THE PERFORMANCE GAP PROJECT

Closing the Gap Between Design & As Built

23rd September 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
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

Further Research

Services
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 ✗

Compressed edge seal and insulation difficult to install and omitted on site.
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 the same thickness across the entire roof.
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

Performance Assessment R&D
Skills and Knowledge Development
Construction Details Scheme
Continued Evidence Gathering
GOVERNMENT RECOMMENDATIONS
GOVERNMENT RECOMMENDATIONS

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
**Industry Led Innovations**

**2014**
- Development & implementation of ‘Energy’ content for NVO, BTEC, BSc & BA courses
- Development of ‘Energy’ certified trades – link to existing schemes providers
- ZCH Tool box talks for SMEs & small builders
- Develop industry owned & managed Construction Fabric & Details scheme

**2015**
- ARB / RIBA / CIAT / CIBSE include as-built energy performance content within all new entrant and existing workforce courses
- ‘Energy’ certified trades & management scheme live
- Site management and operatives adopt scheme as normal practice

**2016**
- Industry refines solutions plus inclusion of innovative alternatives as lessons are learned
- Leading house builders increasingly seek to understand the as-built performance of their homes and demand more from their designs and supply chain

**2017**
- Industry wide agreement on demonstrating performance (methodology)
- Refine, prove and submit commercially viable as-built performance methodologies for government approval prior to 2018

**2018**
- Part L2016 Consultation to consider:
  - Revised U-value & Pi-value conventions linked to qualified person scheme
  - In-situ factors for fabric & services as systems via SAP conventions
  - SAP Assessor & Building Control responsibilities
  - Developer ‘signed’ plain language compliance report

**2019**
- Government and European sourced funding supports industry to develop commercially viable methodologies to demonstrate performance process (e.g. Technology Strategy Board & EU Horizon 2020)
- Industry demonstrates the 2020 ambition

**Industry R&D:**
- In-situ test protocols for fabric and services systems
- Manufacturer investigations into their product & system performance
- Whole house test & in-use monitoring protocols
- Demonstrating as-built performance methodology trials
- Roll-out of ZCH ‘House Building Process’ review
- Co-ordinated research strategy delivered by industry, academia & government

**Evidence informs continuous improvement cycles**
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!
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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