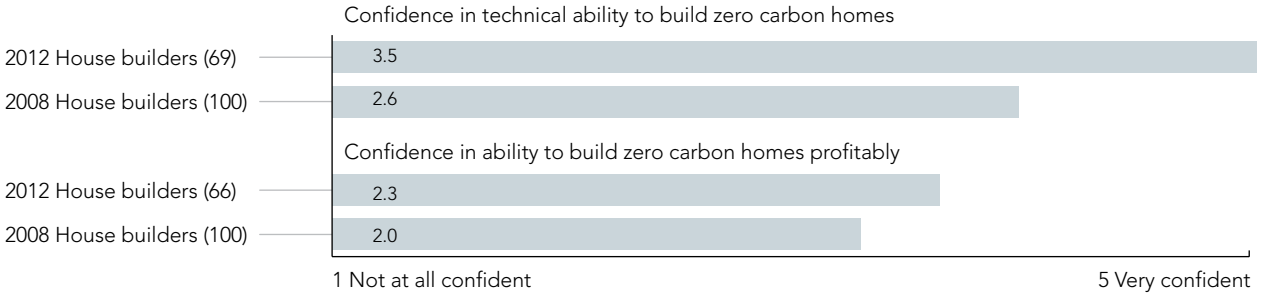
Based on those able to give a view.

The impact of house builders' improved familiarity and experience of zero carbon homes can be identified through comparison with the 2008 study. Average levels of house builder confidence in their technical ability to build zero carbon homes has risen from 2.6 to 3.5 (Figure 14.11).

Although twice as many house builders are confident that they can meet the technical requirements than in 2008 (52% compared with 26%), this means that 48% remain lacking in confidence or are unsure.

While there has been a slight increase in confidence about building profitably, very few are confident in their ability to do so.

Figure 14.11 Comparison with views on ability to build technically and profitably 2012 and 2008

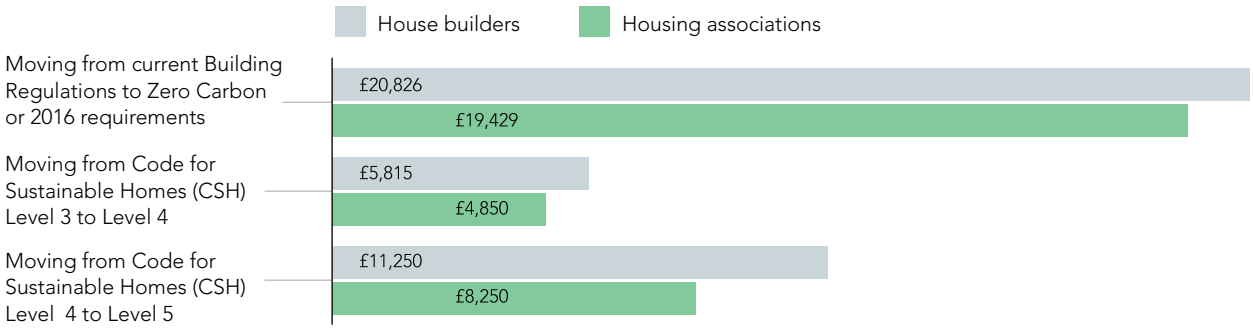


14.7 Cost expectations

Knowledge of the incremental costs involved in moving between different levels of the CSH and zero carbon homes 2016 requirements varies. 67% of house builders and 71% of housing associations can give at least some view on costs.

Average anticipated figures are shown in Figure 14.12, with the estimated cost of moving from current Building Regulations to the zero carbon homes policy being about £20,000 (with a range of £3,000 to £40,000). Some of these estimates could relate to the earlier definition of zero carbon as other responses identify confusion about the extent of the zero carbon homes policy. The regulations which house builders were working to were not defined but at the time of the interview many are believed to have been building to the 2006 Building Regulations. Housing associations are currently more than likely to be building to Level 3 of the CSH.

Figure 14.12 Average cost estimate per dwelling/unit of moving to different requirements



Bases vary. 68 able to give at least 1 cost estimate out of 101 interviewed.

A greater number of larger house builders were able to give views on cost (90%) than medium and small house builders (64%).

For comparison purposes, based on figures available from the Zero Carbon Hub[15], the cost of building an average semi-detached home built to 2016 standards will be about £10,000 over and above the cost of a similar home built to comply with the requirements of the 2006 Building Regulations[16]. This is around half the average amount that house builders expect.

14.8 Effect on designs

A view was expressed in the house builder focus group that new home designs will be needed for zero carbon homes, and that these will tend to be non-traditional in appearance.

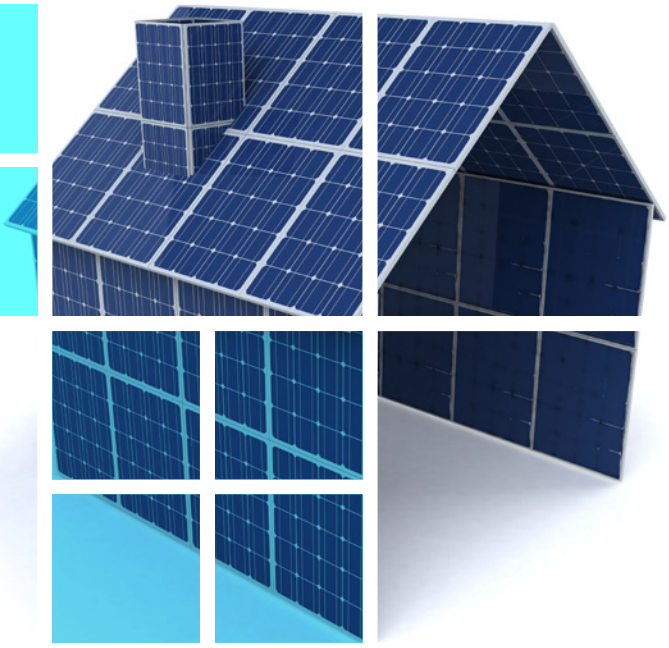
> *'Some of these technologies drive the aesthetics – there are mono-pitched roofs that orientate in a particular way, there's paraphernalia on the roof, there's a certain design. I'm not saying all of them are BedZed type looking, but some are.'* House builder

> *'I think sometimes the architects do get carried away and think that because it's a zero carbon home it also needs to be contemporary. There are certain things that will dictate the look of the house but I think they go one step further, as if they need to make it look different.'* House builder

Telephone interviews reveal however, that 57% of house builders think they will be able to modify existing designs while only 34% expect to introduce new designs (the rest do not know or only provide bespoke designs).

All house builders expect design advice for zero carbon homes to come from a mix of sources, both internal and external, including designers and CSH assessors. However, 43% of small house builders and 30% of medium house builders expect to turn to the NHBC for design advice.

15 Experience of features and manufacturers



Key findings in this section

- Most house builders and housing associations have experience of technologies such as solar thermal, solar electric, MVHR, and air source heat pumps. In all cases, housing associations have more experience.
- Both house builders and housing associations are of the view that increasing thermal insulation, MVHR, triple glazing, solar thermal and solar electric panels will be the most popular approaches to meet the 2016 requirements.
- Some technologies have caused unsatisfactory experiences to date. Examples cited include air source heat pumps and biomass boilers.
- 45% of housing associations say they have installed a back-up for a renewable technology in case of failure, and 23% have chosen to decommission a renewable technology as a result of problems experienced.
- There is some confusion among housing associations and their tenants as to who is benefiting from the FIT.
- There is widespread experience of water-saving measures, such as dual flush toilets and low flow or aerated taps, but to meet future requirements, increased use of greywater recycling, rainwater harvesting and shallow baths is expected.

- Most house builders and housing associations cite at least 1 example of a problem experienced with product manufacturers. The main problems quoted are reliable sourcing, after-sales support and installation by trained or qualified subcontractors.
- The majority of technology failures are attributed to poor installation.
- There is a lack of strong product brand awareness, with no 1 dominant brand. Only 1 manufacturer could be named by more than 3 people in the focus group, and only 31% were able to name a manufacturer with whom they have had good experience.
- There appears to be no reliable source of information about renewable technology products. Both house builders and housing associations rely on the internet and trade magazines, with only 15% and 10% respectively sourcing this information from the manufacturer themselves.
- The main lesson drawn from all discussions about incorporating renewable technologies is to plan for it in the early stages of design.

15.1 Materials used for the structure of high Code for Sustainable Homes Level homes

In the 2008 study, 56% of house builders expected to use timber or other framing systems and 49% conventional brick and block in the construction of high CSH Level homes. Timber frame has indeed proved to be the most popular build method for high CSH Level homes, with 73% of those interviewed saying they have used timber frame or SIPS panels and 63% using conventional brick and block. Some have used both methods to achieve different requirements or CSH Levels on different developments, hence this adds to over 100%.

15.2 Use and experience of renewable technologies

A variety of energy-related features may be used to deliver zero carbon homes, and it is up to the designer, builder and/or client to select products to achieve the required performance levels. To date the most popular features, used by the highest number of house builders and housing associations, are solar thermal panels, MVHR, solar electric and air source heat pumps.

Significantly more housing associations have gained experience of the use of biomass boilers than house builders (Figure 15.1).

The principle of providing a highly insulated building fabric, ahead of adding renewable technologies ('fabric first') will be pursued by almost all house builders. Thereafter, the approaches most likely to be used to meet the 2016 zero carbon requirements are solar electric, MVHR, triple glazing, solar thermal panels and air source heat pumps (Figure 15.2).

Figure 15.1 Which of these do you have experience of?

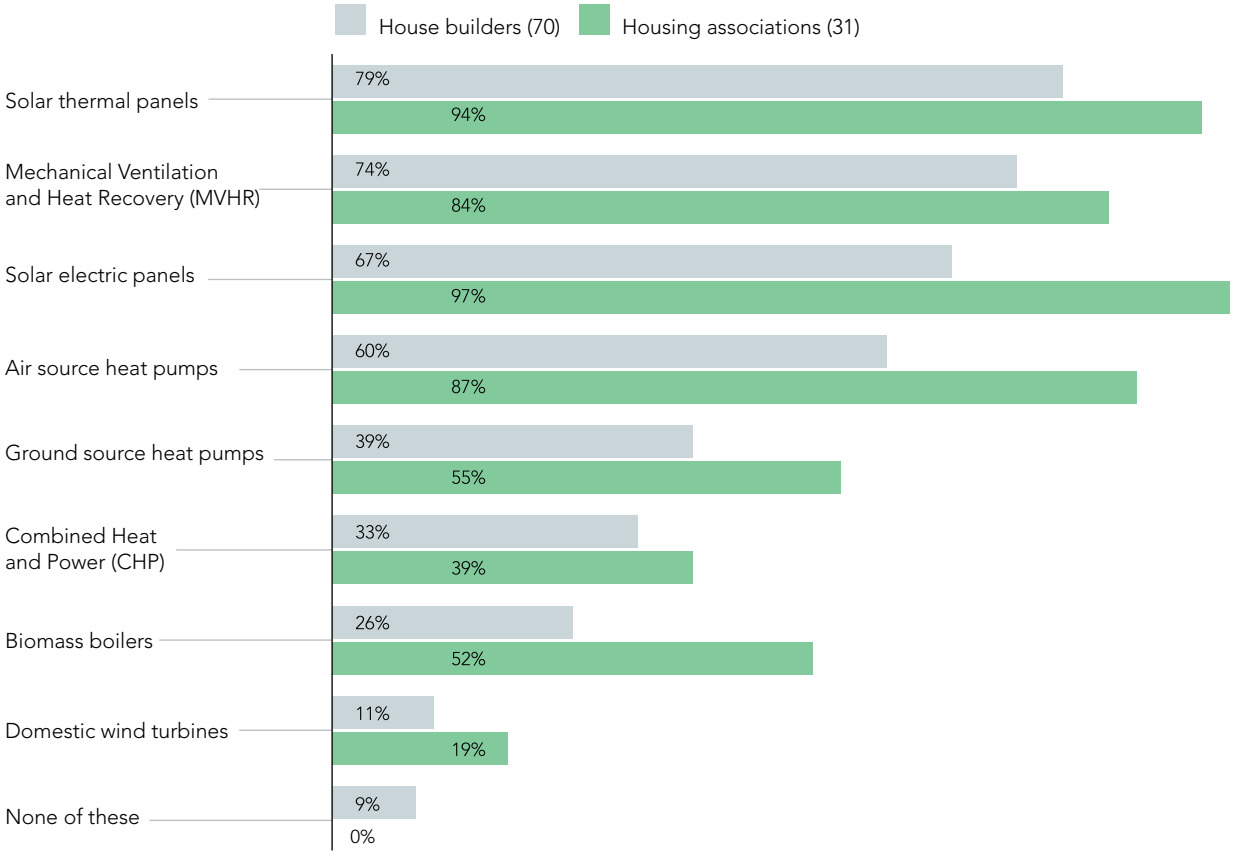
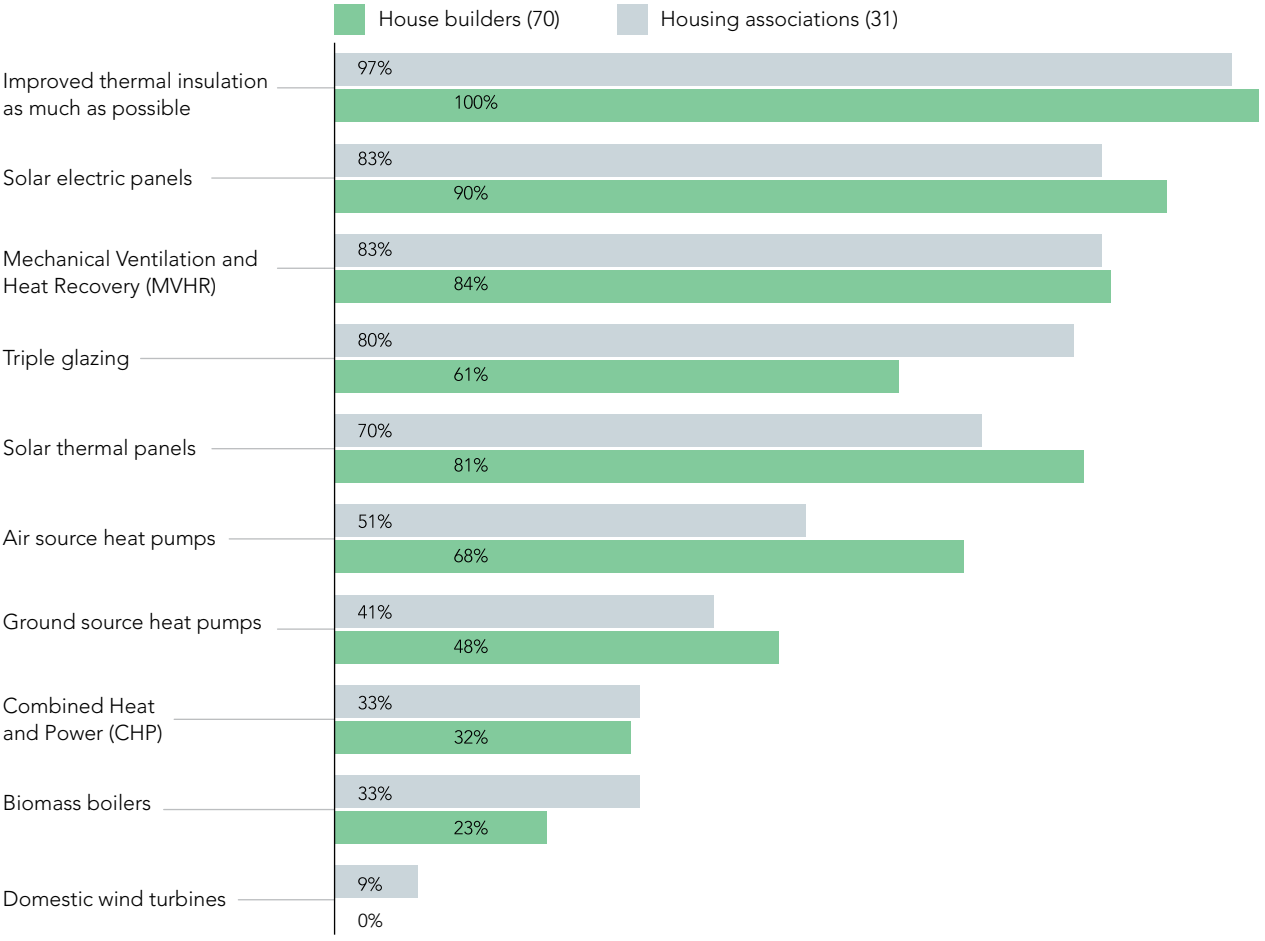


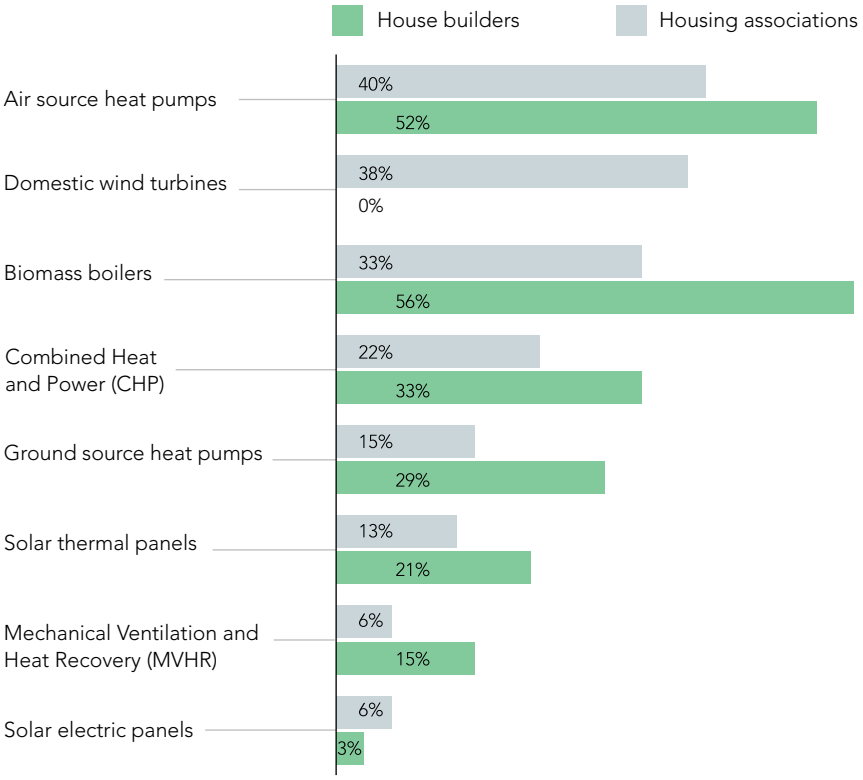
Figure 15.2 Which of these approaches do you think you are most likely to use to meet the planned 2016 zero carbon requirements?



Housing association focus group participants repeatedly mentioned installing back-up systems, as well as incorporating overcapacity into renewable technology designs. Poor operating experiences that had led to decommissioning or equipment becoming redundant were also mentioned (Figure 15.3). The main reasons relate to high running costs, difficulties in operation by occupiers, installation issues, poor reliability and high maintenance costs (Table 5). To examine the prevalence of these, respondents who have installed the technologies were asked if they have had any unsatisfactory experiences. Air source heat pumps and biomass boilers appear to have caused the most problems.

'When you do these exemplar projects, one of the massive issues is that you have too many pieces of technology and too many different things going into one scheme. You have biomass, you have a ventilation system. You can't just have one electronic panel, you have 5 or 6. Everything goes wrong and you never do another one again.' Housing association

Figure 15.3 Which have you had unsatisfactory experiences with, if any? Based on those with experience of each – percentage with unsatisfactory experiences (Table 5)



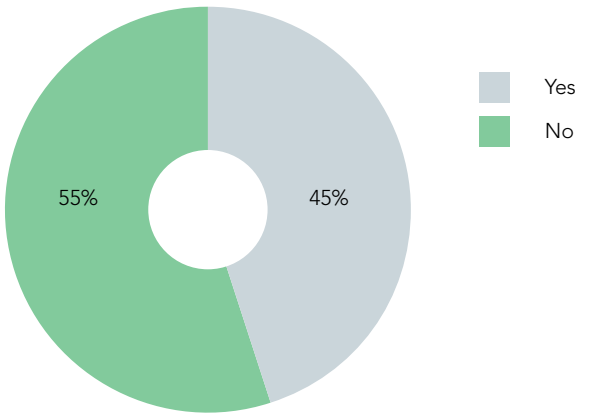
Across the technologies there are recurring themes. Clearly occupants find many technologies difficult to understand, operate and live with. Homeowners in the focus groups described some of the same difficulties, with reliability and maintenance mentioned most frequently. There was a clear call for product manufacturers to provide easy to understand owner/user information, training and support to ensure the correct operation and long-term performance of these technologies.

Table 5 Main reasons for unsatisfactory experiences

Renewable technology	Main reasons for unsatisfactory experiences
Air source heat pumps	■ Occupants not understanding how it works/not able to use/ hard to operate ■ Not reliable/break down ■ Failures in freezing weather/winter ■ Slow response times (in getting heat) ■ Skills issue in installing the features/poor installation
Biomass boilers	■ Cost of fuel/pellets/supply issues ■ Storing the fuel/space required ■ Difficult to maintain/high maintenance costs ■ In domestic situation not viable/applicable to large blocks ■ Problems with installation
Ground source heat pumps	■ Installation problems – pipework has had a high failure rate ■ Occupants understanding how it works/not able to use ■ Failures in freezing weather/winter ■ Cost
Solar thermal panels	■ Occupants do not understand how it works/difficult to use/ cannot understand the control system ■ Getting hold of replacement panels/cost of maintenance
Combined Heat and Power (CHP)	■ Installation and running costs ■ Maintenance issues ■ Unreliable
Mechanical Ventilation and Heat Recovery (MVHR)	■ Occupants do not understand the technology ■ Skills issue in installing the features ■ Lack of understanding of the technicalities in own companies

As a result of problems experienced, 23% of housing associations have chosen to decommission a renewable technology, and 45% have experience of installing a back-up system in case of failure or long-term problems (Figure 15.4). Examples were given of decommissioning biomass boilers, air source heat pumps and wind turbines.

Figure 15.4 Have you designed and installed a back-up system for any installed renewable technologies? Housing associations



Based on 31 housing associations.

15.3 Benefiting from the Feed-in Tariff

In the focus group with housing association tenants who live in enhanced new homes with solar electric panels, there was confusion around who was benefiting from the FIT. While some respondents recognise they are getting lower cost, or free electricity, some express dissatisfaction that they are not receiving financial benefit from the panels on their roof via the FIT.

The bigger picture emerging in the telephone interviews with housing associations indicates a mixed approach and in some cases it is unclear who is getting the benefit. One-quarter say that neither they nor their tenants benefit from the FIT. Where benefit is accruing to tenants, this is thought to be in the form of free, self-generated power.

The issues surrounding receipts from the FIT have been the subject of considerable debate throughout the affordable housing sector. The HCA has issued policy statements relating to eligibility where grant funding has already been provided for home construction, and there are concerns about the impact of any income from this source where occupants are in receipt of benefits.

15.4 Use and experience of water-saving features

Reducing water consumption is another core objective of the CSH and the evidence suggests there are already high levels of adoption of water-saving technologies. Most house builders and housing associations are installing dual flush toilets and low flow taps and showers (Figure 15.5). Shallow baths are proving less popular so far. In terms of local water collection and recycling, water butts are being used extensively, but far fewer have explored rainwater harvesting or the recycling of waste greywater.

Greywater recycling and shallow baths are considered to be the least acceptable of the technological features to occupiers. Yet between half and three-quarters of house builders and housing associations expect to use these features, alongside rainwater harvesting, to meet future requirements (Figure 15.6).

Figure 15.5 For water-saving measures, which of these are you already using?

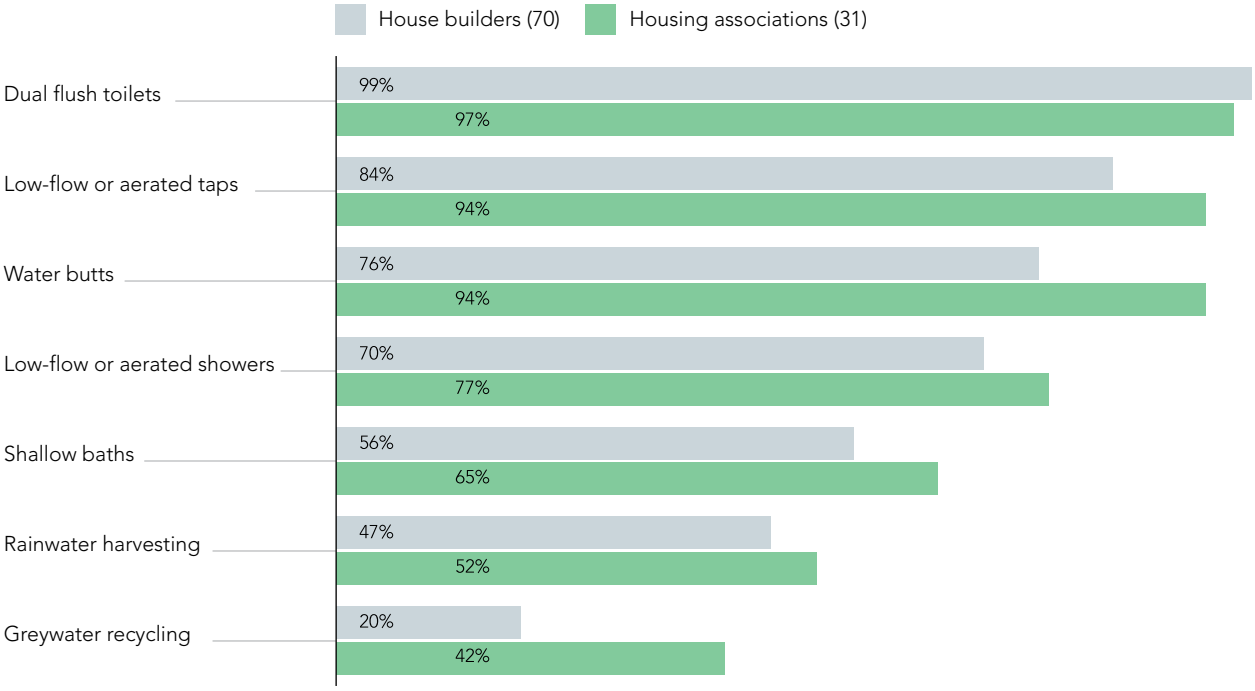
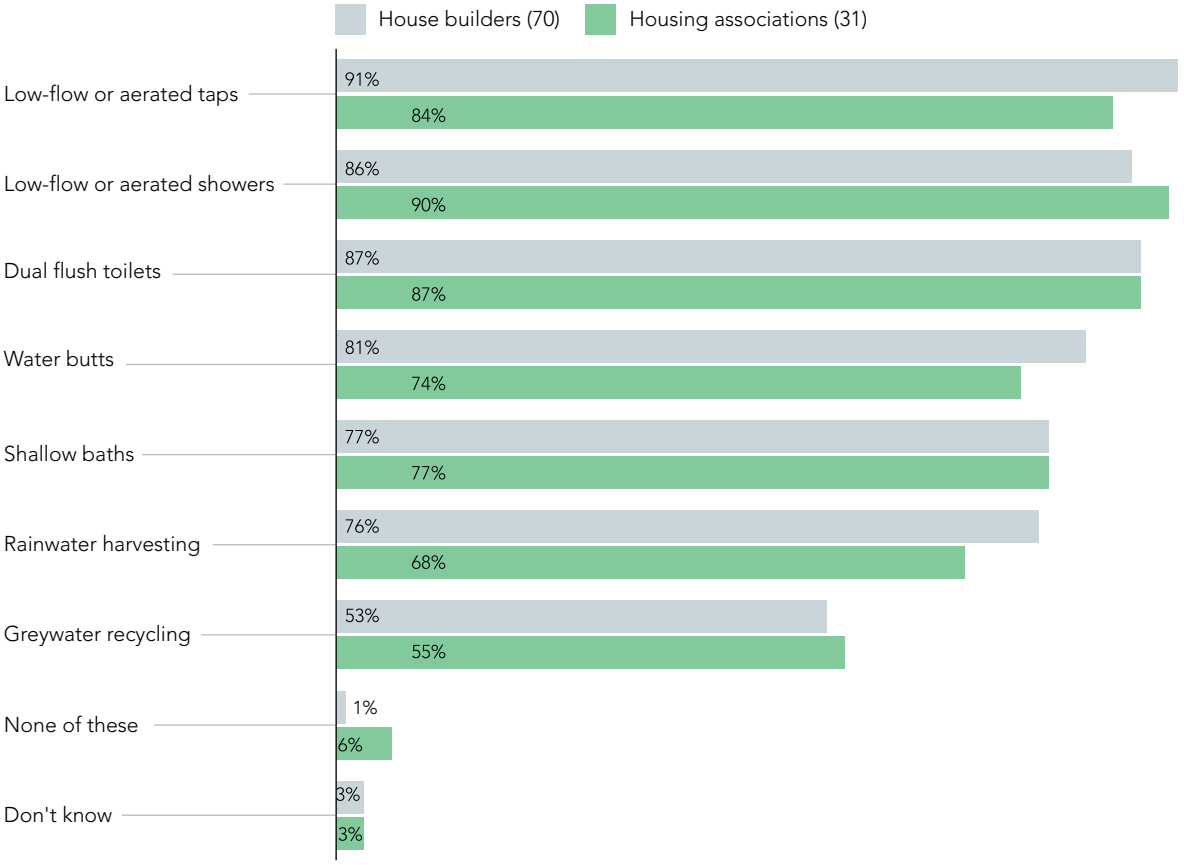


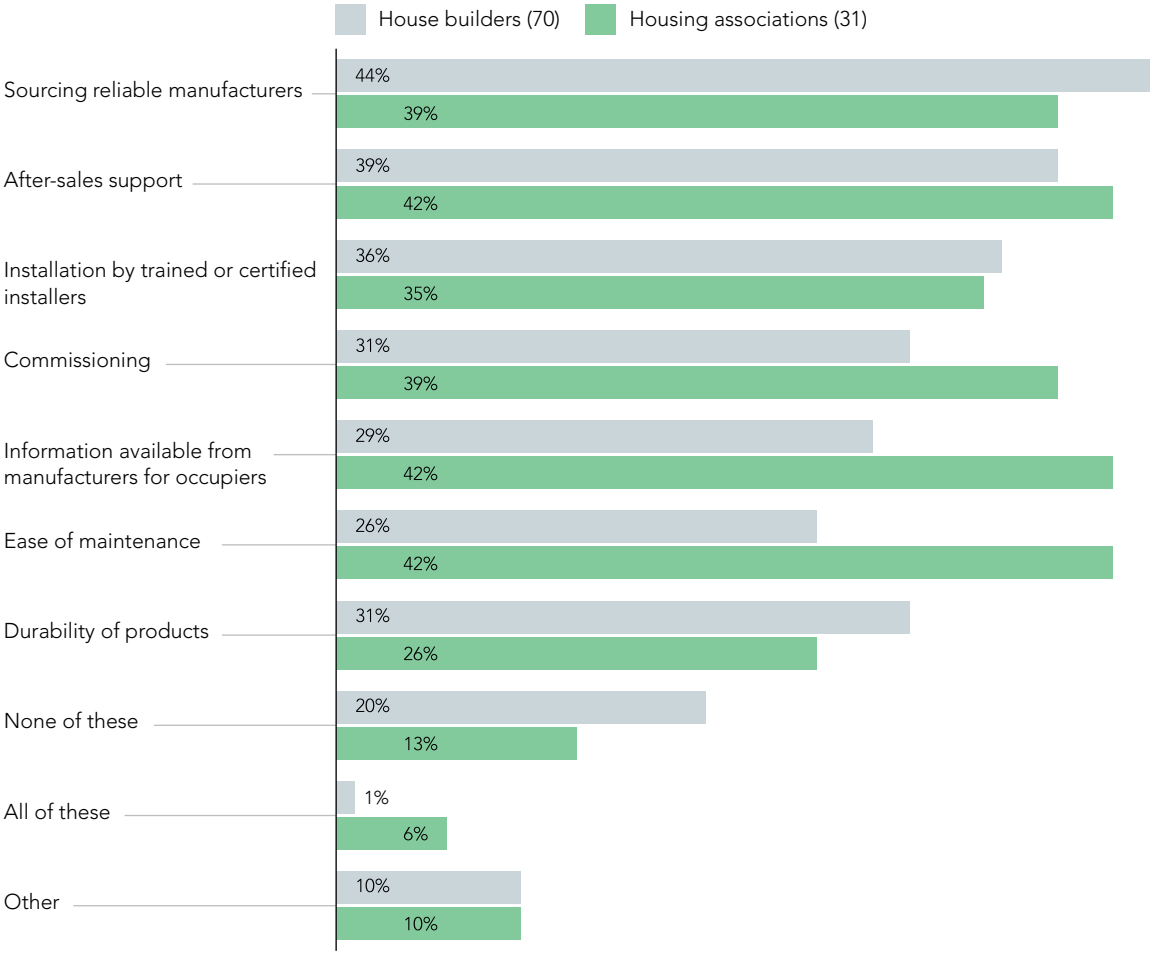
Figure 15.6 For water-saving measures, which of these do you think you are most likely to use to meet the future water-saving requirements?



15.5 Experiences with manufacturers

A number of issues with technological features of zero and low carbon homes, and manufacturers of the products and systems, were raised in the focus groups. These included lack of training of installers, poor information availability for end users and poor after-sales support. The majority of failures were attributed to poor installation. These views are supported by the telephone survey, where the same problem areas are shown to be widespread (Figure 15.7).

Figure 15.7 Which of these problem areas have you encountered with regard to the new technologies? Percentage encountering problem



'With heat pumps, the installers of the kits are refrigeration engineers and they do not have experience of the housing market.' Housing association

'Finding a central and reliable source of information that can be trusted is the main problem.' Housing association

'It's all about training installers and end users.' Housing association

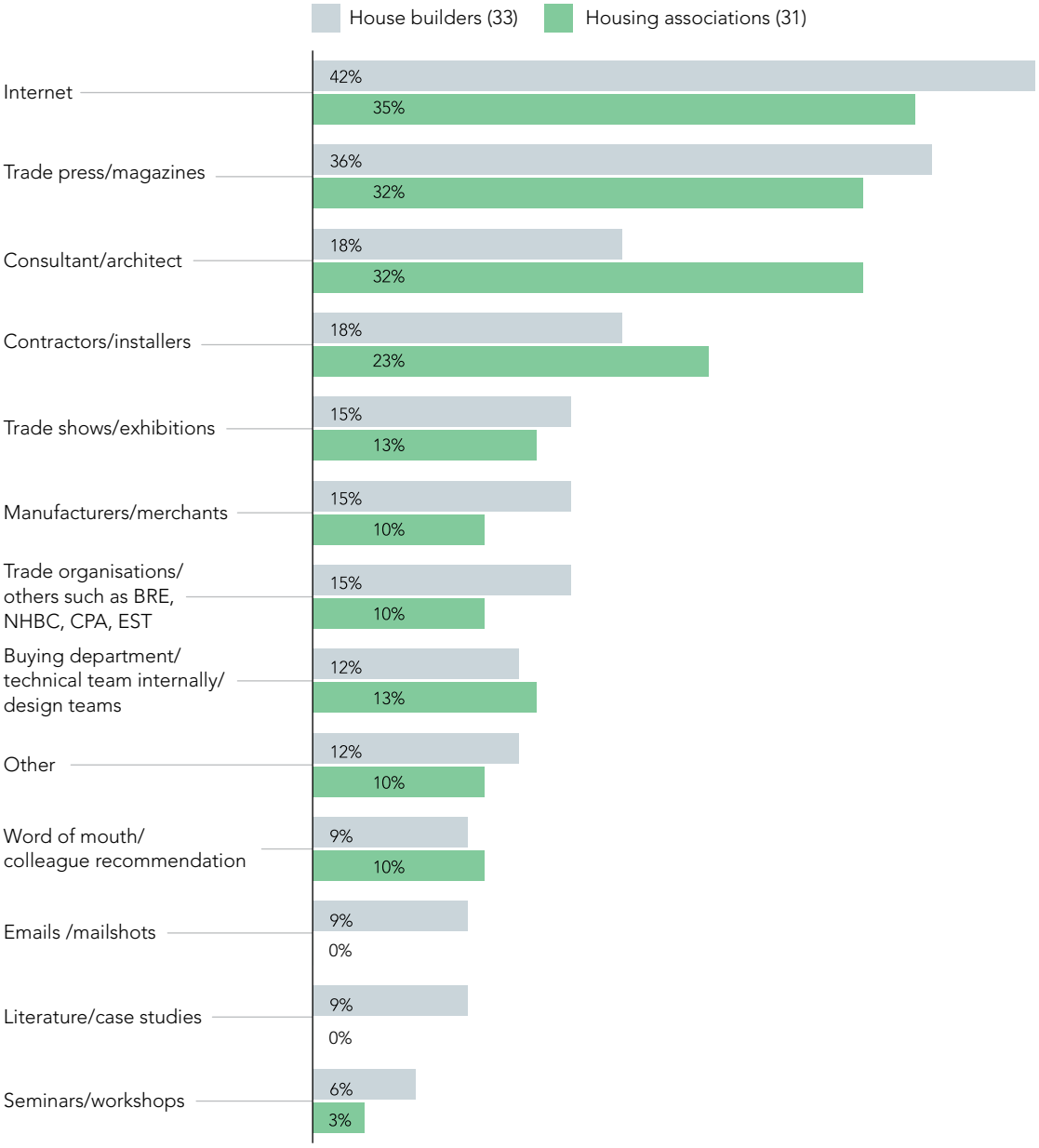
There is a lack of strong brand awareness in this sector. When asked to name a manufacturer who came to mind for supplying features such as microgeneration, ground and air source heat pumps and rainwater harvesting, only 1 brand out of the 62 mentioned spontaneously could be named by more than 15%.

Only 31% could name a manufacturer with whom they have had good experience, and only 1 manufacturer could be mentioned by more than 3 of 101 interviewed. Product durability, responsiveness, enthusiasm, the provision of support and aftercare to occupiers, innovation and good information are all given as reasons for describing an experience with a product manufacturer as a good one.

15.6 Information sources

For manufacturers wishing to market their renewable products for zero carbon homes, it is important to know where house builders and housing associations turn for information. While the internet and trade press are important sources, consultants and contractors also provide information, particularly for housing associations (Figure 15.8).

Figure 15.8 Where do you get information about renewable technology features? (Unprompted)

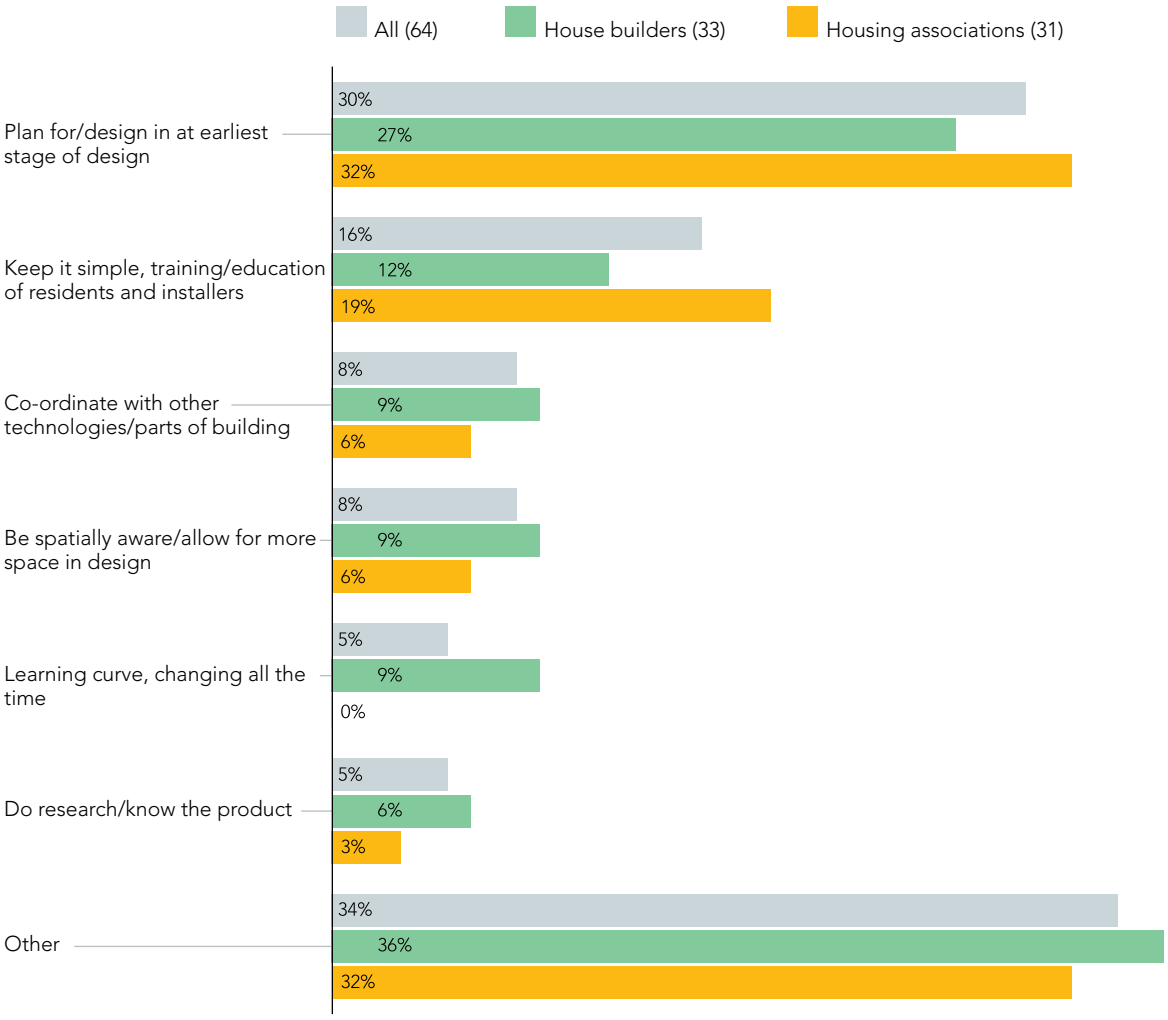


Other includes: Through clients, the housing officer, reps and advertising.

15.7 Build lessons learned

Among those with experience of building to CSH Levels 4 and over, the main lesson learned about incorporating new technical features is to plan for it at an early stage of the design process (Figure 15.9).

Figure 15.9 Main build lessons about incorporating new technology, (unprompted) as percentage of those building to Code for Sustainable Homes Level 4 and above



Based on those able to give a view

'You need to make provision for the size and scale of some of the new technologies and also protecting the actual outlets from damage. Some of the systems are very, very heavy and you almost need to construct the house around them. Also you need to allow more time for commissioning and also for training our staff to be able to then train residents.' Housing association

'The technologies being incorporated need to be considered as early as possible during the project. Consider tenants use of it, eg tenants' age.' Housing association

'From a build perspective it is the planning, get it in as early as possible, build things around the infrastructure, ie: get your pipes and heating system in early.' Large house builder

Two-thirds of housing associations provide information about their maintenance experiences to their development teams to help with investment decisions, but one-third have only just started doing this or are planning to do so in the future. Half have studied the costs of these technologies in operation and just over one-third have identified the savings in use and are feeding this information into future design strategies.

One-third of housing associations have not studied the post-installation performance of renewable technologies at all.

16 Experience of buyers', occupiers' and lenders' reactions

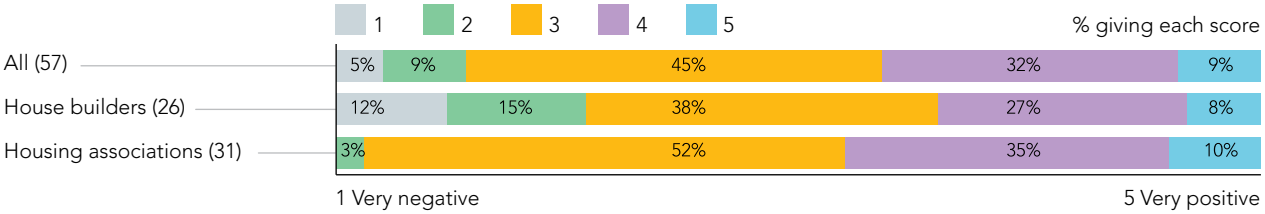
Key findings in this section

- 35% of house builders and 45% of housing associations say that their buyers and/or tenants are responding positively to the technological features in enhanced new homes.
- The main benefit raised by potential buyers is the cost saving through reduced fuel bills, although concerns were expressed about maintenance commitments.
- Almost 6 out of 10 house builders with experience of CSH Level 4 homes and above find that buyers are unwilling to pay a premium to gain the benefits of cost savings achieved through energy-efficient homes.
- 60% of house builders say that valuers are not placing a premium on enhanced new homes with additional technology.
- Through their own research, housing associations have found that tenants in enhanced new homes are experiencing reduced utility bills, but there is a high lack of understanding about how to operate and obtain optimum performance from their homes.
- 94% of house builders and 97% of housing associations have provided written information and instructions to occupiers about the new technologies in their home. The figures are slightly lower for the provision of training, but still remain over two-thirds.
- Concerned that tenants may not be operating the technologies correctly, 8 in 10 housing associations are planning to improve the information and training they provide.

16.1 Perceptions of potential buyers' and tenants' reactions to high Code for Sustainable Homes Level homes

Generally speaking, house builders and housing associations find that more potential buyers and tenants react positively than negatively to the new technical features of enhanced new homes (Figure 16.1).

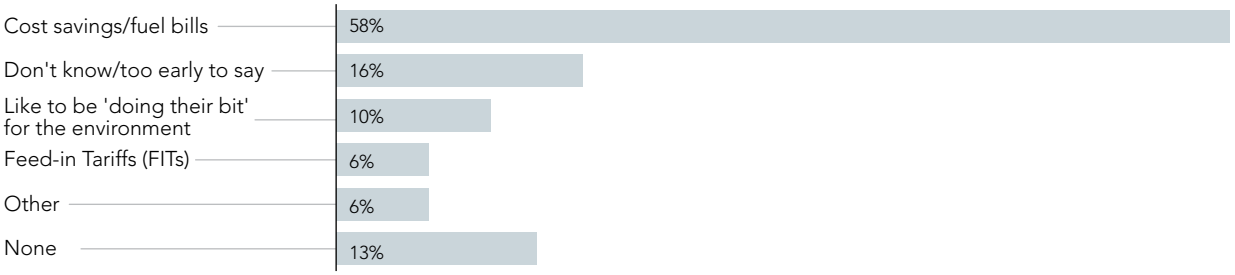
Figure 16.1 Reactions of buyers/tenants to such features as solar panels and ventilation systems. 1 is very negative and 5 is very positive



Based on house builders with experience of building to Code for Sustainable Homes (CSH) Level 4 and above and able to give a view, and all housing associations.

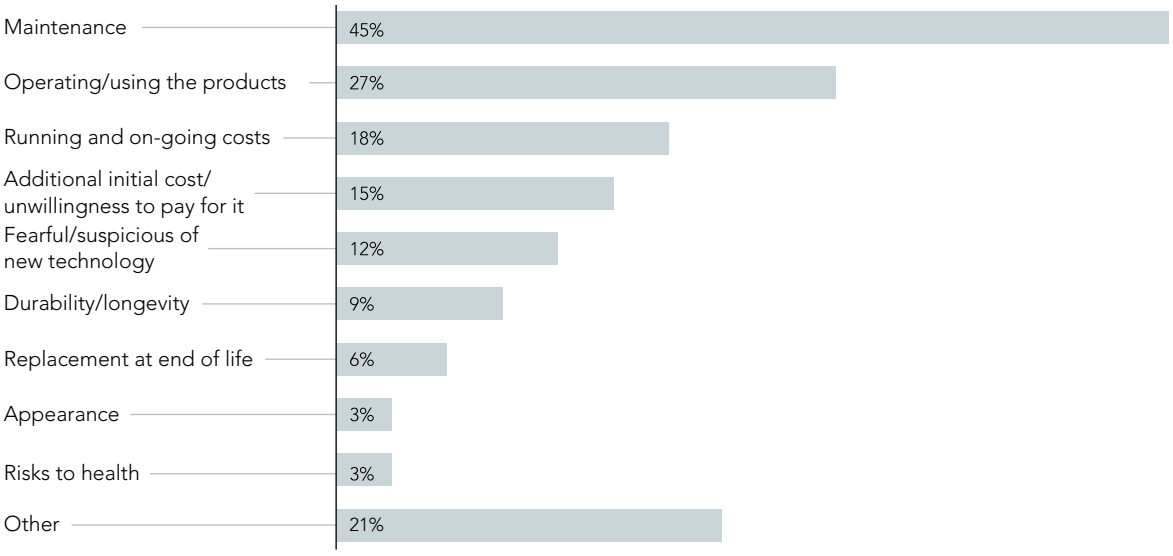
House builders find that the main benefits raised by potential buyers are the savings in energy bills (Figure 16.2). However, about half of house builders find that potential buyers raise concerns about maintenance, and to a lesser extent about operating the features (Figure 16.3).

Figure 16.2 House builders' view of benefits raised by potential buyers about these new features when they are considering buying a home (unprompted)



Based on 31 house builders (those building to Code for Sustainable Homes (CSH) Level 4 and above and able to give a view)
Other includes: resale value of property, modern feel to the house.

Figure 16.3 Concerns encountered by house builders among buyers (unprompted)

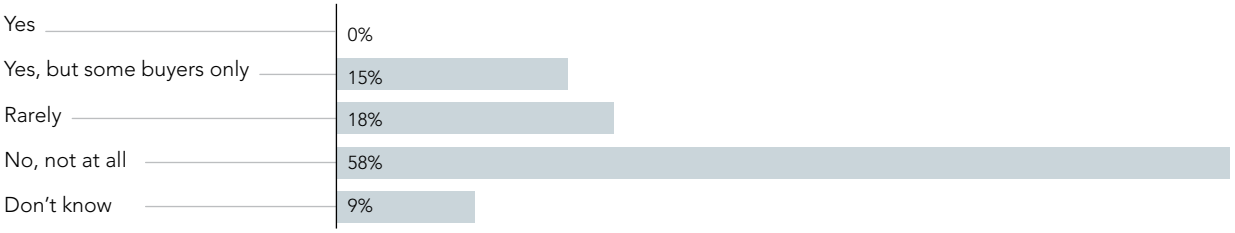


Based on 33 house builders (those building to Code for Sustainable Homes (CSH) Level 4 and above)
Other includes lack of knowledge about features, vandalism/risk of damage, risk of overheating.

16.2 Willingness to pay a premium

Almost 6 in 10 house builders with experience of CSH Level 4 homes and above find that buyers are unwilling to pay a premium to gain the benefits of cost savings achieved through the features of energy-efficient homes (Figure 16.4).

Figure 16.4 Do you think or have you found that buyers are willing to pay a premium on the home to gain the benefits of these new features?



Based on 33 house builders (those building to Code for Sustainable Homes (CSH) Level 4 and above).

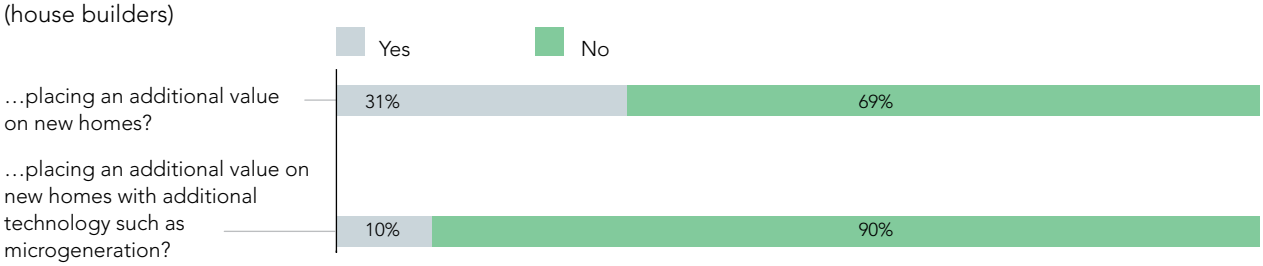
Three-quarters of housing associations do not charge a premium in rent to tenants living in enhanced new homes or highly energy-efficient homes. With the perceived lack of ability to recover the significant additional construction costs involved in delivering a zero carbon home through the selling price, or increased rental, there is no financial incentive that could drive voluntary adoption of increased energy performance standards.

16.3 Valuations of new and highly energy-efficient homes

Several house builders in the stage 1 (qualitative) focus group spoke of encountering valuers who are not placing a premium on new homes, nor placing an additional value on the technologies installed in highly energy-efficient homes.

Results of the telephone survey support the incidence of this on a wide scale, with 90% of those able to give an opinion finding that additional technology is not being valued (Figure 16.5). More small compared to large and medium house builders find that valuations for their new homes are at a premium.

Figure 16.5 Have you found that valuers and mortgage lenders, compared to second-hand homes, are …? (house builders)



Based on 52 house builders able to give an opinion.

The implications are significant for the industry. The cost of improving the energy efficiency of a new home in line with the 2016 zero carbon homes target set by the Government will, at today's prices, add an estimated £10,000 to the build cost of an average semi-detached home over and above those built to the 2006 Building Regulations requirements[16]. This is a cost that may have to be passed on to home buyers. Where buyers are prepared to pay a higher price for a property which saves money on energy bills, if valuers are unwilling to reflect this in mortgage valuations, sales could be negatively impacted.

'People don't buy houses, mortgage companies buy houses.' House builder

16.4 Studies of occupiers' experiences post-occupation

The experiences of occupiers in highly energy-efficient homes are detailed in part 2 of this report. Questioning of house builders and housing associations examined whether they have been monitoring occupier experiences for themselves and if so, what reactions are like.

This research finds that 43% of housing associations have undertaken studies to examine tenants' experience of living in highly energy-efficient homes. However, of these 13 organisations, 6 think that it is too early to draw conclusions. Results of the 7 other studies include both positive and negative findings:

- Reduced energy bills but with variations due to differing lifestyles.
- A positive reaction to the light and airy feel of homes.
- A lack of understanding about the technologies and their operation (eg tenants switching ventilation systems off).
- Properties getting too hot in the summer.
- Controls that are too complicated and need to be made easier to operate.

An interesting point is raised about expectations and understanding – that these technologies can operate in a very different way to people's expectations, and in turn can lead to poor operation or perceptions that they are not working properly. These experiences are illustrated in some of the following comments:

> *'Anything that runs 24 hours is being turned off, tenants are unable to understand the benefits and thinking they are saving by turning things off. Tenants will not change filters. It is hard to get access to some equipment, some people find it difficult to explain things to tenants, tenants are not always to blame for the way they interpret things.'* Housing association

> *'There are psychological elements to the new technologies. For example, occupiers expect the radiators to be boiling hot and they are not.'* Housing association

> *'The customer satisfaction survey had been generally pretty positive. There has been the odd thing, mainly because the dwellings have been the larger ones, about how light and airy they seem to be. There's not a lot of comment about the renewable element other than the controls that they want to be more simple and direct – either on or off, especially for the elderly.'* Housing association

16.5 Benefits experienced in occupation

Whether a formal study has been carried out or not, half of the housing associations interviewed feel that the main positive for tenants is that they have experienced lower utility bills (spontaneous mention). Others mention reduced water usage and that tenants enjoy doing their bit for the environment. 13% do not feel that their tenants have experienced any benefits so far.

The majority do not know whether tenants have changed their behaviour as a result of having technology to generate electricity or to heat water. However, 16% find that tenants are using more electricity or hot water because it is considered to be free and 13% that they have switched to using more in the day rather than at night.

16.6 Issues encountered among tenants and buyers

The main downsides encountered by housing associations among tenants and raised spontaneously are a lack of understanding about operating the technical features of the new homes and a dislike of low flow taps and shallow baths (Figure 16.6).

When prompted, almost all housing associations managing properties built to high CSH Levels think that there is a lack of understanding about how to operate features, and three-quarters have experience of complaints about bills not being as low as expected.

Figure 16.6 Which of these have you encountered from tenants with regard to new features and technology used to meet high Code for Sustainable Homes Levels? (Housing associations)

Based on 31 housing associations.

Those house builders with experience of occupiers' reactions (52%) also find that the main issues are a lack of understanding about how systems work and how to use them.

> *'Tenants do not listen initially, it is only when they are actually using it that they realise they have not heard what they were told. We have to revisit them but we do it as a matter of course'.* Medium house builder

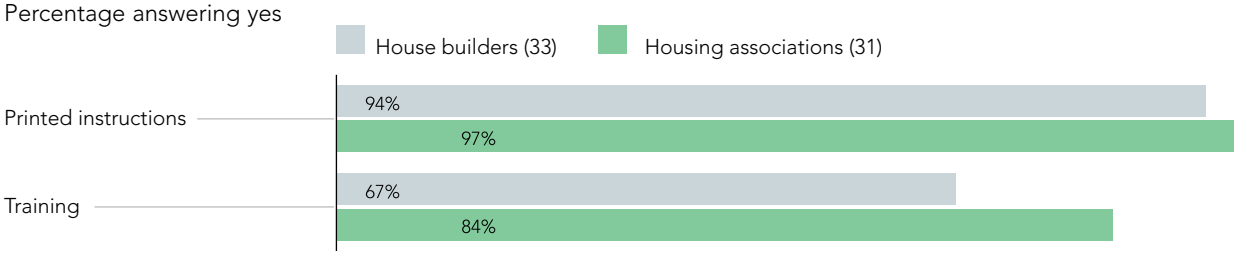
> *'A general dislike of air source heat pumps, people do not like the size of the radiators and general operation of the products'.* Large house builder

> *'Some of the technologies can be complicated and difficult for them to use, because they are not used in a normal way. There needs to be an additional support and education'.* Housing association

16.7 Information provided to occupiers

Issues with the operation of the new technological features do not appear to be due to a lack of the provision of information, with most house builders and housing associations providing printed instructions and training (Figure 16.7).

Figure 16.7 With the new technologies you have installed, have you provided tenants with any of the following? Percentage answering yes



Based on house builders with experience of building to Code for Sustainable Homes (CSH) Level 4 and above and housing associations.

However, in providing printed instructions, 87% of the housing associations have given their tenants manufacturers' manuals. Discussion in the focus group with tenants revealed that these were technical manuals that were not especially user-friendly and contained volumes of information not applicable to them. This has proved confusing to tenants.

Having learned that tenants may not be operating features correctly, many housing associations are realising that the information they provide needs to be improved. 8 in 10 are planning to change this through rewriting manuals or by introducing more training. Similarly those house builders with post-occupation experience feel that many of the problems experienced through poor operation may be overcome through better education and training for occupiers.

17 Improving the uptake of energy-efficient and zero carbon homes

Key findings in this section:

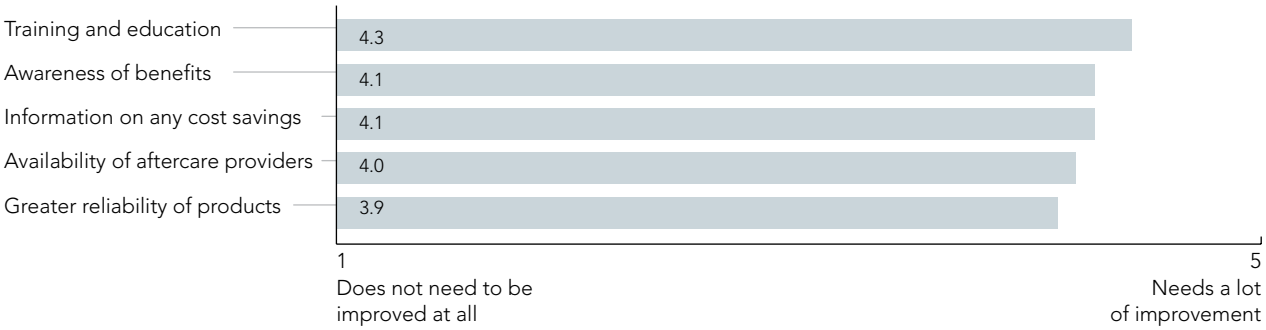
- House builders and housing associations alike are of the view that training and education of occupiers needs to be improved to encourage uptake of new technologies, and that there needs to be better awareness of the benefits and cost savings.
- 69% of house builders claim lower energy costs or better efficiency compared to existing homes in their marketing of new homes, but only 29% of house builders mention the approximate cost of energy bills.
- Almost one-third of house builders admit to not using the EPC information when marketing their new homes.
- More than half of housing associations think that a more positive response to new technologies by tenants will come from better demonstration of benefits, both in terms of cost and environmental impact.

17.1 Factors in need of improvement to encourage better uptake of new technologies

Buyers need to be encouraged to place a value on highly energy-efficient homes. Research with occupiers in part 2 of this report shows a degree of interest in new technical features, but set alongside concerns about maintenance and associated costs.

House builders and housing associations alike identify the need for better training and education as being most in need of improvement to encourage greater interest and uptake (Figure 17.1). In addition, awareness of the benefits and cost savings needs to be improved together with the availability of companies able to provide aftercare.

Figure 17.1 How much do you think the following need to be improved to encourage consumer uptake of the new technologies? Average score out of 5



Based on 64 house builders and housing associations with experience of building to Code for Sustainable Homes (CSH) Level 4 and above.

17.2 Existing practices when marketing energy-efficient homes

Part 2 stated that if occupiers are to consider a new home, 62% would like to see the approximate cost of energy bills rather than simply being told that the home is energy-efficient.

However, only 29% of house builders are proactively marketing energy cost information at present (mainly the larger ones), which is probably due to most not having conducted analysis to be able to provide this information. At similarly low levels, only 23% of housing associations provide information on the cost of energy bills when marketing homes through choice-based lettings or to shared owners (Figure 17.2).

Most house builders and housing associations are quoting that the home has lower energy costs than existing homes but are not quantifying this (Figure 17.3). Approaching one-third of house builders do not use the EPC ratings in their marketing information at all, with others placing it in the handover pack or placing it on display in the show home (Figure 17.4). An inspection of the property pages of the daily and weekend press reveals a conspicuous absence of EPCs or reference to the energy performance of new developments. Similarly, popular online property sites and those dedicated to new build do not promote EPC information or the benefits of energy-efficient design, leaving it to be included inconsistently in expanded details or downloadable property brochures.

Figure 17.2 Do you mention any of these in your marketing of new homes?

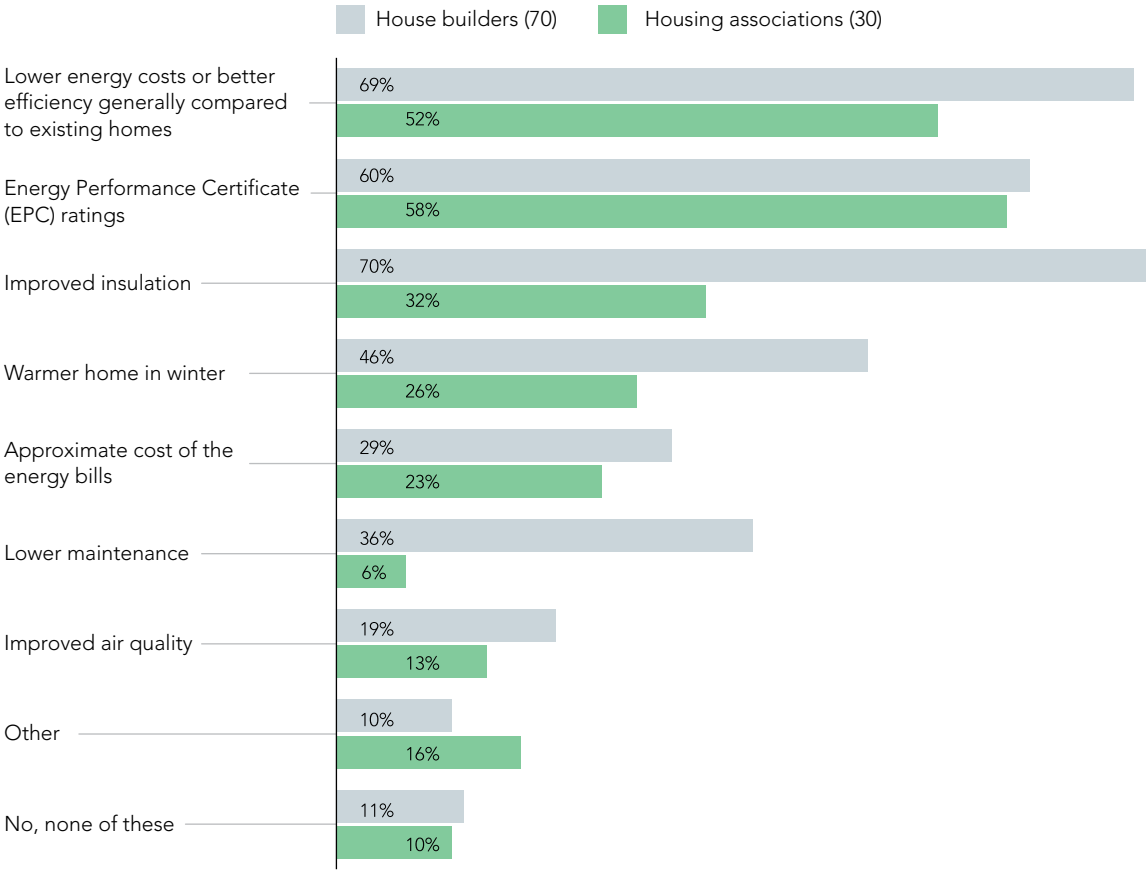
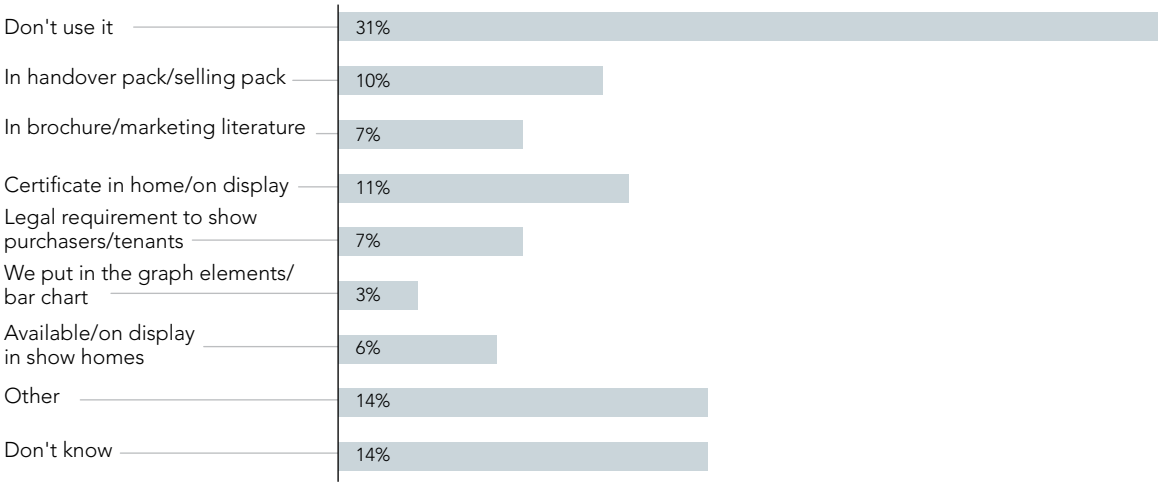


Figure 17.3 House builders quoting approximate cost of energy bills, by size

Based on 70 house builders.

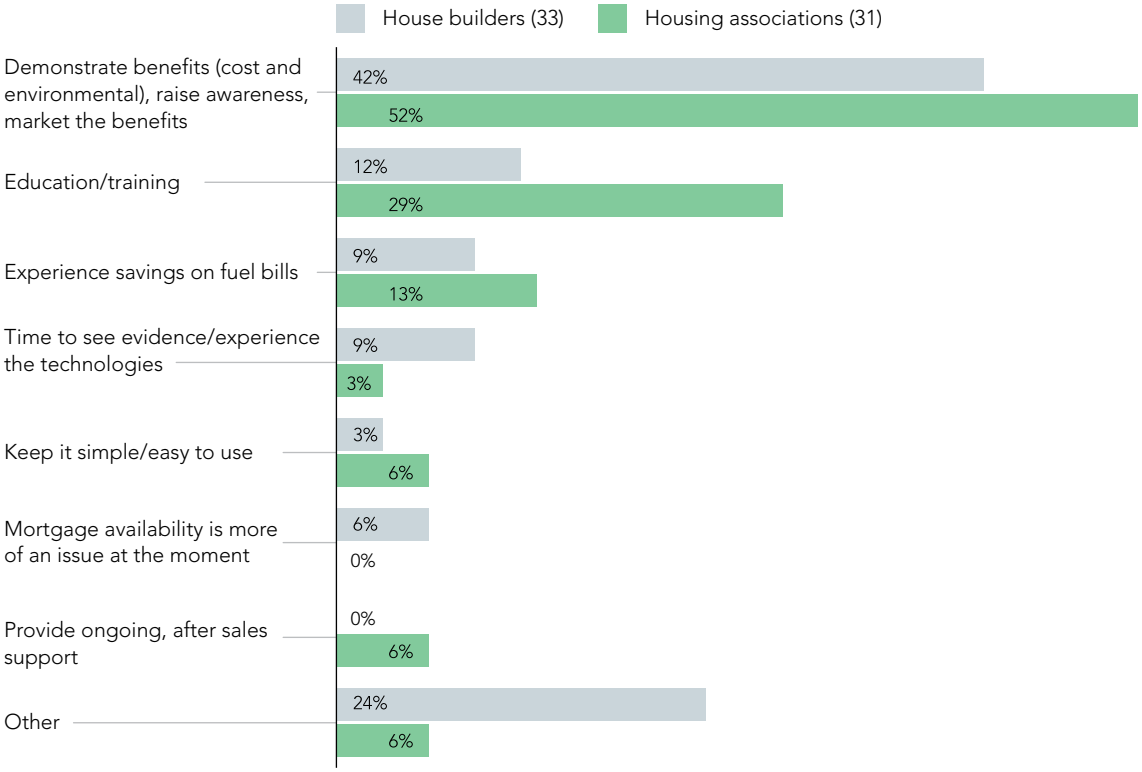
Figure 17.4 How do you use Energy Performance Certificate information in your marketing if at all? House builders only (unprompted)



17.3 Encouraging a positive response to zero carbon homes

The main factor that house builders and housing associations feel is needed to encourage a positive response from potential buyers and tenants is better marketing, demonstration of the features and raising awareness of the benefits of living in a zero carbon home (Figure 17.5).

Figure 17.5 What do you think could help to encourage a positive response from potential buyers/tenants to the new technologies which may be found in new homes from 2016? (Unprompted)



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NF 39 February 2012

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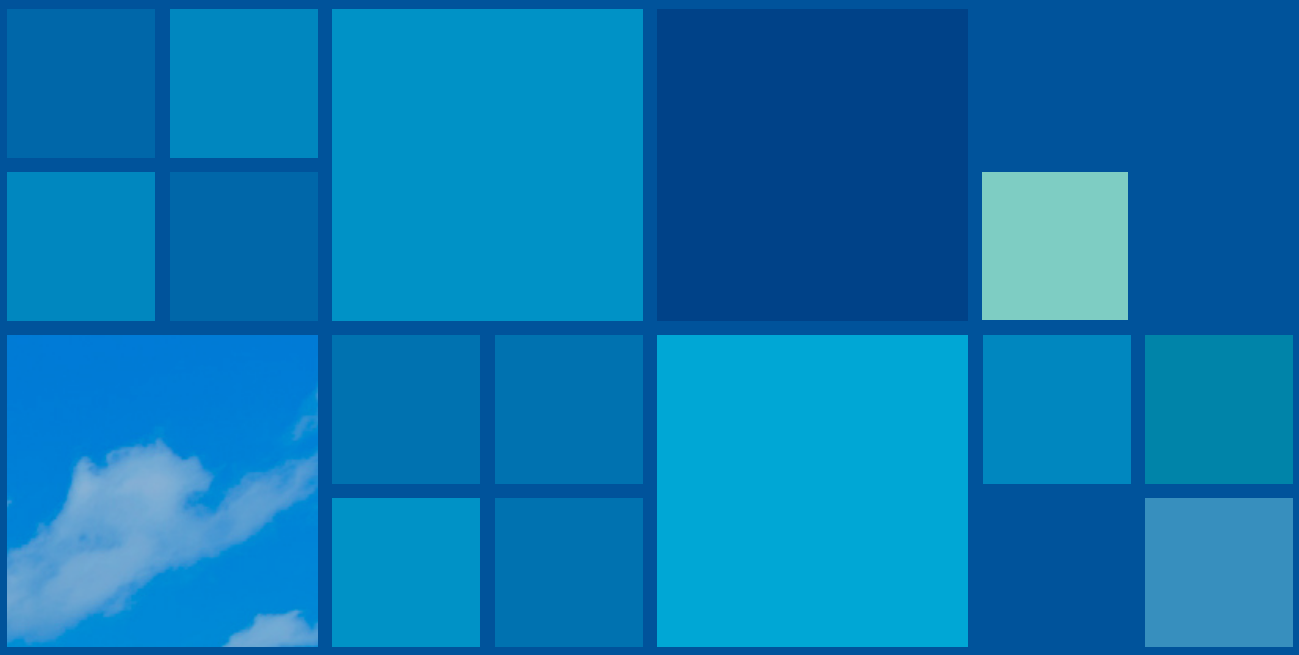
Today's attitudes to low and zero carbon homes

Views of occupiers, house builders and housing associations

In 2008, NHBC Foundation published NF 9 *Zero carbon: what does it mean to homeowners and house builders?* This innovative research provided a valuable insight into attitudes to low and zero carbon homes, climate change, energy efficiency and microgeneration. In the time since its publication, much work has been done in line with the recommendations, but it is clear that in 2012 there is still some way to go.

This report investigates, 4 years on, whether attitudes have changed and contains a detailed examination of responses from occupiers, house builders and housing associations. It examines the current thoughts, awareness and understanding towards issues such as climate change, the 2016 zero carbon definition, airtightness and renewable technologies.

The report assesses the priorities of industry and the consumer when building or purchasing a new home, and looks at views that could impact new homes of the future. It sets the context for the research and presents the key findings, recommendations and current details of the definition of zero carbon homes.



The NHBC Foundation has been established by NHBC in partnership with the BRE Trust. It facilitates research and development, technology and knowledge sharing, and the capture of industry best practice. The NHBC Foundation promotes best practice to help builders, developers and the industry as it responds to the UK's wider housing needs. The NHBC Foundation carries out practical, high quality research where it is needed most, particularly in areas such as building standards and processes. It also supports house builders in developing strong relationships with their customers.

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