



# DEFINITION OF 'ZERO CARBON HOMES AND NON-DOMESTIC BUILDINGS' CONSULTATION

## KEY DISCUSSIONS

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### **FULCRUMCONSULTING**

Fulcrum is an international team of leading consulting engineers. Our objective is to facilitate the ongoing development of a low-impact built environment in a way that harnesses innovation and is compatible with economic reality and occupant expectations in terms of comfort, functionality and beauty.

As part of our 2009 debate series, March sees us discussing the recent Government consultation on 'the definition of zero carbon homes and non-domestic buildings'. We expect a lively debate around the hierarchical approach proposed by Government and the list of 'allowable solutions' on offer to achieve 'zero carbon' status. The event will be held in our London office on March 11<sup>th</sup> from 6pm.

For further information on any of our debates, please contact [natasha.eyre@fulcrumfirst.com](mailto:natasha.eyre@fulcrumfirst.com)

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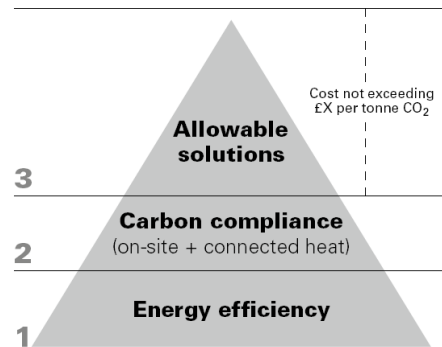
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## 1 INTRODUCTION

On December 17<sup>th</sup> 2008 the Department for Communities and Local Government (CLG) published a consultation on the definition of zero carbon homes and non-domestic buildings. The document follows on from a report published by the UK Green Building Council (UK-GBC) in May of 2008<sup>1</sup> which reviewed the current definition of ‘zero carbon’ as stated in the Code for Sustainable Homes (CSH) and suggested that it could be technically unviable for up to 80% of new developments in the UK. The UK-GBC report recommended a number of changes to the CSH definition and drew attention to specific areas of research where further work was required in order to develop a robust definition of ‘zero carbon’.

## 2 ‘ZERO CARBON’ HIERARCHY

The consultation document outlines a hierarchical approach to zero carbon similar to the one originally proposed in the UK-GBC report<sup>2</sup>, proposing strict energy efficiency targets, followed by a degree of mitigation via on-site renewable and district heating/cooling systems. However, rather than then asking developers to mitigate remaining emissions via a fund as proposed by the UK-GBC, developers can select from a variety of interventions termed ‘allowable solutions’. The consultation only discusses the definition of zero carbon as it would apply to dwellings in any detail. Consideration of a definition for non-domestic buildings has been left for a further consultation later in 2009.



Proposed ‘zero carbon’ hierarchy

The need for each step of the hierarchy and a discussion around how the requirements should be defined is included below:

### 2.1 ENERGY EFFICIENCY

Energy efficiency measures reduce the demand for energy and resources and are generally more robust and longer lasting than supply-side measures such as low and zero carbon (LZC) generation technologies. For these reasons, energy efficiency should always be the first port-of-call for anyone seeking to design sustainable buildings; however, the current market structure and resulting market forces do not incentivise best practice.

The consultation document mentions two examples of energy efficiency standards<sup>3</sup>:

- EST Standards – which provide backstop fabric performance standards
- PassivHaus Standard – which combines backstop fabric performance standards with a maximum annual heating and cooling demand of 15kWh/m<sup>2</sup>

The level of energy efficiency required and the metric used to express the requirement can have a profound impact on the outcome. This not discussed in the consultation document and respondents are only asked whether they agree with Government’s ambition to require high levels of energy efficiency “broadly equivalent to some of the most demanding standards currently published”.

‘Government believes that, whatever the mix of onsite energy technologies and other offsite solutions adopted, all zero carbon homes should be built to very high standards of energy efficiency.’

CLG, Consultation Document, Para 4.5

<sup>1</sup> UK-GBC, *The Definition of Zero Carbon Report* (May 2008); <http://www.ukgbc.org/site/resources/showResourceDetails?id=180>

<sup>2</sup> *ibid*

<sup>3</sup> Though it should be noted that only the EST standards were considered in the associated Costs & Benefits Analysis and Impact Assessment

## Which Metric?

While only two options are raised in the consultation document, there are of course, a variety of ways in which the energy efficiency requirement could be defined:

- Backstop U-values, airtightness and thermal bridging
 

This would be a simple metric, offering the possibility of mass-replicable solutions so potentially precipitating an efficient industry supply chain response. It would also be less sensitive to modelling inaccuracies and may be easier to enforce. On the downside it is a crude measure and would undoubtedly discourage innovation, especially if the backstops were not set stringently enough.
- Maximum heating and maximum cooling demand – kWh/m<sup>2</sup>

This would be an outcome based measure which is likely to encourage innovation. However, it is a more complex metric and performance will be dependent on modelling accuracy. .
- Maximum total energy demand – kWh/m<sup>2</sup>

Similar to setting a maximum heating and cooling demand, but more flexible as all energy demands would be included, this metric is outcome-based and would push innovation. However it is more complex than other metrics and would require a new compliance model to be developed. Performance would be dependent on modelling accuracy.
- Heat Loss Parameter (HLP) – W/m<sup>2</sup>K
 

This combines heat loss from building fabric, thermal bridging and ventilation into a single figure. This metric is used in the Code for Sustainable Homes, but is not well understood by industry. A given HLP is in general much harder to achieve with houses than flats. As a metric, its use cannot be extended to non-domestic buildings – the other measures listed here could.
- Percentage CO<sub>2</sub> emissions reduction
 

This really isn't a useful metric to use for defining energy efficiency and we would strongly recommend against it.

In choosing the metric and level, a compromise will need to be made in order to balance the competing demands of:

- ability to achieve lasting CO<sub>2</sub> emissions reductions
- ability to drive innovation
- fairness across dwelling types
- complexity and accuracy of compliance model
- technical and financial viability
- level of skills and understanding required by compliance modeller and compliance checker.

Given that legally binding targets for GHG emissions reductions are already in place, it is important to ensure that real progress is made. For this reason outcome based targets should be preferable as they are more easily measurable/ enforceable and should ensure the required progress is made without unintentionally allowing the regulations to favour particular technologies or development types (a major risk with other metrics).

Therefore, Fulcrum would recommend that a metric similar to the PassivHaus standard is used (a combination of backstop values and maximum heating/cooling demand); however, we note that it is important to review the potential for unintended consequences when exporting a methodology from one country to another.

## 2.2 CARBON COMPLIANCE

Even though the UK-GBC report<sup>4</sup> demonstrated that achieving ‘zero carbon’ using on-site measure alone was likely to prove impossible for many development plots, the case was argued for a minimum requirement of on-site energy in order to ensure that viable renewable resources are used when possible and not locked-out during development. The term ‘carbon compliance’ is used in the consultation document to refer to a minimum level of reduction in carbon dioxide emissions, compared to current Building Regulations, that must be achieved via on-site solutions and/or via connection to neighbouring district heating/cooling networks.

Analysis commissioned by CLG tested 5 scenarios: 25%, 44%, 70% and 100% of the regulated energy (uses covered by Part L), and then 100% + cooking and appliances (i.e. ‘total energy’). However the consultation document only takes three of these levels forward for further consideration as the minimum level of Carbon Compliance; 44%, 70% and 100%.

### Which Metric?

The ‘Building a Greener Future’ policy statement outlined the Government’s proposed trajectory toward ‘zero carbon homes’ as follows<sup>5</sup>:

Date	2010	2013	2016
Energy/carbon improvement as compared to Part L (Building Regulations 2006)	25%	44%	zero carbon
Equivalent energy/carbon standard in the Code	Code level 3	Code level 4	Code level 6

Seemingly as a continuation of this thinking, Government has so far chosen to express the potential Carbon Compliance standard in terms of a percentage reduction in CO<sub>2</sub> emissions from regulated (Part L) energy consumption. There is a strong case to suggest that this is not the optimal metric and that the level of Carbon Compliance would be better stated in terms of a percentage reduction in CO<sub>2</sub> emissions from ‘total energy’ (Part L regulated energy + non-regulated energy).

Part L only regulates energy consumption for space heating, hot water, lighting and ventilation and therefore by using this as the metric for Carbon Compliance the methodology will restrict the technologies used to meet the standard. Furthermore, for energy efficient dwellings, non-regulated energy accounts for around 50% of total predicted CO<sub>2</sub> emissions, making a metric that only covers regulated energy potentially misleading. Using ‘total energy’ would arguably allow a more fair, robust and flexible response to the challenge. Ultimately whichever metric is chosen care must be taken to prevent consultants from “loophole hunting” as the detailed technical knowledge required resides almost entirely on the applicant’s side.

### Which Standard?

Setting a single level of ‘carbon compliance’ to be required across England and Wales is incredibly difficult. The level needs to be stretching in order to encourage innovation and remain faithful to the original concept of the ‘zero carbon’ policy; but it should not be so stretching as to significantly restrict the number of sites that can be delivered, particularly in areas of low land value or areas with specific planning restrictions (such as conservation zones). Urban infill sites will generally have less wind and solar energy available per m<sup>2</sup> of development compared to suburban plots. Therefore, setting a standard that is stretching for suburban plots could be impossible for a large number of infill sites. Furthermore, individual sites may present specific opportunities or restrictions that would need to be accounted for. In order for the standard to be mandatory it needs to be realistically achievable across the vast majority of potential sites.

<sup>4</sup> UK-GBC, *The Definition of Zero Carbon Report* (May 2008); <http://www.ukgbc.org/site/resources/showResourceDetails?id=180>

<sup>5</sup> Although the reference to “Equivalent energy/carbon standard in the Code” was presumably included to help people join up the various regulatory requirements, in practice it has proved very confusing because many in the industry believed it to refer to the whole Code rather than just the Ene1 credit area.

Setting the standard too low risks sending a message to industry that “this is all that you have to do” and the mass-market tends to do just enough to achieve compliance with the minimum regulations. However, setting the standard too high risks undermining the government’s commitment to high proportions of brownfield land development and the ability to deliver new housing projects in the future.

Initial analysis undertaken for the UK-GBC report<sup>6</sup> suggested that it would be difficult to set a single standard that would be suitable for the entire industry, but recognised the added complexity that would come with setting different standards for different building types or site locations. The UK-GBC report circumvented this dilemma by proposing a reducing incentive to mitigate emissions on-site via the price of paying into the fund<sup>7</sup>. The absolute minimum ‘carbon compliance’ level was set relatively low, but the price of paying into the fund was high (a margin above the price of mitigating CO<sub>2</sub> via PV) upto a second level, at which the price of paying into the fund dropped. The intention was that developers would always see paying into the fund as an expensive option, and therefore go to a reasonable effort in order to avoid paying. Similarly, consultants and product manufacturers would be incentivised to offer their services to developers in a way that demonstrated their ability to save them money mitigating emissions on-site and thus avoiding fund payments. Further details of the fund can be found below.

**Evidence-based approach**

We are inclined to agree with Government, that the consultation process is not the correct vehicle to determine where and how the backstops should be set. Instead we believe they should be carefully considered based on the evidence available and expert opinion and analysis.

‘We do not believe this consultation is the right vehicle for setting the precise level of the energy efficiency backstops or of the carbon compliance level’  
 CLG, Consultation Document, Para 5.5

**2.3 ALLOWABLE SOLUTIONS**

The final step in the Government’s hierarchy is a list of Allowable Solutions. Each option is discussed briefly below:

**Carbon Compliance beyond the minimum standard**

Allowing developers to choose to deliver more on-site low and zero carbon energy and directly connected heat than the minimum requirements should always be an option.

However, studies to date show that the majority of developments would be physically unable to use this as the sole mechanism for mitigating all predicted emissions. For those sites where the possibility does exist, the cost of doing so is likely to be prohibitively high, preventing many developers from following this route unless other influences such as public perception or CSR came to bear.

**Energy efficient appliances/ building control systems**

For some time, various parts of the industry have been calling for a more flexible methodology to be used to estimate non-regulated energy demands; for example when low energy appliances or energy saving devices are installed. Therefore this is a welcome addition.

We understand the reasons for its inclusion under Allowable Solutions, but logically this measure should in fact be considered under Energy Efficiency.

<sup>6</sup> UK-GBC, *The Definition of Zero Carbon Report* (May 2008); <http://www.ukgbc.org/site/resources/showResourceDetails?id=180>

<sup>7</sup> The only ‘allowable solution’ under their suggestions

## Exports of LZC heat (or cooling) to surrounding developments

If planned on an appropriate scale, this option has the potential to deliver greater CO<sub>2</sub> savings for a given cost than many of the other options. Energy Service Companies<sup>8</sup> (ESCOs, or similar) could gain economic benefit from this and it could therefore be used as a mechanism for lower energy costs across their entire customer base and could aid the proliferation and uptake of such decentralised approaches to LZC energy generation and sale. This would bring benefits to the new development as well as the local existing stock, and could potentially help to alleviate fuel poverty.

As a solution, it has an intrinsic 'local' bias and could encourage a greater sense of integration between new and existing developments. However, currently there is very little district heat infrastructure in the UK and therefore this option is unlikely to be available to many developers unless an ESCo take on the cost of delivering the infrastructure themselves. This option may be contractually and logistically complicated to plan, install and manage, however the current requirements in the Planning and Climate Change Supplement to PPS1 require Local Authorities to plan community infrastructure around CO<sub>2</sub> emissions reductions.

## Section 106 Agreements

On the face of it, the use of S106 Agreements to secure the 'zero carbon' status of developments seems sensible as is it an existing mechanism and monies secured in this way by the planning authority could be pooled to fund larger, more effective projects. However, as we understand it there are a number of problems with this solution:

- Any 'zero carbon' payment has the potential to be confused with other S106 payments
- S106 payments are subject to a lot of pressure and can be, and frequently are, negotiated down
- Some developments do not have S106 agreements associated with them; in 2005/06, this was the case in over 50% of all major residential developments granted planning permission in England<sup>9</sup>
- A framework must be in place for the council to audit CO<sub>2</sub>, to ensure that an adequate amount is offset by the contribution. No such framework exists currently
- A formula for the 'zero carbon' contribution would need to be written into the Local Development Framework of each Council in England<sup>10</sup>
- From a developer's point of view, it is likely that there are already too many disparate items to be negotiated in an S106 agreement; adding an additional 'zero carbon' payment to the mix may not be desirable
- S106 payments are subject to a time limit on being spent; otherwise the contribution has to be returned<sup>11</sup>
- In practice, S106 contributions are not necessarily ring-fenced for particular activities
- Local Authority Planners do not have the skills to identify appropriate investments

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<sup>8</sup> ESCOs can take many forms including private companies, community trusts and public private partnerships. Stakeholders can include local residents, the Local Authority and existing energy suppliers.

<sup>9</sup> Valuing Planning Obligations in England: Update Study for 2005-06, CLG, 08/2008

<sup>10</sup> 'Policies on types of payment, including pooling and maintenance payments, should be set out in Local Development Frameworks. The local authority's generic policies on payment types should be contained in Development Plan Documents, and the details of their application in Supplementary Planning Documents' (ODPM - Circular 5/05: Planning Obligations (July 2005), B17)

<sup>11</sup> 'In the event that contributions are made towards specific infrastructure provision but the infrastructure is not provided within an agreed timeframe, arrangements should be made for contributions to be returned to developers' (ibid, B24)

### **Retrofit existing stock in locality**

This option has the potential to aid other Government targets for GHG emissions reductions and, depending on the calculation methodology adopted, could deliver greater CO<sub>2</sub> savings than if the same money were to be spent on new-build development. It could help reduce fuel poverty and create jobs in the retrofit market. However, there are a number of potential complications with this solution:

- It is likely to be contractually and logistically complex
- the skills required to retrofit existing building are not the same as those required to construct new ones, therefore there is a further potential skills gap if this option takes off
- A methodology to audit the CO<sub>2</sub> savings must be developed and a compliance regime introduced
- There may be negative perception issues from certain quarters as it may be deemed by some not to constitute true 'zero carbon' new-build
- Potential behaviour change loosely associated with visible "iconic" renewable energy technologies would be lacking
- The term 'locality' would need to be defined

### **Investment in offsite LZC & benefits of ownership transferred to householder**

This option is potentially simple and cheap for the developer and has the potential to increase funding for large-scale LZC installations.

In terms of the benefits of ownership being transferred to the householder, we believe there are a number of problems with this, not least on the basis of practicality. What would happen to the benefits when the house changed ownership? Would the householder be able to sell the benefits of ownership (e.g. shares)? Fragmented ownership of an LZC asset is likely to be problematic. However, if the ownership could be held by the community, for example via the site ESCo then some collective benefit could be realised and problems associated with transfer of ownership for individual homes could be negated.

### **Offsite renewable electricity (via direct physical connection)**

We believe that off-site renewable electricity with a direct physical connection to the development should be counted under Carbon Compliance as it is the electrical equivalent of a heat network connection.

As an Allowable Solution, this option is easily auditable and could bring about behavioural change which has been loosely linked to 'visible' LZC technologies.

While the new wired-infrastructure could be used to deliver next generation technologies, such as dynamic demand control, there is the potential for duplication of wires and hence an increased use of copper (a finite natural resource) and potential complications of routing wires and achieving planning permission for an off-site asset.

### **Any other measures announced by Government**

Government would need to be very careful how they introduce any further Allowable Solutions if they were to do so in the future as land purchases are often made many years in advance and new solutions could change the cost dynamic.

## Cost Cap

The consultation document proposes a capped cost on the Allowable Solutions, but it is unclear what this is referring to. By its name one would be forgiven for thinking that it would be a limit on the cost of zero carbon homes to developers. However, careful scrutiny of the wording in the document suggests that instead it is more of a benchmark that Government will use to check the cost of the Allowable Solutions against during the review they propose for 2012. If this is true then it should be made much clearer to the industry as it is not unreasonable to assume that “capped cost” referred to a cap on the cost of something.

A fundamental problem with the 2012 review process is that the level at which the capped cost is defined will be fairly arbitrary, and come 2012 there will be very few projects that can demonstrate the real costs of ‘zero carbon’. The document isn’t at all clear on the issue and we are awaiting clarification from Government on what exactly the capped cost will mean to industry.

## Consistency

We believe that the Allowable Solutions currently proposed pose a fundamental problem in terms of consistency. For example:

- Investment in LZC infrastructure requires that the homeowner receives some benefit from the asset, however export of LZC heat will not have any discernable benefit for the homeowner (apart from their home being badged as ‘zero carbon’) and neither will S016 agreements or retrofitting of existing stock.
- There does not appear to be any consistency in the duration of carbon savings from the different solutions
- The solutions are unlikely to offer developers predictability and consistency of cost

## Community Energy Fund

Perhaps the most interesting recommendation to come out of the UK-GBC task group report, was the creation of a ‘Community Energy Fund’ as a mechanism for allowing off-site mitigation for sites that could not achieve ‘zero carbon’ on-site. The fund was proposed as the final step in the hierarchy, i.e. where ‘allowable solutions’ sit in the hierarchy outlined in the consultation document. The advantage of the fund mechanism is that it can be applied to any development, regardless of its specific location or other circumstances, making it simple for developers to factor in. Furthermore, the fund mechanism can deliver predictable development costs that can better facilitate strategic investment decisions and land purchases. The fund is also the easiest measure to adjust for regional variations such as land values should it be determined that a “one size fits all” approach is not workable or equitable. Most importantly, with a fund the money could be spent strategically in order to maximise the emissions reduction per pound of investment rather than encouraging individual developers to invest in disparate solutions that may be more expensive in terms of £/kgCO<sub>2</sub> than a collective project.

In the consultation document, Government acknowledges the suggestion of a community energy fund, but rules it out as a measure seemingly only due to the required involvement of HM Treasury, although no proper discussion is included.

‘the case for any such fiscal measures needs to be considered by the Government in the context of the broader economic and fiscal environment and can only be brought forward through HM Treasury budget processes’

*CLG, Consultation Document, Para 6.12*

Fulcrum strongly supports the idea of a community energy fund as the sole ‘allowable solution’ beyond further on and near-site measures.

Our further thoughts on this issue can be found in our ‘dream definition’ document here: <http://www.fulcrumfirst.com/pages/Knowledgebase/zerocarbon.html>

### 3 OTHER ISSUES

There are a number of other issues that the consultation document throws up:

#### 3.1 COMPLIANCE MODEL

The current National Calculation Methodology (NCM; SAP for housing; SBEM for non-domestic buildings) was not designed to assess zero carbon buildings and as such is not able to appropriately consider many of the design solutions that they are likely to feature. Furthermore, it has been shown that even in well-managed buildings the in-use performance is often significantly different from that predicted by the model. We believe there is an urgent need for a fundamental re-think in order to develop a compliance tool that is fit for purpose.

Currently, Government are dealing with the review of the NCM as a separate issue to the definition of zero carbon and indeed the update of the Building Regulations. It is difficult to overstate how unhelpful it is to deal with such a complex and interlinked problem in such a fragmented manner, taking each strand in isolation. We strongly urge that a more coordinated approach is taken and that predicted performance is brought more in line with experience from reality.

#### 3.2 TIMING

The Government's timeline to zero carbon is extremely ambitious. Almost two years have passed since the 2016 target for zero carbon housing was announced in the pre-budget report and the industry is still awaiting a clear and consistent definition. The decision timeline regarding defining zero carbon given in the consultation document is stretched over far too long a period; industry needs to be given as much clarity as possible as soon as possible in order for it to be in a position to deliver zero carbon homes in 2016.

Despite the current economic conditions, building developments are still being planned, but low delivery rates mean that delivery is being "pushed back" and an increasing number of homes will now need to be built to the zero carbon standard. It is therefore imperative for the energy and infrastructure masterplanning of these developments that the consultation and decision-making process regarding all aspects of the zero carbon standard is concluded as soon as possible.

The review of progress towards delivering zero carbon homes indicated for 2012 gives very little time for data to be gathered let alone demonstration projects built and adequate in-use monitoring undertaken. Hence for any meaningful review to be carried out, Government will need to put in place a strategy for gathering as much relevant data as possible and making it available to speed up the industry's learning process. This has been recommended to Government repeatedly<sup>12</sup> and is discussed further below.

#### 3.3 SKILLS

The timeline to zero carbon for all developments (2016 – 2019) does not allow much time for the construction industry to adapt their practices and develop, evaluate and consolidate solutions. All of the stakeholders, from developers and design consultants to Planning officers and Building Control inspectors, will need time to re-skill and re-evaluate their position in the delivery chain.

With the current Planning and Climate Change supplement to PPS1 and other documents placing demands on local authorities to require lower CO<sub>2</sub> emission developments, already significantly more detailed information is required at the early stages of planning, requiring greater input from consultants who have traditionally not been brought on board until much later. The zero carbon agenda will necessarily force an even greater evolution of traditional roles within the design team. This amount of change in what is a very conservative industry will take time and the transition is likely to be uncomfortable for many.

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<sup>12</sup> Both the UK-GBC Carbon Reductions In New Non-Domestic Buildings report and the Definition of Zero Carbon reports recommended this and many more have done so before.

Change will need to take place at all levels of the industry, from developers to consultants to manufacturers to planning departments to building control, with many individuals needing to be up-skilled.

The suggestion in the consultation document is that Building Control (BC) seems to be the most obvious existing body to take on the remit of enforcement of zero carbon standards. However, BC personnel lack the skills required to carry out that role robustly as their traditional responsibility has been almost solely concerned with health and safety. Significant investment in extensive training and recruitment programmes will therefore be required in order for appropriate skills to be gained.

### **3.4 MONITORING AND FEEDBACK**

An integral part of any policy initiative should be a clear monitoring and feedback strategy to assess how the industry has responded to the legislation and how much progress has been made towards objectives. In addition, feedback helps to identify any unintended disbenefits and informs the rate at which future changes can be made. Given the ambitious timescales proposed by Government, and the long lead times involved in the construction industry, it is particularly important to ensure that lessons learned in the early stages of policy development are incorporated into the regulations as they are updated.

Currently there is no formal feedback mechanism and the industry as a whole is suffering from a lack of operational data on building performance. The UK-GBC Report on Carbon Reductions in New Non-domestic Buildings<sup>13</sup> lamented the general lack of buildings in-use data and called for a national database to collect, store, and make available buildings in-use data to industry. This is an area on which Government need to act urgently. We believe there should be a comprehensive regulatory requirement for the gathering of in-use energy data at a level of detail that will enable feedback loops to be clearly established.

Various small-scale studies have shown that in-use performance can be 150%-300% of that predicted by modelling carried out at the design stage. This is likely to be due to a number of factors including: errors in the building benchmark data used at design stage, variations between design intent and final construction, poor operational management and unforeseen patterns of user behaviour. All these areas need to be addressed. In order for design-stage assessments of building performance to be more accurate a strong feedback loop from the performance of recently completed and existing buildings needs to be established. This is especially crucial given the very short timescales involved in the trajectory to 'zero carbon'.

While the current policy drive for 'zero carbon' focuses on design interventions in the new building stock, ultimately it is the real greenhouse gas emissions from the energy actually used in the buildings during their lifetime which will affect our climate. The issue of predicted versus actual energy consumption needs to be tackled as a matter of priority.

Monitoring will also be important in order to gauge public perception and attitudes towards the non-traditional technologies that will be required in zero carbon buildings. This will aid the industry in knowing where and how to concentrate efforts to educate building occupants on the proper use of their buildings.

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<sup>13</sup> UKGBC, *Carbon Reductions in New Non-domestic Buildings* (Dec 2007); <http://www.ukgbc.org/site/resources/showResourceDetails?id=121>

## 4 CONCLUSIONS

The consultation represents a useful departure in thinking from the original zero carbon definition which allowed only on-site measures. However, as has been shown above, there are still many concerning aspects about this proposed new definition including:

- Level and metric of 'carbon compliance'
- Confusing array of 'allowable solutions'
- Lack of ability to respond to regionally specific conditions
- Some fundamental issues such as skills and monitoring are still not being addressed with enough purpose

Our proposals which are described in Fulcrum's Dream Definition document<sup>14</sup> can broadly be summarised by:

- High levels of energy efficiency required
- On- and near-site 'carbon compliance' (heat and electricity), using total energy as the metric
- Payment into a 'Community Energy Fund' as the only 'allowable solution' apart from further on- and near-site measures

We believe this would overcome many of the problems with the current proposals and ultimately lead to a greater reduction in UK GHG emissions and hence aid progress toward the targets Government have set.

**For more information visit:  
[www.fulcrumfirst.com/pages/Knowledgebase/zerocarbon.html](http://www.fulcrumfirst.com/pages/Knowledgebase/zerocarbon.html)**

**Please send comments to [ZCD@fulcrumfirst.com](mailto:ZCD@fulcrumfirst.com)**

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<sup>14</sup> Fulcrum Consulting, Fulcrum's Dream Definition of Zero Carbon Buildings, (February 2009); <http://www.fulcrumfirst.com/pages/Knowledgebase/zerocarbon.html>