



The Performance Challenge

A programme to close the gap between designed and as-built performance

Background

There has been a growing realisation that homes designed to meet current and future standards of energy performance may fall short of expectations (see 1). The gap between what is intended and what is achieved by fabric and services can be large, with some studies indicating, for example, that fabric heat loss can be 100% more than that predicted by design (see 2).

The widespread presence of such a gap would have major repercussions and introduce significant supply-side risks. For the Government it would mean that even new housing (and by inference other new buildings) cannot be relied upon to play its expected, vital role in the national carbon reduction plan. For owners and occupants, energy bills will be higher than expected, undermining buyer confidence in new (low carbon) homes. For planners, designers, product manufacturers and house builders the fallout from underperforming new homes could be damaging to reputation and business.

For all, therefore, there is a pressing need to understand the reasons for the performance gap and to put in place the mechanisms and the support to address it.

Support

The Government has taken a close interest in this issue and at Ecobuild this March, Communities and Local Government Minister Don Foster MP announced that DCLG is providing significant funding for a major work programme on the performance gap. This work, led by the Zero Carbon Hub, will follow on from a Hub-led study completed in 2011 (see 3) which proposed that carbon performance needed to be based on what could be achieved in practice rather than solely on theoretical design calculations.

Scope of the work programme

This new work, initially funded for a period of one year, will review the entire house-building process for evidence of activities, methodologies, assumptions and other factors that could be contributing to the performance gap (Figure 1). By mid 2014 the programme will have developed a series of early recommendations and practical actions to address the key sources of the performance gap.

In the longer term, on-going sampling and performance evaluation of newly-constructed homes will help us to better understand as-built performance (Figure 2). It will enable us to gauge the national pattern of performance over time, and to provide additional insights to ensure that feedback is accurately targeted.

Overall objective:

The overall objective of this programme of work is to steadily close the performance gap over time and from 2020 to be able to demonstrate that at least 90% of all new homes meet, or perform better than, the designed energy/carbon performance (see 3).

What could be contributing to the performance gap?

Prediction tool

Is the energy assessment tool (eg SAP) sufficiently accurate?

Input data

Have human error or unrealistic conventions caused incorrect input data?

Design

Is the design overly complex, presenting unreasonable challenges for the construction team?
Is the design information adequate in terms of detail?

Construction

Are there fundamental construction quality and skills issues?

Materials and manufacture

Do construction materials and building services perform in practice as laboratory tests predict?

Substitutions

Are substitutions of materials or equipment equivalent in performance?

Testing/Checks

Are post-construction tests and checks suitably accurate and appropriate?

Figure 1 A cross-sector challenge. Some of the issues (from 4) that the Work Groups will be considering in their evaluation of the performance gap

Deliverables

The following objectives and deliverables have been drawn up for the period 2013/2014:

- Draw together and analyse existing work on the performance gap
- Identify weaknesses in the evidence base
- Agree a programme of work to close the performance gap
- Develop a subset of 'quick win' measures to be introduced as soon as possible
- Maintain collaborative working ethos with Government and Industry contributors
- Where necessary, commission or carry out critical research and development (eg testing procedures, QA schemes)
- Interim Report on progress: Summer 2013
- Final Report: Spring 2014.

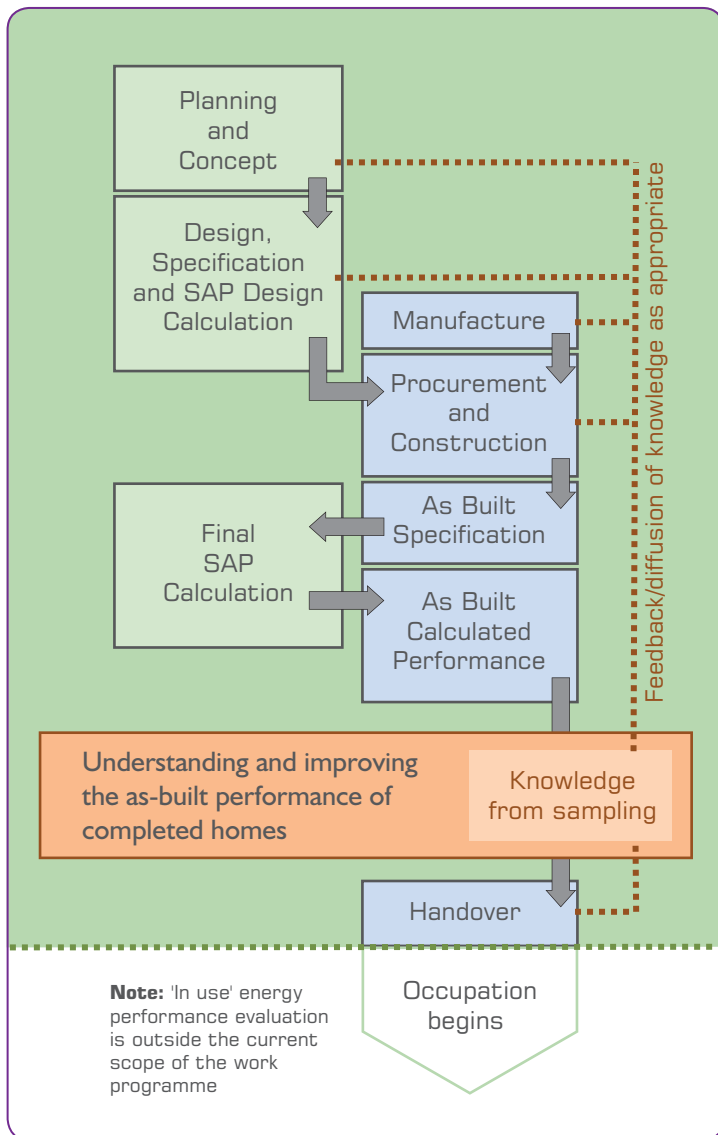


Figure 2 The Performance Challenge programme scope and (in orange) the long-term purpose. Note that for simplicity, process issues like verification and testing, with potential applicability to most stages, are not included in this chart.

Structure

An Executive Committee and a Steering Group, comprising experts from the housing sector and academia, will guide the work programme. Specific input will be provided by the following Work Groups:

- WG 0 Process (cross-cutting)
- WG 1 Concept and Planning
- WG 2a Design
- WG 2b Design and Assessment Tools
- WG 3a Materials and Products
- WG 3b Procurement
- WG 4 Construction
- WG 5a Verification
- WG 5b Testing (in-line and end-of-line)
- WG 5c Construction Joint Details

These Work Groups are already established, however if you think you have information or knowledge that could inform their thinking, please contact the Zero Carbon Hub at info@zerocarbonhub.org

References

- 1 Carbon compliance for tomorrow's new homes - closing the gap between designed and built performance. Zero Carbon Hub, 2010.
- 2 Evaluating the impact of an enhanced energy performance standard on load bearing masonry domestic construction. Lessons from Stamford Brook. Partners in Innovation Project, CI 39/3/663.
- 3 Carbon compliance - setting an appropriate limit for zero carbon new homes. Zero Carbon Hub, 2011.
- 4 Low and zero carbon homes: understanding the performance challenge. NHBC Foundation NF 41, 2012.

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