Innovate UK

Building Better Buildings
Oxford

Rob Pannell
Zero Carbon Hub
THE PERFORMANCE GAP PROJECT

Closing the Gap Between Design & As Built

26th November 2015
Purpose and Strategic Objectives

Facilitate the mainstream delivery of low and zero carbon homes working across boarders

- Provide leadership and create confidence
- Reduce risk
- Disseminate information
THE PERFORMANCE GAP
MOVING FORWARD

ZCH

Government
Industry WG Structure

Core Work Groups
- WG0: Process
- WG1: Concept & Planning
- WG2a: Design
- WG2b: Tools
- WG3a: Materials & Procurement
- WG3b: Procurement
- WG4: Construction
- WG5a: Verification
- WG5b: Testing
- WG5c: CJDs

Industry Executive Committee

Steering Group

Assured Performance

Delivery Approaches
- Design and Build
- Speculative Housebuilder

Services

Further Research
The Problems!
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
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
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
INDUSTRY RECOMMENDATIONS
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Performance Assessment R&D

Skills and Knowledge Development

Construction Details Scheme

Continued Evidence Gathering
GOVERNMENT RECOMMENDATIONS
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Signal Clear Direction

Stimulate Industry Investment

Strengthen Compliance Regime

Support Skills & Knowledge Development
ROUTE MAP TO 2020

The challenge ahead
How to address the Performance Gap?

- Provide a good practice guide in simple, clear format

- Use with on site toolbox talks, site manager training, builder’s merchants, building control, designer awareness, specifications, warranty providers.....disseminate lessons to the industry!
Site posters

**CAVITY WALL**

**PROBLEM TO AVOID**
GAPS IN INSULATION

**WHAT TO DO?**

1. Protect cavity and insulation from mortar droppings
2. Smooth mortar joints to allow insulation board tight against block
3. Install insulation tightly batted with no gaps
4. Cut insulation tight to cavity closures, brick and cavity trays

**GOOD PRACTICE**

Please print and use in your site office, for further information www.zerocarbonhub.org

**PROBLEM TO AVOID**
MISSING INSULATION

**WHAT TO DO?**

1. Install rigid insulation behind steel boxes, cavity trays, meter boxes and soliflux vents or any other elements bridging cavity
2. Blown or injected insulation, ensure this reaches the whole wall with no gaps
3. Adjust drill pattern for tight spots, cavity trays and inject below DPC

**GOOD PRACTICE**

Use preformed tray around complex junctions

Please print and use in your site office, for further information www.zerocarbonhub.org
Zero Carbon Hub Guides

The 7 Brothers; Guiding SME’s

1. Builders’ Book - Masonry
2. SAP Untangled
3. Thermal Bridging Guide
4. Design Guide
5. Cost Efficiency Handbook
6. Services Simplified
7. Builders’ Book - Timber Frames
THE FUTURE
ZCH
OVERHEATING PROJECT
An interesting time for new build homes....

EPBD Article 2, NZEB definition:
[...] ‘nearly zero-energy building’ means a building that has a very high energy performance [...]. The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby. [...]
THANK YOU

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