THE ARCHITECTS' JOURNAL
WWW.ARCHITECTSJOURNAL.CO.UK
ESTABLISHED 1895
VOLUME 227, ISSUE 11
GREATER LONDON HOUSE
HAMPSTEAD ROAD
LONDON NW1 7EJ

Opinion If we are to stand a chance of meeting our zero-carbon targets, we must face up to what is really possible, says *Nick Grant*

Mainstream developers are currently tripping over each other to deliver the highest levels of the Code for Sustainable Homes, in order to meet the UK government's target for all new homes to be zero-carbon by 2016. But of course, most of these developments are only demonstration projects with high budgets, unproven performance and little hope of replication.

What these developers seem to be missing is the potential of eco-minimalist techniques, such as the German PassivHaus standard ('Lessons from Abroad', AJ 28.02.08), which is based on enhancing building envelopes to reduce heating loads to the point where a conventional heating system can be eliminated.

Sadly, it seems that the eco-minimalist approach, which strips design back to the essentials, is often seen as boring by those not bitten by the bug. The simplest way to reduce environmental impact is to manage with less. A smaller house uses fewer resources and will need less stuff to fill it. This is not a moral stance, simply a statement of fact. Adding extra insulation and renewable energy systems to compensate for an excessive footprint is chasing our tail in environmental terms.

If we don't measure performance against design predictions we won't learn from our mistakes

Clever early-stage design, such as the ordering of services, is also key. Hot-water pipe-runs and subsequent energy and water wastage must be minimised, and rooms must be ordered to maximise useful living area, perceived space or solar gain.

Another crucial consideration is the ordering of building layers to avoid the structure penetrating the thermal envelope. Ignoring this apparently very simple rule will lead to thermal bridges and tricky air-tightness details which increase cost and heat loss.

It's important to remember to oppose inappropriate or unnecessary technology. For example, it's often a good thing to replace pumps with gravity, although it might require more care at the design stage. However, 'passive' is an eco-cliché that must not be adopted without thinking. For example, in well-insulated buildings most of the heat is lost in the ventilation air, so a relatively simple (but efficient) fan and heat exchanger provides a good payback on invested energy, and can introduce other advantages, such as humidity control and excellent air quality.

The most important environmental performance measure is energy consumption, and so, indirectly, carbon emissions. A good, robust and (compared to some) relatively uncomplicated tool such as the PassivHaus Planning Package (available as an Excel spreadsheet from **www.passiv.de**) allows the designer to optimise the built form for minimal energy consumption and optimum comfort.

If we don't measure actual performance against our design predictions we miss the opportunity to fine tune or to learn from our mistakes. As it is very likely that performance will fall short of expectations it takes a brave designer to ask the client about utility bills or user satisfaction. Bill Bordass of the Usable Buildings Trust, a proponent of post-occupancy evaluation, suggests that as a rule of thumb, energy use in (non-domestic) eco-buildings is typically around three times what design predicts. Closing the gap between theory and reality will save more carbon than any number of building-mounted wind turbines.

Nick Grant is a water and energy consultant with Elemental Solutions

The full version of this article can be read at **www.usablebuildings.co.uk**

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