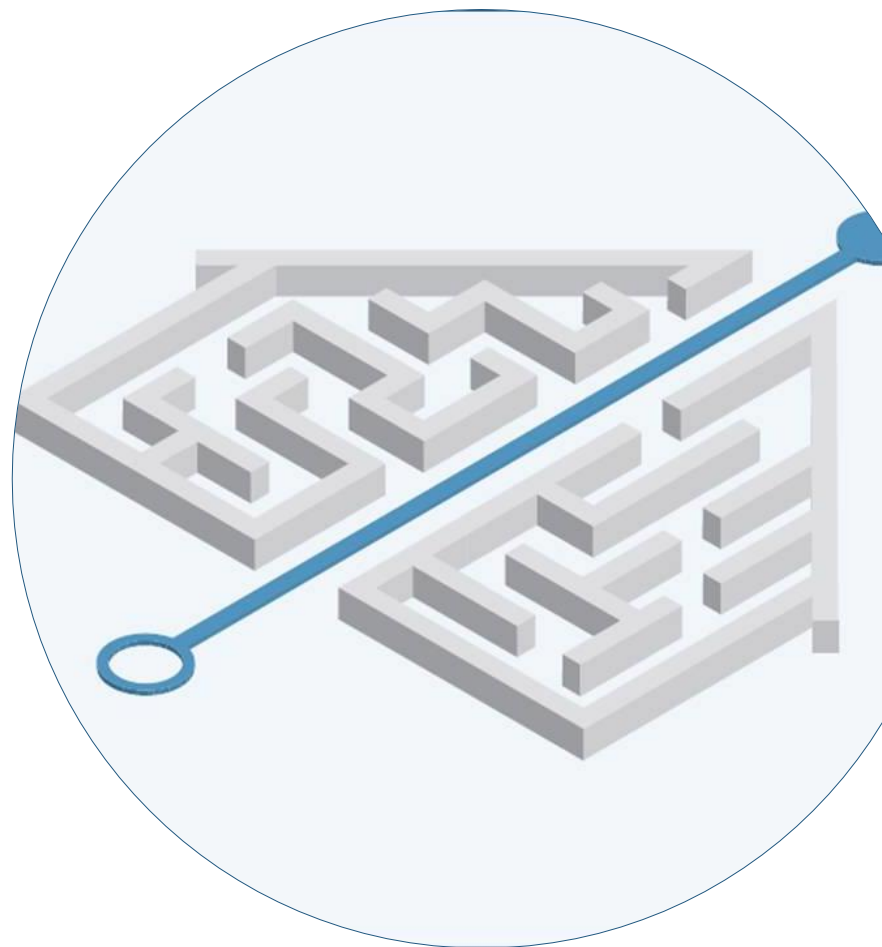


HBF TECHNICAL COMMITTEE ZERO CARBON POLICY UPDATE

Rob Pannell

14th October 2014



Overview

- What We Do
- Zero Carbon Policy Update
 - ZC Hierarchy and definition
 - Housing Standards Review
 - Allowable Solutions
 - The Performance Gap
- Immediate Priorities

Role of the Zero Carbon Hub

To facilitate the mainstream delivery of low and zero carbon homes

- Provide leadership and create confidence
- Work with industry & government
- Reduce risk and clear obstacles
- Disseminate information



ZERO CARBON

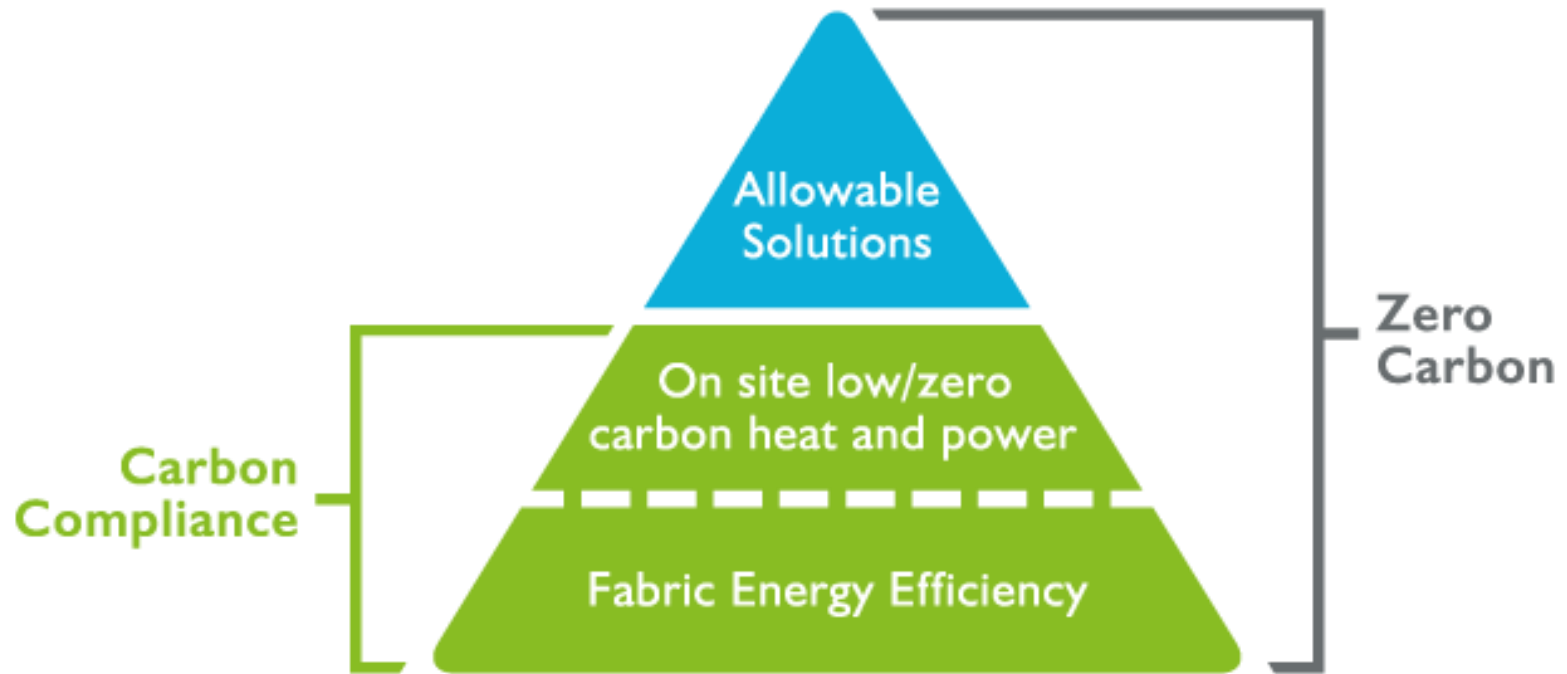
Hierarchy and definition



VIABILITY



Zero Carbon Hierarchy



investments in energy storage and demand-side management projects

investment in embodied carbon reduction initiatives

investment in retro-fitting of low-carbon technologies

investment in low carbon cooling

investment in low carbon electricity generation assets

investment in Energy-from-Waste plants

Investment in district heating pipework

OFF-SITE OPTIONS

investment in local low carbon street lighting

investment in local sustainable energy infrastructure

retrofitting of local communal buildings

low carbon heat export infrastructure

investment in local electric vehicle infrastructure

communal waste management solutions

local micro-hydro schemes

local energy storage solutions

NEAR-SITE OPTIONS

UK ZERO CARBON HIERARCHY

UNREGULATED EMISSIONS
(cooking, electrical appliances)

REGULATED EMISSIONS (heating, ventilation, lighting)

Allowable
Solutions

On site low/zero
carbon heat and power

Fabric Energy Efficiency

CARBON COMPLIANCE

home electricity storage

LED street lighting

ON-SITE OPTIONS

demand side management

site-based heat storage

home electric vehicle charging

vacuum waste collection systems

smart appliances

Green Gas Certificates

CHP
biomass
boilers

thermal bridging
high efficiency boilers
solar hot water

ground source heat pumps
air source heat pumps
photovoltaic panels

external heat gains

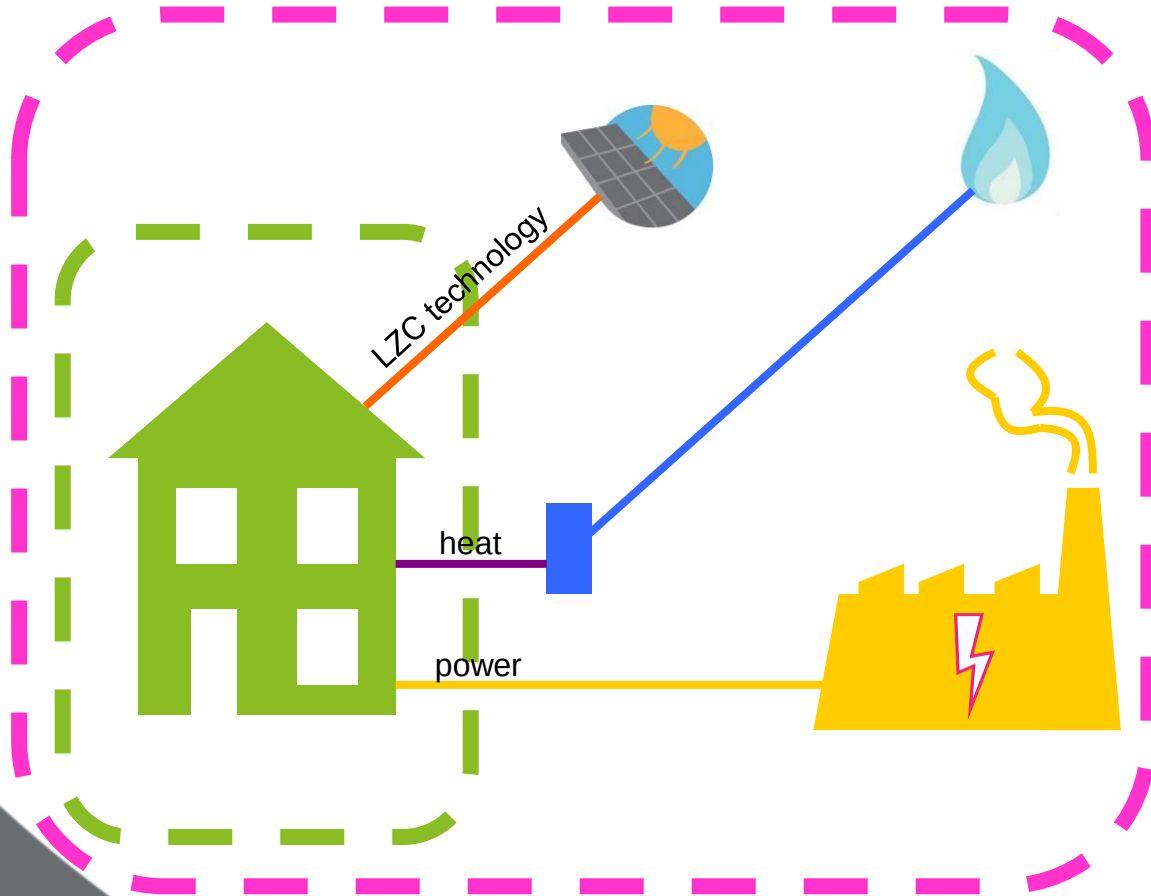
thermal mass

internal heat gains

air permeability

building fabric U-values

Scope of 'Carbon Compliance'



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 LZC technologies

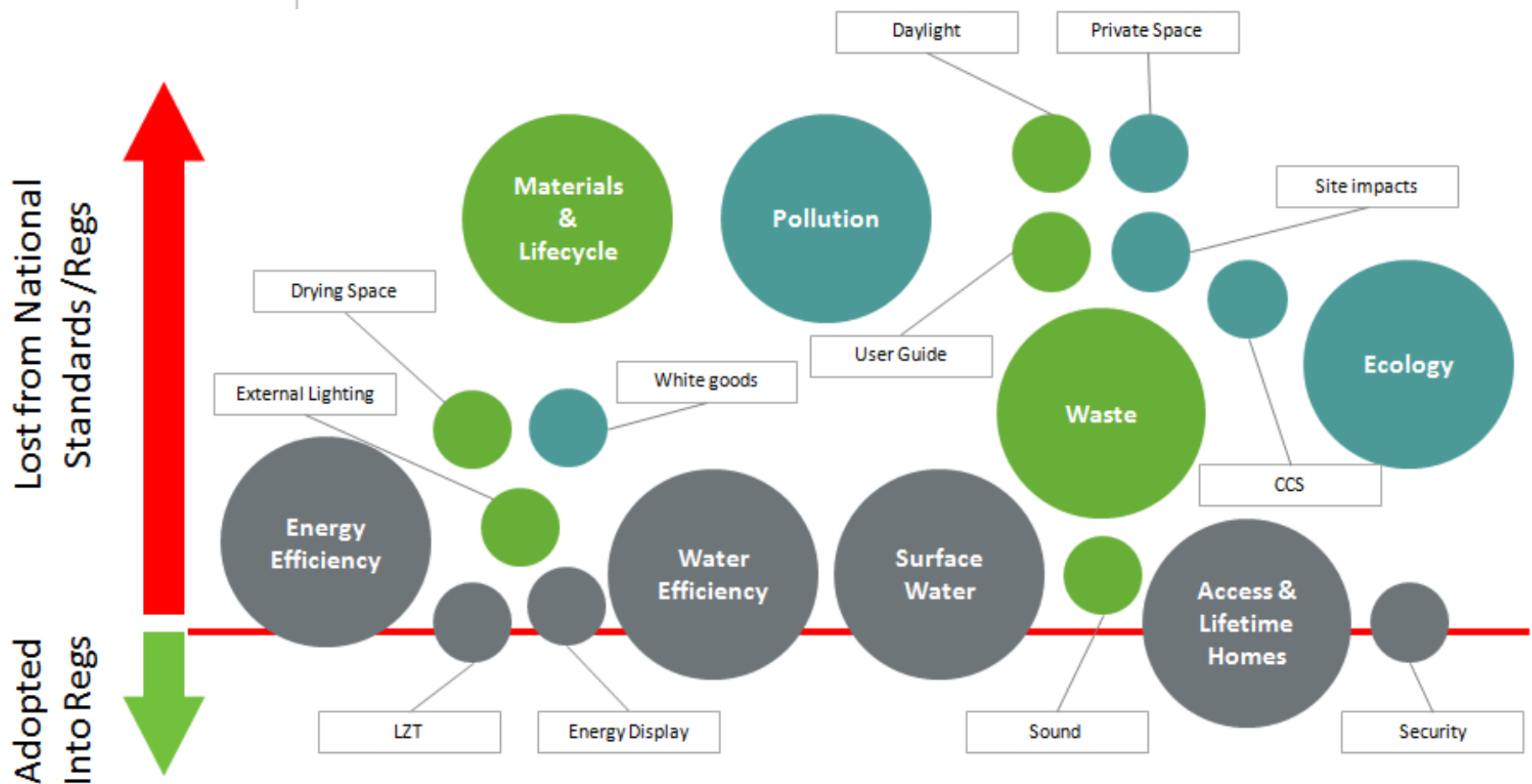
HOUSING STANDARDS REVIEW

Implications for the Zero Carbon Policy





Implications for the Code?



Source – BRE diagram featured in 'Analysis : A Code for Living,' Building Products Sept 2014

Transitional period – LA ability to influence EE up to 2016

ALLOWABLE SOLUTIONS

Developments to date

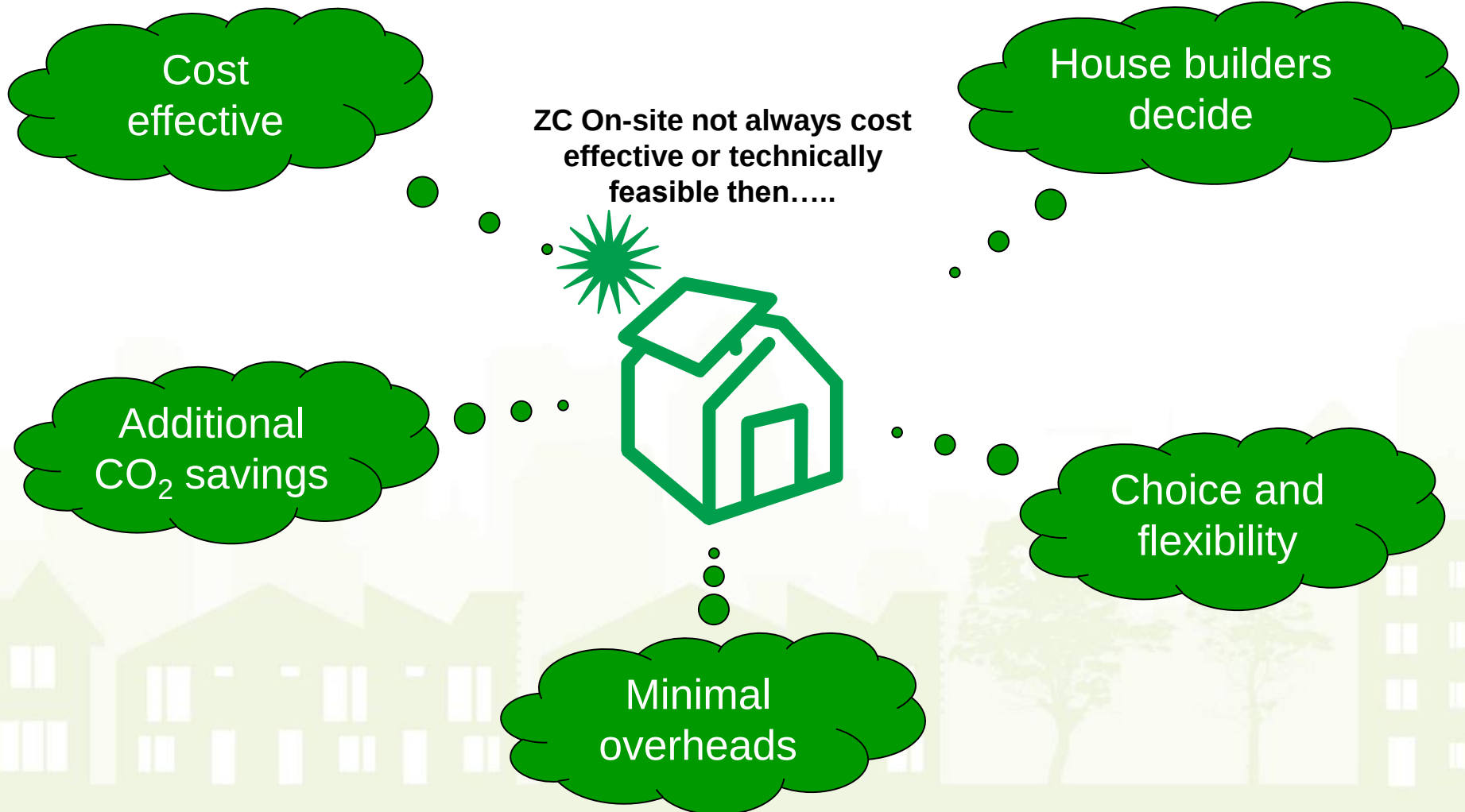


Allowable Solutions - The Journey to date





Design Principles for Allowable Solutions





A range of delivery models

100% On site

Beyond Carbon
Compliance

D.I.Y

Retrofit, heat networks,
Beyond Part L banking

**3rd Party
Contracting**

Direct, LA, matching,
brokerage

Invest in a Fund

Managing a portfolio of
projects



How do I achieve compliance?

Carbon still to be abated via Allowable Solutions will be calculated using the NCM

Energy and Infrastructure Bill

- Queen's Speech in July 2014

'Legislation will allow for the creation of an allowable solutions scheme to enable all new homes to be built to a zero carbon standard.....'

- Further clarity and consultation :-
 - National Framework (LA interaction)
 - Fund Price cap - £ per tonne of carbon
 - Small site exemption
 - Certification & Verification



THE PERFORMANCE GAP

To 2016 and beyond.....



Ambition - Carbon Compliance report, Recommendation 4a:

Closing the Performance Gap – the 2020 Ambition:

“From 2020, be able to demonstrate that at least 90% of all new homes meet or perform better than the designed energy / carbon performance”

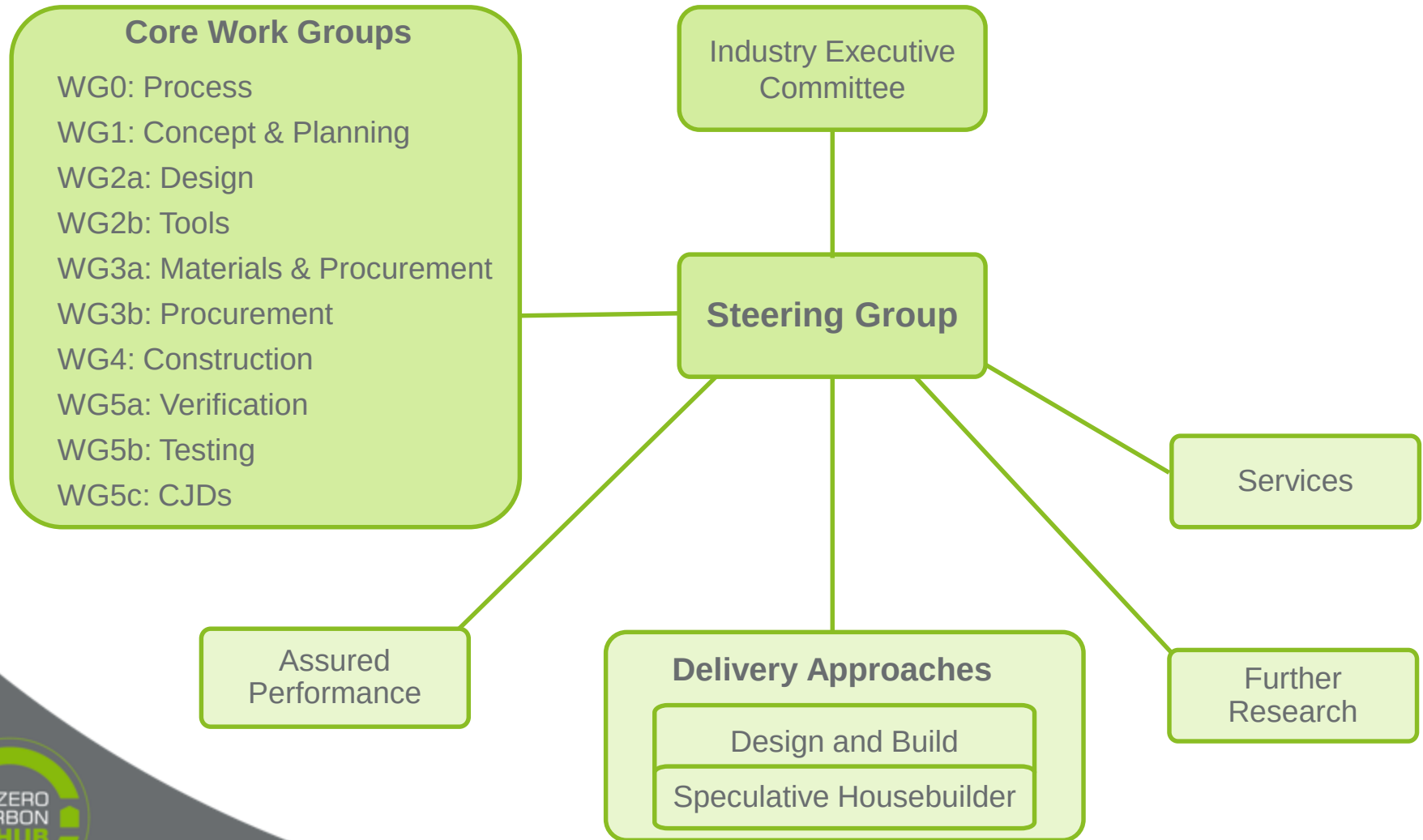
1. Map out the journey to achieve this target:

2013 → **2016** → **2020**

2. Develop a mechanism to demonstrate achievement:

- *Assuring performance*
- *Motivating improvement through feedback loop*

Industry WG Structure



Interim Report

The Problems!



CROSS-CUTTING THEMES



KNOWLEDGE & SKILLS

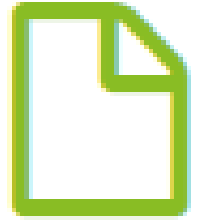


RESPONSIBILITY



COMMUNICATION

Literature Review



- **State of the industry (*aggregated data*)**
 - NHBC, LABC, SAP software providers, professional institutions, house builders, manufacturers
- **Compliance processes**
 - As-built SAPs, ACD/ECD use, Air pressure tests, commissioning
- **Field trials**
 - TSB Building Performance Evaluation, EST Heat pump trials
- **Academic studies**
 - Stamford Brook, Elmtree Mews, Temple Avenue
- **“Secret” knowledge**
 - Manufacturers, Universities

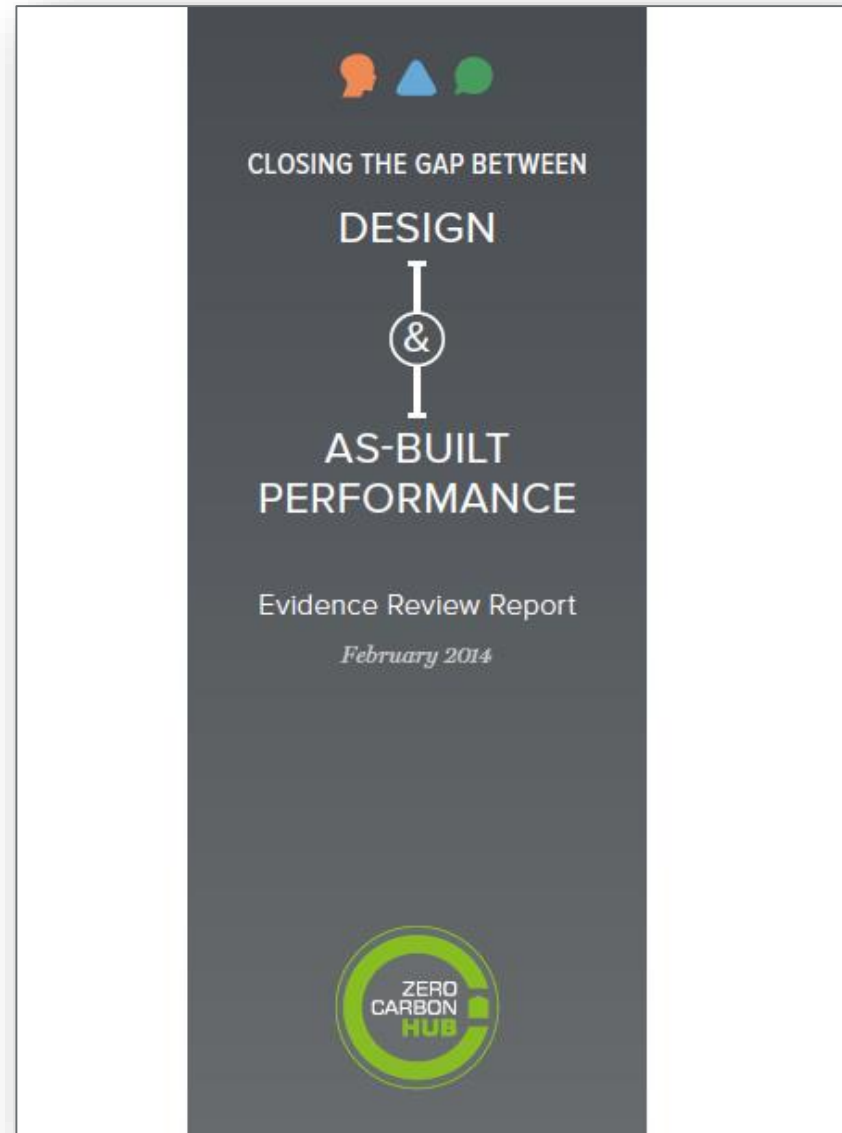
Housebuilding Process Review

- 21 sites analysed
- Over 200 units
- Completely anonymous
- Identified many issues

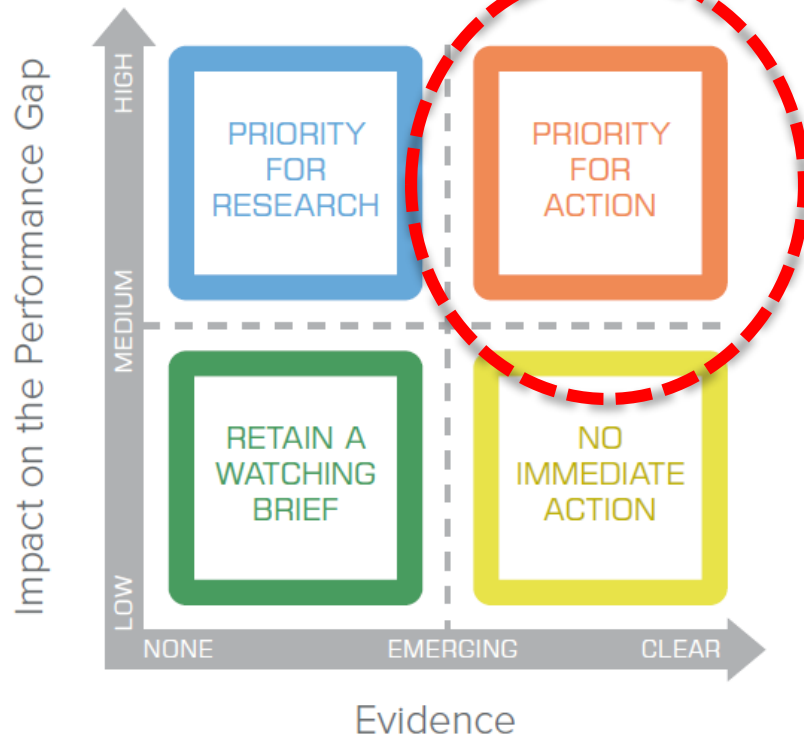


Evidence Review

The truth behind
the myths.



Prioritisation of issues



- 15 Priority for Action

AND cross-cutting themes



KNOWLEDGE & SKILLS

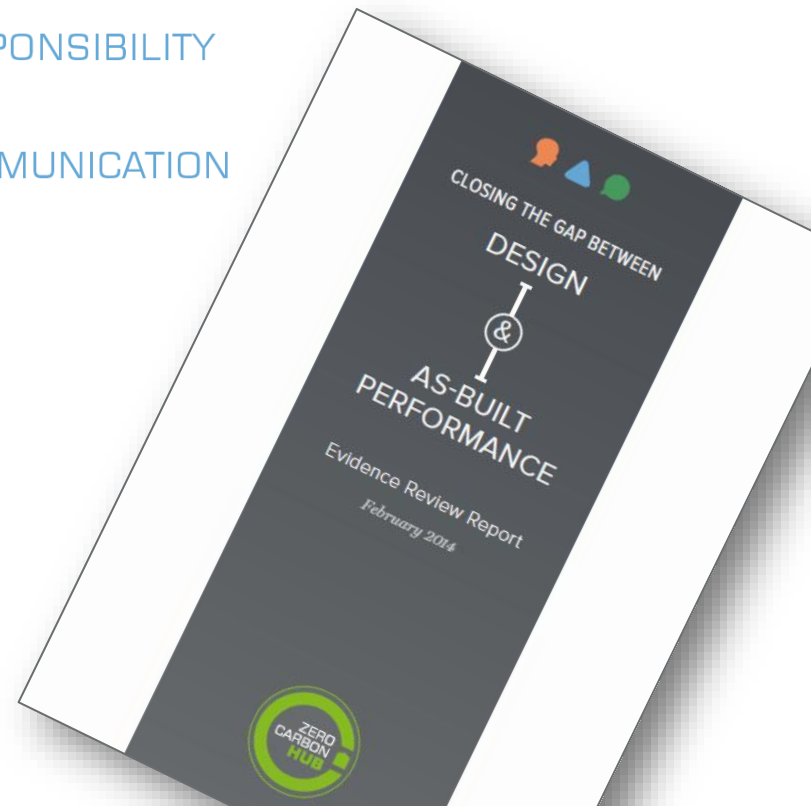


RESPONSIBILITY



COMMUNICATION

Evidence Review Report



CONCEPT DESIGN & PLANNING

P2

Limited understanding of impact of early design decisions on energy performance

DETAILED DESIGN

D1

Inadequate understanding and knowledge within detailed design team

D2

Lack of integrated design between fabric, services & renewables

EM8

Issues around use of U-value and thermal bridging calculation procedures

EM7

Concern over competency of SAP assessors

PROCUREMENT

PR2

Inadequate consideration of skills and competency at labour procurement

CONSTRUCTION & COMMISSIONING

C5

Product substitution on site without consideration of energy performance

C15

Poor installation of fabric

C9

Poor installation or commissioning of services

C13

Lack of site team energy performance knowledge & skills

C6

Lack of adequate energy performance related QA on site

VERIFICATION & TESTING

T3

Concern over consistency of some test methodologies & interpretation of data

EM4

As-Built SAP not reflective of actual build

V2

Lack of robust energy performance related verification, reliance on third party information

V5

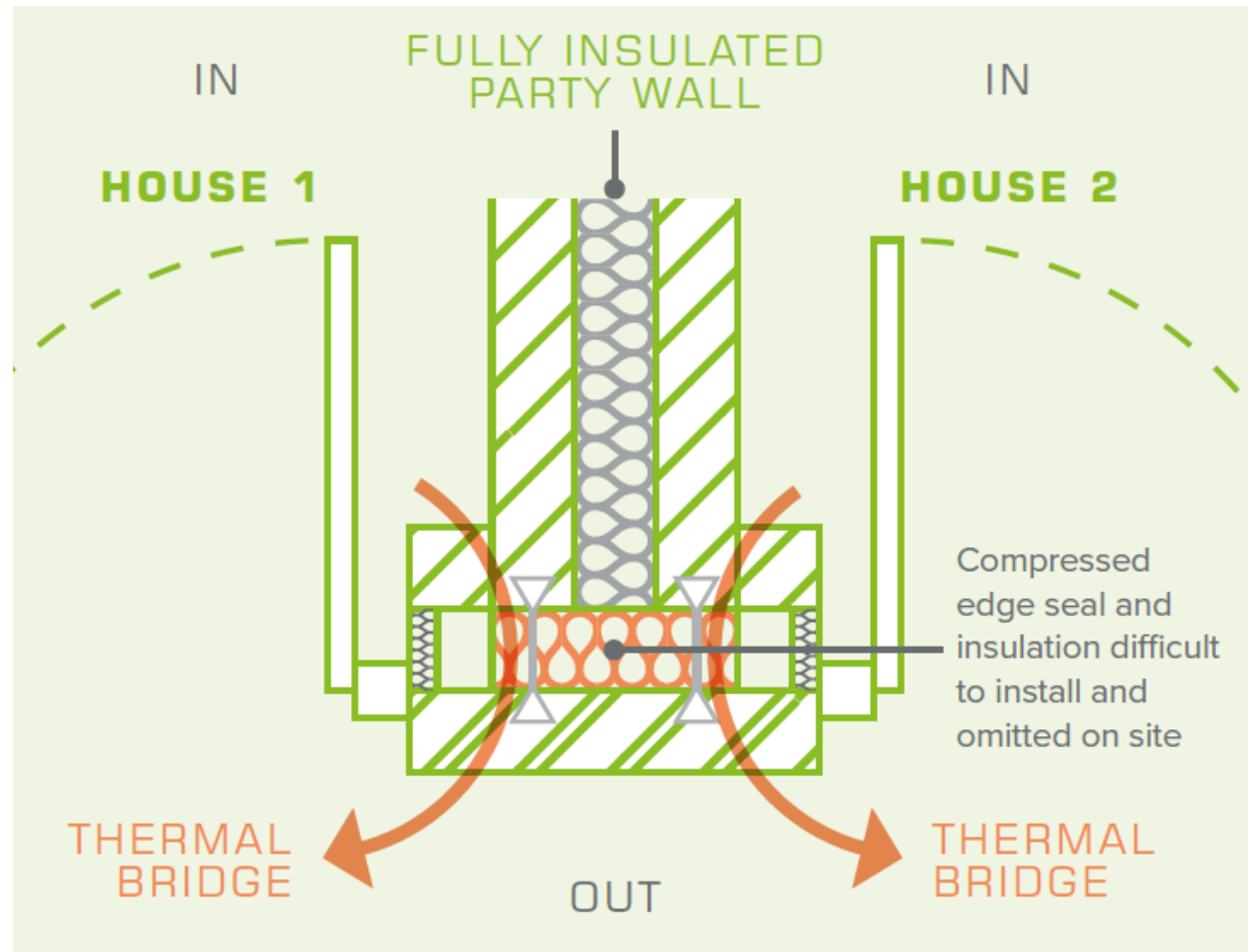
Lack of clarity over documentary evidence for Part L & Part F compliance

1. Inadequate Understanding & Knowledge within Design Team

- Impact on:
 - Buildability
 - Compatability of systems, materials and services
 - Thermal detailing
- Typical examples:
 - Details into which insulation is impossible to fit
 - No detail on support of screed at ground floor perimeters
 - No consideration of thermal bridges for rooms over garages
 - Etc....

○ Reality:

- Wall ties ✓
- Compressed edge seal ✗
- Insulation ✗



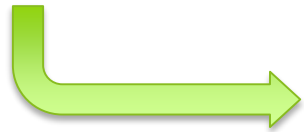
2. Concern over Competency of SAP Assessors

- Problems with:
 - Accuracy of inputs
 - Following conventions
 - Validating assumptions
 - Evidencing assessments

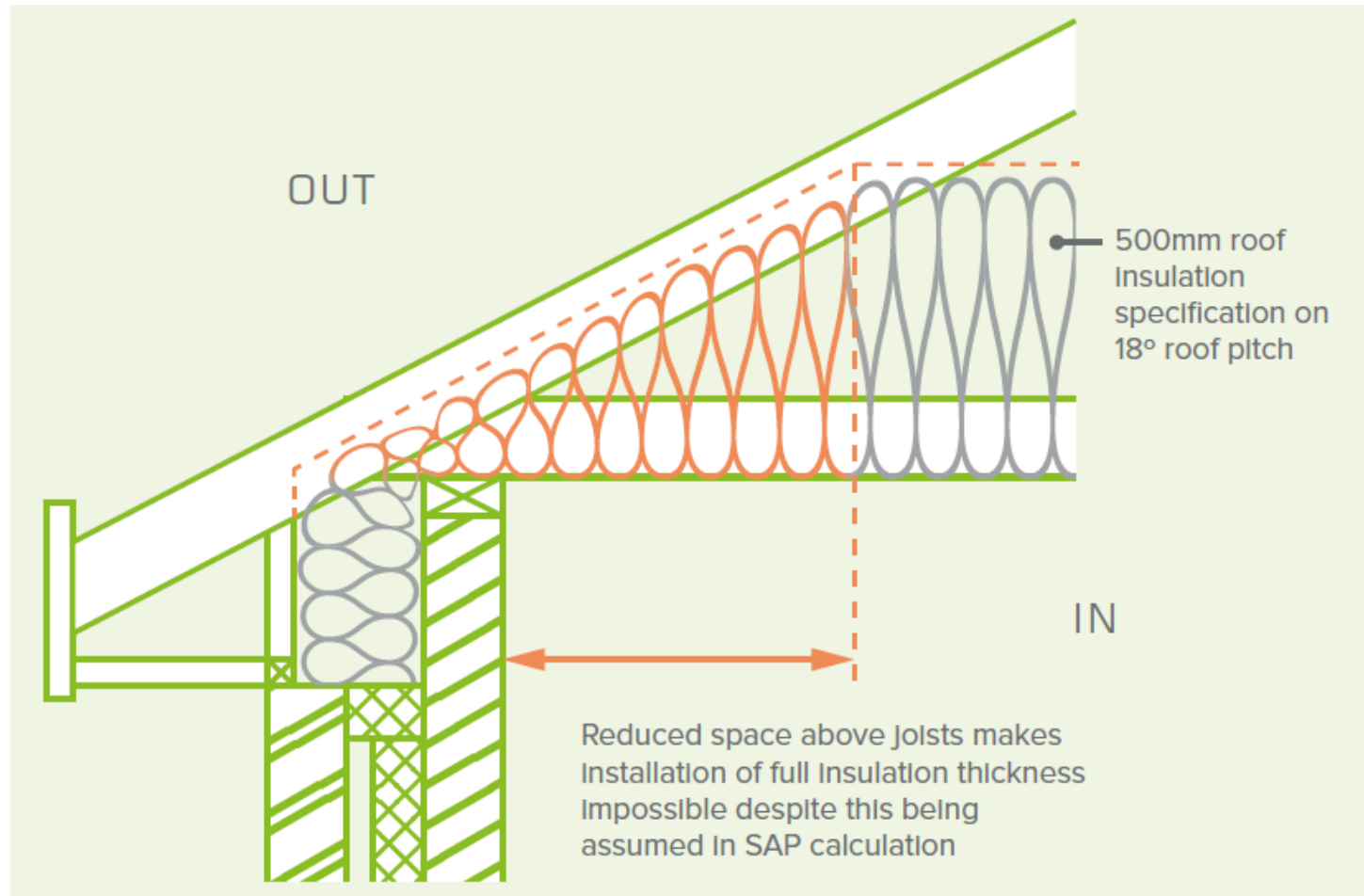


Massive impact where they are giving design advice

○ How is the u-value calculated?



Can't assume same thickness across entire roof



3. Lack of Site Team Energy Performance Related Knowledge and Skills and/or Care

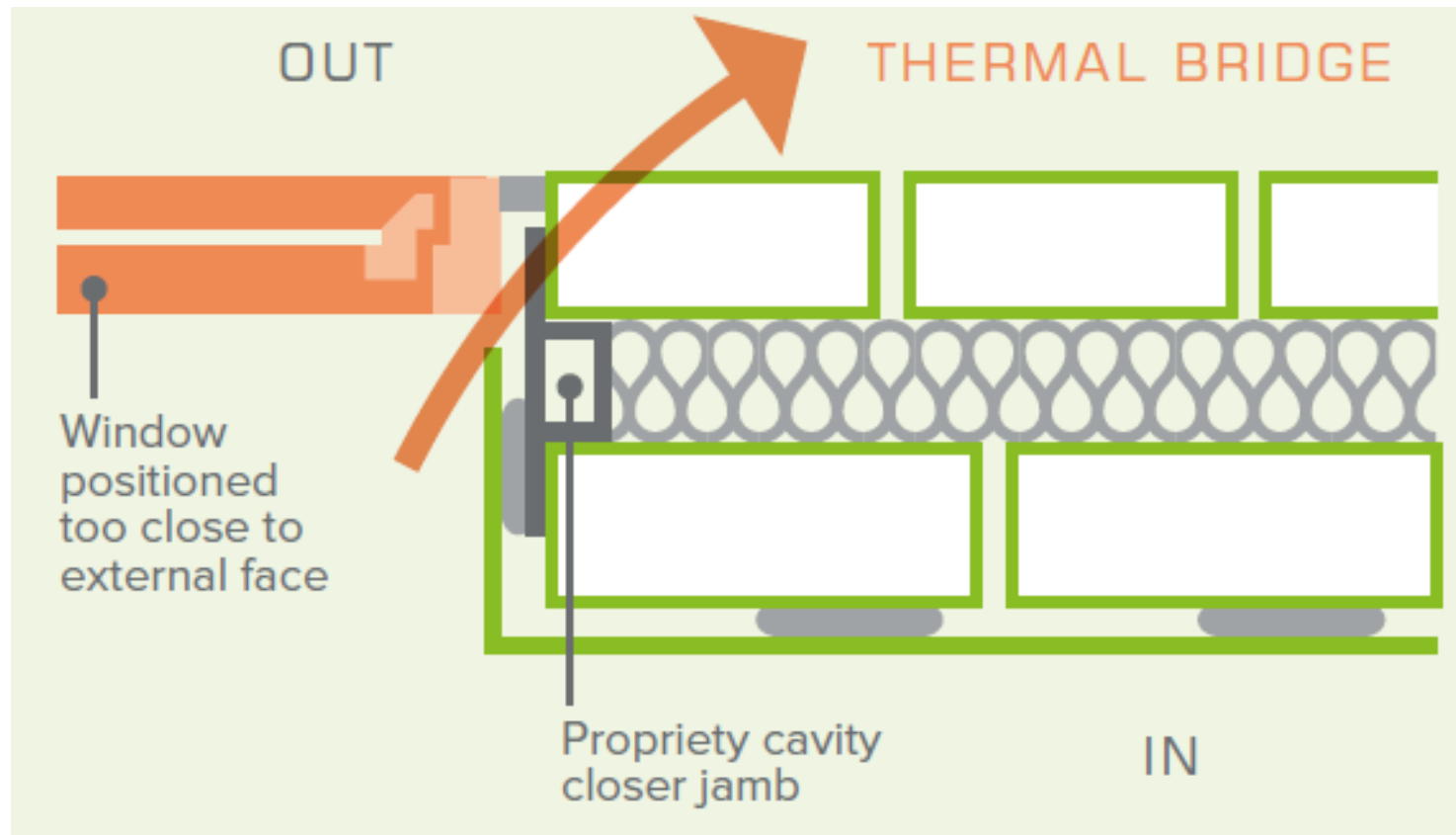
- Literature Review -

- *“The lack of proper training of the workforce.....resulted in significant construction faults, unplanned design solutions and wrong system commissioning”*

Oxford Brookes University, Understanding the Gap between As Designed and As Built Performance, 2013



- Windows located in front of design positions
 - Insufficient overlap with cavity closer
 - 8 out of 9 sites visited



4. Product Substitution On Site

○ Literature Review -

- *“The most striking observation about the application of materials and components were the number of occasions on which materials intended for one location were used in another”*

Leeds Metropolitan University, Lessons from Stamford Brook, 2008

○ Housebuilding Process Review -

- Identified on all sites reviewed
- Blockwork & windows

INDUSTRY RECOMMENDATIONS



1 - PERFORMANCE ASSESSMENT R&D

Undertake the research and development necessary to create innovative testing, measurement and assessment techniques to understand the performance gap and develop commercially viable methodologies acceptable across industry for 'demonstrating performance'

2 - SKILLS AND KNOWLEDGE DEVELOPMENT

Ensure that as-built energy performance knowledge, including learning from on going research and development, is embedded into training and up-skilling for professionals and trades.

3 - CONSTRUCTION DETAILS SCHEME

Develop an industry owned and maintained construction details scheme providing 'assured' as-built energy performance for the most common major fabric junctions and systems.

4 - CONTINUED EVIDENCE GATHERING

Support further evidence gathering processes and coordinated feedback to ensure accelerated continual improvement across all sectors of industry .

GOVERNMENT RECOMMENDATIONS



1 - SIGNAL CLEAR DIRECTION

Clearly indicate that, in place of immediate additional regulation, it expects the construction industry to act now and have put in place a number of measures to ensure that the energy performance gap is being addressed and to demonstrate this by 2020.

2 - STIMULATE INDUSTRY INVESTMENT

By funding research and development into testing, measurement and assessment techniques with immediate effect, to support the industry in providing the information necessary to quantify the performance gap and create the learning loops required to drive continuous improvement.

Additionally provide pump prime funding to enable industry to develop a construction details scheme.

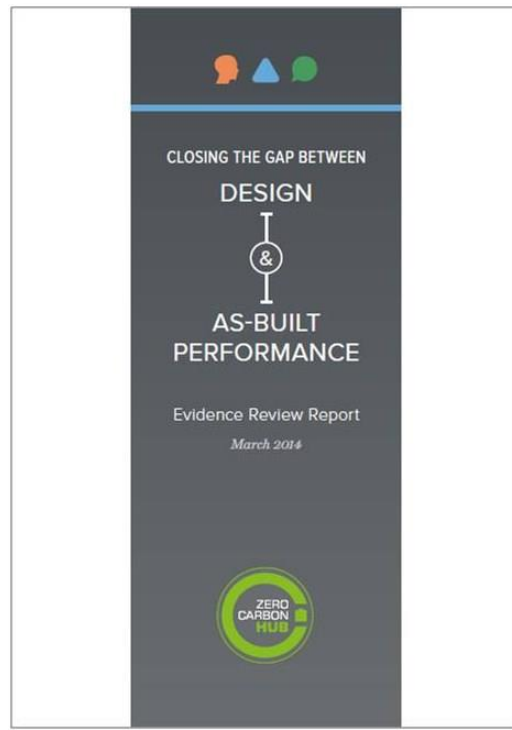
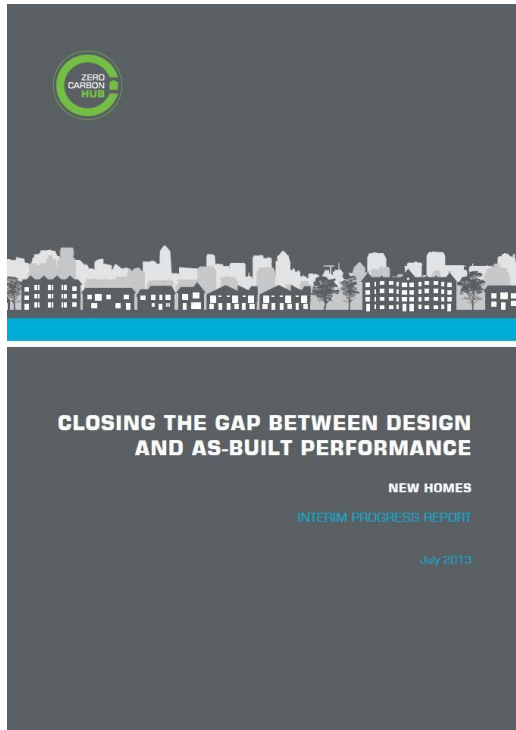
3 - STRENGTHEN COMPLIANCE REGIME

Take action by 2016 to ensure that the Zero Carbon Hub recommended revisions to energy modelling practices, SAP processes and verification procedures, together with a strong regime to ensure that only suitably qualified persons carry out energy modelling, can be put in place.

4 - SUPPORT SKILLS & KNOWLEDGE DEVELOPMENT

Accelerate the demand for industry developed qualification schemes by requiring energy certified trades and professionals for all developments on public land from 2017.

The journey so far:



Immediate Priorities

- SAP - Just where is this going?
- Allowable Solutions 'Live Trials'
- Small builder 'Know How' campaign
- Overheating & Ventilation
- Skills and Knowledge





ZERO CARBON COMPENDIUM

The Future of Low Energy Cities and Communities



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Thank you

