

Sustainability

A discussion sponsored by **H+H**
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Including
contributions from:

Dave Baker
Robust Details

Paul King
UK Green Building Council

Neil Smith
NHBC

John Spence
calfordseaden

Andrew Mellor
PRP Environmental

Mike Peasland
Balfour Beatty

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Mark Oliver,
Managing Director,
H+H UK.

Welcome to the sustainability discussion

Contrary to the impression created in the news over the last few months, buildings are still being built in the UK and the imperative to reduce their environmental impact has not diminished simply because our economy is faltering.

However, we do think there is a danger that critical debates over sustainability may be drowned out in the deafening discussion of slow-down and credit squeeze. This document is therefore an attempt to focus on sustainability and to present a range of viewpoints from some of the people we meet with on a regular basis in our position as a supplier to domestic and commercial building projects of all sizes.

The need to improve the environmental performance of new buildings was not questioned by anyone we spoke to: that debate is long over – the Why? is clearly decided and all of our contributors focused on the How?

It is particularly reassuring to see the beleaguered housebuilders re-emphasising their commitment to sustainable development and also to see government initiatives, trade associations and commercial organisations all prepared to work together to achieve demonstrable improvements in the performance of new buildings.

In all of our discussions, two key points were returned to again and again: the need to establish a clear set of definitions and a coherent regulatory framework in which to improve the environmental performance of buildings and the need for the industry to collaborate.

In the latter we see great progress being made and there are now startling examples of genuine collaboration throughout the supply chain with all parties agreeing to make their own knowledge and experience available for the benefit of all. As for the former – all we can do is look to the government to sort out its priorities and give the industry the clear regulatory direction it needs.

What we as manufacturers can do is to maintain our momentum – to continue research and development programmes in order to carry on delivering innovations that support the industry’s move towards a zero carbon future. It’s a fascinating and progressive process continually uncovering new solutions. Long may the discussions continue!

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Front cover photograph: Barratt Green House copyright Denis Jones.

The BIG Question

Dave Baker

Chief Executive,
Robust Details Limited.



A lot of collective effort has been invested in the design of mainstream energy-efficient buildings, following the last Part L revision. But, deep down, we know that, neither the performance nor the results have been quite as good as they should have been.

In my view the focus should be on buildability and on-site compliance, rather than theory and calculation.

More complex calculation methods are being talked up and whole new forms of construction are being computer-modelled for the next step-change. But who will have to translate this into actual 'product'? It will, of course, largely be down to those suppliers, builders and manufacturers, who are doing it already.

Using a feedback and improvement cycle, backed up by 'real building' measurements, we could quickly learn together what will (and what won't) work. We've shown this with Part E where, using robust details, the industry has moved from a position where around a third of the finished product didn't meet minimum standards (perhaps like the current Part L) to something close to a 98% compliance rate. And importantly, the 'average' mark is higher than anyone could ever have expected.

A leading academic in the field of energy efficiency complained to me that all his efforts to produce sustainable building designs were being wasted because builders couldn't get them right on site. He reported that performance always dipped alarmingly when his 'solutions' were reproduced in the field.

The difference with Part E, I suppose, is that the industry was seen as an important part of the solution, rather than the problem.

In the end, whether the fabric of a real and actual building delivers low or zero carbon will be down to the people who put it together. In my view, it wouldn't be a bad idea to take them with us on the journey.

Neil Smith

Group Research and
Innovation Manager,
NHBC.



It is particularly encouraging to see the positive way that house builders are working with the sustainability agenda and responding to its challenges. And while NHBC shares the enthusiasm to find solutions, we are determined to make sure that homeowners' interests are kept firmly in mind.

There are too many examples of house-building technologies from the past that have not worked well. Doubtless, the designers and builders of LPS (large panel system) flats in the sixties were enthusiastic to solve the nation's post-war housing crisis. However, regrettably their efforts did not stand the test of time. Think of the carbon wasted in the manufacture, the construction and the demolition of that generation of homes.

Owners of the next generation – of very low and zero carbon homes - should not be used as guinea pigs in another large-scale experiment. **We need to work together to find 'safe solutions' – designs and forms of construction for homes that are comfortable to live in and deliver their intended environmental benefit over the many decades they will be standing.**

It's important that homes are designed so that everyone is able to use them, not just those who are capable of programming a video recorder! They must be easy to operate correctly – how many times have you seen a thermostat used as an on-off switch or the room temperature controlled by opening a window while the radiator blasts away? Unless homes are designed for everybody their potential benefit will not be realised and we will not be reducing our dependency on carbon.

Ensuring that the next generation of sustainable homes meets homeowners' reasonable expectations while delivering a substantial carbon saving is our greatest challenge.

Andrew Mellor

Associate Director,
PRP Environmental.



As one of Europe's largest architectural practices specialising in residential and mixed use design, creating high quality sustainable developments lies at the core of PRP's corporate culture. However, such development is not the norm in the UK and, until recently, there has been little demand. **There is still a shortage of immediate skills and expertise to deliver such a quantity of zero carbon homes.** However, zero carbon housing is achievable and one only needs to look towards countries like Germany to see examples.

Using, whenever possible, benign materials in energy efficient design is one important aspect – our aim is to ensure that the building fabric and services work harmoniously to produce buildings which are environmentally sensitive, during the construction and operational phases. We focus, where possible, on specifying reused, recycled and locally-sourced materials which have low embodied energy. We also aim to reduce carbon emissions to below statutory or funding requirements and to reduce waste during construction.

For the future we see environmentally responsible construction becoming essential as we replace the consumer society of the 20th century with a world-wide sustainable community for the 21st century.

Interested in opening up the debate on sustainability, H+H UK approached some of the industry's key opinion leaders to ask them:

“What’s the greatest challenge facing the construction industry in tackling the sustainability issues of the future?”

John Tebbit

Industry Affairs Director and Deputy Chief Executive, Construction Products Association.



The biggest challenge is ignorance and in particular widespread ignorance of the existing information sources on products and their contribution to sustainable buildings and works.

Many people do not know that the industry started developing whole life cycle analysis (LCA) information over a decade ago in a joint government industry project that led to Ecoprofiles and the BRE Green Guide, which are used in the Code for Sustainable Homes. This ignorance leads to uninformed converts to sustainability trying to reinvent the wheel, sometimes with public money. Frequently their chosen sustainability indicator is a single issue, rather than LCA. Typically they will talk to the industry as though it had never heard of sustainability let alone done anything about it.

Some products are inherently going to have higher environmental impacts than others but the industry as a whole will move towards lower impacts due to competitive pressures. If there are a myriad of measurement methods for environmental impact then there will be less clarity about what is a low impact material. Therefore it is crucial that we have just one measurement method and that has to be LCA. At present in the UK that is BRE's method but in a few years we will have a European Standard.

To move forward we need to be developing better design and improvement tools that use the LCA data, rather than wasting our time on countless pet sustainability indicators. These tools will allow designer more easily to design sustainable buildings and that in turn will drive the demand for better materials and products.

Paul King

Chief Executive, UK Green Building Council.



When I was Director of Campaigns at WWF and heard that some of the biggest players in the construction industry were getting together to form the UK Green Building Council (UK-GBC) I confess I was a little sceptical. An industry-led campaign for sustainability? That sounded too good to be true.

I was won over very quickly when I realised that the founding members' enthusiasm for sustainability was not some sort of PR wheeze or attempt at 'greenwash', but was heartfelt and genuine. The launch of the UK-GBC is really just a symptom of how important sustainability has become to the construction sector, going from fringes to mainstream in a very short space of time.

Given the built environment is essentially the very fabric of our landscape, through which we all live, work and travel it is perhaps no surprise that it should be responsible for such a large chunk of our unsustainable behaviour and practices. Those issues – energy consumption, water use, pollution, embodied carbon, threats to biodiversity are all huge challenges facing the construction industry, although can't be rehearsed in full here.

In short, things are as they are for a whole variety of historical social, economic and political reasons. But what I find exciting is turning this issue on its head. **The built environment is so fundamental to our day-to-day lives, it has to be at the forefront of tackling urgent threats like climate change, and it can change from being a problem that we are made to feel guilty about, to a crucial part of the solution – and one to feel proud of.**

We're seeing some evidence of real progress emerging – innovative design, ambitious targets being set by big players in the sector, and an increased appetite for knowledge-sharing and co-operation. And I think we're only just beginning to fulfil potential. **Our buildings, both new and existing, have to enhance our quality of life, and support economically and socially as well as environmentally sustainable communities.** I look forward to the UK-GBC being at the heart of this process.

Cliff Fudge

Technical Director, H+H UK.



The construction industry has come a hugely long way already and the speed of innovation has been increasing all the time. If our experience at H+H is in any way representative then we are seeing a great spirit of co-operation with the whole supply chain working together to find solutions.

Initially there may be problems of capacity with new technologies (particularly those associated with microgeneration) but **I generally feel that technological issues can be overcome – the more potent difficulties will arise from the preferences of the homebuyer and the difficulties of working in volatile market conditions.**

The design of individual houses themselves need not, in fact, change out of all recognition (as shown with the Barratt Green House on p8), but areas of large scale development will look very different. Water conservation, power generation, street design and waste reduction will all have an impact on the street scene and a shift in mindset is needed so that these changes are celebrated rather than resented.

Call me an optimist, but I don't think this is impossible. Already we are making demands on individuals that would have been unthinkable twenty years ago and I would suggest that many initiatives are now being regarded as rather cool instead of dismissed as the simple enthusiasms of hirsute hippies. This is a trend that needs to be supported and actively encouraged by all of us.

Which leaves us with the issue of the moment: money. If we are not simply to ditch all the gains we have made then we need to have a secure, timetabled and very clear regulatory framework within which to operate – assuring us that innovation must continue through the current downturn to meet legislative requirements in the near future. A restoration of financial calm would be even better, of course, but I would hazard a guess that we may have to wait a while for that.

DESIGN IN A DOWNTURN



Ian Exall,
Head of Marketing,
H+H UK.

Despite the very bleak outlook right now there is no doubt of the long-term future for the housebuilding industry – but how different will it be in 2016? Using the privileged position as a supplier to all the major housebuilders, Ian Exall, Head of Marketing, H+H UK is able to give a perspective on the likely future development of the industry as it responds to the challenges of increasingly stringent targets for energy efficiency.

Housebuilders are generally prepared to acknowledge that they are no experts in innovation: compare the housebuilding industry to the automotive or pharmaceutical sectors and the lack of change over the last 50 years is thrown into stark relief. There is no particular surprise in this, its customers are extremely conservative and modern house designs simply reflect the aspirations of the homebuyer. However, I would argue that the next 10 years is going to see radical change – change which has already begun and which we can only hope will not be completely derailed by the current chaos.

All of our major customers are developing initiatives to meet the Code for Sustainable Homes agenda – and, in terms of development, are well ahead of schedule. All have designs that will meet Code level 3 and probably 4.

Meeting these Code levels can, and in most cases is being achieved through improved performance of the passive elements of the house design and the resulting buildings are modifications of existing house types. Change of this nature is being delivered through a genuine co-operation between all elements of the supply chain. Housebuilders have looked to their suppliers to come up with solutions and also looked to the site workers to up their game to ensure that build quality is high enough to deliver key benefits such as airtightness.

Michael Black, Group Development Director of Bovis Homes, summed up the situation so far by saying: *“We have been looking at incremental rather than radical developments based on sound principles and have been impressed by the innovations our supply chain has come up with.”*

While these Code Level 3 and 4 house designs are on the drawing board, few builders are prepared to volunteer to use them – and their construction is generally limited to areas where local authorities have demanded such performance levels.

Which neatly brings up one major frustration with the whole improvement drive. The Code for Sustainable Homes is a voluntary code – housebuilders see the necessity to design to meet its various levels, but also find it difficult to cope with the widely differing demands of planning authorities. As Michael Black goes on: *“We need a clear timetable and a single set of standards (ie building regulations) under which all the new initiatives can sit. At present we have a situation where local authorities have differing interpretations of the current requirements and timetables”.*

But if implementing Code levels 3 and 4 is possible with alterations to existing house designs (albeit that these may be substantive and costly), reaching level 6 requires a much more radical approach and it is here where housebuilders find their major challenges.

Meeting the zero carbon target requires the development of alternative energy sources and, as Garry McDonald of Miller Homes points out, *“We are trying to find solutions while acknowledging that the industry is coming from a position of having relatively little knowledge”.* Added to the lack of experience with microgeneration is the simple question of capacity: *“can we imagine suddenly being able to source 240,000 sets of photovoltaic roof tiles overnight? The supply chain just isn’t there at the minute, and in the current economic climate, where is the impetus for would-be suppliers to invest?”*

Questions of capacity are not going to vanish overnight, but the major housebuilders have all been making considerable investments to ensure that the current targets can be met. Barratt Homes, for example, having built the “Home for the Future” Code level 6 house (see p8) has gone on to be awarded preferred developer status for creating a new community of 200 homes at Hanham Hall near Bristol – likely to be the first development in the UK to be built to a CSH Level 6 standard. The company currently has, according to Michael Finn *“around*

100 low carbon schemes on the go and are continually updating our knowledge from the various projects that we are involved in to help us formulate solutions to meet the Government's challenging targets."

But what happens now? The consensus is that the market is in no fit state to bear the increased costs associated with delivering higher energy performance. Couple this with a lack of customer enthusiasm and it is easy to picture a scene where all innovation simply grinds to a halt.

But that would be to ignore a wider imperative. At an individual level we all understand the issue and, as our whole society embraces ever more initiatives – recycling, waste reduction, voluntarily dismissing plastic bags – I believe housebuyers of the future will be ready to accept changes to our concept of a traditional street scene. We can still be creative in

our choice of design and materials to ensure new houses are sympathetic to the local vernacular, but there is no doubt that a zero carbon street will look different and there needs to be a change in mindset to accept this difference – a change that I believe is already starting.

At the same time there is no indication that the Government is planning to alter its targets. While the dual (and amazingly ambitious) targets of building 240,000 homes a year to a target of zero carbon by 2016 are widely felt to be unachievable there is no doubt that the much discussed housing shortage has not simply gone away and, once financial constraints are resolved, there will be renewed demand.

The housebuilders we spoke to all warned against a loss of nerve. Clearly the market is going to be tough, tough, tough, but companies need

to be ready to deliver houses which meet the requirements of the Code when demand returns. As Garry McDonald summarised: *"we can build one Code Level Six house now – building to zero carbon standards at high volume is a different issue and we need to get to grips with this challenge early."*

This commitment to the longer term needs to be reflected throughout the supply chain and, as manufacturers, we simply cannot afford to stop innovating. Radical innovation will be necessary to deliver sustainable housing and a readiness to work collectively is essential. As manufacturers of masonry products it is satisfying to see that a masonry structure is regularly seen as the preferred solution for zero carbon housing and our willingness to rethink every element of our design and manufacturing process has helped to deliver this result. I simply do not believe that the advances made over recent years will be lost and also share the faith of the housebuilders that when housing starts regain their volume the houses being built will look, and perform, very differently.

“ We can build one Code Level Six house now – building to zero carbon standards at high volume is a different issue and we need to get to grips with this challenge early. ”



Introducing the future

Surprisingly for some industry watchers, one of the first completed homes actually to perform to the Government's Code for Sustainable Homes Level 6 uses a masonry structure: combining proven materials with contemporary design to produce ground-breaking performance.

At first sight the Barratt Green House, built as a demonstration project at the BRE, does not look radically different from the sort of thing many of us live in: a modern three storey, three bedroom family home. Familiar enough, yet stylish enough, to win the votes of 22,000 readers of the Mail on Sunday but packed with the innovation necessary to reduce carbon emissions to zero.

After winning the design competition, architects Gaunt Francis teamed up with Barratt to build the house who turned to H+H to provide the solution for the structure of the building.

Delighted to have the opportunity to show off its Europe wide experience, H+H brought in products and techniques new to the UK. Utilising the characteristics of high thermal mass was the chosen strategy for meeting the performance requirements of the building and this meant using masonry not only in the external walls, but also concrete floors throughout.

H+H's solution involved the packaging of various components into a system easily assembled on site. The walls were constructed mainly of storey-height aircrete panels – an idea borrowed from Scandinavia, but manufactured in the UK. The size of the panels dramatically reduces joints (with a resultant reduction in the likelihood of air leakage) while their inherent strength allows for concrete floors and internal masonry walls to be used throughout the building. In addition, H+H also provided aircrete lintels – a product range currently being trialled for use in the UK.

The combination of inherently insulating aircrete with external insulation and render removes entirely the problem of thermal bridging and the structure's efficiency was further increased by the close attention paid to eliminating all heat loss at construction junctions. The result is tested airtightness of better than $1\text{m}^3/\text{hr}/\text{m}^2$ – ten times in excess of current Building Regulations

Barratt Green House, Copyright Denis Jones.

Rooftop Planting

North roof planted with vegetation enlarging the local ecosystem.

Automatic Shutters

Computer controlled shutters close to limit heat build up due to strong sunlight in the summer.

Heat from the Air

House and hot water heated by central equipment which extracts heat from the air to provide warmth.

Interactive House

Power and data distributed around the house to allow wired & wireless internet everywhere, using easily accessed routes under the floor.

Automatic Controls

Computer control system for house ensures best operation of the systems with minimal owner input, and provides music and data central storage facility.

Solar Power

Photovoltaic cells on south facing provide electricity to the house's equipment.

Controlled Ventilation

Mechanical background ventilation ensures the house has clean, fresh air without letting cold air straight in.

H+H Airocrete plus Super Insulation

180mm of high performance insulation wraps the whole house walls to keep the heat inside the dwelling.

Heavy Floors

Concrete floors with smooth ceiling finishes link the air to the mass of the house and help moderate internal temperature fluctuations.

Triple Glazing

High performance glazing in insulated timber frames help keep the heat in.



The large panels allow for very quick installation on site, while trickier details in the external walls were constructed using the more familiar airocrete blocks, put together using the thin-joint technology now widely accepted on sites as an efficient and effective method for speeding up construction.

The single skin walls are enveloped in approximately 180mm of high performance (phenolic) insulation, rendered and achieving a U-value for the walls of 0.11W/m²K. The result is a satisfyingly clean, contemporary appearance that still does not move potential occupants too far from their expectations of how a house should look.

This combination of modern with traditional is continued inside where internal walls are dry-lined to allow services including MVMR ducting to run in the void between the wall and the plasterboard. The interior is then finished using familiar trades and skills.

The layout and design of the interior is also reassuring, incorporating living-dining-kitchen space, downstairs cloakroom, games/play room, home office, family bathroom and ensuite to the main bedroom. All rooms are "reasonably" sized and serviced from a central hallway, which starts from the front door and covered carport area and terminates at the second floor external terrace.

"We have taken a pragmatic view of sustainability: rather than trying to convert people to a different style of living we have met the needs of modern living but looked to meet those needs using lower energy solutions" is how architect Andrew Sutton summarised the approach.

The key is to use the structure of the building to provide genuine innovation in an understated way. For example, the thin coat render and pre-patinated (hence green) copper cladding on the walls was chosen as a deliberate statement that sustainable houses do not have to be clad in timber or orientated entirely to South.

The roofs of the building are made from a combination of south facing single ply membrane (to be covered with solar collectors) and a north facing roof covered with vegetation (sedum) and trimmed with copper.

The house also utilises its position as a one-off construction to incorporate two arrays of photovoltaic cells, both on its own roof and on a neighbouring building, and an air source heat pump. These elements are provided on the test house to achieve the CfSH Level 6 performance, but would be replaced in a volume housing type with developwide local heat and power supplies.

The result is an astonishingly advanced building

designed to be replicated in volume. "It is a really exciting development" enthuses Cliff Fudge, Technical Director of H+H. "For so long we have lagged behind Europe in our acceptance of new building methods, and now in one step we have overtaken everyone to produce the most efficient house in Europe."

"The next step is to see such advances becoming adopted as standard practice and we can only hope that the current problems in the housebuilding sector do not stifle this radical and exciting progress."

“For so long we have lagged behind Europe in our acceptance of new building methods, and now in one step we have overtaken everyone to produce the most efficient house in Europe.”



An Architect's View



John Spence is Lead Architectural Partner at calfordseaden and heads the Practice's architectural and master planning group. John gives his view on sustainability below.

I realised things were getting serious when one of my fellow Partners arranged a sabbatical to build his own house from straw bales and mud. The building industry and particularly those involved in housing are facing a new era – we have had 'modernism' and 'post modernism', we now have 'sustainism'.

This new 'ism' has a serious rationale – global warming. Architects and others within the building industry must respond to the challenges global warming presents in double quick time. As an architect, there is also the challenge of working to the Code for Sustainable Homes, especially on government funded housing schemes, which must comply with this Code.



Working at grassroots level though, you find that people are struggling to find efficient, sensible and effective ways of complying with the Code, trying to rack up points for their schemes through low energy light bulbs, solar thermal water, photovoltaics, combined heat and power units etcetera. In spite of requests for energy to be made 'greener' and more environmentally friendly by the major energy suppliers, their energy is not admissible when calculating 'Code points' and therefore individual housing schemes must be developed with their own electrical generation, using for example, solar panels and wind turbines.

This is having a fundamental effect on the design of new homes. For example, orientation, solar shading and internal ventilation are all becoming major factors. New design features include mono-pitch roofs, canted to maximise sunlight and the potential area for solar panels, with large guttering to send rainwater to storage tanks for toilet flushing and garden irrigation.

In a recent article, Terry Keech, one of calfordseaden's leading sustainability advisers, wrote about how the changing British climate should be considered in

the design and construction of today's new homes. 'Living in the Goldilock's Zone' discussed timber frame and thermal mass construction and the merits of each in a climate more like North America, Canada and Northern Europe (Timber Frame) or the Mediterranean (Thermal Mass).

Personally, I am looking to the Mediterranean for inspiration rather than North America, Canada and Northern Europe. The difference between these two climate zones has influenced the type and design of buildings and the materials these buildings are constructed from. In the Mediterranean houses are constructed from readily available natural materials, i.e. sun-dried earth. The brick render and tiles keep houses cool during the day and give off heat during the night, when the warming rays from sun have passed slowly through the thermal mass walls.



There are some useful lessons to be learnt too from the Victorians who were past masters in maximising the use of natural light and manually controlling fresh air movement through buildings.

I am a great advocate of modern methods of construction and have worked extensively over many years with various timber frame and volumetric systems. However, when H+H UK approached calfordseaden to prepare their standard housing templates for approval by the Housing Corporation, we did some research and found that their thin-joint aircrete blocks are commonly used in Scandinavia, due to their very good thermal insulation qualities but with the benefits of thermal mass. Buildings can also be erected quickly and aircrete blocks are load bearing, flexible and easy to adapt in the future. These distinct benefits mean a designer can make variations to their design without fear of incurring increased costs and time delays – calculations and drawings can easily be revised and the blocks sawn to fit the new design onsite if needed.

The coming weeks and months are going to be very challenging for the UK building industry and within calfordseaden our team of sustainability experts, including architects, civil & structural engineers, mechanical & electrical engineers, project managers and building & quantity surveyors are currently designing many creative and innovative schemes, some to Level Five and Six of the Code for Sustainable Homes.



“ I have always said that being an architect is a great life. Nothing stays the same – today's new technologies will soon become the norm, giving us new opportunities. ”

A Contractor's View



Mike Peasland is Group Managing Director of Balfour Beatty's Building and Building Management Sector – here he gives a brief overview of the organisation's role in improving sustainability.

Balfour Beatty has been addressing the issue of sustainability for many years and has a firm and explicit commitment to fulfilling its responsibilities to all its stakeholders. The focus starts internally, with initiatives for our own working practices, but also reaches the customers with whom we work and the wider community who are affected by the infrastructure we create.

Starting with our own organisation, Balfour Beatty works systematically to prevent negative environmental impact from our activities and to improve our environmental performance at every stage of our work. We measure our energy and resource usage, waste generation and recycling and water consumption on an annual basis and ensure that our impact on environmentally sensitive areas is minimised.

By the end of 2007, all our UK operations and most of our businesses outside the UK (with the exception

of new acquisitions) had achieved ISO 14001, the key environmental standard or its equivalent. The total amount of waste generated was 24% less than the previous year and we had reduced our relative contribution to global warming by 30% over the previous five years.

More significant than our own impact, however, is the contribution that a constructor can make to the performance of the structures it creates. Clearly we are always working to meet the customer's brief, but in some cases this is not enough. We also need to share the knowledge we acquire and use any new technology to achieve a genuinely collaborative working process with our stakeholders.

In the PFI model this practice works extremely well. We can provide real savings in the lifecycle through concept-feasibility-design-construct-commission-operate-decommission-deconstruct-recycle etc. However, on supply and install schemes the design

is usually a completed process when our involvement in the project begins. The design stage is the point where most improvements can be made and where the constructor can make most impact.

It is our collective responsibility to build assets that enhance the quality of life both now and in the future: we have an opportunity to transform the way that infrastructure is created, by rethinking the way we design and use resources. The objective must always be to find solutions that benefit people and the environment while also making sound business sense.

Achieving this end involves extensive collaboration with all those involved in the project – our customers, end-users and local communities to ensure a shared understanding of the needs and impacts of schemes, alongside a view of what is technically possible and affordable.

Translating this ideal into reality demands that designers, contractors and suppliers work together to embrace new ideas and technology to develop innovative solutions.

In short, a new mindset is required in the construction industry. The green agenda needs to be completely embedded in every stage and considerations of the impact of any construction on the wider community should be the first, and not the last, consideration in project design.



“ As the UK's leading building and building services company we are uniquely placed to influence the sustainability agenda and practice across the country and we take this responsibility extremely seriously.

”

Zero Carbon Where are we?



David Mitchell,
Technical Director,
Home Builders
Federation.

Before answering the second hardest question in housebuilding at the moment (the hardest being how do we manage our way through the credit crunch) it's important to understand where we started from, where we want to finish and to highlight some of the important milestones along the way.

In December 2006 the Government published its 'Building a Greener Future – Towards Zero Carbon' consultation. This set out a timetable for improving the energy performance of new homes, based on incremental improvements to Part L of the Building Regulations 2006, namely: 25% by 2010, 44% by 2013 and zero carbon by 2016. A key question was always of course to determine the definition of zero carbon.

The CLG consultation document on 'The Definition of Zero Carbon' due out later this year will be pivotal for the whole industry. We await it with great interest, but in the meantime we are without a final definition that gives us certainty about what 'Zero Carbon' actually means.

And, of course, at the same time Government would also like to see an increase in the number of homes produced from 165,000 to 240,000 by 2016. Overall a very significant twin challenge – particularly in the current market.

The industry is nevertheless undertaking pro-active work and I would like to talk about one piece of this.

Early in 2007 the Home Builders Federation (HBF) and the Modern Masonry Alliance (MMA) formed the 'Futures Group'. Together with the NHBC and Robust Details Limited, the group's objective was to achieve the most cost-effective solutions to meet the Part L 2010 and 2013 targets.

The initial phase looked at existing house designs provided by HBF members to see whether these would with challenging fabric specifications meet the required 2010 and 2013 standards.

In each case, the Target Emissions Rating (TER) was determined in accordance with the current Part L. Incremental improvements were then made to the fabric of the dwellings, followed by improvements to lighting, heating and energy sourcing. The Futures Group was able to suggest areas of development and highlight necessary changes to the SAP methodology to make it more robust.

The Group also wanted to offer design options that, whilst very challenging, allowed the most cost effective constructions to be achieved without a significant increase in the dwellings' footprint.



As an example, it was shown that with very challenging cavity wall constructions using cavities no wider than 100mm, and an air tightness of $5\text{m}^3/\text{hour}/\text{m}^2$ at 50 Pascal it was possible with some designs to achieve a 25% improvement in CO₂ emissions without using any renewable energy option.

To reach 44% improvement the same construction types as given for the 25% improvement were retained, but with the addition of some renewable energy.

It was also recognised that 100mm cavities with thermal board on the inner surface provided a highly insulated construction. Thus high performance specifications can be achieved with little effect on the footprint of the dwelling. Such constructions might also transfer to separating walls, which could enhance acoustic performance and reduce heat loss through the wall itself.

This is just one example of many similar types of work being undertaken by HBF and its members so, to bring us back to the question "Zero Carbon – where are we?" I would answer it this way:

“A lot of theoretical work has been done that shows that with challenging design solutions the 2010 and 2013 targets for CO₂ reduction could be possible with the addition of a small amount of renewables.

The direction of travel from 2013 to Zero Carbon will then be largely dependent upon the final definition, which as mentioned, is to be the subject of a CLG consultation due out shortly. Once we know the implications of that definition then we will need to examine how the industry that emerges from the other side of the credit crunch is best able to tackle the challenge with its partners.”

The Regulatory Environment

At the time of writing, Jeremy Sumeray was on secondment to the Department for Business, Enterprise and Regulatory Reform DBERR. He is now working as an independent sustainability consultant.



Jeremy Sumeray

A range of new measures is being introduced this year that will have an impact on the whole construction industry supply chain. Many of these were in development in 2007, with the industry participating in consultation exercises lead by Defra and CLG (Communities and Local Government). These include:

- Site Waste Management Plans
- Energy Performance Certificates
- The Planning Bill

Site Waste Management Plans (SWMPs)

New regulations brought in by Defra in April of this year require a Site Waste Management Plan to be produced for all construction projects in England with a project cost of more than £300K. Basic reporting requirements will be required for projects between £300K - £500K with more detailed reporting required for larger projects.

The aims are two-fold. The first is to help prevent the illegal disposal of waste. The second is to improve materials source efficiency within the construction sector by reducing the amount of waste produced and encouraging recovery of as much as possible of the remainder.

The recently launched Strategy for Sustainable Construction contains the target to halve construction, demolition and excavation waste sent to landfill by 2012 and Site Waste

Management Plans, a mandatory component of CLG's Code for Sustainable Homes, will be a key methodology in reducing waste.

Energy Performance Certificates (EPCs)

An Energy Performance Certificate (EPC) is a document detailing the theoretical energy efficiency of a building based on an analysis of its fabric and its energy management systems.

The Energy Performance of Buildings Regulation started to come into force in April 2007 and there is a schedule of dates for the introduction of requirements through to January 2011. The two key dates are 1 June 2007, when EPCs became mandatory for the sale of existing dwellings where a Home Information Pack (HIP) is required and 6 April 2008 when EPCs became required for the sale or rent of buildings, other than dwellings, with a floor area over 500m².

The main purpose of the Regulations is to implement the Energy Performance in Buildings Directive (EPBD), which is designed to promote the improvement of the energy performance of buildings within the European Community. It is hoped that implementing the EPBD will encourage owners and tenants to choose energy efficient buildings when seeking new accommodation and to encourage them to improve the performance of the buildings they occupy.

The Regulations introduce EPCs for buildings when they are constructed, sold or let. They show prospective building owners or tenants the current energy performance rating of a

building and the potential energy performance if energy efficiency measures are implemented. EPCs are a mandatory part of the HIP.

The Planning Bill

This introduces a new system for planning nationally significant infrastructure projects, alongside further reforms to the town and country planning system. It builds on Planning for a Sustainable Future, the planning white paper published in May 2007.

The Planning Bill will enable ministers to set national policy statements for infrastructure, which will be developed following public consultation and parliamentary scrutiny. Ministers will have a duty to contribute to sustainable development and to carry out an appraisal of their policy's sustainability.

Once an infrastructure project is under consideration, the developer will have a legal duty to consult the local community, local authorities and key stakeholders.

An independent planning commission will be established to conduct planning inquiries into infrastructure projects, in which the content of the national policy statements will be the key consideration.

The government is also aiming to ensure that planning enquiries will be more accessible to the public, and a public 'right to be heard' will be protected. Any person who registers an interest will be able to give oral evidence at relevant stages of an enquiry.

Other elements of the Bill are aimed at streamlining the existing planning system, simplifying the preparation of local development frameworks and development management processes.



A WORD FROM THE SPONSOR

Cliff Fudge, Technical Director, H+H UK reviews the debate so far and adds his own contribution.



If there is one question that is now safely beyond debate it is: “Do we need to do anything?”.

Resoundingly, we all agree that the answer is yes. All of us, both as individuals and through the organisations we represent, need to contribute to the drive to make a sustainable future. But, as ever, the devil is in the detail and the question is “where to start?”

In the UK housebuilding sector the focus is clearly on the Code for Sustainable Homes – a laudable and ambitious attempt to produce real improvements in the performance of new housing. This must be the right approach – with a clear legislative framework and timescales in place we all know what we are working towards and the playing field is level.

While that is the objective, however, the reality is rather less straightforward and we would urge the government to live up to that objective: to make sure that definitions are agreed, that timescales are set nationally and that individual planning authorities are not allowed to set their own agendas. The present variations give huge headaches to companies trying to design standard house types or plan the introduction of new technologies.

We would also temper our enthusiasm for the Zero Carbon targets by asking that technologies are proved before they are widely implemented. It doesn't seem fair to ask the housebuyer (already facing a larger bill for a house built to higher environmental standards) to be at the same time a guinea pig for new micro generation technologies. These are not only unproven in large scale applications but also (possibly because they are still at an early stage) can be amazingly complicated to operate correctly. The last thing we want is for people to associate low energy homes with mind-achingly difficult

equipment that may simply go unused because it takes too long to master.

The lack of any guarantee that technologies will actually be used as they are intended has implications for the methods used to meet the different levels of the Code. Surely it makes more sense to focus initially on the fabric of the building than to allow houses to be rated to Code Level 3 simply by utilising energy efficient appliances and some alternative power generation?

Similarly, there is a question mark over the relative importance placed on embodied energy versus energy in use. Clearly both contribute to the overall sustainability of a building, but energy in use, with its ongoing impact must be the more important criterion. As it happens, aircrete performs well in embodied energy calculations but we would question the value of a set of figures for the building fabric that assume a building lifespan of only 60 years.

Despite these reservations we do strongly believe that regulation is the way to progress and the impact of impending legislation with a clear target (even if some of the practicalities are a bit wobbly) has been astonishing – new house designs, rapid new product development and, above all, a new spirit of collaboration has galvanised the building industry.

Over the last two years we have seen the beginning of a radical change in the way we work on large projects – we, as manufacturers have begun to be consulted at initial design stages and to be asked to work together with a client to solve a particular problem or produce improvements in aspects of the building process. This is a hugely promising development, recognising the value of our own technical knowledge and experience.



It is a refreshing environment to be working in and it makes our product development a far easier process to conduct. There is a more widespread acceptance of innovation, allowing genuinely useful developments to be widely implemented in a short space of time.

In the case of H+H we are able to capitalise on a sound track record of innovation to discuss new solutions for the UK market. Traditionally one step ahead of the UK market the company has never been frightened to discuss radical innovations and to make full use of its international experience to spread new practice across markets.

A good example of this was the introduction of the Râ Build concept: for some in the UK it was a little uncomfortable to see a company that could have been pigeon-holed simply as a manufacturer of a traditional building material instead giving a new solution for site building practice. But this is surely a model for the future – great ideas should be capitalised on – no matter which part of the supply chain they come from. The success of this approach can be seen in the radical solutions proposed by builders prepared to collaborate to achieve startlingly effective results – as in The Barratt Green House discussed earlier.

Using Aircrete as a material gives H+H an immediate advantage, of course. Being made largely of pulverised fuel ash (a by-product of power generation) and having excellent embodied energy ratings makes it a positive choice for the environmentally minded, but it is what H+H does with the material that turns it into an even more significant choice.

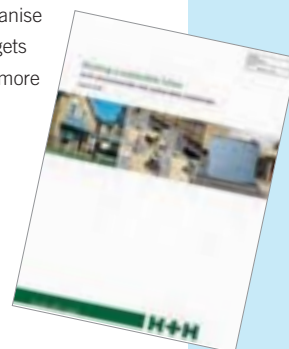
Initiatives such as thin-joint construction and the Râ Build concept, for example, while designed to improve speed and accuracy on site also contribute to a wider agenda of waste reduction. Improved build speed reduces time and labour waste while site waste is all but eliminated with Ra Build as the material requirements are calculated by our

technicians before the lots are packaged and dispatched (contributing to the developer's Site Waste Reduction targets). Once included in the house design, the performance of the aircrete comes into its own, with its great thermal and acoustic insulation and the high thermal mass used to such good effect in increasing numbers of Code Six house designs.

There is no room for complacency, however, and in supporting the drive for better sustainability we wholeheartedly "live the talk" by maintaining a rigorous approach to environmental standards and innovation in our own production and management systems.*

This time last year I would have viewed the drive for greater sustainability with wholehearted enthusiasm – given the current catastrophic conditions in the housing sector it is difficult to remain as positive. However, I do believe that we all need, as far as is possible in these dire trading conditions, to remain focused on a greater imperative. It would be truly tragic if the advances achieved over recent years – advances in technology and in building practice, were lost because of immediate market conditions.

From our own viewpoint, although we are right in the front line when it comes to market slowdown, we still believe that environmental considerations need to remain at the top of the agenda. The government has been absolutely right to galvanise the process by setting tough targets and we believe that, with a little more clarity, this is the place to start.



* For full details of our environmental credentials, see our document Building a Sustainable Future, published in February 2008.

“Do we need to do anything?”
YES!”

Build with our expertise

At H+H UK we believe in making your life easier by offering quality products, innovation solutions and unrivalled service as part of our total commitment to our customers.

Quality aircrete - the foundation of our company

H+H aircrete is designed to meet exacting quality standards and regulatory requirements.

Innovative solutions - how we create results

Our RA Build method using the Thin-Joint system offers even faster construction times, easy building, plus excellent acoustic and thermal resistance.

Trusted partner - our reputation in the industry

We support our customers with personal service, attention to detail and technical support and advice.

Visit www.hhcelcon.co.uk to find out more.

build with ease

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