Who designed this?
1998-2007 was the warmest decade on record.

2009 – 5th warmest globally and 14th warmest in the UK

2012 Hottest day ever in Scotland and wettest June in the UK

2013/4 was the wettest winter on record.
BRINGING DESIGN AND OPERATIONAL PERFORMANCE TOGETHER

Rob Pannell
Managing Director
Zero Carbon Hub
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
ZERO CARBON HIERARCHY

- Off-site carbon offsetting measures
- Maximum CO₂ emissions (kg/m²/year)
- Maximum energy demand (kWh/m²/year)
ANNUAL HOUSEHOLD ENERGY SPEND

- Victorian with modern day improvements:
  - 4-bed Detached house: £2,379
  - 3-bed Semi-detached house: £1,621
  - 3-bed Mid-terrace house: £1,388
  - 1-bed Ground floor flat: £915

- New Build built to 2006 regulations:
  - 4-bed Detached house: £1,187
  - 3-bed Semi-detached house: £888
  - 3-bed Mid-terrace house: £864
  - 1-bed Ground floor flat: £489

- Future 2016 aspirations:
  - 4-bed Detached house: £504
  - 3-bed Semi-detached house: £361
  - 3-bed Mid-terrace house: £405
  - 1-bed Ground floor flat: £346
FIRST REPORTS ON ZERO CARBON DEFINITION

- Nov 2009
- Aug 2010
- Feb 2011
- Jul 2011
RECOMMENDATION

- Carbon Compliance report, Recommendation 4a:

  “From 2020 the test results distribution should demonstrate that at least 90% of all dwellings would meet or perform better than the designed energy / carbon performance.”

- The journey: 2013 > 2016 > 2020
AS-BUILT VS AS-DESIGNED BUILDINGS

Overview & Programme
BUILDING PROCESS AND THE GAP

Knowledge Gap

Stockwell
Procurement
Turnham Green
Building Regulations Application
Sapping Forest

Stan More
Construction
Testing

Building Regulations Certificate
Handover
under development

Key to lines
- Designers
- SAP Assessor
- Manufacturer’s Information
- Sub Contractor Design
- House Builder

© Richards Partington Architects
PROJECT DESCRIPTION

Main aim:

- To improve the as-built performance of new homes and enable the 2020 ambition to be met
- Collaboratively, bring together and help to develop all strands of work in this area

What are we trying to do?

- Find solutions that suit industry & government
- Preferably at no net cost!
PROJECT’S STRUCTURE

140 industry experts

- Work Group 0 - Cross-cutting group focused on process
  - Cost Analysis
  - Reporting to government

- Work Group 1
- Work Group 2
- Work Group 3
- Work Group 4
- Work Group 5

Industry Executive Committee

Steering Group
PROGRAMME OF WORK

Jan 2013

Jan 2013

Identify and understand
- Current processes (S,M,L builder)
- Existing evidence base
- Areas that gaps may occur
- Methods of analysis

Review and prioritise
- Existing and new evidence
- Requirements and methods
- Housebuilding Process Review
- Impact of the issues

Mar 2014

Mar 2014

Produce
- Update prioritisation
- Proposals on ‘Priority for action issues’
- Programme of future industry research
- Cost analysis

Summer 2014

Summer 2014

Continue to produce
- Quick wins
- Solutions
- Guidance
- Cost analysis

2020

2020

REPORT

REPORT

REPORT

REPORT
INTERIM PROGRESS REPORT

- House building process
- Cross-cutting issues
- Emerging themes and issues
- Construction Joint details
- Evidence collection and analysis
- Costing the impact of solutions
- Emerging work plan
- Next steps
IDENTIFIED ISSUES - SAMPLE (SERVICES)

- Lack of clear processes to ensure communication of performance related issues between concept and detailed design teams.

- Products and materials generally tested in isolation, not as systems or fabric assemblies constructed on site.

- In-situ performance values that different than states design values.
IDENTIFIED ISSUES - SAMPLE (SERVICES)

- Probable institutionalised optimism of performance.

- Lack of manufacturer provision of product installation and commissioning guidance for site team.

- Building services installers often lacking the skills to commission systems efficiently.
Evidence Collection
- Literature review
- Housebuilding Process Review
- SAP Questionnaires
- Assessing the Issues

Results
- Priority for Action
- Priority for Research
- Retain a Watching Brief

Conclusions and Next Steps
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

Evidence Gathering
- Interviews
- Design Review
- Construction Walkthrough

- Concept Design
- Detail Design
- SAP Assessor
- Procurement
- Construction
- Full drawing package
- Associated information
- Stage by stage: sub-structure through to build complete
- Photo evidence against a checklist
- Looking for good practice as well as bad!
**Priority for Action** – Issues with a strong supporting evidence base and medium to high potential impact.

**Priority for Research** – Issues with emerging evidence and a suspected medium to high potential impact.

**Retain a Watching Brief** - Issues with limited evidence and a suspected low to medium potential impact.

**No Immediate Action**
Issues with a large degree of evidence but with a low impact.
IDENTIFIED ISSUES A - SAMPLE (SERVICES)

- Lack of consideration of the impact of work sequencing or services location on insulation installation. (100% of sites checked)

- Lack of integration of ventilation strategies with other aspects of the home (Lit. Review)

- Decisions over design details of services installation made on site without reference to the designer and original design intention or the impact on the fabric of the house. (78% of sites checked)

- Incorrect, incomplete or contradictory design information is being given to the SAP assessor. In addition to errors in the SAP submissions it was observed that many of the SAP analyses are not being updated to reflect changes made during the construction process. (100% of sites checked)
ONGOING WORK
TESTING & ONGOING EVIDENCE COLLECTION

Testing

- Evaluation of methodologies
- Protocol under development

Ongoing Evidence Collection

- Housebuilder process review
- SAP audit
- SAP sensitivity analysis

Assured Performance workgroup

- Possible regimes to demonstrate compliance with 90% target
Focus on solutions & extracting ‘case study’ information for End of Term Report

New WG Structure for Jan 2014

Industry Executive Committee
BR443 U-value calculations
Services
Evidence

Steering Group

Compliance and Assurance Group
Testing
Design & Assessment Tools
Verification
Construction Joint Details

Delivery Approaches

1. Contracted Approach Group
- Concept
- Design
- Procurement
- Construction

2. Direct Control Group

3. Standardised Product Group
- Knowledge
- Responsibility
- Communication
- Skills

Organisational Structure
SKILLS AND TRAINING FOR THE SME
Zero Carbon Hub publications can be found at:

<table>
<thead>
<tr>
<th>Stand Number</th>
<th>Saint-Gobain</th>
<th>NHBC Foundation</th>
<th>LABC</th>
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<tbody>
<tr>
<td>N750</td>
<td>&quot;Low Energy Know How Campaign&quot; - With a focus on Solutions</td>
<td>N802</td>
<td>S1900</td>
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<tr>
<td></td>
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<td>Zero Carbon Research - Highlighting several areas integral to delivering the Zero Carbon Journey</td>
<td>Zero Carbon Guidance - Both Theoretical and Practical Guidance</td>
</tr>
</tbody>
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Electronic copies: [www.zerocarbonhub.org](http://www.zerocarbonhub.org)
I’d love a new home - any time soon!

Thankyou