



# ZERO CARBON HUB

**NEIL JEFFERSON**



FACILITATING THE MAINSTREAM DELIVERY OF LOW AND ZERO CARBON HOMES



## TCPA SEMINAR – 18 MAY 2010

### AGENDA

- Introduction to the Zero Carbon Hub
- Zero carbon definition – update
- Low carbon homes
- Fabric Energy Efficiency Standard
- Skills and training



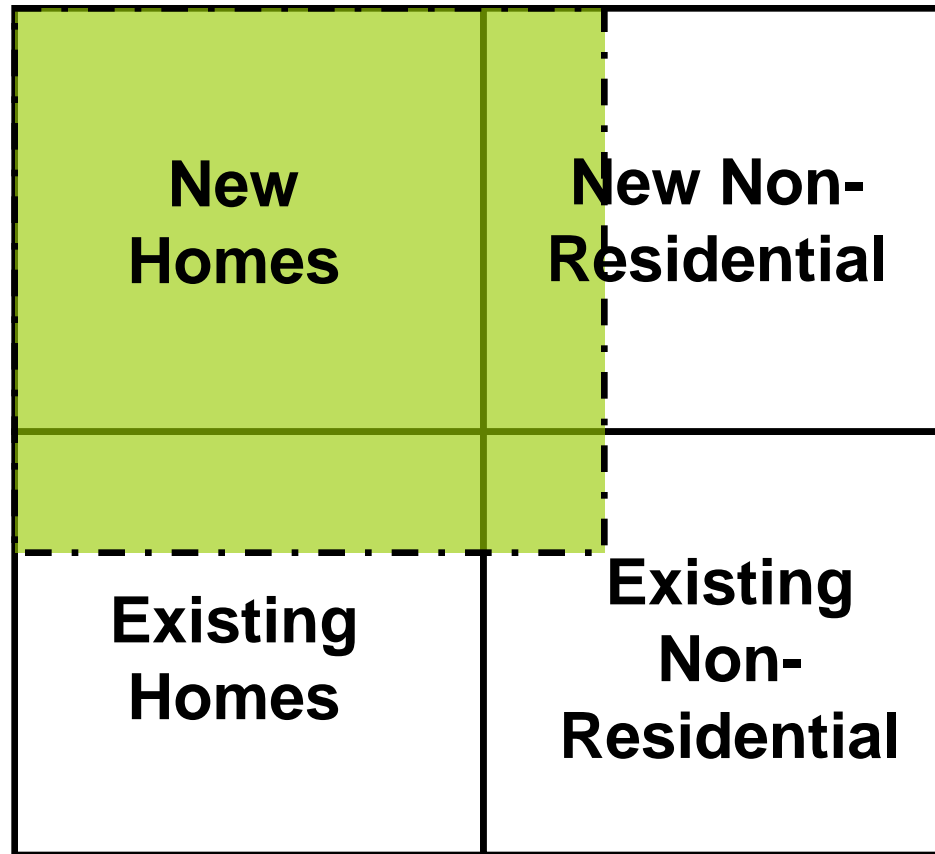
# INTRODUCTION TO THE ZERO CARBON HUB

## BACKGROUND

- “Government and the house-building, construction products and energy supply industries should jointly sponsor a delivery unit to monitor, co-ordinate and guide the zero carbon programme.” - Callcutt Nov 2007
- Launched in 2008
- Co-funded by private and public sectors
- Report progress to the 2016 Taskforce
- Broad-based representation and constitution
- Focussed on new homes



## OUR CURRENT POSITION





# ROLE OF THE ZERO CARBON HUB

## PURPOSE AND STRATEGIC OBJECTIVES

*Facilitate the mainstream delivery of low and zero carbon homes*

- Provide leadership and create confidence
- Reduce risk and clear obstacles
- Disseminate information



**2016 TASKFORCE**

**Paul King, Chair**  
(UK-GBC)

**ZERO CARBON  
HUB BOARD**

**Neil Jefferson, CEO**  
**David Adams, Director**

**ZERO CARBON HUB WORKSTREAMS**

**Energy efficiency**

**Rob Pannell**  
Head of House Building

**Imtiaz Farookhi**  
NHBC

**Energy supply**

**Ross Holleron**  
Head of Energy Supply

**Mike Freshney**  
HBF/RD Ltd

**Examples and scale up**

**Clive Turner**  
Information Manager

**Ray Morgan**  
LGA

**Skills and training**

**Annie Hall**  
Manager

**John Tebbit**  
CPA

**Consumer engagement**

**Matt Robinson**  
EST

**Bob Ledsome**  
CLG

**Trevor Beattie**  
HCA

**Madeline Logan**  
PA/Office Manager



## FIVE WORKSTREAMS

**Energy  
Efficiency**

**Energy  
Supply**

**Examples**

**Consumer**

**Skills**



# EXAMPLES

**LZ CARBON PROFILE**  
Profile: 009  
June 2009

**The BASF House**  
Level 4 Code for Sustainable Homes  
CO2 emissions: **At least 44% reduction**  
Developer: **BASF**  
Architect: **Derek Trowell Architects**  
Completed: **January 2008**  
Location: **University of Nottingham**

The BASF Project is a housing development providing storey high and a dist...  
The aim of Sustainable Passivhaus completed replicable

**Low-carbon approach**  
Fabric The concrete thermal mass (EPS) will incorporate provide as cooling the finished w Micronal systems a  
Heat and zero carb as the pro heat of the entering t majority of locally gric and water

**Miller Homes Miller Zero Housing Project**  
Level 6 Code for Sustainable Homes  
Targetting **148% reduction over Part L2006**  
Developer: **Miller Homes Ltd**  
Architect: **Fraser Brown MacKenna Architects**  
Expected **May/June 2009**  
Location: **Basingstoke, Hampshire**

CO2 emissions:  
Developer:  
Architect:  
Completion:  
Location:

The Miller Homes Miller Zero housing project comprises the homes complying with Code levels 3, 4, 5 and 6. The development is an R&D project aimed at showcasing how these various code levels dwellings can be produced and the implications for the supply chain.

The level 6 house is a two-storey 4-bedroom house with a floor area of 105m<sup>2</sup>. It uses products that are available on the market and aims to put them into functional use while demonstrating that zero carbon housing can be achieved today.

**Low-carbon approach**  
Fabric The walls are fabricated from storey high concrete concrete planks. An advantage of using this system is that due to the large size of the planks and the thin joint that mortar, there are fewer smaller joints through which air can leak, thus creating a more airtight envelope. Another advantage is their high thermal mass, which provides passive heating and cooling throughout the seasons. Exterior insulation minimises heat losses through the building envelope and through reduced thermal bridging.

**Heat and power generation** All heat and power generation comes from renewable resources. These include a biomass boiler connected to under floor heating and a hot water cylinder for maximum efficiency. A large photovoltaic array on the roof provides power.

**Ventilation** The house uses a mechanical ventilation system with an in-built heat recovery unit and summer by-pass option.

**LZ CARBON PROFILE**  
Profile: 011  
June 2009

**Southdale House**  
Level 3 Code for Sustainable Homes  
CO2 emissions: At least 10% reduction  
Developer: Al...  
Architect: N...  
Completed: J...  
Location: W...

**Adelaide Wharf**  
Ecohomes Excellent  
Developer: **First Base**  
Architect: **Alford Hall Monaghan Morris**  
Completed: **October 2007**  
Location: **Shoreditch, East London**

Adelaide Wharf is a development of 147 mixed tenure apartments, and 700 m<sup>2</sup> of office space. There are 73 flats for private market, 41 shared ownership for key workers, and 33 social rented.

Typical office building technologies have been utilised with a concrete frame clad with a unitised cladding system, which was craned from delivery trucks directly on to the building without the need for scaffolding. Pre-fabricated bathroom pods, plant rooms, balconies and dry lined internal partitions were also used. The developer calculates the project's design efficiency saved six months of construction time.

**Low Carbon Approach**  
Fabric A concrete frame construction was used with insulated unitised cladding panels interlocked to provide a high level of thermal performance, reducing energy consumption.

**Heat and power generation** A centralised gas-powered heating system, using gas condensing boilers, provides energy-efficient heating and hot water for each apartment through localised heat exchangers.



# ZERO CARBON COMPENDIUM

Who's doing what in housing worldwide



# JOURNEY TO ZERO CARBON HOMES

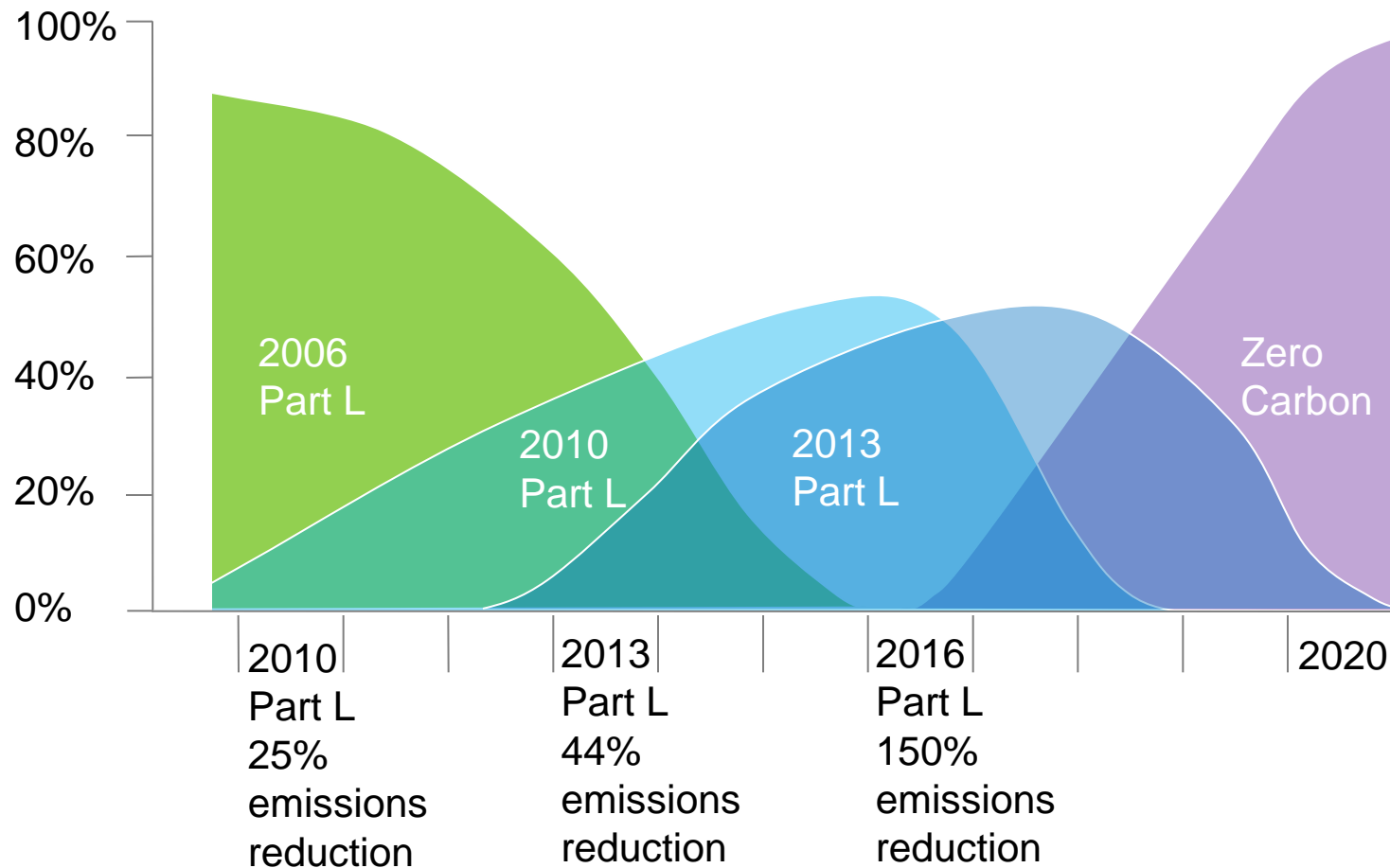
## CONTEXT OF PROPOSED CHANGES

- 80% cut in greenhouse gas emissions by 2050
- Homes = 27% of UK's CO<sub>2</sub> emissions
- 'Zero Carbon' new homes in England from 2016
  - 2010 – 25% reduction from 2006 levels
  - 2013 – 44% reduction from 2006 levels
  - 2016 – 150% reduction from 2006 levels
- Different targets for Scotland, Wales and Northern Ireland



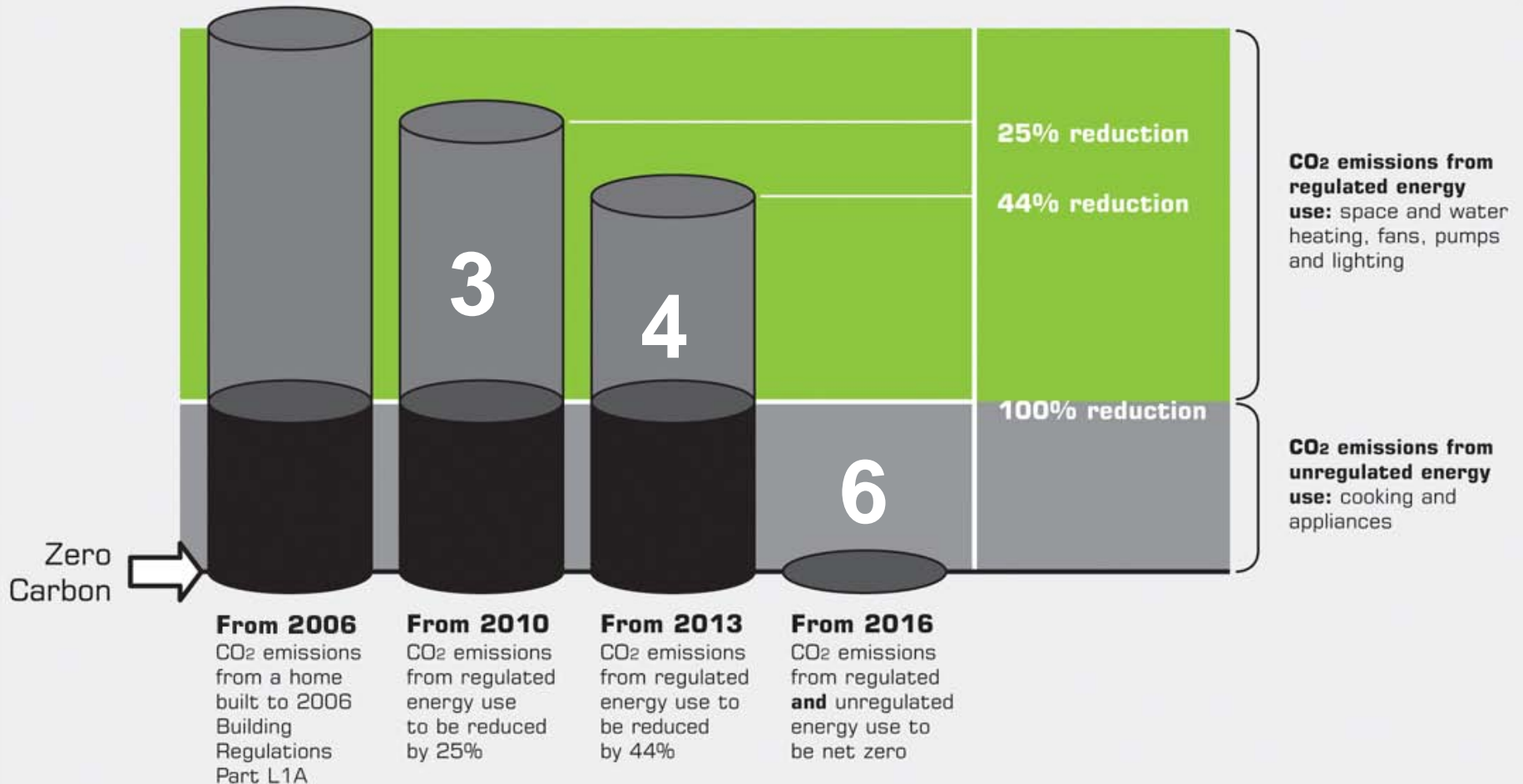
# JOURNEY TO ZERO CARBON HOMES

% of homes built





# JOURNEY TO ZERO CARBON HOMES

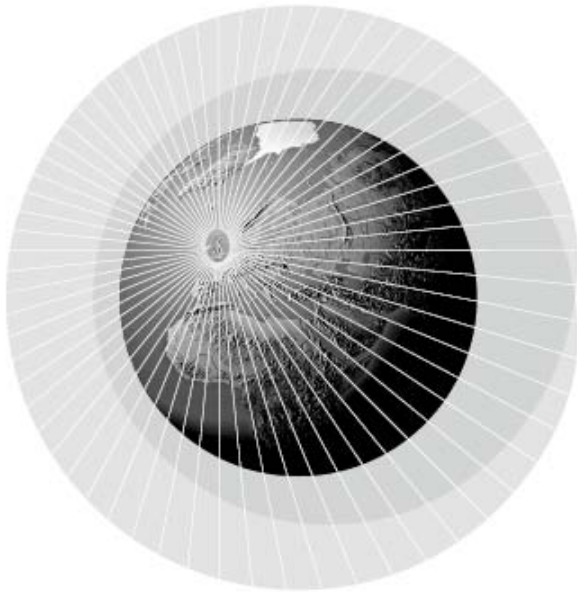




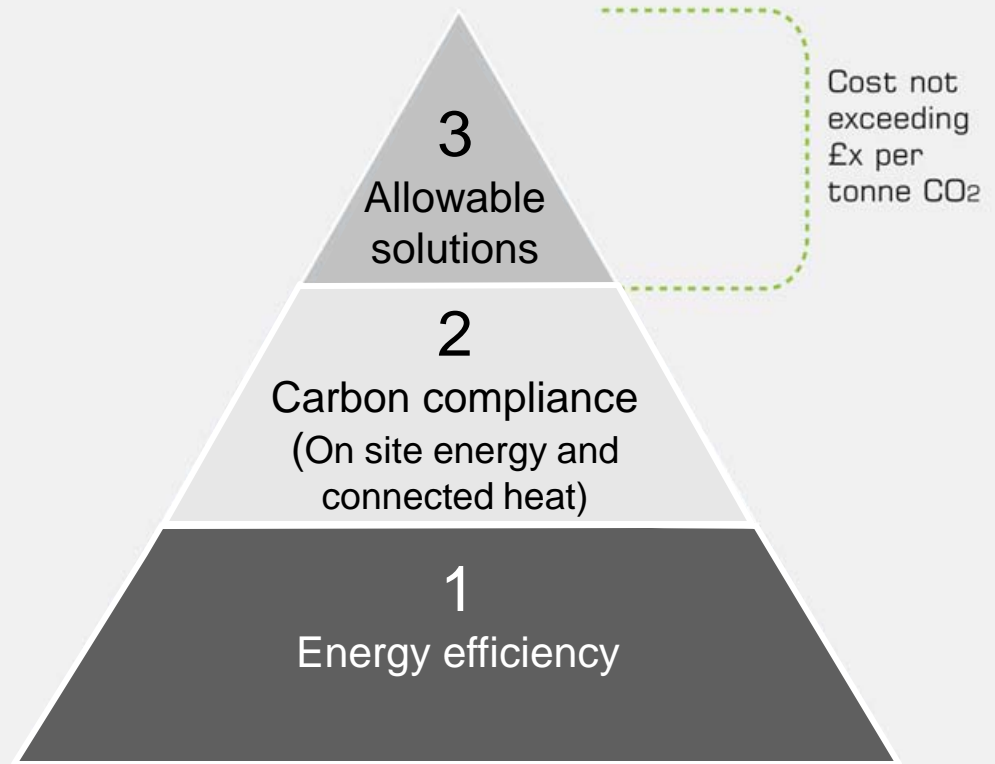


# ZERO CARBON DEFINITION

HM Government



 **DEFINITION OF ZERO CARBON HOMES AND NON-DOMESTIC BUILDINGS**  
Consultation  
DECEMBER 2008





# ZERO CARBON DEFINITION

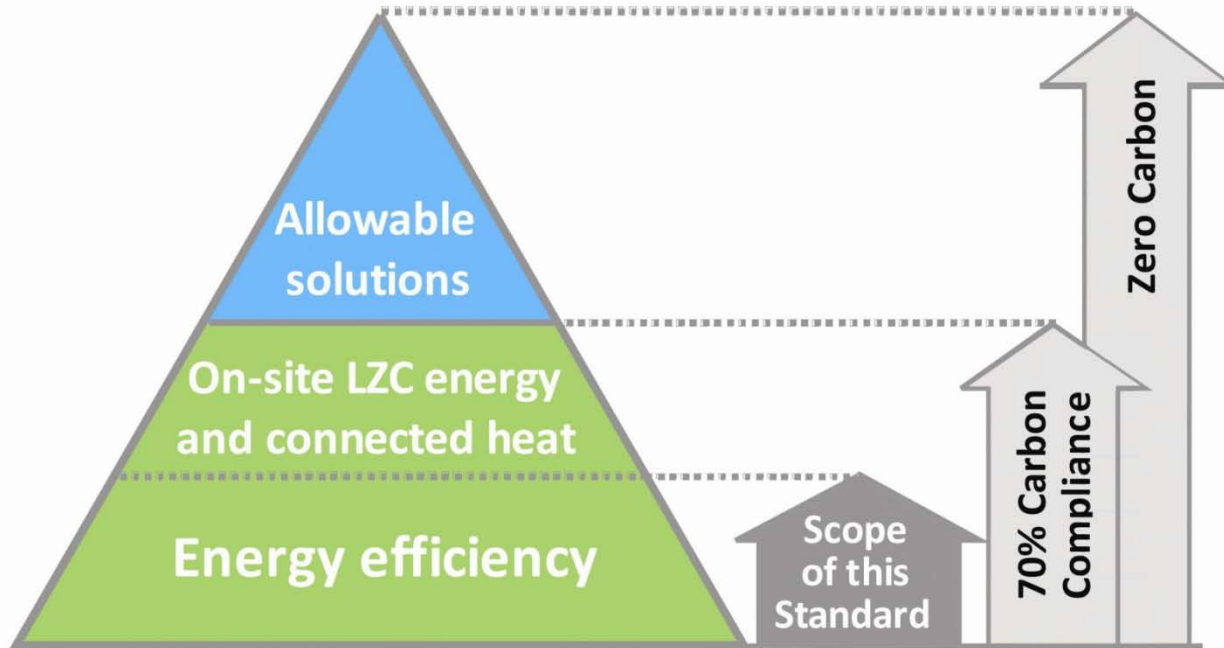
## WHERE ARE WE NOW?

### Summary:

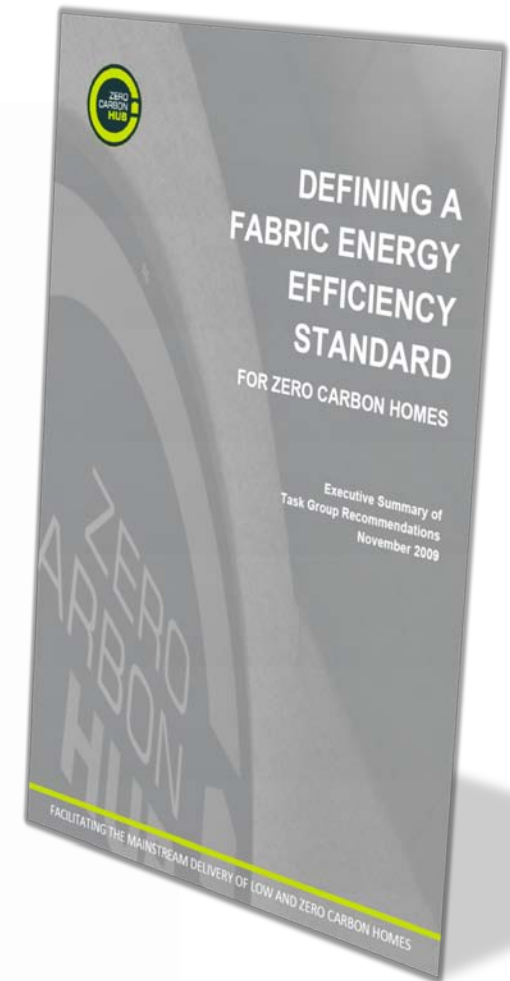
- Task Group (led by Zero Carbon Hub) proposed minimum energy efficiency standard - for inclusion in Code for Sustainable Homes
- Carbon compliance (energy efficiency + on-site renewables) will be set at approximately 70%
- 'Allowable Solutions' will be implemented to manage mitigation of residual CO<sub>2</sub> emissions



# ENERGY EFFICIENCY STANDARD



Zero carbon hierarchy





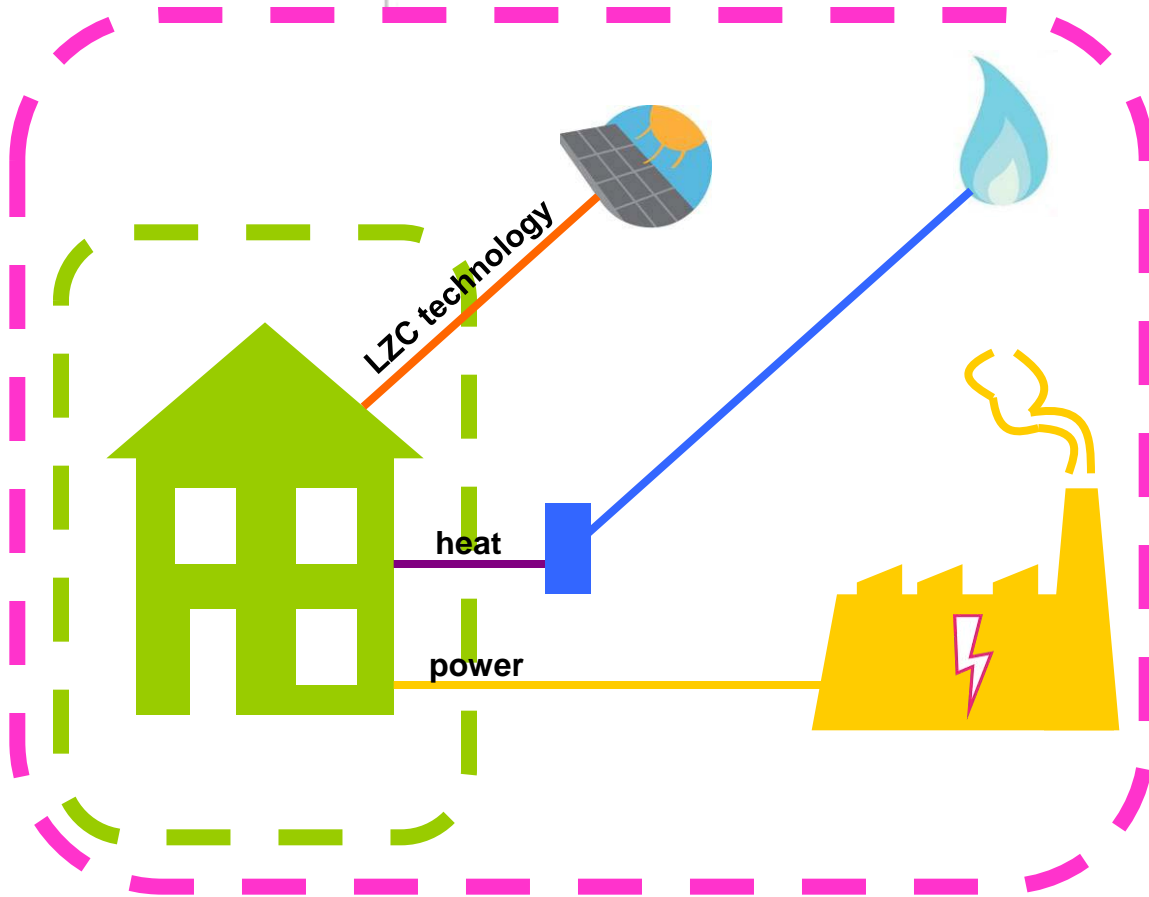
# ENERGY EFFICIENCY STANDARD

## ROLE OF THE HUB - BRINGING PEOPLE TOGETHER





# SCOPE OF 'ENERGY EFFICIENCY'



## Energy Efficiency Standard

- Building fabric U-values
- Thermal bridging
- Air permeability
- Thermal mass
- Solar, metabolic, lighting & appliance gains

## Carbon Compliance Standard

- Heating / cooling appliances (boilers, etc)
- Mechanical ventilation
- Hot water
- Active controls
- Fixed lighting
- All LZR technologies



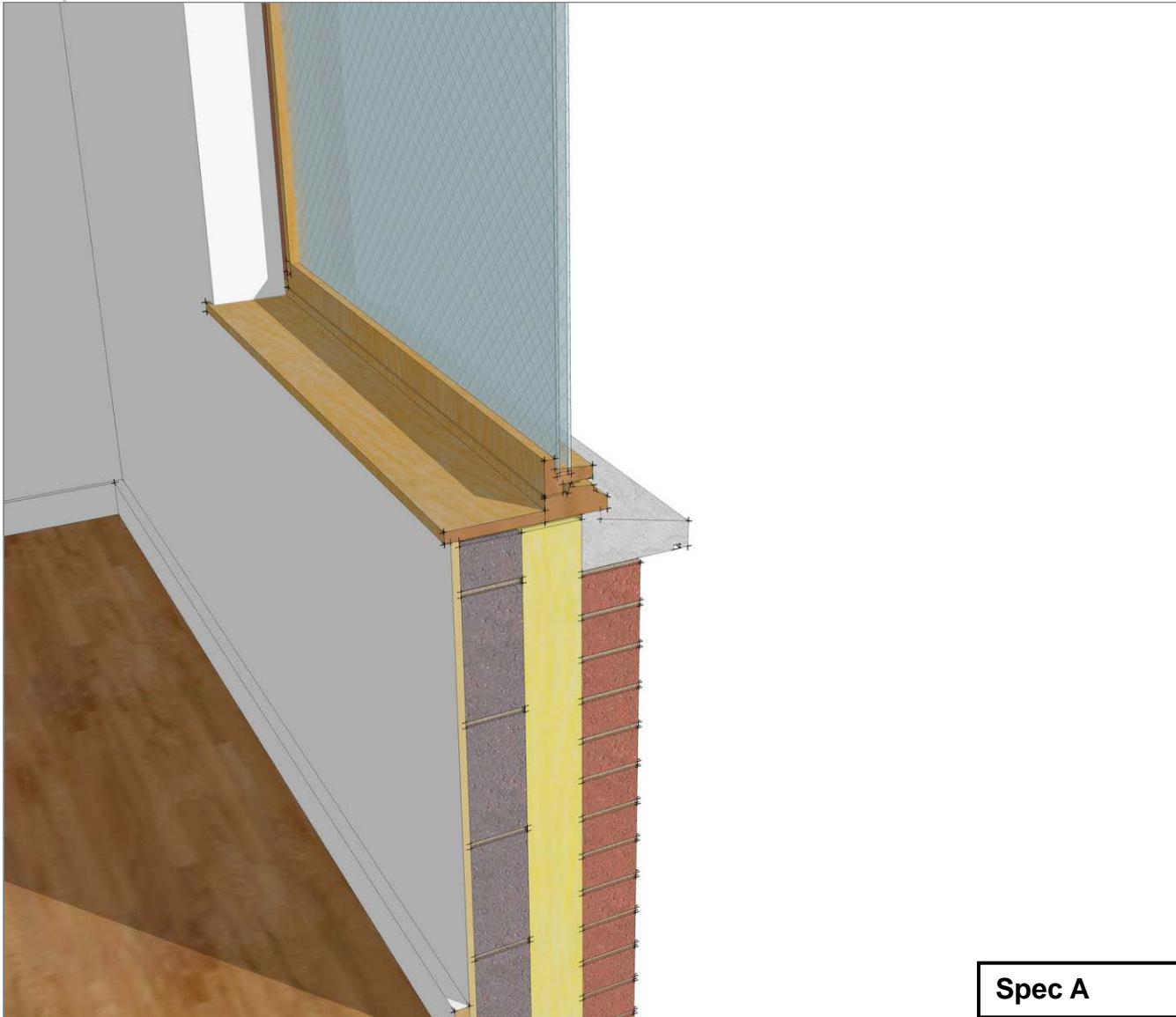
## DECISION CRITERIA

### **SPECIALIST TASK GROUP ASKED TO CONSIDER:**

- 1 Building Practices
- 2 Future proofed construction
- 3 Buildability at mass scale
- 4 Health and well being
- 5 Desirable at mass scale
- 6 Upfront build cost
- 7 Maintenance and energy costs
- 8 Energy security
- 9 Broader environmental



# BUILDABILITY: WALLS



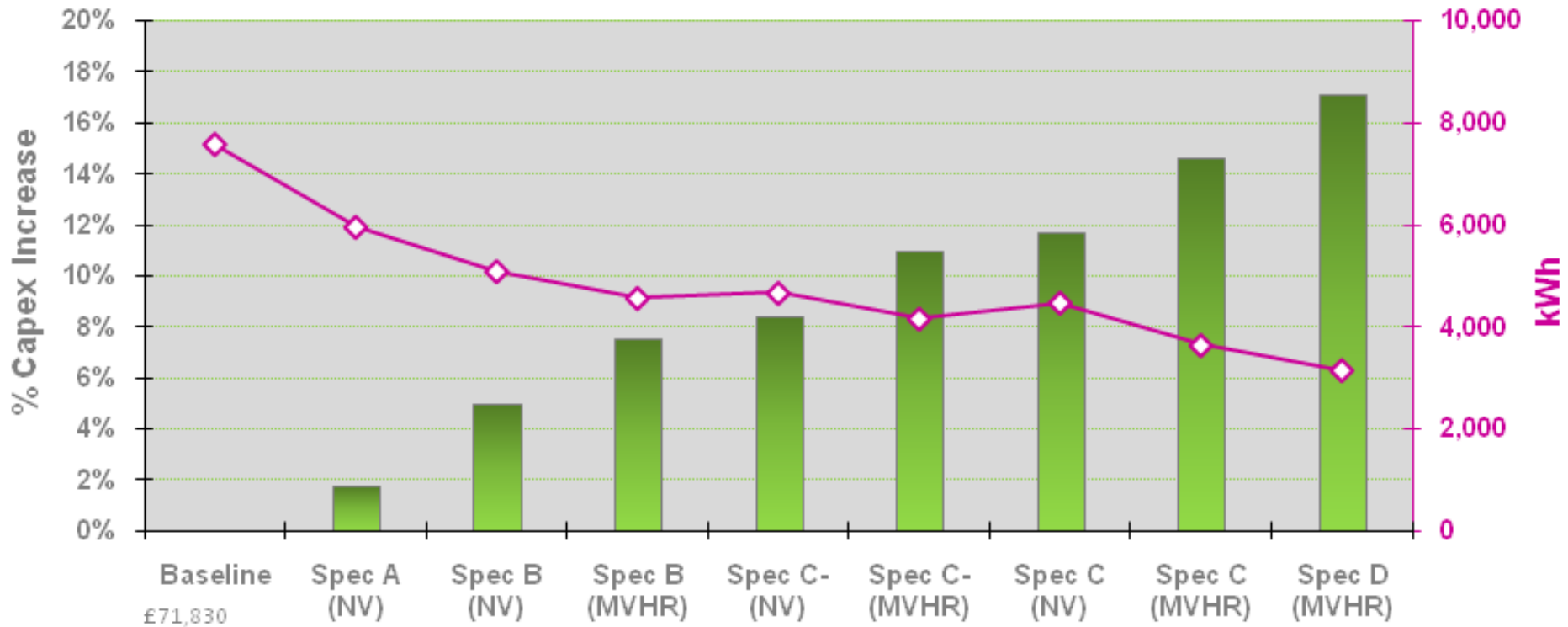
Spec A



# CAPITAL COST

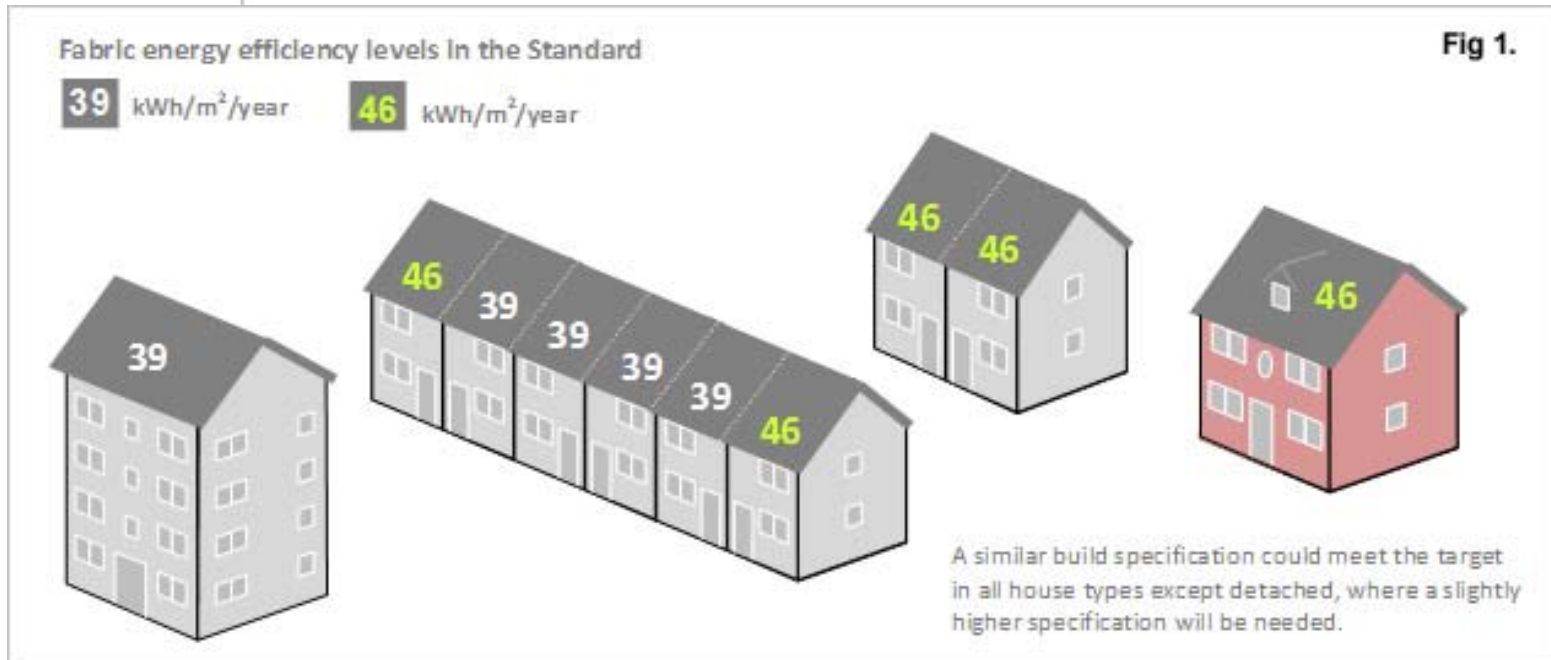
## Energy Efficiency Measures

### Semi detached house





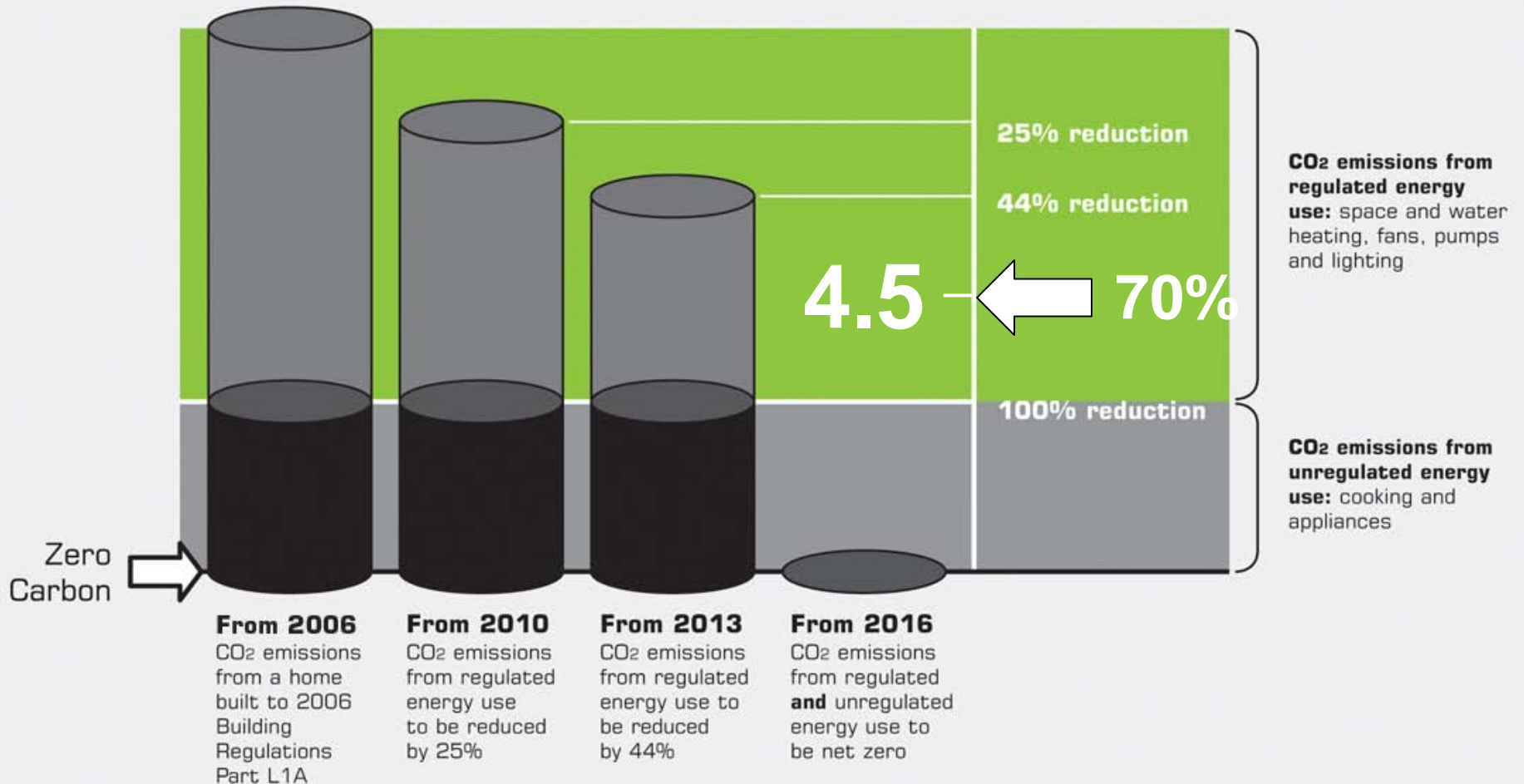
# RECOMMENDATIONS SUMMARY



- **Performance not prescriptive**
  - Space heating and cooling only
  - No U-value lists or specific limits on elements – use kWh/m<sup>2</sup>/yr
- **Two levels depending on dwelling type**
  - Objective being to allow similar construction challenges



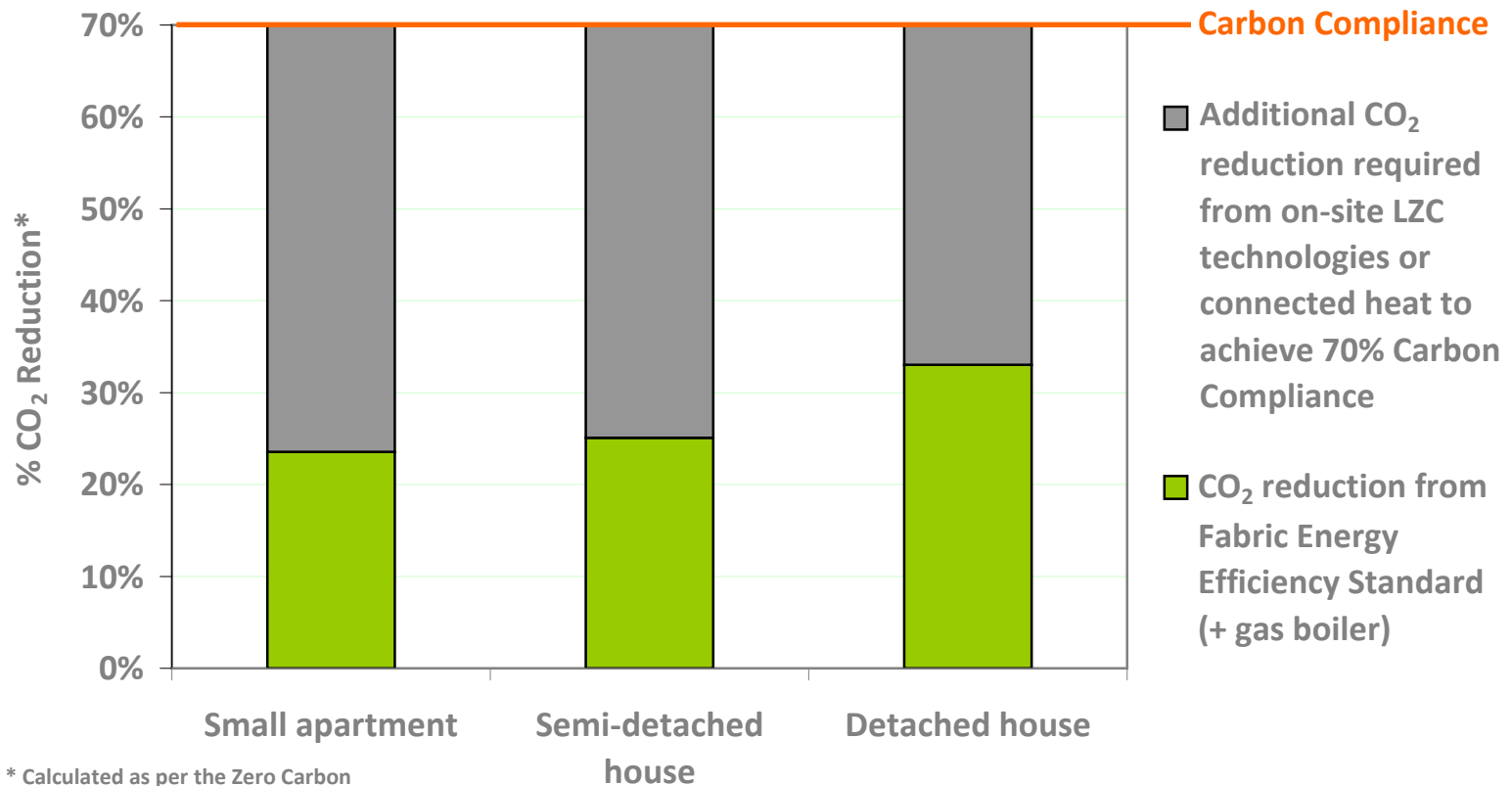
# JOURNEY TO ZERO CARBON HOMES





# WHAT THIS MEANS

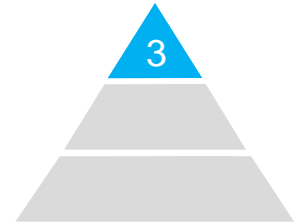
## Relationship with 70% Carbon Compliance



\* Calculated as per the Zero Carbon consultation document assumptions



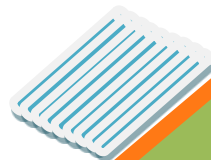
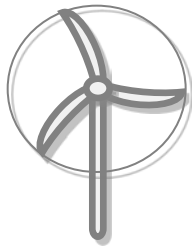
# ALLOWABLE SOLUTIONS



Investment in offsite LZC (financial return)

Continue carbon compliance onsite

Export LZC heat to existing stock



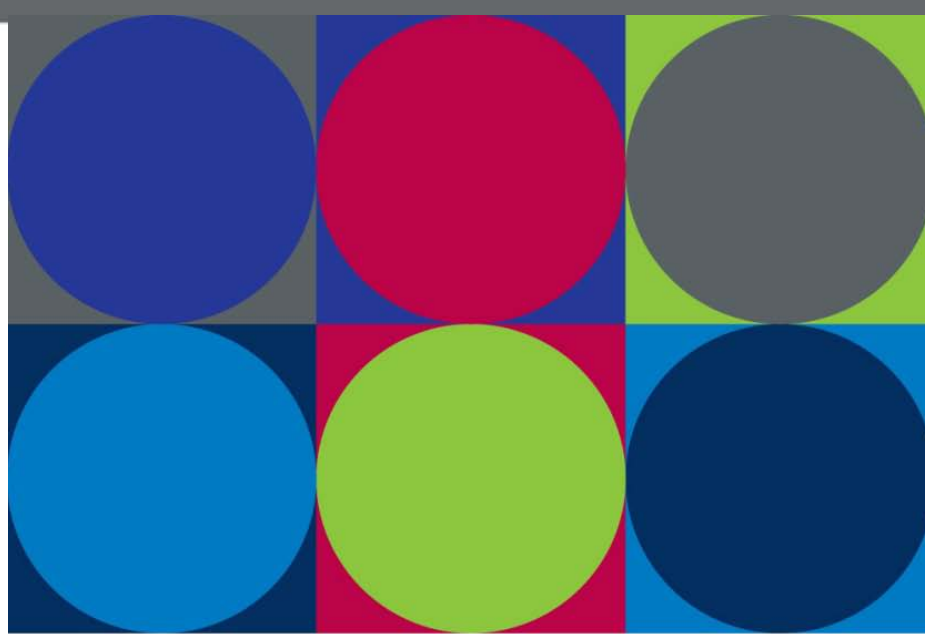
2016 Allowable solutions

Offsite LZC electricity with direct physical connection

Efficient appliances and controls

Section 106 credit

Improve existing stock fabric



# Home Building Skills

an action plan to 2020

[homebuilding-skills.com](http://homebuilding-skills.com)

## What home building professionals (individuals and employers) want and need from a portal

- Easy, searchable database of relevant solutions to meet skills, knowledge and CPD needs
- Additional advice on funding, buying guides, understanding the qualifications framework etc.
- Case studies of how individuals and employers are upskilling for the future
- Other benefits



## What the training providers want and need from a portal

- Listings of courses, qualifications etc.
- Visibility, profile and free marketing
- Feedback reports and business intelligence metrics
- Other benefits



# 4 main areas of value

2020

2016

2013

2010

1. Scenarios of home building to 2020  
- vision, insights and analysis of impacts

2. Skills matrix -  
recommendations of each job's skills, knowledge and CPD needs



3. Searchable database -  
a 'Google for home building skills'  
with signposts to all relevant training and qualifications providers

4. Continual 'NEW' updates





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