



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

## FULCRUM CONSULTING RESPONSE

Submitted 18<sup>th</sup> March 2009

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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.

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EC1R 4RR**Telephone:** 020 7520 1300**Fax:** 020 7520 1355**e-mail:** [tessa.parnell@fulcrumfirst.com](mailto:tessa.parnell@fulcrumfirst.com)**Is your response confidential? If so please explain why. (See disclaimer on page 13)**Yes  No **Comments:****Are you responding as an individual?**  **Or are you representing the views of an organisation**  ?**If you are responding on behalf of an organisation, please say who the organisation represents and, if applicable, how the views of members have been assembled.**

This response has been put together by Tessa Parnell and Jules Saunderson on behalf of Fulcrum Consulting. A number of internal discussions and workshops were held to inform our response.

Provision is made throughout this questionnaire for you to provide additional comments. If, however, you wish to provide more detailed comments on any aspect of the consultation then please feel free to append additional materials and supplementary documents, clearly marked and cross referenced to the relevant questions, as necessary.

<b>Organisation type (tick one box only)</b>			
House or property developer	<input type="checkbox"/>	Local authority – Planning	<input type="checkbox"/>
Commercial Developer	<input type="checkbox"/>	Local authority – other (please specify)	<input type="checkbox"/>
Housing Association (Registered Social Landlords)	<input type="checkbox"/>	Approved Inspector	<input type="checkbox"/>
Property Management:		Professional body or institution	<input type="checkbox"/>
Residential	<input type="checkbox"/>		
Commercial	<input type="checkbox"/>		
Public sector	<input type="checkbox"/>		
Builder – Main Contractor (commercial/volume house builder)	<input type="checkbox"/>	Trade body or association	<input type="checkbox"/>
Builder – Small Builders (repairs/maintenance, etc)	<input type="checkbox"/>	Householder:	
		Homeowner	<input type="checkbox"/>
		Tenant	<input type="checkbox"/>
Builder – Specialist Sub Contractor	<input type="checkbox"/>	Energy sector:	
		Generation	<input type="checkbox"/>
		Transmission	<input type="checkbox"/>
		Distribution	<input type="checkbox"/>
		Supplier	<input type="checkbox"/>
		Energy Service Company	<input type="checkbox"/>
Manufacturer	<input type="checkbox"/>	Other non-governmental organisation	<input type="checkbox"/>
Architect	<input type="checkbox"/>	Specific interest or lobby group	<input type="checkbox"/>
Civil/Structural Engineer	<input type="checkbox"/>	Research/academic organisation	<input type="checkbox"/>
Consultancy	<input checked="" type="checkbox"/>	Journalist/media	<input type="checkbox"/>
Individual in practice, trade or profession	<input type="checkbox"/>	Development funder	<input type="checkbox"/>
Local authority – Building Control	<input type="checkbox"/>	Other (please specify):	<input type="checkbox"/>
<b>Geographical Location</b>			
England	<input checked="" type="checkbox"/>	Wales	<input type="checkbox"/>
England and Wales	<input type="checkbox"/>	Other (please specify)	<input type="checkbox"/>

## Questions

### Section 4: Overview of Proposed Approach

**Q1.** Do you agree that the Code for Sustainable Homes should be revised to reflect the approach to zero carbon homes described in the hierarchy set out in Section 4?

Yes  No  Do not know

**If you agree, how do you think the Code should be revised?**

It makes sense for the Code to be revised to reflect the approach to zero carbon homes taken as a result of this consultation. However, we do have some difficulty answering this question because the answer does depend on the main purpose of the code – which is currently unclear.

- § If it is a signal for the future direction of regulations, then yes, it must be aligned
- § If it is a tool to incentivise innovation among market leaders, then no it should allow more flexibility
- § If it is a tool to aid market change/transition by feeding innovation back to the mass-market, then yes, it must be aligned, but also must give more support to developers.

Assuming the Code is to be revised, then it should utilise the same hierarchical approach, with the same metrics and levels used. We think that Code 6 should reflect the definition exactly, but then additional credits could be available under Ene1 if a developer were to go beyond e.g. the minimum level of Carbon Compliance. This would help encourage developers to do more on- and near-site if feasible and viable by rewarding them for going further. Similarly, going beyond the minimum energy efficiency standard could be rewarded by additional credits available to be gained under Ene2.

**If you have any further comments on Section 4 please add them here**

### Section 5: Energy Efficiency and Carbon Compliance

**Q2.** Government is minded to require very high levels of energy efficiency in 2016, broadly equivalent to some of the most demanding standards currently published by third parties (such as PassivHaus and Energy Saving Trust). Do you agree with that ambition?

Yes  No  Do not know

As acknowledged in the document, energy efficiency is of great importance due to the life-long carbon emissions savings achieved and the multiple benefits gained in terms of reduced energy demand, reduced carbon emissions, and subsequently reduced requirement for LZC energy generation as we head towards 2020 and 2050.

The level of energy efficiency required and the metric used to express the requirement can have a profound impact on the outcome. 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 would potentially initiate 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, with performance reliant on how well the individual elements are put together in practice. It 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 capability.

§ 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 generally much harder to achieve in houses than it is in flats. As a metric, its use cannot easily 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).

Fulcrum favours a metric similar to the PassivHaus standard (i.e. a combination of backstop values and maximum heating/cooling demand); however, we note that it is important to fully assess the potential for unintended consequences when importing a methodology from one country to another.

We would urge a full and rigorous analysis of possible metrics and levels to be carried out to determine the most appropriate metric and level to set. This should include Government deciding whether consistency of approach or consistency of outcome is the main driver for the energy efficiency standard.

It should also be noted that for the more complicated metrics where a greater analysis of each dwelling type may be required, 'standard' practices will be produced by the industry in time (e.g. EST good/best/advanced standards; EST guidance series on energy efficiency and the Code for Sustainable Homes).

Whatever metric and level is chosen as the minimum energy efficiency standard, industry needs to be given a trajectory to that level via the proposed updates to Building Regulations Part L in 2010 and 2013 to allow for appropriate learning cycles to take place.

If you do not agree to setting very high energy efficiency standards for homes, please say why you disagree.

**Q3. Do you agree that the approach to carbon compliance should not favour a direct physical connection of electricity or of private wire over connections via the distribution network?**

**Yes**  **No**  **Do not know**

We believe that the approach to 'carbon compliance' should not require Private Wire (Cf. Citiworks Case), but the definition of 'carbon compliance' should be broadened to include 'near-site' directly connected electricity.

See answer to Q4.

**Q4. Government is minded not to allow offsite renewable electricity to be claimed as part of the carbon compliance calculations. Do you agree with this approach?**

**Yes**  **No**  **Do not know**

We believe that off-site renewable electricity should be allowed as part of the carbon compliance calculations if it 'near-site' (e.g. has a direct connection to the site). Current proposals include 'near-site' heat, but not power, and this seems inconsistent to us.

Near-site assets have benefits which off-site assets do not, as a visual connection is still present between occupants and the asset. In fact, most forms of renewable electricity generation technologies offer more of a visual stimulus to encourage behavioural change than heat generating plant. We therefore think these benefits should be gained under carbon compliance rather than included in allowable solutions, which largely consists of off-site measures.

There could be many occasions where good natural resources (e.g. wind or small-scale hydro) exist in the proximity of but not within the boundary of a site. We believe that if the requirement allows directly connected renewable electricity then this will naturally limit the distance which that additional cabling is laid (due to cost and practicality constraints). If this is not considered sufficient, Government could define 'near-site' by a straight-line distance to the edge of a site and allow those assets to connect into the Grid instead but still count as 'near-site' energy production under 'carbon compliance'.

**Q5. Is the Building Control system the right regulatory framework for monitoring and enforcing carbon compliance?**

**Yes**  **No**  **Do not know**

If not, what approach would you prefer and why?

While Building Control is the most logical place to deal with carbon compliance monitoring and enforcement, in its current form it does not possess the skills or capacity required to deliver 'zero carbon', let alone an efficient and sustainable built environment.

While the existence of a skills gap is widely acknowledged, action to address it is not commensurate with the scale and urgency of the problem. This is a major threat to the delivery of 'zero carbon', but perhaps more importantly, there is a real danger that 'zero carbon' policies will be misinterpreted and misapplied resulting in perverse outcomes and ultimately, a less sustainable built environment. Furthermore, currently the skills that do exist in this area reside almost entirely in Engineering consultancies that are engaged by developers to find the least-onerous way of negotiating the regulatory requirements.

While we understand there is little to no appetite for starting a new entity and attempts to do so would likely be criticized as “reinventing the wheel”, there are such fundamental problems at each stage of the regulatory process that a new planning process may be the most effective way to respond to the challenges that we must address via the built environment.

**Q6. Does the analysis of carbon dioxide reductions from different technologies and the associated costs set out in Annex E look about right to you?**

**Yes**  **No**  **Do not know**

**If not why not?**

There appear to be a number of anomalies with the data, but it is very difficult to uncover why as many of the assumptions are not clearly stated. For example:

§ The cost of abatement using heat pumps is very high. Looking at the ratio of the carbon benefits of heating over the carbon disbenefits of the electricity for the heat pumps we calculated the COPs and found them to be in a range from 2.4 to 3.8. Most were so low that they would not be a viable low carbon technology. If a more typical COP of 4 were to be used, smaller plant could be provided and costs would come down. Without full knowledge of the assumptions made in order to come up with these figures we cannot accurately assess why our figures differ from those shown.

§ Some of the other technologies assessed seemed to suggest a varying level of £/kgCO<sub>2</sub> for the same technology – making it difficult to assess whether the cost had been over-estimated and the potential carbon savings under-estimated or vice-versa.

We have carried out a fuller analysis of the Annex E costs and CO<sub>2</sub> reductions, and this is included at the end of Section 7.

**Q7. Is it right to rule out a carbon compliance level based on eliminating 100 per cent of regulated emissions plus emissions from cooking and appliances onsite as from 2016?**

**Yes**  **No**  **Do not know**

Requiring 100% of predicted emissions to be mitigated via on-site measures is likely to be too challenging for the majority of potential sites. This was strongly illustrated by the UK-GBC report on the definition of zero carbon which informed this consultation. Therefore we believe it is right to rule it out as the carbon compliance level.

If the Code for Sustainable Homes is brought in-line with the proposed definition of zero carbon, then there is the potential to acknowledge and reward sites which can and do go further than the minimum carbon compliance level set. See answer to Q1.

**If not, why not?**

**Q8.** Assuming feed-in tariffs and renewable heat incentives cannot be claimed towards the cost of installing low and zero carbon energy in support of a new home, which of the following carbon compliance levels would you favour for 2016 (please tick):

- (i) a continuation of the 44% to be introduced from 2013
- or (ii) 70%
- or (iii) 100%

**Please give reasons for your preference:**

Feed-in tariffs and renewable heat incentives are completely separate incentives and should be dealt with separately and based on merit.

It is important that the level of carbon compliance is a fair but meaningful challenge for all development sites in order to stimulate innovation and ensure responsible resource stewardship. The requirement should be set based on evidence of what is fair and reasonable across the majority of potential development sites in the UK.

We believe that further work is needed to determine the appropriate level to set for 'carbon compliance', and that it should be worked out based on evidence of technical viability first, before the need for fiscal incentives is assessed. We believe that fiscal incentives should be employed to encourage developments to go beyond the minimum requirements, not meet them.

It is almost certainly impossible to set a single level of carbon compliance across the whole country under the current proposals: regionally specific climatic and economic conditions will impact the developer's ability to mitigate emissions on-site; and more local, potentially site-specific constraints (such as conservation zoning) will mean that a standard set so as not to significantly restrict the number of potential sites that can be developed is unlikely to be stretching for many other sites.

Under the current proposals there is no incentive (other than potential CSR/PR drivers) to go beyond the minimum carbon compliance level as the 'allowable solutions' are, according to the cost analysis done for the consultation, cheaper than carbon compliance measures.

**Q9.** If feed-in tariffs and/or renewable heat incentives could be claimed by a house builder or energy service company, what would be your answer to the previous question (please tick)?

- (i) a continuation of the 44% to be introduced from 2013
- or (ii) 70%
- or (iii) 100%

**Please give reasons for your preference:**

Refer to answer to Q8.

**Q10.** Following the outcome of this consultation, should Government indicate the level of carbon compliance proposed for 2016 as:

(i) a single number

or (ii) a range, with the final number to be decided through subsequent Part L reviews?

If you prefer a range, how wide should the range be (please express as a number)?

As we have said elsewhere in our response, we do not believe that it is appropriate to set a single value for the level of carbon compliance, but the question refers to whether the level of carbon compliance should be set now, or left till later.

Industry needs to know what will be expected of it as soon as possible in order to allow enough time for an effective response to what is an incredibly ambitious timetable.

Furthermore, waiting till subsequent Part L reviews to decide the level of carbon compliance would surely render the proposed 2012 review process useless, as the level of carbon compliance and choice (and resulting cost) of allowable solutions are intrinsically linked. We are already concerned about the number of good examples that will be available for interrogation at the time of the 2012 review; if the definition being tested up until 2012 is not intended to be the same as the 2016 definition then it seems the review is pointless.

**If you have any further comments on Section 5 please add them here**

#### **Setting the standard**

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. We believe 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.

#### **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.

## Section 6: Allowable Solutions

**Q11.** Do you disagree with the inclusion of any of the allowable solutions listed in Section 6.3?

Yes  No  Do not know

If you do disagree, please list which allowable solutions you disagree with and state your reasons.

Firstly, a point of clarification: a number of the 'allowable solutions' refer to "a credit" for example "a credit for any energy efficient appliances" – we have assumed this is intended to be "credit" as in 'recognition' rather than e.g. a Code for Sustainable Homes credit as the wording would suggest.

Below are our comments on each allowable solution:

### **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.

However, logically, this should be included under the 'energy efficiency' step of the hierarchy. It is confusing to have it here and it detracts from the logic of the hierarchical approach which quite correctly puts energy efficiency measures first.

While we understand the practical reasons for its inclusion as an allowable solution given the current regulatory framework, we would seek reassurance that this option will be included in the NCM at the earliest possible juncture.

### **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>1</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 takes 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.

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<sup>1</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.

## Section 106 Planning Obligations

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>2</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>3</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>4</sup>.
- § In practice, S106 contributions are not necessarily ring-fenced for particular activities.
- § S106 contributions have to be tied in with the specific impact of the development which may restrict the CO<sub>2</sub> saving activities which the Local Authority could spend the contribution on
- § Local Authority Planners do not have the skills to identify appropriate investments.

In addition, the Examiner's Report for the Further Alterations to the London Plan<sup>5</sup> states that the current Government guidance on the use of section 106 contributions prohibits its use in this way.

### Retrofitting of existing buildings in the 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

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<sup>2</sup> Valuing Planning Obligations in England: Update Study for 2005-06, CLG, 08/2008

<sup>3</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 within Development Plan Documents, and the details of their application in Supplementary Planning Documents' (ODPM - Circular 5/05: Planning Obligations (July 2005), B17)

<sup>4</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)

<sup>5</sup> <http://www.london.gov.uk/mayor/strategies/sds/eip-report07/panel-report-further-alts-eip.pdf>

- § 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
- § Separate policies exist to improve the existing stock. Any 'allowable solution' improvement needs to be in addition to this. Tackling the existing stock is also more urgent; starting to retrofit stock in 2016 will be too late.

### **Investment in offsite LZC & benefits of ownership transferred to the house buyer**

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.

The benefit of other 'allowable solutions' are not transferred to the home-owner, such as retrofit of neighbouring buildings or directly connected energy infrastructure. Therefore this is a slight anomaly. However, without it developers may be encouraged to use this solution and benefit from the LZC asset themselves (e.g. by receiving share dividends). We urge Government to re-think the consistency of the allowable solutions.

In addition, studies done to-date assessing the UK's ability to achieve various emissions reductions have assumed that the built environment will deliver zero carbon homes from 2016 without the use of large-scale renewables. Therefore these estimates will need to be reassessed.

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

We believe that off-site renewable electricity with a direct physical connection to the development (i.e. 'near-site') 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.

**Q12.** Assuming directly connected offsite renewable electricity does not count towards carbon compliance, should it count towards the allowable solutions?

Yes  No  Do not know

But we believe this should be included as a 'near-site' option under carbon compliance.

See answer to Q11.

**Q13.** Are there any further measures which you think should be added to the list of allowable solutions at this stage?

Yes  No

If so, what are they and why should they be added now?

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

### **Community Energy Fund**

The consultation document does not provide a proper reasoned discussion as to why the recommendation for a community energy fund in the UK-GBC task group report has not been included in the consultation as a possible route to deliver 'allowable solutions'. This is extremely disappointing and we strongly believe Government should re-assess this option.

The advantage of the fund mechanism is that it can be applied to any development, regardless of its size, location or other any other specific circumstances, making it simple for developers to factor in. The fund mechanism can deliver predictable development costs that can better facilitate strategic investment decisions and land purchases while incentivising innovation. 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.

Furthermore, the price of paying into the fund could be used as a market mechanism to incentivise developers to go beyond minimum carbon compliance requirements, and a tiered or escalating cost could be used to avoid the issues of having to set a single carbon compliance target achievable by all.

A centrally mandated fund, administered through Local Planning Authorities would aid local plans for LZC energy infrastructure and ensure that development of such assets is not limited to areas of high housing growth.

The price of paying into the fund would be a single policy lever that Government could adjust to steer the market whilst avoiding too much disruption. i.e. all that changes is the price that is paid per kgCO<sub>2</sub> and therefore how hard innovation is driven to reduce costs.

**Q14.** Please provide any views on how the Community Infrastructure Levy (CIL) might be used as an allowable solution in a way that is consistent with the Government's approach to the CIL.

When the CIL was first announced, it appeared to offer the potential to support a fund mechanism similar to that proposed by the UK-GBC's definition of zero carbon report and other industry stakeholders. However, as details have emerged, confusion over the coverage and intent of the CIL has grown. We acknowledge that 'district heat networks' was mentioned once in the CIL document as an example, but we believe that it is generally perceived to be a levy to enable delivery of strategic transport infrastructure, flood defences, etc. and that it very much is not a 'low carbon' community infrastructure levy.

The CIL is an optional charge and Local Authorities can choose not to implement it, meaning it would be “hit-and-miss” as to whether it was available as an allowable solution.

Therefore we are concerned about the use of the CIL as an allowable solution, for similar reasons to our concerns about Section 106 Planning Obligations:

- § It does not contain a mechanism for auditing CO<sub>2</sub> emissions reductions
- § The skills and capacity will not be there to effectively plan strategic investment for CO<sub>2</sub> emission reductions
- § There is potential for public confusion over a levy that seeks to reduce CO<sub>2</sub> emissions, but also funds the construction of roads and transport infrastructure.
- § It is not clear whether the ‘zero carbon’ money will be ring-fenced.

From reading the consultation document and from discussions with CLG officials, we understand that the main reason that the community energy fund was not proposed in the consultation as a viable option was due to it being seen as a tax. However, the CIL is effectively a tax and therefore if Government is prepared to make CIL work, why are they not prepared to take more time to properly consider the potential of having a separate community energy fund to strategically deliver CO<sub>2</sub> savings for zero carbon buildings? This is a question that we feel Government owes industry an answer on, especially as the fund proposed in the UK-GBC report had gained lot of industry support – it’s not often industry asks for extra taxes.

**Q15a.** Paragraph 6.6 notes that carbon compliance measures and nearly all the allowable solutions relate to measures undertaken in the locality of the housing development. Do you agree that this provides sufficient emphasis on local measures?

Yes  No  Do not know

**Comments :**

Cost and availability have to be considered alongside numerical quantity of solutions. i.e. even if there are 100 options, if 99 of them offer a local emphasis, but the one which does not is always available and always cheaper than the other 99, then local emphasis will not be achieved as the 99 with a local emphasis would rarely be implemented.

We are concerned that the current proposals will not encourage developers to go as far as possible on- or near-site (i.e. beyond the minimum carbon compliance level). This is largely due to the fact that the allowable solutions are predicted to be cheaper than solutions available under carbon compliance. With a community energy fund, developers could be encouraged to go beyond the minimum carbon compliance level if possible on the particular site by fiscal measures (e.g. stepped or graduated fund price).

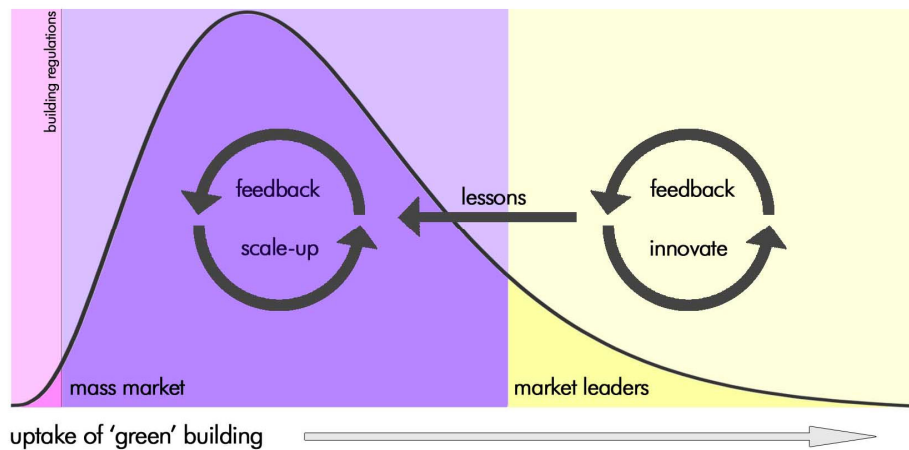
We believe a question should have been asked about the potential of each of the allowable solutions in terms of cost, availability and impact (carbon saving). It would have been interesting for Government to understand the industry’s response to this.





buildings. The innovators will then respond to this and, as has always happened in the past, various third parties will produce the simplified guidance for the mass market on how to achieve the required results<sup>8</sup>.

The diagram below tries to represent the real market process currently being hindered by Government legislation in this area. Rather than learning from the market leaders, Government is forcing cumbersome, top-down legislation on the entire industry.



**Q19.** Is 2012 the right time to undertake a review of the allowable solutions?

Yes  No  Do not know

If not, do you think the review should be (i) earlier  , or (ii) later  ?

**Comments:**

**Both:**

(i) earlier - for a theoretical review of the policy

(ii) later - for a review of all practical examples to see how the pioneers are reacting to the policy.

There will not be enough data for a meaningful review at 2012 but equally the current requirements are not based on evidence and this should be addressed as soon as evidence is available. Wherever possible the creation and sharing of such evidence should be incentivised.

<sup>8</sup> For example: Knauf Insulation 'Solutions' guides ([www.knaufinsulation.co.uk/solutions.aspx](http://www.knaufinsulation.co.uk/solutions.aspx)); EST good/best/ advanced standards; EST guidance series on energy efficiency and the Code for Sustainable Homes

**Q20.** Please indicate which one of the following is your preferred basis for setting the capped cost:

(i) Shadow Price of Carbon

or (ii) price of carbon dioxide implied by Renewable Obligation Certificates;

or (iii) price of carbon dioxide implied by incentives for emerging renewable technologies (ie two ROCs)

Please give reasons for your preference.

**None**

We feel strongly that the term 'capped cost' is very misleading. As we understand it from the consultation document and conversations with CLG officials, the idea is not to cap costs at all. Instead the 'capped cost' will be a 'benchmark' figure against which the cost of the allowable solutions for 'zero carbon' projects delivered in time to feed into the 2012 review will be compared. If the cost of allowable solutions is above the 'cap' then new interventions will be considered to try and reduce the price. We believe there is a very real possibility that many people will respond to this consultation expecting a 'capped cost' that is actually 'capped', meaning that they will never have to pay more than that figure to deliver 'zero carbon'.

According to the associated cost benefit analysis<sup>9</sup> all of the options listed will mean that the allowable solutions are always cheaper than on-site measures; therefore developers will not be incentivised to go beyond the minimum requirements on-site even if it is possible.

Brighton & Hove have a mechanism detailed in their adopted Sustainable Building Design SPD<sup>10</sup> similar to the fund proposed in the evidence base for this consultation. The stated 'offsetting' cost charged varies between £1,006/tCO<sub>2</sub> and £2,525/tCO<sub>2</sub>, which is based on the price of delivering carbon savings elsewhere via solar thermal systems and cost-effective insulation upgrades.

Regardless of how the allowable solutions are delivered, the cost must be commensurate with the cost of achieving the required carbon savings elsewhere; none of the options suggested here attempt to take this into account.

**Q21.** Of the following, which is your preference as to the number of years of residual emissions to be covered via allowable solutions:

(i) 30 years .

or (ii) 60 years

Please give reasons for your preference.

**Neither**

See answer to Q22.

<sup>9</sup> Costs and benefits of alternative definitions of zero carbon homes, project report February 2009

<sup>10</sup> <http://www.brighton-hove.gov.uk/index.cfm?request=c1200178>

**Q22.** If you do not think that either 30 or 60 years is appropriate, then please say what your approach would be.

Given the proposed list of allowable solutions it would be impossible to dictate a particular period of time for which all allowable solutions must operate. For example, upgrading the thermal performance of existing buildings in the vicinity will only produce carbon savings for as long as that building remains occupied. If upgraded buildings were demolished and replaced within 30 years, would the developer have to invest again in further allowable solutions?

Furthermore, if a wind turbine was funded for 30 or 60 years as part of a wind farm, would the wind farm operator be able to lease/sell the plot to a new developer at the end of that time period?

Instead we feel that developer investment should be directed at the most cost-effective, long-term solutions. In addition, consideration should be given to how these solutions could be adopted by operators that would then have a vested interest in maintaining them as part of their business plan. This could include community-owned ESCo models so that profits are re-invested in low carbon infrastructure. This option would be in-line with the recommendations of the Government's own Foresight Sustainable Energy Management and the Built Environment Project report 2008<sup>11</sup>:

*'The demands of managing complex, localised, energy systems require institutional arrangements for the longer term management of the development'*

*'It may even be possible to envisage local communities sharing in both the management and financial returns of such innovative developments provided new institutional arrangements can be created. Urgent consideration needs to be given to how such models may be developed in consultation with the property, construction and development sectors.'*

**Q23.** Do you consider that the role outlined for Local Planning Authorities in paragraphs 6.52 - 6.56 is reasonable in relation to their capacity and expertise?

Yes  No  Do not know

**Comments:**

We believe that due to the current lack of relevant skills and capacity within LPAs, the role outlined is not practical. However, it does seem sensible for that role to be taken on by LPAs, so a concerted effort will need to be made to up-skill, re-train, and retain LPA staff. It cannot be stressed enough that this up-skilling will need to start imminently in order for LPAs to be adequately prepared by 2016.

<sup>11</sup> <http://www.foresight.gov.uk/OurWork/ActiveProjects/SustainableEnergy/sembeoutputs.asp>

**24. Do you consider that the role outlined for Building Control Bodies in paragraphs 6.52 - 6.56 is reasonable in relation to their capacity and expertise?**

**Yes**  **No**  **Do not know**

**Comments:**

We believe that due to the current lack of relevant skills and capacity within BCBs, the role outlined is not practical as their traditional responsibility has been almost solely concerned with health and safety. There is anecdotal evidence to suggest that BCBs do not adequately enforce current standards relating to Part L of the Building Regulations, so confidence in them to be able to properly enforce the zero carbon standards is very low. However, it does seem sensible for the role outlined to be taken on by BCBs, and therefore significant investment in extensive training and recruitment programmes will be required in order for appropriate skills to be gained.

Well skilled and well informed Building Control inspectors could be a great asset and help realise the step-change required in the performance of our Built Environment. These skills would be highly exportable and would help to establish the UK as the vanguard of sustainable construction strategy.

As mentioned previously, this would be a great leap from the current state of Building Control, although there may be an opportunity in the current market to recruit those who find themselves out of work but already possess suitable skills and experience for the role outlined above.

See also answer to Q5.

**If you have any further comments on Section 6 please add them here**

**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.

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. Government needs to recognise this and ensure that appropriate training programs are available and being utilised appropriately.

**Fund mechanism**

We have put together a position paper on the definition of zero carbon buildings, and include a copy here as an embedded file.



DreamDefinition.pdf

## Section 7: Costs and Benefits

**Q25.** Do you agree that the Impact Assessment broadly captures the types and levels cost associated with the policy?

Yes  No  Do not know

If you do not agree, please say why not.

The assessment does not cover all of the options, for example it only considers the EST approach to energy efficiency and neglects to assess outcome-based measures such as PassivHaus. Furthermore, it does not cost air source heat pumps (ASHP), which, given that they have recently been classified as 'renewable' in Europe is probably an unreasonable omission unless CLG do not intend ASHPs to count as an LZC technology.

More fundamentally, the cost model is not transparent and there are a huge number of options (396). As these costs are being used to model future scenarios involving large numbers of houses they have probably not been developed to reflect the full range of issues likely to confront a housebuilder. For the purposes of projection it is only important that they are correct on average, but then should not be expected to give cost security to housebuilders.

Furthermore, it is not at all clear which costs have been included/excluded in the model – for example: whether the dwellings are on a heat network, whether that heat network is paid for upfront by the developer or by an ESCo out of future earnings. Some things suggest that heat networks have been considered e.g. the fact that small-scale developments are not modelled with biomass CHP (because presumably being small they are not likely to warrant the investment for a heat network). However if this means the larger developments are on a heat network, then the costs seem too low. Gas CHP, biomass CHP, and biomass are all likely to require heat networks to be viable. In fact the question of whether a heat network is being provided is a point of major differentiation between schemes on the path to zero carbon, and this should have been reflected somewhere in the costings.

Gas CHP costs seem high (perhaps it is micro CHP?), while biomass CHP and biomass boiler costs seem low.

The cost modelling produces such an extraordinary range of costs that it is impossible to say, in general, whether they are too high or too low, and assessing each option in detail in order to respond to this consultation is an unreasonable expectation. We have conducted a more detailed analysis of the cost benefit analysis attached at the end of this section.

**Q26.** Do you agree that the Impact Assessment broadly captures the types and levels of benefits associated with the policy?

Yes  No  Do not know

If you do not agree, please say why not.

The cost of abatement using heat pumps is very high. Looking at the ratio of the carbon benefits of heating over the carbon disbenefits of the electricity for the heat pumps we calculated the COPs and found them to be in a range from 2.4 to 3.8. Most were so low that they would not be a viable low carbon technology. If a more typical COP of 4 were to be used, smaller plant could be provided and costs would come down.

Biomass CHP seems to show too much electrical savings and not enough heat saving which means the heat is being wasted. In addition, the cost of biomass CHP seems too low, particularly if it is oversized so as to provide zero carbon electricity while producing heat which is surplus to requirements.

**Q27.** Do you agree that the Impact Assessment reflects the main impacts that particular sectors and groups are likely to experience as a result of the policy?

Yes  No  Do not know

If you do not agree, please say why not.

There is no consideration for the social change required, both within the industry and among the house-buying public. The roles and responsibilities within a design team are currently in flux as the regulatory framework changes and it will likely be some time before more standardised roles emerge. Many clients are still unclear of the full details of the requirements and therefore the level of work required to demonstrate full compliance. Equally it doesn't consider the need for more skilled repair and maintenance personnel, and for the general public to be more engaged with the maintenance of their home.

**If you have any further comments on Section 7 please add them here**

We have carried out a more detailed analysis of the costs and benefits stated within the main consultation document and the associated impact assessment. Please refer to the embedded file below.



Cost Supplement.pdf

## **Section 8: New Non-domestic Buildings**

**Q28.** Do you agree with the Government's policy objectives for carbon reductions from non-domestic buildings set out in paragraphs 8.1 - 8.17?

Yes  No  Do not know

If not, why not?

Regarding the policy intent outlined in 8.4, we believe that the fundamental drive should be for the greatest possible reduction in GHG emissions from the Built Environment at the best £/kgCO<sub>2</sub> rate possible.

What alternatives do you propose?

**Q29.** When considering how to achieve the policy objectives set out in paragraphs 8.1 - 8.17 do you agree that the Government should consider the same policy mechanisms for non-domestic buildings and for domestic buildings?

Yes  No  Do not know

**Comments:**

We believe that consistency is important to prevent adverse outcomes, especially when dealing with mixed-use sites. We have experienced adverse consequences relating to the allocation of CO<sub>2</sub> savings on mixed-use sites where the dwellings are being assessed under the Code for Sustainable Homes. The methodology in the Code effectively inhibits non-domestic buildings connecting to district systems serving the dwellings as the CO<sub>2</sub> savings are allocated based on floor area of all buildings connected. This is a major issue for the proper functioning of new mixed-use communities, especially in terms of energy infrastructure. Mixed-used developments are of great importance to delivering sustainable (environmental, social and economic) development and policy should encourage rather than restrict the development of energy infrastructure which serves all parts of a development.

**Q30.** Do you think that Government should work on the presumption that zero carbon for non-domestic buildings should cover both regulated and unregulated emissions, as for domestic buildings?

Yes  No  Do not know

**Comments:**

We believe the hierarchy and methodology should be the same. However, the minimum level set for 'energy efficiency' and the minimum level set for 'carbon compliance' will necessarily need to be different for non-domestic buildings.

See also answer to Q31.

**Q31.** Do you think that Government should exclude some elements of energy use for non-domestic buildings from the definition of the zero carbon standard, such as energy for industrial processes?

Yes  No  Do not know

If yes, which elements of energy use should be excluded and why?

In many cases, the exact initial end-use of a non-domestic building is not known until after completion of the building. It would therefore be difficult to include specific process loads in the calculation due to the variety of final uses possible for a single type of building. Some of these large loads may serve essential services, such as hospital equipment. Clearly a zero carbon policy that made hospitals economically unattractive would be undesirable.

Furthermore, many commercial and industrial buildings house processes that require large amounts of energy. Many such businesses will likely already be covered by other legislation and may already be participating in emissions trading schemes.

Much greater knowledge is required of the energy demands of non-domestic buildings. Much of the current data is some years old and therefore not inline with current practices and trends. The UK-GBC's report on Carbon Reductions from New Non-domestic Buildings<sup>12</sup> itself highlighted the urgent need for further data to be obtained. It is important to remember that the report also excluded "process loads" from its consideration but urged that a specific definition be developed.

<sup>12</sup> <http://www.ukgbc.org/site/resources/showResourceDetails?id=121>



**Q35.** Do you agree that the Government should base any support for sustainability tools on the criteria set out in paragraph 8.51?

**Yes**  **No**  Do not know

Are there any other criteria which should be used also?

The criteria in the consultation document are too unfocused and they vary significantly in terms of their scope and depth. There is no indication whether the criteria will be weighted or how the various criteria will be interlinked. For example: 'Carbon emissions and renewable energy' is a high-level issue whereas 'recycling facilities for staff' is an extremely detailed issue.

We believe that if Government feels the need to endorse sustainability tools, it should use high-level over-arching criteria. Given the ambitious targets that Government have set, support for sustainability tools should be based, first and foremost, on a scientific (i.e. evidence based) analysis of their ability to reduce national GHG emissions. Assuming that national regulations will be updated to adequately protect the occupant's health and safety, other sustainability criteria should include water, external air quality, pollution and bio-diversity.

Confusion surrounding the current proliferation of sustainability tools needs to be addressed. We believe that industry either needs a single well-designed tool, or a suite of tools which work together in a plug-and-play/ modular style. We also believe that any tool endorsed by Government should require publication of in-use data. Much of the current policy interventions have little or no reliable evidence base, therefore it is of paramount importance that we start to build up a picture of the performance of our Built Environment. The Government should mandate a particular level of feedback in a consistent format from sanctioned tools.

**Q36.** Are there any other areas, apart from those listed in paragraph 8.52, that Government should encourage a sustainability tool for non-domestic buildings to cover?

**Yes**  **No**  Do not know

If yes, which areas?

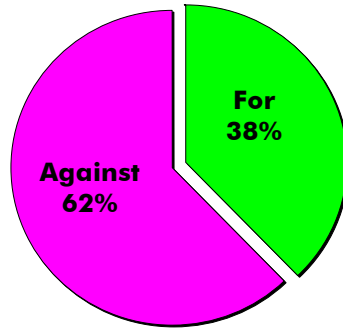
Government should not get into the business of specific credit areas, but should instead focus on the big picture outcome, and ensuring that the regulatory framework is robust enough to allow developers of component tools to work together toward a common/unified outcome.

**If you have any further comments on Chapter 8 please add them here**

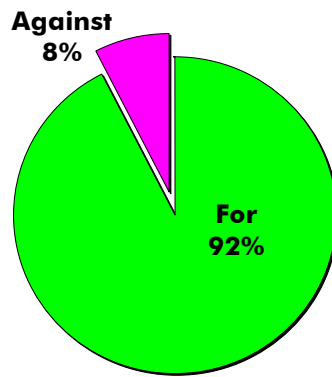
Please make any further additional comments here, ensuring that you clearly refer to any relevant questions or responses submitted above.



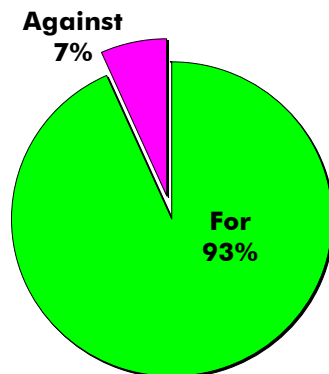
This house believes that the proposed 'allowable solutions' can deliver the carbon savings required



This house believes that greater levels of dialogue is required between Government and industry particularly around cost and viability



This house believes that the current proposed list of 'allowable solutions' should be replaced by a Fund mechanism as recommended by the definition of zero carbon evidence base



We believe that Government are currently in a unique position; with industry ostensibly behind arguably one of the most ambitious environmental policy objectives in the world. To-date, many stakeholders have shown incredible good-will in donating large amounts of time for non-partisan collaborative work and the results have been clear: there is a requirement and desire for more data, enhanced skills, and evidence-based decision-making. The Fund mechanism will provide a clear framework that will allow industry the cost-certainty required to operate effectively, that is also flexible and highly-adaptable in the future as our understanding of the issues and potential solutions improves. Industry is calling on Government to take tough decisions and act decisively in this respect to bring some clarity to the zero carbon trajectory.