



# DEFINING ZERO CARBON HOMES

## **'HAVE YOUR SAY' REPORT 2009**

Feedback from a national programme of events organised by the Zero Carbon Hub on the Government's consultation on the definition of zero carbon homes.

## ZERO CARBON HUB

This guide is available as a PDF Download from  
[www.zerocarbonhub.org](http://www.zerocarbonhub.org)

Copyright 2009 Zero Carbon Hub. All rights reserved.  
 April 2009

### LONDON OFFICE

62-68 Rosebery Avenue  
 London EC1R 4RR

### MILTON KEYNES OFFICE

NHBC House, Davy Avenue  
 Milton Keynes MK5 8FP

**T 0845 888 7620**

**F 0871 813 0569**

**info@zerocarbonhub.org**

**www.zerocarbonhub.org**

## ACKNOWLEDGEMENTS

The Zero Carbon Hub is grateful to the following organisations for providing promotional and practical assistance in support of the 'Have your say' events:

Association of Environmentally Conscious Building (AECB)  
 Aldersgate Group  
 British Electrotechnical and Allied Manufacturers' Association (BEAMA)  
 Building Research Establishment (BRE)  
 Building Control Alliance  
 Buro Happold  
 Carbon Trust  
 Chartered Institute of Building (CIOB)  
 Commission for Architecture and the Built Environment (CABE)  
 Communities and Local Government (CLG)  
 Construction Products Association (CPA)  
 Department of Energy and Climate Change (DECC)  
 Energy Efficiency Partnership for Homes (EEPH)  
 Energy Industries Council (EIC)  
 Energy Saving Trust (EST)  
 Federation of Master Builders (FMB)  
 Fulcrum Consulting  
 Good Homes Alliance (GHA)  
 Home Builders Federation (HBF)  
 Homes and Communities Agency (HCA)  
 House Builders Association (HBA)  
 Housebuilder Media  
 Housing Forum  
 HTA Architects  
 Inbuilt  
 Local Government Association (LGA)  
 National Energy Services (NES)  
 National House-Building Council (NHBC)  
 PRP Architects  
 Renewable Energy Association (REA)  
 Robust Details Ltd  
 Royal Institute of British Architects (RIBA)  
 Sponge  
 Town & Country Planning Association (TCPA)  
 UK Business Council for Sustainable Energy (UKBCSE)  
 UK Green Building Council (UK-GBC)  
 WWF

# Contents

<b>Foreword</b>	<b>4</b>
<b>Executive summary</b>	<b>5</b>
<b>Purpose</b>	<b>7</b>
<b>Policy background</b>	<b>9</b>
<b>Journey to zero carbon homes</b>	<b>10</b>
<b>The events</b>	<b>13</b>
<b>Support for energy efficiency</b>	<b>14</b>
<b>Energy efficiency requirements for 2016</b>	<b>15</b>
<b>Carbon compliance</b>	<b>17</b>
<b>Cost of delivering carbon compliance</b>	<b>19</b>
<b>Allowable solutions</b>	<b>21</b>
<b>Validation and enforcement</b>	<b>23</b>
<b>Link with the Code for Sustainable Homes</b>	<b>24</b>
<b>Privately-generated off-site renewable energy</b>	<b>25</b>
<b>Ecobuild 2009</b>	<b>25</b>
<b>Conclusions and further work</b>	<b>26</b>
<b>Observations about the 'Have your say' process</b>	<b>29</b>
<b>References</b>	<b>29</b>
<b>Zero Carbon Hub</b>	<b>30</b>



# Foreword

The Zero Carbon Hub (the 'Hub'), launched last summer, represents a ground-breaking commitment to help industry overcome the barriers to delivering one of the Government's most ambitious policies to tackle climate change. The Hub exists to highlight challenges and find practical solutions for those across the public and private sector, delivering zero carbon homes by 2016.

Following the launch of the Government's consultation on the definition of zero carbon in December, the Zero Carbon Hub visited eight locations across England gathering views from more than 500 industry stakeholders. This raised awareness and understanding of the issues and gave the opportunity to listen to the views and concerns of those in the front line of delivery.

These 'Have your say' events prove pivotal to providing informed, evidence-based feedback to Government on its proposals, whilst alerting the Zero Carbon Hub to the difficulties that the industry currently perceives.

This is an important starting point, both for the urgent resolution of the definition itself, and for the work of the Hub in supporting the industry towards the 2016 zero carbon homes target.

My Zero Carbon Hub colleagues and I are very grateful to all the organisations who supported and promoted this exceptional consultation process. I would also like to thank all the participants who took the time to contribute to the debate, ensuring a well-informed report.

We look forward to a productive, if challenging, year ahead, and continuing to build proactive and practical partnerships that will move the industry confidently towards achieving a very important goal.

**Paul King**

Chairman, Zero Carbon Hub

April 2009



# Executive summary

- In December 2008, Communities and Local Government (CLG) published its much awaited consultation on the definition of zero carbon homes. In order to engage those involved in delivering low and zero carbon homes, the Zero Carbon Hub, with support from CLG, organised a series of events across England during February 2009. These events were designed to offer a straightforward explanation of the definition proposals and to secure a wide response from those involved in house-building.
- A key part of the approach was the use of hand-held electronic voting equipment to capture views and levels of understanding accurately. In addition to the voting sessions, each event allowed sufficient time for discussion and opportunities for delegates to put questions to presenters.
- More than 500 delegates attended the events, representing a wide range of organisations including housebuilders, developers, local authorities, housing associations, manufacturers, consultants and academics. Only about a fifth came to the event with an accurate perception of the magnitude of carbon emissions reduction that would be required in a zero carbon home. 41% of delegates significantly underestimated the reduction required.
- The overall majority of delegates (over 90%) agreed or strongly agreed that the Government should legislate for higher energy efficiency in homes. This view was consistent across all parties represented.



Targeting 150% reduction over Part L 2006.  
This zero carbon house is being built as part of the Creative Energy Homes Project at Nottingham University.

**Developer: Tarmac**  
**Construction: Lovell Partnership**  
**Architect: ZEDfactory**

Image courtesy of Tarmac Ltd

- The overall perception of the challenge posed by high energy efficiency standards (which were described broadly as EST Advanced Practice/PassivHaus standards) was very mixed. Some features, such as provision of high efficiency windows and highly insulated floors, walls and roofs, were generally seen as less challenging, whereas achieving very low air leakage rates and eliminating thermal bridges were regarded as much bigger challenges. The achievement of design standards on site, however, was considered by delegates to be the most demanding challenge.
- On the timing of advice on energy efficiency, the majority of people wanted to see the requirements for 2016 specified with the 2010 update of Part L.
- Carbon compliance (energy efficiency plus on-site low and zero carbon technologies) is a central issue in the consultation. The consultation explains that achieving zero carbon through carbon compliance alone is impractical for individual developments in most situations. The consultation therefore invited views on three alternative carbon compliance levels: reductions of 44%, 70% and 100%. Once the pros and cons of these options were clarified, the 70% option was most favoured by delegates at the Zero Carbon Hub events. Nearly 80% of consultants were in favour of carbon compliance set at 70% or above. With developers/ housebuilders, there was a split vote with about 51% preferring carbon compliance set at 70% or above and 49% preferring carbon compliance set at 44%. A high proportion of delegates (78%) voted in favour of a variable-level carbon compliance that would result in an equally challenging target across different dwelling types.
- On the cost of carbon compliance, 45% of delegates with experience of low carbon homes felt that the cost figures in the consultation document were underestimating the true costs that would be incurred in 2013 and 2016.
- A system of 'allowable solutions' is offered in the consultation, to give the industry and its clients flexibility over how to step up from the carbon compliance level to achieve the zero carbon target. The allowable solutions are essentially ideas at this stage and are offered in the consultation to gauge their potential. Delegates were therefore contributing feedback without the benefit of specific information on how each might work in practice. Typically, three quarters of delegates acknowledged high potential or some potential for each idea. The allowable solution considered to have most potential at this point was the one that gave credit for energy efficient appliances and controls. The one considered to have least potential was the idea that gave credit for export of low/zero carbon heat to existing local buildings.
- Feedback from delegates at the events, and from a range of visits attended by the Zero Carbon Hub during the consultation period, indicated considerable concern over the complexity of the overall framework for the allowable solutions approach and how the individual allowable solutions would be delivered in practice.
- The large majority of delegates favoured 2012 or earlier as the date for carrying out a review of the allowable solutions.
- On who should enforce the zero carbon targets in homes, there was broad consensus that building control should be responsible for overseeing the energy efficiency and carbon compliance levels. For the enforcement of the allowable solutions, some of which are effectively off-site or sometimes remote activities, the consensus favoured the establishment of a new accredited body.
- Delegates felt very strongly that the definition being developed through this consultation should also be applied to the energy section of the Code for Sustainable Homes.
- Although not detailed in this report, delegates felt very strongly that the definition and framework for zero carbon homes should be carried over and applied to non-domestic buildings.
- Feedback from the events is highly instructive and provides clear messages for the Zero Carbon Hub in its facilitation role. It identifies consensus on certain issues and differing opinions in others. It also identifies areas where industry has concerns about delivery and areas where it is more confident.

# Purpose

## **Why a new definition?**

On 17 December 2008, Communities and Local Government (CLG) launched its consultation on the definition of zero carbon homes (reference 1 page 29). This consultation was in response to uncertainties and concerns over previous definitions and their suitability within the industry. One of the most significant contributions to the debate, from the UK Green Building Council (reference 2 page 29), indicated that the existing zero carbon definition, Level 6 of the Code for Sustainable Homes, would be unattainable for as many as 80% of new homes.

## **Broad purpose of the new definition**

While it keeps zero carbon as the target, the proposals for the new definition have flexibility in mind. So, rather than placing reliance solely on the development itself (through energy efficiency and on-site renewable energy) to deliver zero carbon, a range of additional, mostly off-site solutions, would be made available to developers in the new definition. These so-called 'allowable solutions' contain a number of new ideas and some which have been on previous agendas – all intended to help developers and their clients to identify zero carbon solutions which are right for the specific circumstances presented by different development sites.

In the definition proposals, this flexibility is married with challenging energy efficiency targets to ensure that each new building minimises energy demand and running costs for owners and tenants. Also, there is an expectation that some on-site low or zero carbon (LZC) energy technologies are incorporated to reduce emissions from energy supply and further reduce running costs. Carbon reductions from energy efficiency and on-site LZC energy technologies are expected to be regulated as a single measure, the 'carbon compliance'. The consultation seeks views from the industry on where the line for carbon compliance should be drawn.

## **Role of the Zero Carbon Hub**

It is two years since Gordon Brown, as Chancellor, announced that we should work towards a target of zero carbon new homes from 2016. While considerable progress has been made, despite the lack of agreement on definition, the Zero Carbon Hub believes that a clear, workable definition lies at the heart of successful scale-up towards mainstream delivery of zero carbon homes. As part of its



facilitation role, the Zero Carbon Hub organised a series of events to engage with representatives of key stakeholders on the key points of the consultation.

### **Purpose of the events**

The aim of these events was to generate greater awareness of the issues surrounding the definition, particularly among people who might not normally contribute to a government consultation, and to assist CLG in moving as rapidly as possible towards a practical and agreed definition.

CLG was also keen to maximise awareness and understanding of its proposals and increase the quality of feedback. CLG officials made presentations at every event and were available to answer questions. Prior to the events, CLG colleagues also contributed actively and constructively to presentational ideas and approaches developed by the Zero Carbon Hub team.

### **Purpose of this report**

The Zero Carbon Hub has generated this report to provide a publicly available summary of the feedback, provided by the industry, on the Government's zero carbon proposals. It provides a valuable set of views from a good sample of stakeholders who were presented with additional explanatory information. It will be used by the Government and the Zero Carbon Hub to steer future activities and set priorities for future research and advice.



# Policy background

Communities and Local Government (CLG) has the responsibility for developing policy on zero carbon homes. It has set a high priority in moving rapidly towards an agreed and practical definition of zero carbon to give clarity to the industry as it works to the 2016 target. In recognising concerns over previous definitions, CLG has suggested a modified framework for delivery which gives greater flexibility, while retaining a number of key features of previous consultations.

## Retained in the new definition are:

### The net zero carbon approach

Allowing some CO<sub>2</sub> emissions during a yearly cycle, provided this is balanced across the year by periods of negative emissions.

### Operational energy use only

The definition is concerned with operational (in-use) CO<sub>2</sub> emissions from the running of a home. CO<sub>2</sub> emissions from embodied energy, construction, demolition, replacement or refurbishment are not included.

### All energy use

CO<sub>2</sub> emissions from all household appliances are covered in the definition, not just the energy use which is currently regulated (space and water heating, lighting and ventilation).

### Staged approach

New homes to be zero carbon from 2016, with interim milestones in 2010 and 2013, each stage supported by revised Building Regulations Part L1A.

## The new definition consultation proposed the following main points:

### Backstop energy efficiency

The new definition proposes a high-hurdle minimum energy efficiency backstop, perhaps equivalent to the EST Advanced Practice standard.

### Carbon compliance

An emissions reduction target for a housing development (the sum of reductions from energy efficiency measures and on-site low and zero carbon energy technologies).

### Allowable solutions

A series of largely off-site solutions that provide a flexible framework for stepping up to zero carbon from the carbon compliance level.

## The CLG sees the delivery of zero carbon homes as part of a wider policy agenda:

- Reducing national CO<sub>2</sub> emissions
- Future-proofing new homes
- Achieving strong national standards for housing
- Achieving fuel savings
- Stimulating innovation
- Encouraging renewable and distributed energy
- Demonstrating international leadership on low carbon economy

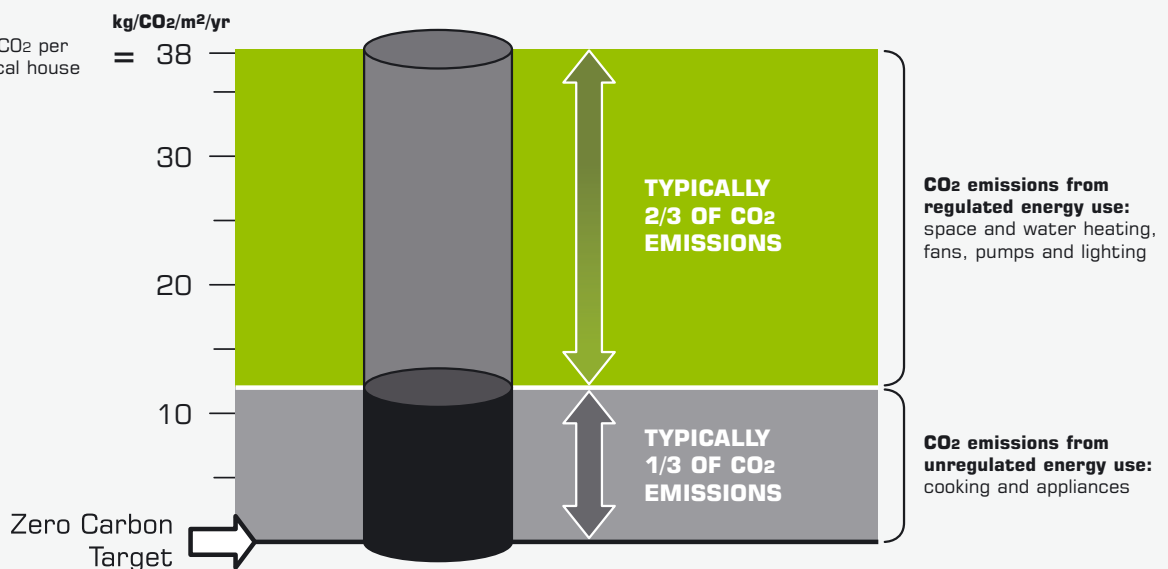
# Journey to zero carbon homes

A typical average-sized house built to 2006 Building Regulations releases about 3.2 tonnes of CO<sub>2</sub> per year (**Figure 1**). About two thirds of these emissions come from regulated energy use in the home (space and water heating, lighting, pumps and fans). The final third comes from unregulated energy use, from appliances and household equipment. It is fair to say that focus on the unregulated energy use has only registered strongly with industry and others since the zero carbon target was announced just over two years ago.

However there is still confusion, as evidenced in the 'Have your say' events, over the idea that a zero carbon house would need to target carbon emissions reductions of about 150% over a house built to current regulations. An understanding of this lies at the heart of appreciating the difficulties of delivering zero carbon homes and also the industry's understandable concerns about the massive performance step change required from 2013 to 2016. In its consultation, CLG proposes a hierarchy of measures to address the emissions reduction target (**Figure 2**), fully acknowledging that the strategy must address in particular the significant performance improvement between 2013 and 2016 (**Figure 3**).

**FIGURE 1**  
**THE CHALLENGE OF ZERO CARBON**

carbon emissions from a typical house built to today's Building Regulations standard

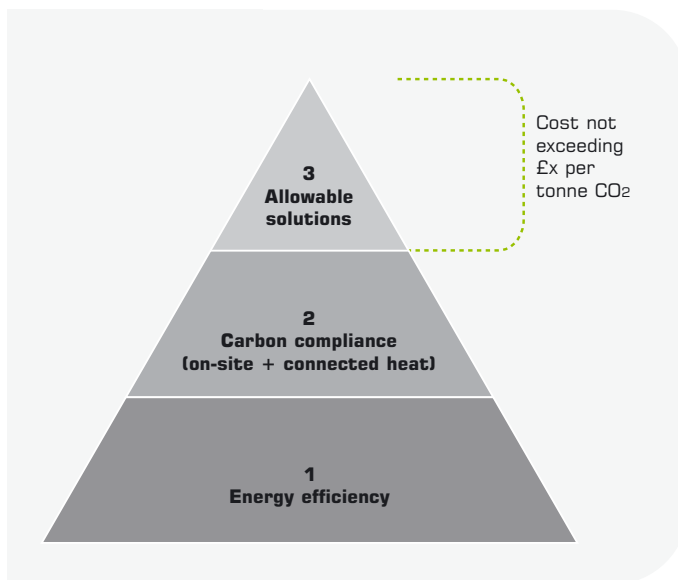


In this report we consider in the following sections the key structural components of the zero carbon definition, but it is important first to explain how the major pieces of the jigsaw fit together and how the proposals differ from Level 6 of the Code for Sustainable Homes.

In **Figure 4** we show how energy efficiency, on site low and zero carbon energy technologies and allowable solutions contribute to a zero carbon solution. The figure illustrates the three scenarios the Government is exploring in its consultation and how they compare with the very demanding and aspirational on-site solution required by Level 6 of the Code for Sustainable Homes.

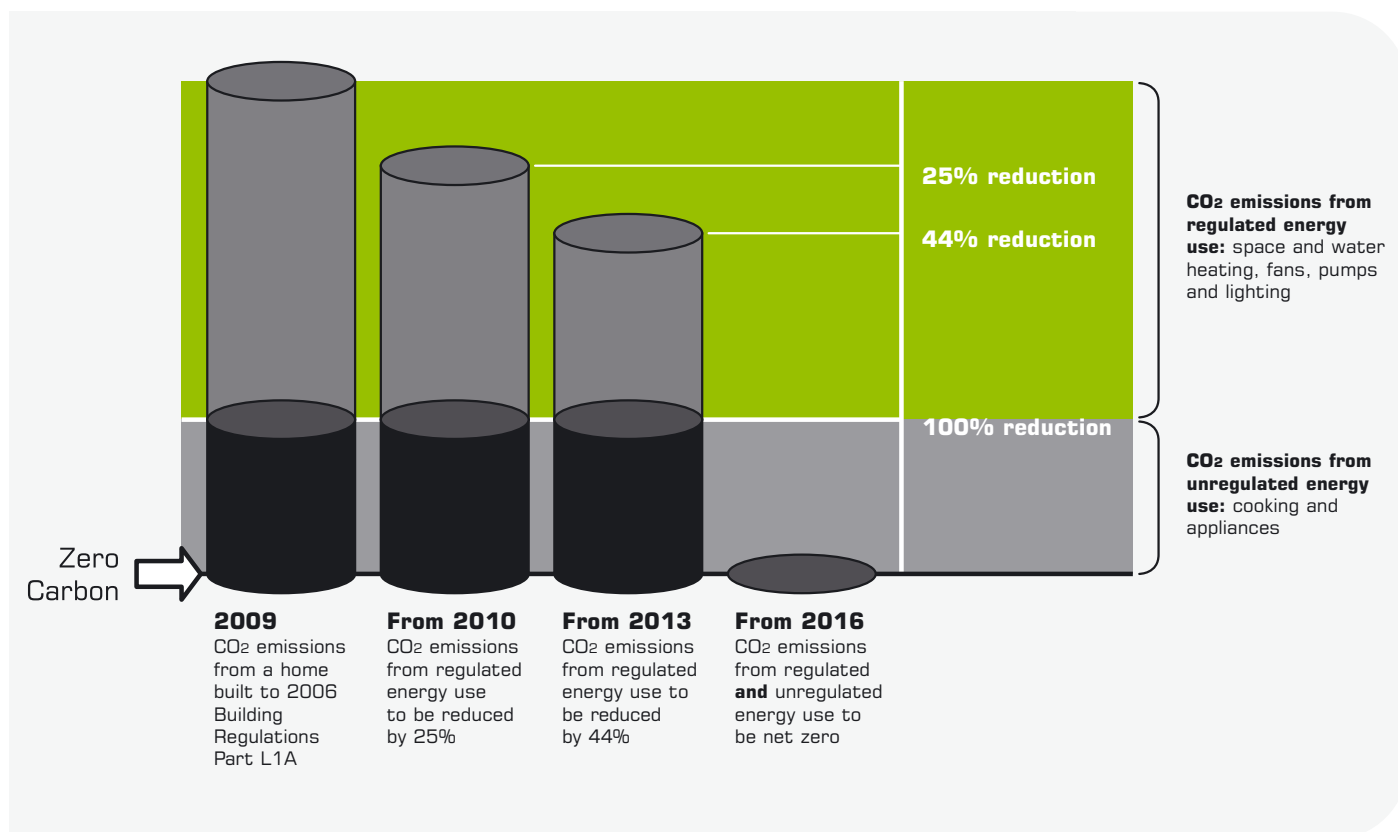
**FIGURE 2**

The hierarchical triangle used in the Consultation document to show the three tiered approach proposed for reaching zero carbon



**FIGURE 3**

The planned steps towards 2016



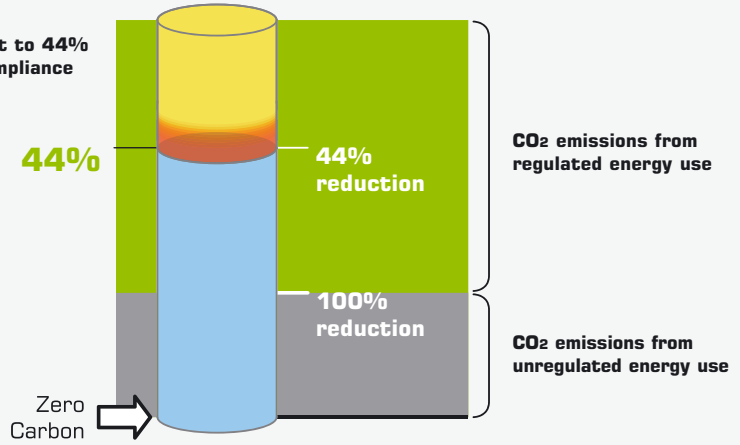
**FIGURE 4**  
**CARBON COMPLIANCE FOR 2016**

The three alternative compliance levels for homes

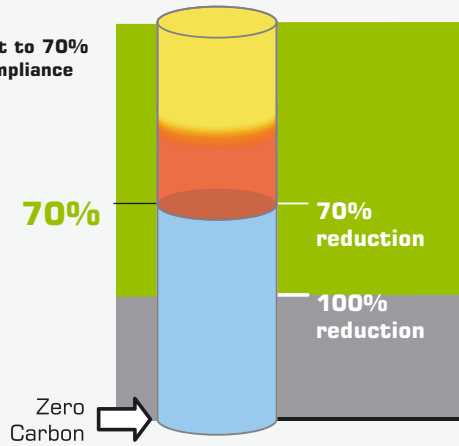
**LEGEND**

- CO<sub>2</sub> emissions reductions from energy efficiency
- CO<sub>2</sub> emissions reductions from on-site low/zero carbon energy technologies
- CO<sub>2</sub> emissions reductions from allowable solutions

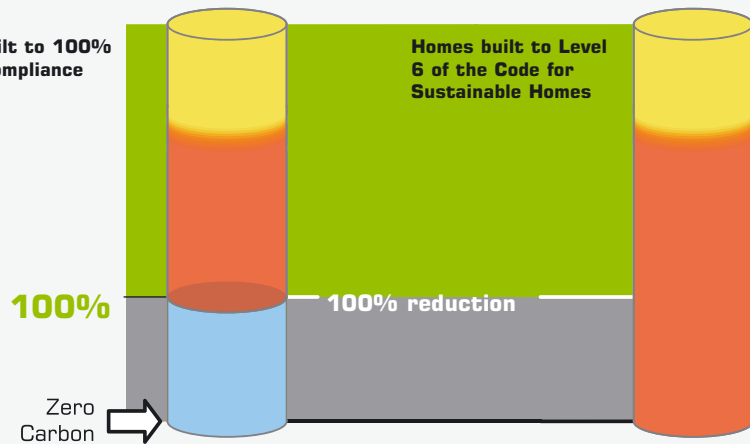
**Homes built to 44% Carbon Compliance**



**Homes built to 70% Carbon Compliance**



**Homes built to 100% Carbon Compliance**



# The events

In collaboration with Communities and Local Government, the Zero Carbon Hub developed interpretational material and a series of questions designed to engage the housing sector in the key aspects of the consultation. A key part of the approach was the use of hand-held electronic voting equipment at intervals, to capture views and levels of understanding accurately. Another early decision was to keep the events short and focused, and not judgemental over the consultation proposals presented.

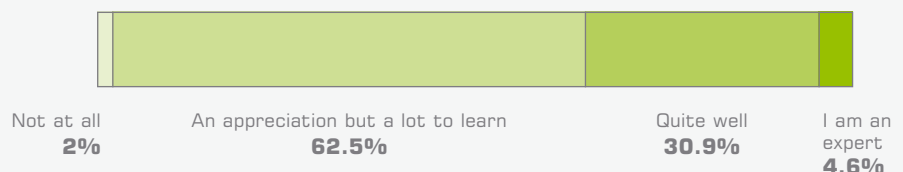
A marketing campaign was carried out in January and over 500 delegates attended the eight events planned. These commenced in Leeds on 10 February, then at Haydock, Birmingham, Peterborough, Heathrow, Bristol, Brands Hatch, and finishing at London Zoo, in partnership with Sponge, on 27 February. Delegates were very positive in their feedback over these events: the live feedback on voting patterns and the hand-held equipment undoubtedly contributed greatly to maintaining momentum and interest.

## The audience

The profile of attendees varied across the events, but overall represented a good cross-section from the housing sector, with housebuilders/developers and consultants being the largest subgroups. Overall, delegates to these events did not see themselves as experts (Figure 5) and many underestimated significantly the challenge of zero carbon (Figure 6).

**FIGURE 5**  
**AUDIENCE SELF ASSESSMENT**

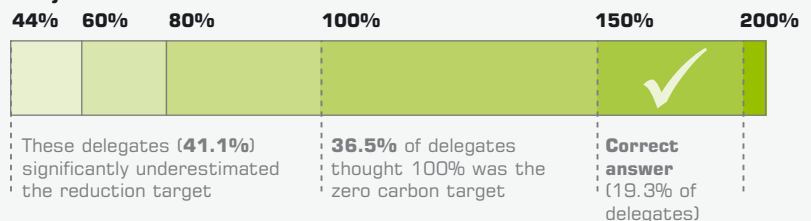
RESPONSE TO THE QUESTION:  
How well do you understand what the Government's proposals for zero carbon mean?  
(All delegates – sample size 501)



**FIGURE 6**  
**AUDIENCE AWARENESS OF ZERO CARBON REDUCTION TARGET**

RESPONSE TO THE QUESTION:  
What percentage of CO<sub>2</sub> reduction does zero carbon mean compared to (that regulated by) Building Regulations Part L1 2006?  
(All delegates – sample size 502)

Do you think zero carbon is a reduction of:



# Support for energy efficiency

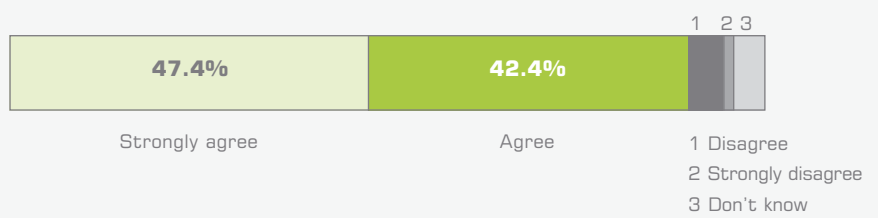
Energy efficiency is regarded as a worthy investment because it provides long-lasting benefit for the consumer. Whereas low and zero carbon energy technologies may be relatively easily upgraded in future years, a building with below optimal energy efficiency is not easy to upgrade economically. The CLG consultation document asked a single question on energy efficiency:

“Government is minded to require very high levels of energy efficiency in 2016, broadly equivalent to some of the most demanding standards currently published by third parties (such as PassivHaus and Energy Saving Trust). Do you agree with that ambition?”

The Zero Carbon Hub wanted to secure more detail on this issue and, with the agreement of CLG, presented a number of separate questions to delegates to help get a closer understanding of current perceptions and concerns on energy efficiency. The first of these was a key and very direct question attempting to gauge the industry's reaction to future, tougher legislation in this area (**Figure 7**). Across all the better-represented groups attending the events there was very strong agreement that it would be right to legislate for higher levels of energy efficiency.

**FIGURE 7**

RESPONSE TO THE QUESTION:  
Is it right to legislate for energy efficiency?



**Agree or strongly agree breakdown:**




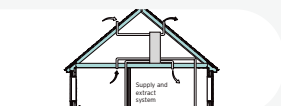


- Consultant **98.8%**
- Local Authority **96.3%**
- Manufacturer **93.3%**
- RSL **90.5%**
- Developer/Housebuilder **87.6%**

# Energy efficiency requirements for 2016

While the building regulation change in 2010 will require adjustment in practice, more significant changes will be required for the planned changes in 2013 and 2016. For these two dates, the likely requirements are summarised in **Figure 8**. These are projected on the basis that the government will legislate for broadly EST Advanced Practice standards from 2016.

**FIGURE 8**

Anticipated energy efficiency requirements in 2013 and 2016.

		2013 anticipated requirements	2016 anticipated requirements
<b>FLOORS</b>		0.20 W/m <sup>2</sup> K	0.15 W/m <sup>2</sup> K
<b>WALLS</b>		0.20 W/m <sup>2</sup> K	0.15 W/m <sup>2</sup> K
<b>ROOFS</b>		0.13 W/m <sup>2</sup> K	0.13 W/m <sup>2</sup> K
<b>MVHR</b>		85% (or more) heat recovery	85% (or more) heat recovery
<b>AIR LEAKAGE</b>		3m <sup>3</sup> /h/m <sup>2</sup> @ 50Pa	3m <sup>3</sup> /h/m <sup>2</sup> @ 50Pa
<b>WINDOWS</b>		BFRC band A	BFRC band A

### The challenge of delivering to the high energy efficiency standards

Delegates at the events were asked for their views on the difficulty of delivering against the 2016 energy efficiency performance targets. A summary of their responses is shown in **Figure 9** – a very mixed reaction to the various challenges. There was not seen to be a major challenge associated with providing highly energy efficient windows or highly insulated floors, walls and roofs. Provision of high-efficiency Mechanical Ventilation and Heat-Recovery (MVHR) systems, avoiding

thermal bridging and providing an airtight structure, were seen as more challenging. However, the most serious challenge was considered to be the ability to achieve design standards on site.

### Timescale

In terms of the timescale for alerting the industry to the intended high performance energy efficiency requirements for 2016, 65% of delegates voted in favour of an announcement along with, or before, the 2010 revision of Part L.

**FIGURE 9**  
**CHALLENGES TO DELIVERY OF HIGH ENERGY EFFICIENCY**

Summary results from delegates' feedback when asked to rate the challenge each item posed to widespread adoption of high energy efficiency standards. (All delegates – peak response 479 votes)

**LEGEND**

- Not very demanding
- Demanding
- More demanding

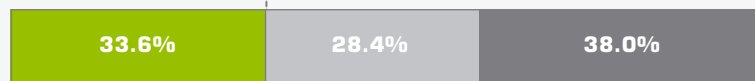
**High efficiency windows**



**Highly insulated floors, walls and roofs**



**MVHR with 85% heat recovery efficiency**



**Very low air leakage rates**



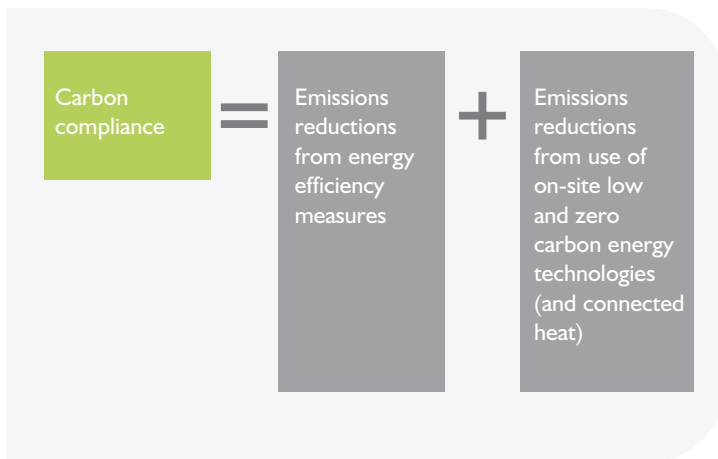
**Eliminating thermal bridges**



**Achieving the design standards on site**



# Carbon compliance



Carbon compliance is a key concept in the CLG consultation. It is intended to be a legislative threshold for carbon reduction that all homes, as part of a development, must meet. Through the consultation, the CLG is seeking feedback from the industry on where this minimum reduction threshold should be. Lower carbon compliance does not mean that there will be a lower target for overall carbon emissions reduction – selection of a lower level simply places greater onus on meeting zero carbon from the allowable solutions (which are dealt with in the next section). Carbon compliance is made up of two parts, as shown in the box on this page.

Delegates were asked for their views on where the carbon compliance threshold should be set. They were asked twice to give a view on the three carbon compliance levels (44%, 70% and 100% emissions reduction over 2006 Part L standard). They were asked the first time when the concept was introduced and again, later, when they had had a chance to hear about how the allowable solutions might work. This double vote 'before' and 'after' is shown in **Figure 10**. An important point of context is that respondents were asked this question without having an indication as to whether new homes would benefit, and if so by how much, from financial assistance from schemes such as the proposed 'Feed In Tariff' or 'Renewable Heat Incentive'. This was intentional as the scheme details are not known.

From **Figure 10**, it can be seen that across all delegates (when considering both 'before' and 'after' votes) there was a slight preference for the 70% carbon compliance level. Considering just the 'after' vote, nearly 80% of consultants were in favour of carbon compliance set at 70% or above. With developers/housebuilders, there was a split vote with about 51% preferring carbon compliance set at 70% or above and 49% preferring carbon compliance set at 44%.

## Variable carbon compliance

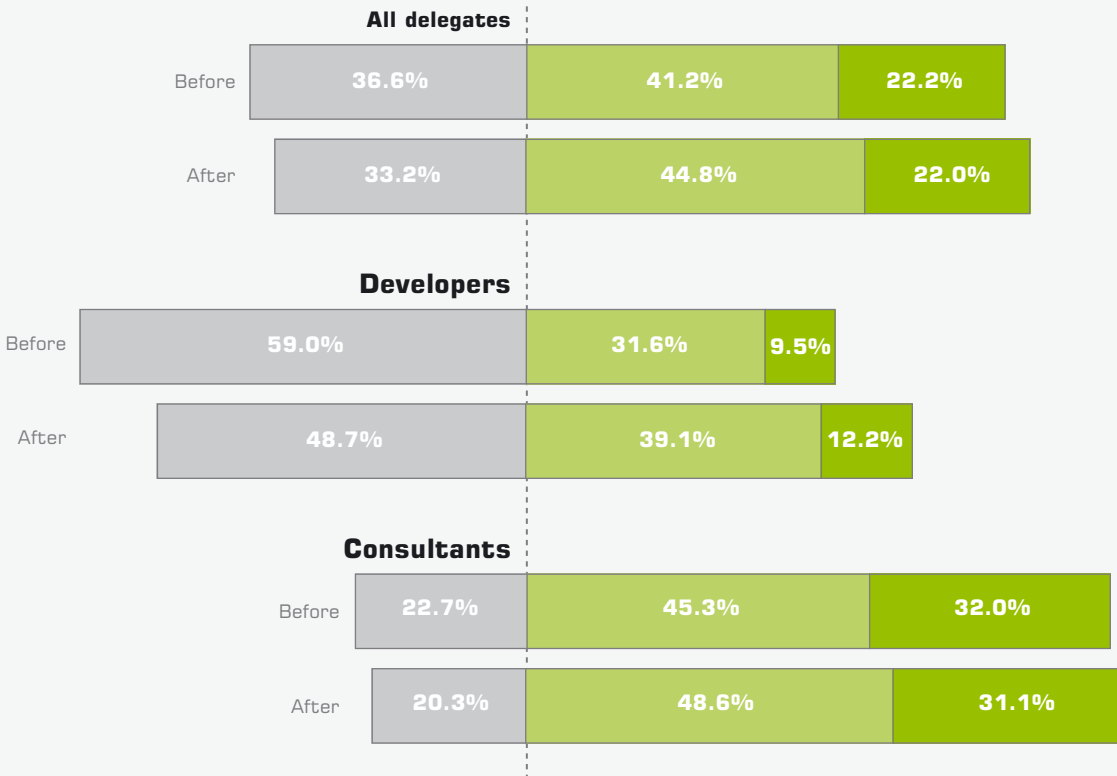
A high proportion of delegates (78%) voted in favour of a variable level carbon compliance that would result in an equally challenging target across different dwelling types.

**FIGURE 10**

Carbon compliance levels chosen by delegates, before and after 'allowable solutions' had been introduced and described.

**LEGEND**

- % of delegates who selected the **44%** carbon compliance level
- % of delegates who selected the **70%** carbon compliance level
- % of delegates who selected the **100%** carbon compliance level



# Cost of delivering carbon compliance

Since the announcement of the zero carbon ambition in late 2006, the cost of delivering to such a high performance requirement has been at the centre of the debate and a number of studies have been undertaken in an attempt to quantify this.

There is an understanding and acceptance that low and zero carbon homes will cost more to build, however the cost model from 2016 onwards is likely to be very different to that today, bearing in mind the likely scale up of demand and reduction in unit costs. For the benefit of this consultation, the CLG revisited the cost data and provided models of likely costs in 2016. For the 'Have your say' events, this cost data was translated into simple percentage increases (over and above a house built to today's 2006 Part L requirements) for a range of house types in different locations. It was made clear that the costs presented covered carbon compliance and did not include the costs for allowable solutions. Delegates were asked to vote on whether these cost estimates were too low, about right or too high. Those with experience in building to Levels 4, 5 and 6 of the energy criteria of the Code for Sustainable Homes were then asked to vote again.

While a considerable proportion of all delegates (38%) were unable to give a view, about 27% considered that the cost estimates were about right (**Figure 11**). Among those with experience in building to low and zero carbon standards, a higher proportion felt that the costs were too low. Amongst the homebuilders and developers, 73% felt that the costs were too low. Among consultants, 32% felt that the cost estimates were about right, 7% felt they were too high and 20% felt that the cost estimates were too low.

Throughout the events, in discussion and informal conversations, many delegates expressed a view that while the cost estimates of carbon compliance were possibly near or less than they would expect them to be in 2016, they were nevertheless concerned about the impact of additional costs on their businesses. In subsequent meetings and fora, this concern was consistently picked up.



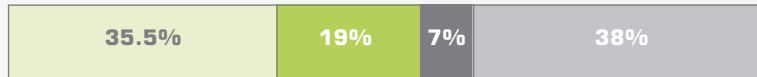
**FIGURE 11**  
**COST ESTIMATES**  
**OF CARBON COMPLIANCE**

Delegates' views of the CLG cost data for achieving carbon compliance

**LEGEND**

- Costs too low
- Costs about right
- Costs too high
- Unable to give a view

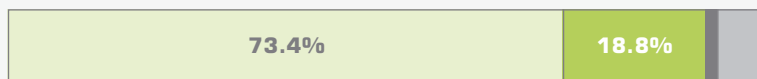
**All delegates** (sample size 414)



**Delegates with LZC experience** (sample size 180)



**Developers with LZC experience** (sample size 64)



**Consultants with LZC experience** (sample size 50)

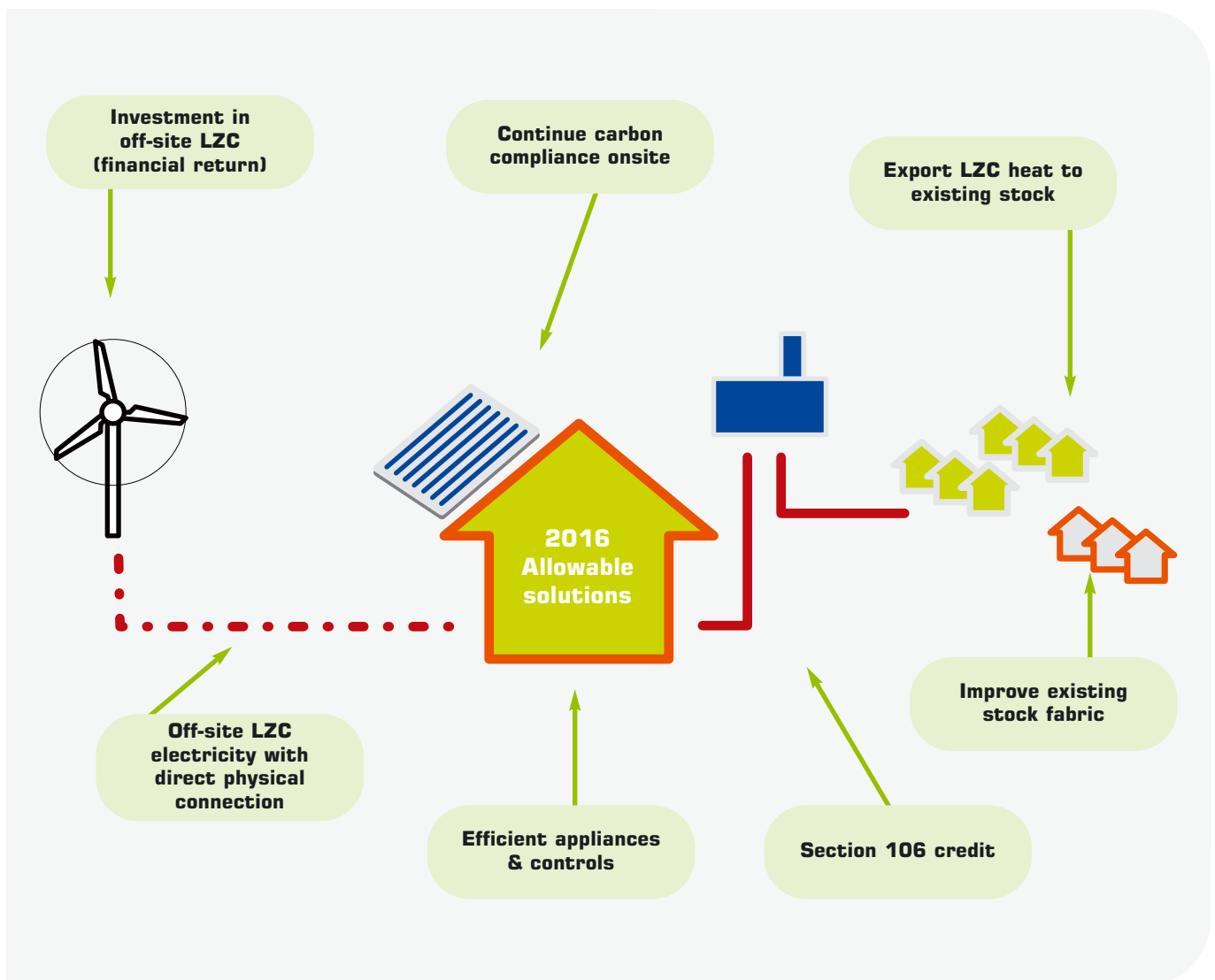


# Allowable solutions

Allowable solutions aim to provide a range of options to enable developers to achieve zero carbon in most situations. They are in an early stage of development and the list of suggestions included in the consultation is not exhaustive. Some are completely new concepts and more ideas may arise from the consultation. The seven current allowable solutions are shown in **Figure 12**. There are two allowable solutions that give credit for additional on-site emissions reduction, but the others are all off-site options.

**FIGURE 12**

The allowable solutions



Delegates were invited to vote on the inclusion of each of the seven allowable solutions. All seven received strong recommendation (of between 61 and 82 percent of the vote) for inclusion, as shown below.

- 82%** voted for inclusion of **Energy efficient appliances and controls**
- 81%** voted for inclusion of **Continuing carbon compliance measures**
- 74%** voted for inclusion of **Off-site renewable – direct connection**
- 69%** voted for inclusion of **Section 106 credit for LZC infrastructure**
- 65%** voted for inclusion of **Improving existing stock fabric**
- 65%** voted for inclusion of **Investment in off-site renewables**
- 61%** voted for inclusion of **Export of LZC heat to existing stock**

CLG is keen to understand the potential that is recognised in the industry for each of the allowable solutions. Presented in decreasing order of potential, this is a synthesis from a question that asked delegates to rate each allowable solution as having 'High' 'Some' or 'No' potential.

Continuing carbon compliance measures	<b>0.73</b>
Energy efficient appliances and controls	<b>0.70</b>
I06 credit for LZC infrastructure	<b>0.57</b>
Improving existing stock fabric	<b>0.52</b>
Off-site renewable – direct connection	<b>0.50</b>
Investment in off-site renewable	<b>0.48</b>
Export of LZC heat to existing stock	<b>0.36</b>

In this chart: **1.00** = everyone selecting high potential  
**0.00** = nobody recognising any potential

### Timescale

In the consultation, CLG sought feedback on the timing for carrying out a major review of the allowable solutions. When delegates were asked if 2012, the date proposed by CLG, was the right time to carry out this review, a majority (61%) responded with a 'yes' vote. Of the delegates who voted 'no' to this date, most wanted a date earlier than 2012. Overall just over three quarters of the delegates preferred the review of allowable solutions on or before 2012.

### Complexity

While delegates, as indicated above, did recognize potential in the adoption of the various allowable solutions, informal feedback from the 'Have your say' events indicated concern over the likely complexity of the allowable solutions concept as a whole. Some were concerned over the complexity of policing the allowable solutions and others over whether or not the ideas could be delivered in a practical way. During these events and at subsequent consultation events and meetings, Zero Carbon Hub staff have encountered quite strong concerns over these points and how each allowable solution would work. The biggest concern expressed was a worry that the allowable solutions could form a further complex framework for the industry to grapple with to achieve delivery.

# Validation and enforcement

The consultation seeks views on how best to ensure that zero carbon performance is achieved and maintained on developments. It is logical that enforcement of the energy efficiency backstop would be the responsibility of building control bodies (public and private). However, validation and enforcement of the allowable solutions is a task requiring quite different approaches and skills to those currently available through building control or planning departments. In addition, allowable solutions may involve activities associated with remote generation outside local authority boundaries.

On-site generation of heat and power and enforcement of carbon compliance are also a step beyond the normal existing remit of building control. In the 'Have your say' events, delegates were asked their views on where they thought responsibility should lie for both carbon compliance and allowable solutions. It should be appreciated that this is a major area for wider consideration beyond this consultation and these questions were asked simply to test the water.

Over 67% of delegates thought that the building control system provided the right regulatory framework for delivering carbon compliance (**Figure 13**). Within different interest groups the voting varied, but in all cases the 'yes' vote for building control had an overall majority over the other categories.

For allowable solutions, delegates were invited to vote for a range of options for enforcement. While overall there were more votes for the establishment of a new accredited body (**Figure 14**), a significant number selected building control as their preferred option.

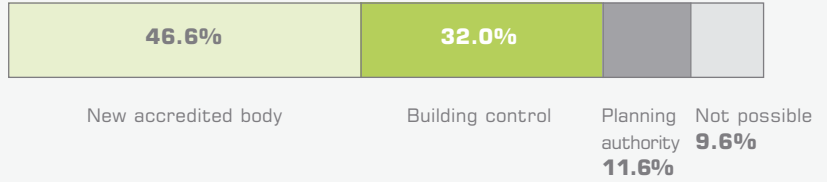
**FIGURE 13**  
**ENFORCING CARBON COMPLIANCE**

RESPONSE TO THE QUESTION:  
Is the building control system  
the right regulatory framework  
for carbon compliance?  
(All delegates – sample size 413).



**FIGURE 14**  
**ENFORCING**  
**ALLOWABLE SOLUTIONS**

RESPONSE TO THE QUESTION:  
Who do you think is best placed to enforce the allowable solutions?  
(Responses from all delegates who voted – sample size 396)

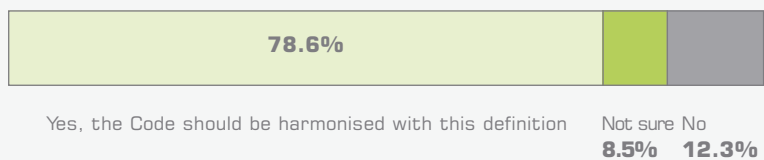


# Link with the Code for Sustainable Homes

Energy policy for homes is being taken forward through a number of routes and the Code for Sustainable Homes is a major driver for achieving low and zero carbon homes. However, the definition used in the Code is significantly different to that being proposed by the new consultation. This current lack of harmony may be acceptable to some (with the Code continuing to provide an aspirational standard for individual houses) or, to others, it might be an unwanted complication. Delegates were asked for their views on whether the definition for zero carbon being developed in the new consultation should be used by the Code for Sustainable Homes (**Figure 15**).

**FIGURE 15**  
**HARMONISING THE**  
**ZERO CARBON DEFINITION**

RESPONSE TO THE QUESTION:  
Should the energy section of the Code for Sustainable Homes be revised to reflect the outcome of this consultation?

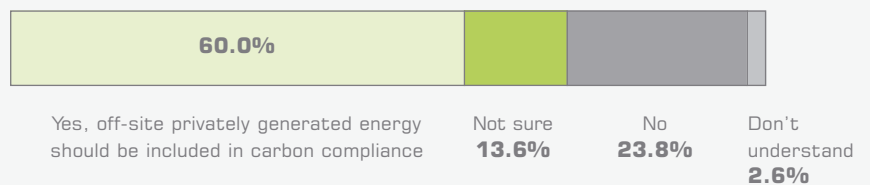


# Privately-generated off-site renewable energy

In the definition of zero carbon consultation document, there is a great deal of consideration applied to the issue of off-site renewable energy generation. There are major cost, management, infrastructure, legal and energy supply implications associated with the decisions made. The Government prefers an approach where a privately-generated off-site renewable energy option be included in the allowable solutions, rather than being seen as part of the carbon compliance. At the events, and following a brief introduction, the majority of delegates (60%) responded with a view that privately developed off-site energy should be part of carbon compliance and 24% opposed (**Figure 16**).

**FIGURE 16**  
**OFF-SITE PRIVATELY-GENERATED RENEWABLE ENERGY**

RESPONSE TO THE QUESTION:  
Should off-site privately-generated renewable energy be included in carbon compliance?



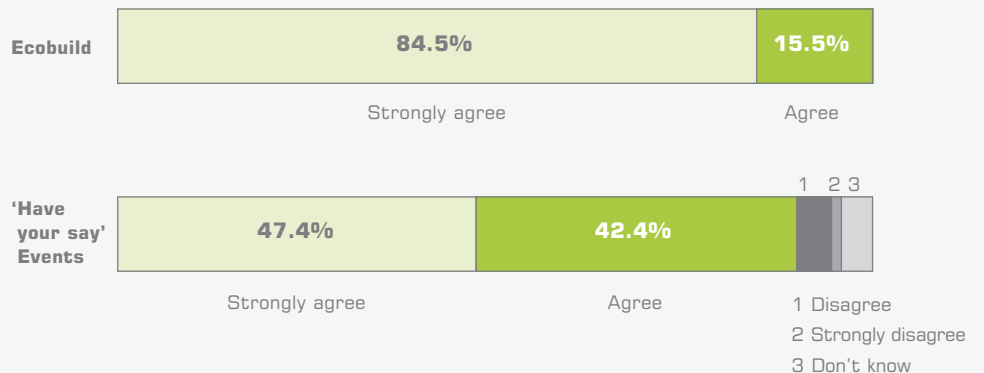
# Ecobuild 2009

Zero Carbon Hub focused on the zero carbon definition consultation at the Ecobuild 2009 conference and exhibition held at Earls Court, London, during the first week of March. This was promoted as ‘last chance to have your say’ and we invited guests to contribute to the definition debate through a competition.

At the event, we trialed further simplification and clarification props and displays to encourage interest and engagement. We provided experts on the stand who were able to explain the significance behind the questions and were very busy for the duration of the exhibition. On a one-to-one basis it was easy to see where our messages were clear and where they still needed attention. Overall, 45 people took the time to complete the competition entry form and gave responses to four questions. Two results are compared below (Figure 17 and 18) with the overall results obtained from the national ‘Have your say’ events. There are significant differences between the two data sets, but it is not known if this is due to markedly different participants, the different information approach/environment, or the one-to-one attention given to guests. Ecobuild delegates were even more strongly behind the introduction of legislation for energy efficiency and slightly favoured the 100% carbon compliance option in the consultation.

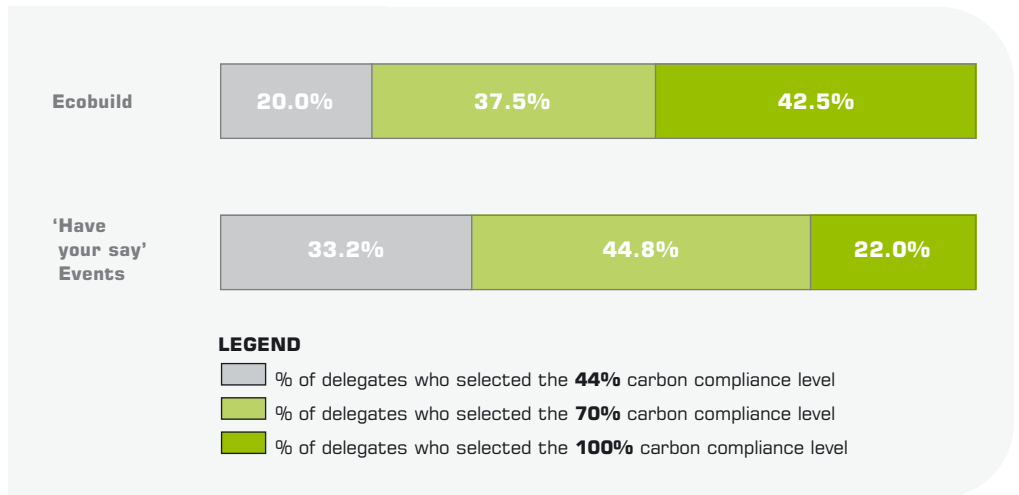
**FIGURE 17**

RESPONSE TO THE QUESTION:  
Do you agree with the  
introduction of legislation for  
energy efficient homes?



**FIGURE 18**

RESPONSE TO THE QUESTION:  
Where should the carbon compliance level be set? Percentage of votes for the proposed 44%, 70% or 100% carbon compliance level.



# Conclusions and further work

- Of the delegates to the events, which included housebuilders, developers, local authorities, RSLs, manufacturers, consultants and academics, **only about a fifth came to the event with an accurate perception of the magnitude of carbon emissions reduction that would be required in a zero carbon home. 41% of people significantly underestimated the reduction required.**
- The overall majority of delegates (**over 90%**) agreed or strongly agreed that the Government should legislate for higher energy efficiency in homes. This view was consistent across all parties represented.
- The overall perception of the challenge posed by high energy efficiency standards (which were described broadly as EST Advanced Practice standards) was very mixed. Some features, such as provision of highly efficient windows, were not seen to be highly challenging compared to provision of high efficiency MVHR, building very airtight structures and eliminating thermal bridging. **The most serious challenge was considered to be the ability to achieve design standards on site.**

- **On the key issue of carbon compliance, the feedback from all delegates indicates a slight preference for the adoption of a 70% compliance level.** However, it should be noted that developers and housebuilders are equally split between adoption of 44% carbon compliance and a value at 70% or above.
- **Overall, there was a positive reaction to inclusion of the seven proposed allowable solutions.** Delegates varied in their views on the potential of each allowable solution. The distribution of views suggested that there is still much to do to explain the likely benefits of each in particular circumstances and how each could be structured without adding a significant level of complexity.
- **The events highlighted four areas of work that the Zero Carbon Hub will focus on over coming months:**

#### Building awareness and understanding

It is concerning to note the relatively low level of understanding of the current definition of zero carbon and its requirements. It is a key role for the Zero Carbon Hub to continue to disseminate information about low and zero carbon homes.

#### Cost

Issues regarding the upfront cost of zero carbon were raised regularly in the open sessions and many of the delegates at the events thought that some of the additional costs for low and zero carbon included within the consultation were underestimated. The Zero Carbon Hub is now working with developers and housebuilders on an individual basis to consider how their estimates compare with the scenarios costed in the consultation documents. In addition, with key stakeholders, the Zero Carbon Hub will explore potential financial mechanisms for reducing upfront costs of delivering zero carbon.

#### Allowable solutions

In both voting and open sessions, delegates raised significant concerns about issues regarding the complexity of some of the proposed allowable solutions and the framework within which they would work. In the consultation, these are described only as concepts and the Zero Carbon Hub will work with CLG and others to develop these ideas.

#### Validation and Enforcement

Delegates also raised concerns about the regulatory process for 'signing-off' zero carbon homes. This is a complex matter and the Zero Carbon Hub will work with others to develop ideas to take this forward. Work has started in conjunction with the Local Government Association and other key stakeholders, such as the Building Control Alliance.

- Overall the Zero Carbon Hub concluded that the events had been successful in building up the significance of the definition consultation and bringing delegates forward in their understanding of the concepts.



# Observations about the 'Have your say' process

- Despite the current economic downturn, the Zero Carbon Hub's 'Defining zero carbon homes – have your say' events attracted more than 500 delegates from across the housing sector.
- Communities and Local Government colleagues contributed actively to the development of the 'Have your say' events and to the presentations and discussions at each venue. The presence of Government officials at the events provided delegates with direct and informative insights into Government thinking on this complex issue.
- The events were marketed as an opportunity for participants to contribute actively and easily to a debate of huge national importance and also emphasised the Zero Carbon Hub's independent role. **The success of these events, which combined marketing effort with other collaborative organisations and the effective use of the latest handheld voting technology, has provided a blueprint for delivery of similar consultation events by the Zero Carbon Hub in the future.**
- The small delegate fee appeared not to be a barrier to attendance. The charging model enabled the Zero Carbon Hub to invest in interpretative material which will be valuable in the Hub's wider activities.
- A number of the events shared venues with NHBC's Building for Tomorrow seminars with the central London event being run in conjunction with Sponge. This mutual support provided significant efficiencies and cross-marketing opportunities.
- Feedback from the events is highly instructive and provides clear messages for the Zero Carbon Hub in its facilitation role. **It identifies consensus on certain issues and differing opinions in others. It also identifies areas where industry has concerns about delivery and areas where it is more confident.**

## References

1. Definition of zero carbon homes and non-domestic buildings. Consultation. December 2008. Department for Communities and Local Government.
2. The definition of zero carbon homes. 2008. UK Green Building Council.

# Zero Carbon Hub

The Zero Carbon Hub was established in the summer of 2008, to support the delivery of zero carbon homes from 2016. It is a public/private partnership drawing support from both government and the industry and reports directly to the 2016 Taskforce.

The Zero Carbon Hub is managed by its own Board of senior industry representatives:

Paul King (Chairman)

Neil Jefferson (CEO)

David Adams (Director)

Trevor Beattie (HCA)

Imtiaz Farookhi (NHBC)

Mike Freshney (HBF/Robust Details Ltd)

Bob Ledsome (CLG)

Ray Morgan (LGA)

John Tebbit (CPA)

Zero Carbon Hub has developed five workstreams to provide a focus for industry engagement with the key issues and challenges:

**Energy Efficiency**

**Energy Supply**

**Examples and Scale Up**

**Skills and Training**

**Consumer Engagement**

To find out more about these workstreams, please visit [www.zerocarbonhub.org](http://www.zerocarbonhub.org). If you would like to contribute to the work of the Zero Carbon Hub, please contact [info@zerocarbonhub.org](mailto:info@zerocarbonhub.org).

The Zero Carbon Hub team that was involved in the development and running of the 'Have your say' events and generating this report included:



**Neil Jefferson**

**CHIEF EXECUTIVE**



**David Adams**  
**DIRECTOR**



**Rob Pannell**  
**HEAD OF  
HOUSE BUILDING**



**Clive Turner**  
**INFORMATION  
MANAGER**



**Matt Robinson**  
**COMMUNICATIONS  
MANAGER**



**Ted Chandler**  
**INTERACTIVE  
TECHNOLOGY**



**Madeline Logan**  
**EVENTS MANAGER**



**Ross Holleron**  
**ENERGY  
CONSULTANT TO THE  
ZERO CARBON HUB**



**Jayde Lucas**  
**EVENTS  
ADMINISTRATOR**

This publication was produced to ISO14001 Environmental Management System standards, and 95% of the waste created during the process was recycled. The materials used included vegetable oil inks, elemental chlorine free pulp and fibre from managed forests. The publication was made CarbonNeutral.® The unavoidable CO<sub>2</sub> emissions created during the manufacturing process were neutralised through investment in climate friendly projects around the world.

**LONDON OFFICE**

62-68 Rosebery Avenue  
London EC1R 4RR

**MILTON KEYNES OFFICE**

NHBC House, Davy Avenue  
Milton Keynes MK5 8FP

**T 0845 888 7620**

**F 0871 813 0569**

**info@zerocarbonhub.org**

**www.zerocarbonhub.org**



**Mixed Sources**  
Product group from well-managed  
forests and other controlled sources  
Cert no. SGS-COC-003351  
www.fsc.org  
© 1996 Forest Stewardship Council



CarbonNeutral.com  
CO<sub>2</sub> emissions reduced to  
net zero by investment in  
the CarbonNeutral Project