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Getting real on 'zero'

New homes continue to be built to 'low carbon' standards but, asks **Malcolm Bell**, how do we know if they are anywhere near this definition without ongoing performance testing?



In 2006 the UK government took the bold step of declaring that the UK could achieve zero carbon new housing within 10 years, and this was enthusiastically embraced (at least in public) by leaders in the house building industry. Four years on, the definition of 'zero carbon' is still under discussion. Meanwhile a number of supposedly low and zero carbon developments are under construction – but the extent to which their design claims will be supported by good performance data remains alarmingly unclear.

Indeed, if our recent research is anything to go by, such 'zero carbon' housing may turn out to be anything but. Detailed monitoring carried out in the last five years on two new housing developments, Stamford Brook in Cheshire and Elm Tree Mews in York, tell similar stories of a serious shortfall in the performance of both fabric and services.

Trials at the two developments – both of which were conducted by my research group at Leeds Metropolitan University – showed fabric heat loss to be 50% to 100% higher than intended at design stage. The system efficiencies of the properties were also well below those assumed in the modelling. Monitoring at Stamford Brook suggested a gap of around 25% between designed and actual carbon emissions. At Elm Tree Mews the gap was about 80%.

These results are echoed by other studies. In the last five years we have measured heat loss from almost 20 dwellings. Not one performed as designed. The worst performer was 120% higher than predicted; the best just over 10% higher. The average was about 60%.

These numbers are very disturbing – and do not bode well for meeting the UK's carbon targets. While recognition of the problem does seem to be increasing within government, the industry and the Zero Carbon Hub – the advisory body that is working on a definition of 'zero carbon' – action remains sluggish. (Almost three years on, I am still waiting for the government to publish the Stamford Brook report!)

Where do the underlying problems lie, and what should be done to tackle them? The forensic analysis undertaken at Elm Tree Mews and Stamford Brook sheds light on these questions. We found that design

is not undertaken at the right level of detail, detailed calculation seems to be avoided, and there is little understanding of as-constructed performance of whole systems or the tolerances involved.

In addition, construction planning does not include detailed work sequencing such that one operation does not hinder another and reduce performance. Commissioning of services does not involve stringent performance measurement of all aspects of the system. Residents are often left bewildered by controls – as are professionals, too, sometimes! The performance claims made by the supply chain rarely take into account the real conditions in which products are applied.

The solutions to all these hindrances lie in building an effective feedback system based on well-run and independently verified performance measurement regimes. Without feedback there is no learning and no improvement.

The design and construction team at Elm Tree Mews had a very difficult job when faced with no data or guidance on the real performance of the fabric and services systems they were working with. They did the best that could be done and their pioneering efforts should be applauded.

The feedback that can be provided by schemes such as Elm Tree Mews needs to be repeated so that we learn what level of as-constructed performance is possible, what process control is required to ensure robust performance, and what approach to measurement and monitoring will ensure that the gap is closed and kept closed.

What is required is nothing short of a re-tooling of the industry and its processes, led by good feedback: while the government can make substantial improvements to regulation and the building control regime, this will not work unless everyone in the industry, including its academics, takes responsibility for ensuring compliance. ●

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