THE PERFORMANCE GAP PROJECT

Closing the Gap Between Design & As Built
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
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

Steering Group

Industry Executive Committee

Delivery Approaches
- Design and Build
- Speculative Housebuilder

Assured Performance

Services

Further Research
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
Inadequate Understanding & Knowledge within Design Team

- Impact on:
  - Buildability
  - Compatibility 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

Reduced space above joists makes installation of full insulation thickness impossible despite this being assumed in SAP calculation.
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
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
Government recommendations

1 - SIGNAL CLEAR DIRECTION
2 - STIMULATE INDUSTRY INVESTMENT
3 - STRENGTHEN COMPLIANCE REGIME
4 - 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
  - Insulation not tight to wall face due to rough surface
  - Gaps between adjacent boards = heat loss

**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 butted with no gaps
4. Cut insulation tight to cavity closers, lintels and cavity trays

**GOOD PRACTICE**

- Use preformed tray around complex junctions

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

Delivered energy nearby

Exported energy nearby

On site

Nearby

Distant

Total energy use of the building

System boundary of energy use

On site RE

No RE

Nearby production plant

Delivered energy nearby

Exported energy nearby

On site

Nearby

Distant

Total energy use of the building

System boundary of energy use

On site RE

No RE

Nearby production plant

Delivered energy nearby

Exported energy nearby
THANK YOU

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