



# Zero carbon for new non-domestic buildings

## Consultation on policy options





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# Consultation summary

## Scope of the consultation

<b>Topic of this consultation:</b>	This consultation relates to proposals for working towards the Government's ambition that all new non-domestic buildings should be zero carbon from 2019, with the public sector leading the way from 2018.
<b>Scope of this consultation:</b>	<p>To seek views on the evidence base, policy options and proposals for further work towards the zero carbon ambition for new non-domestic buildings.</p> <p>The scope of the proposed standard is any non-domestic construction project which meets the definition of a new building as defined by the England and Wales Building Regulations and which is therefore required to comply with the Regulations in full.</p> <p>The proposal to apply the zero carbon standard to new public sector buildings (including some Crown Estate buildings, which are exempt from Building Regulations) is discussed separately.</p> <p>There are 13 specific consultation questions throughout the document, which are summarised in annex 2.</p>
<b>Geographical scope:</b>	The proposals in this document apply only to England, since Building Regulations is a devolved matter in Scotland and Northern Ireland, and will become devolved in Wales at the end of 2011. Planning is fully devolved. (The 2016 zero carbon homes target also applies only in England.)
<b>Impact assessment:</b>	A consultation stage impact assessment is being published alongside this consultation and can be found at <a href="http://www.communities.gov.uk/planningandbuilding/publications/impact-assessments/">www.communities.gov.uk/planningandbuilding/publications/impact-assessments/</a>
<b>Previous engagement:</b>	<p>Initial proposals were set out in the December 2008 consultation on the <i>Definition of Zero Carbon Homes and Non-Domestic Buildings</i>.</p> <p>To help inform this consultation exercise, industry stakeholders have been engaged in further discussions during summer and autumn 2009.</p>

## Basic information

<b>To:</b>	<p>This consultation is aimed at:</p> <ul style="list-style-type: none"> <li>• Property developers and builders</li> <li>• Property owners and occupiers, including facilities managers</li> <li>• Construction industry professionals</li> <li>• Manufacturers and suppliers of construction materials</li> <li>• Building Control bodies and other organisations responsible for assessment, compliance and enforcement</li> <li>• Environmental organisations</li> </ul>
<b>Body/bodies responsible for the consultation:</b>	Department for Communities and Local Government (Sustainable Buildings and Climate Change Directorate).
<b>Duration:</b>	Consultation published 24 November 2009 and closes 26 February 2010.
<b>Enquiries:</b>	If you have any questions about the content of the consultation document, please contact <a href="mailto:buildgreen@communities.gsi.gov.uk">buildgreen@communities.gsi.gov.uk</a>
<b>How to respond:</b>	<p>Responses can be submitted by email (preferred) to:</p> <p><a href="mailto:buildgreen@communities.gsi.gov.uk">buildgreen@communities.gsi.gov.uk</a></p> <p>Alternatively, you can write to:</p> <p>New non-domestic buildings consultation Sustainable Buildings Division, Zone 5/G10 Department for Communities and Local Government Eland House Bressenden Place London SW1E 5DU</p>
<b>Additional ways to become involved:</b>	The Department intends to organise consultation events during the consultation period. If you would like to be involved in such events, please email your name, organisation and contact details to <a href="mailto:buildgreen@communities.gsi.gov.uk">buildgreen@communities.gsi.gov.uk</a> .
<b>After the consultation:</b>	<p>We will aim to publish a summary of responses to the consultation on the Department's website within three months of the closing date for consultation. Further statements on the direction of policy will be made later in 2010. Any changes proposed to the Building Regulations or associated technical guidance will be made in accordance with the schedule of periodic reviews set out in the Future of Building Control Implementation Plan (published September 2009).</p> <p>Information on the Department's consultations is available from: <a href="http://www.communities.gov.uk/corporate/publications/consultations">www.communities.gov.uk/corporate/publications/consultations</a></p>

## About this consultation

This consultation document and consultation process have been planned to adhere to the Code of Practice on Consultation issued by the Department for Business, Innovation and Skills and is in line with the seven consultation criteria, which are:

- Formal consultation should take place at a stage when there is scope to influence the policy outcome.
- Consultations should normally last for at least 12 weeks, with consideration given to longer timescales where feasible and sensible.
- Consultation documents should be clear about the consultation process, what is being proposed, the scope to influence and the expected costs and benefits of the proposals.
- Consultation exercises should be designed to be accessible to, and clearly targeted at, those people the exercise is intended to reach.
- Keeping the burden of consultation to a minimum is essential if consultations are to be effective and if consultees' buy-in to the process is to be obtained.
- Consultation responses should be analysed carefully and clear feedback should be provided to participants following the consultation.
- Officials running consultations should seek guidance in how to run an effective consultation exercise and share what they have learned from the experience.

Representative groups are asked to give a summary of the people and organisations they represent, and where relevant who else they have consulted in reaching their conclusions when they respond.

Information provided in response to this consultation, including personal information, may be published or disclosed in accordance with the access to information regimes (these are primarily the Freedom of Information Act 2000 (FOIA), the Data Protection Act 1998 (DPA), and the Environmental Information Regulations 2004).

If you want the information that you provide to be treated as confidential, please be aware that, under the FOIA, there is a statutory Code of Practice with which public authorities must comply and which deals, amongst other things, with obligations of confidence. In view of this it would be helpful if you could explain to us why you regard the information you have provided as confidential. If we receive a request for disclosure of the information we will take full account of your explanation, but we cannot give an assurance that confidentiality can be maintained in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not, of itself, be regarded as binding on the Department.

The Department for Communities and Local Government will process your personal data in accordance with DPA, and in the majority of circumstances this will mean that your personal data will not be disclosed to third parties.

Individual responses will not be acknowledged unless specifically requested.

Are you satisfied that this consultation has followed these criteria? If not, or you have any other observations about how we can improve the process, please contact:

CLG Consultation Co-ordinator  
Department for Communities and Local Government  
Zone 6/H10  
Eland House  
London SW1E 5DU  
or by email to: [consultationcoordinator@communities.gsi.gov.uk](mailto:consultationcoordinator@communities.gsi.gov.uk)

Thank you for taking the time to read this document and respond.



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# Executive summary

## The case for a zero carbon policy for new non-domestic buildings

Lord Stern identified climate change as the greatest market failure the world has seen. In response, the Government has set in legislation a challenging target to reduce UK carbon emissions by 80 per cent against 1990 levels by 2050. Emissions from the way we heat, cool and power buildings are important in achieving this (17 per cent of UK emissions are from non-domestic buildings and 27 per cent from homes). The scale of the challenge means that we need to find ways of reducing emissions from all types of building: new and existing, domestic and non-domestic.

*Building a Greener Future* in 2007 set out a target for all new homes to be zero carbon from 2016. Since then, this aim has been further developed and defined, and we have consulted on the next regulatory step of a 25 per cent improvement against 2006 standards in 2010. Earlier in 2009, we consulted on the *Heat and Energy Saving Strategy*, setting out a range of approaches to retrofit for both homes and non-domestic buildings. In Budget 2008, we set out an ambition for all new non-domestic buildings to be zero carbon from 2019, with the public sector leading the way with schools by 2016 and other central Government estate from 2018.

The case for regulation at the design and build stage is:

- structures and technologies are 'locked in' for the lifetime of the building – action at this stage can reduce future, often more complex and expensive, 'retrofit' needs
- the fact that building owners and occupiers (who dictate the market sale or rental value of new buildings) do not have long-term knowledge about future energy price rises means that market mechanisms (e.g. cap and trade schemes) do not fully incentivise the necessary actions
- the market is not driving low carbon buildings through a price premium, certainly not yet
- energy costs of commercial buildings are often a small proportion of the organisation's total cost base – so incentives for low carbon construction approaches, even where rational, are not always sufficiently strong
- innovation in reducing emissions from new non-domestic buildings could have a spill-over demonstrator effect, influencing best practice and cost of retrofit
- regulation can reduce cost by increasing demand and certainty – for example in stimulating new markets for new technologies or low and zero carbon generation schemes.

Responses to a December 2008 consultation<sup>1</sup> recognised the case for regulation. However, in the light of current economic conditions, it is also important to consider the costs and potential consequences of such regulation on economic recovery for the construction sector and balance these with the benefits of early certainty around a route-map for future regulatory steps. This consultation therefore sets out policy principles and further modelling work, and seeks views on these and their implications for viability for individual developments and sectors.

## Adapting the zero carbon framework for non-domestic buildings

We will adopt the broad framework for zero carbon that has been developed for homes, but adapted appropriately to reflect the differences in the commercial buildings market and the variation of non-domestic buildings.

This means that, as supported by responses to the December 2008 consultation, we will be using the threefold hierarchy of energy efficiency, followed by on-site or linked low and zero carbon technologies ('carbon compliance'), followed by off-site ('allowable solutions'). Heat and energy generation will also be eligible for Feed In Tariffs or Renewable Heat Incentives, providing future income streams.

The most important differences that need to be reflected in the zero carbon non-domestic buildings policy are:

- The much wider variation in buildings, which can impact on both potential solutions and costs. Reflecting this, in the Part L 2010 consultation we indicated a preference for an aggregate approach, to deliver the 25 per cent improvement in the most cost-effective way. This means that an overall 25 per cent improvement will be achieved across all new build, but that individual building types will be required to contribute to different levels based upon cost-effectiveness. We have been modelling a range of 20 different building scenarios (see the impact assessment), continuing to use the aggregate approach. We will be further refining this modelling – and would welcome views to help us do this, including on whether the 20 building scenarios sufficiently capture the range of variations in buildings and how to improve our understanding of the impact of proposals on the viability of developments, including for different sectors.
- Non-domestic buildings are often more complex and larger scale than homes, so each such development more regularly involves greater technical input in design and construction and a closer level of Building Control involvement and oversight

<sup>1</sup> *Definition of Zero Carbon Homes and Non-Domestic Buildings – Consultation*, CLG, December 2008 and the *Summary of Responses*, July 2009

- non-domestic buildings often have greater potential for on-site renewables (e.g. more roof space) and to play a critical role in the viability of community heat or energy networks. Both of these are valuable, so we need to determine what balance of these opportunities we want to adopt.

## High levels of energy efficiency

Maximising the energy efficiency of building fabric and systems reduces the overall demand for energy, before further steps are taken to meet the remaining demand through on-site or off-site activity. This is best achieved at the design and build stages. As with homes, we want to set energy efficiency standards for non-domestic buildings that are at the highest practicable level.

Building on the work on the energy efficiency standard for homes, we intend to use the same metric for a non-domestic standard (i.e. Kwh/m<sup>2</sup>/year).

We will work with stakeholders to define the highest practicable level for the energy efficiency standard, ensuring it includes appropriate differentiation for different types of building, and to determine the timing and phasing of its introduction.

## Extent of on-site contribution

As with homes, the carbon compliance target can be met either by going further with energy efficiency solutions or through the addition of on-site low and zero carbon heat or energy generation, or directly connected heat. Its purpose is to:

- incentivise additional energy efficiency where cost-effective, thus further reducing overall demand
- ensure an element of renewables provision directly related to the new building, so it can meet in part its future energy needs without increasing carbon emissions or demand from the national grid
- support the Government's renewables target of 15 per cent by 2020.

We have developed three scenarios for modelling potential carbon compliance targets and trajectories towards them:

<b>Description</b>	<b>Trajectory &amp; target (2013, 2016, 2019)</b>	<b>Building type spread within aggregate</b>	<b>Mt CO<sub>2</sub> saved over life of assets</b>	<b>Cost/tonne of non-traded carbon saved<sup>2</sup></b>	<b>Net present benefits or (costs) 2013-29</b>
<b>Scenario 1:</b> Off-site rich – greater role in supporting community networks	30%, 37%, 44%	11% – 85%	120	£42	£190m
<b>Scenario 2:</b> Balancing on- and off-site	44%, 49%, 54%	13% – 100%	127	£95	(£3,273m)
<b>Scenario 3:</b> On-site rich – as for homes	44%, 53%, 63%	22% – 100%	130	£160	(£6,973m)

There are different benefits and challenges to each approach and we are seeking views on these and the impacts on the viability of developments overall and in different sectors.

## Form and timing of off-site element

The final level of the hierarchy is in recognition that it is not possible fully to reduce or meet all the needs of every building through on-site low and zero carbon technologies. Therefore, a menu of options for abating the remaining carbon emissions off-site will be developed. An indication of those approaches that commanded broad support for zero carbon homes was given in July 2009, covering:

- further carbon reductions on-site beyond the regulatory standard
- energy efficient appliances meeting a high standard which are installed as fittings
- advanced forms of building control system which reduce the level of energy use
- exports of low carbon or renewable heat from the development to other developments
- investments in low and zero carbon community heat infrastructure.

<sup>2</sup> Cost per tonne of carbon saved for zero carbon homes policy is £114 (non-traded).

Other allowable solutions remain under consideration and we are considering further with stakeholders the practical arrangements to permit the allowable solutions system to be put in place and ensure that standards are achieved in practice.

To maximise the volume in the allowable solutions market and to make it easier for developers, particularly in mixed use schemes, we intend to have a common approach to allowable solutions for homes and non-domestic buildings. So we will be seeking to develop a single system for delivery and assurance, and we will expect the same allowable solutions to be available for all types of development. However, we would welcome views on the case for any additional allowable solutions for non-domestic buildings only.

For homes, the introduction of allowable solutions is part of the final step to zero carbon (i.e. from 2016). For non-domestic buildings, we could follow the same principle (i.e. introduce in 2019). However, we can see attractions in introducing an element of allowable solutions for non-domestic buildings in 2016, in terms of increasing the volume and therefore viability of the allowable solutions market in its early years and in reflecting the opportunities for non-domestic development to contribute to community energy solutions. We have modelled the implications of doing so to take the overall carbon mitigation levels up to either 70 per cent or 100 per cent. We are seeking views to help us further refine our cost/benefit analysis on this.

## The zero carbon destination for non-domestic buildings

For homes, zero carbon covers both regulated emissions (i.e. from systems integral to the function of the building that are controlled through Building Regulations e.g. heating and cooling, lighting, water heating) and unregulated emissions (i.e. including appliances). This means the overall emissions reduction target is 150 per cent from 2006 standards.

For non-domestic buildings, the variation in energy uses is considerably greater than for homes – reflecting the range of different uses for individual building types as well as the range of energy-intensity of different commercial activity.

As a minimum, the zero carbon destination for non-domestic buildings will cover 100 per cent of regulated emissions. As indicated in the consultation on changes to the regulatory standards for 2010, we will also be considering the case for bringing some currently excluded building services (e.g. lifts and escalators, air curtains) into the regulatory standard.

There is still a case for including an element of unregulated energy to:

- incentivise further on-site activity where cost-effective – recognising that some building types are likely to have carbon compliance levels at or close to 100 per cent
- reflect the ‘polluter pays’ principle, given that the development of new buildings will add to overall UK carbon emissions

- maximise the potential contribution of non-domestic developments as ‘anchor-loads’ for community networks
- maintain continuity with the zero carbon homes approach.

So, we are considering a simplified way of factoring an unregulated element into the target for non-domestic buildings, through a straight factor of either 10 per cent or 20 per cent on top of regulated energy. We would welcome views on this and its potential impact on market viability.

## Public sector leadership

Through its capital budgets of £2.5 billion a year<sup>3</sup>, the public sector can play a significant role in supporting market development of low and zero carbon buildings.

We confirm our ambition from Budget 2008 that the public sector should aim to make the move to zero carbon for new non-domestic buildings by 2018, one year ahead of the regulations. In addition, we will:

- develop a programme of exemplar public sector new buildings
- explore the scope to trial allowable solutions for the public sector in advance of commercial buildings
- develop possible financial mechanisms to support capital costs through capturing future revenue streams and benefits
- ensure central monitoring and reporting of progress by central government departments, their agencies and key estates (schools, NHS, prisons, courts, MOD) of steps towards zero carbon for new buildings, linked into the wider Sustainability of the Government Estate arrangements.

Local government also has a potential contribution to make to this public leadership agenda – both through its own procurement and its local leadership role, including through Total Place<sup>4</sup>. We will explore with local government how it can play a role in supporting the move to zero carbon buildings as part of its wider local leadership on climate change.

## Further issues we will be working on

- The assessment tool to underpin the regulatory standards will be a critical element of the policy. Part L currently uses SBEM (Simplified Building Energy Model). We will be doing further work on the assessment tool for Part L for 2013 and beyond, in line with similar work being led by the Department for Energy and Climate Change on the tool for measuring homes

<sup>3</sup> Covers budgets of central departments and agencies, plus schools, NHS, prisons, courts, defence.

<sup>4</sup> [www.localleadership.gov.uk/total place](http://www.localleadership.gov.uk/total-place)

- Various people are looking at the issue of valuation of sustainable buildings and whether they do or could attract a premium. We want to work with the Royal Institution of Chartered Surveyors and stakeholders to continue to explore this aspect, to ensure the additional benefits of low and zero carbon buildings are appropriately reflected in valuation in future
- We anticipate the need for a similar role to that the Zero Carbon Hub is taking in relation to the zero carbon homes target, to support delivery of the non-domestic zero carbon ambition. We will be discussing with the Hub and other stakeholders how to develop something that enables us to work together on homes and non-domestic, but also separately where there are different considerations and to ensure we do not divert the Hub from its important work on homes.



# Chapter 1

## Introduction and principles

- 1.1 Climate change is the greatest long-term challenge facing the world. Scientific evidence demonstrates the seriousness and urgency of this issue and has moved the debate conclusively from whether or not it is happening to what we need to do about it.
- 1.2 In the UK we are responding strongly: we have put in place legislation which will require an 80 per cent reduction in greenhouse gas emissions, relative to 1990 levels, by 2050, with legally binding five-year carbon budgets governing the trajectory to our 2050 target. The Committee on Climate Change (an independent body established under the Climate Change Act to advise the Government on progress) recently published its first report to Parliament, highlighting the importance of the built environment to achievement of the UK's carbon reduction targets.
- 1.3 Today almost half the UK's carbon emissions come from the use of buildings: 27 per cent from homes and a further 17 per cent from non-domestic buildings. Evidence has shown that even if we rapidly decarbonise the grid and also accelerate action to reduce emissions from existing buildings through programmes like the Carbon Reduction Commitment Energy Efficiency Scheme (CRC), we will still need to design new non-domestic buildings to exacting standards in order to contribute to an 80 per cent reduction by 2050.

### Why zero carbon for new non-domestic buildings?

- 1.4 The Government announced in Budget 2008 an ambition that from 2019 every new non-domestic building should be zero carbon and, in order to show government leadership in tackling climate change, an additional ambition for new public sector buildings<sup>5</sup> to be zero carbon from 2018.
- 1.5 The aim of this consultation is to start to set out the detail of the route-map towards zero carbon, to begin to build certainty for industry. It also reflects the need to understand the implications of the costs of the different ways of pursuing this ambition, and the implications for viability of development and particularly on the prospects for recovery in the construction industry. Estimated

<sup>5</sup> Defined by a government task force as including central (but not local) government estate, hospitals, the defence estate, prisons, courts and schools – see chapter 6.

costs and benefits are set out in full in the attached impact assessment, and in various following chapters of this document in relation to particular aspects of the policy.

1.6 The Government believes that it is right to regulate to reduce the carbon emissions of new non-domestic buildings because there is sufficient evidence to show that the market, even with the influence of market-focused policies like the EU Emissions Trading Scheme (EU ETS) and the CRC, will not make this change alone. In particular:

- buildings with lower carbon emissions do not attract a price premium from buyers or tenants, or at least not enough of a price premium to cover the cost of improvements made to the building, because occupiers do not have long-term knowledge about the future of energy prices (or the cost of carbon allowances needed for trading schemes) that might lead them to want better performing buildings
- as the price of energy rises, then the cost of running less efficient buildings will increase significantly, but by then it will be too late (or much more costly) to change the building, since the technologies will be 'locked in'. Therefore there is a strong argument for regulating at the point of build
- apart from very energy intensive industries the overall business models of tenants (who dictate the market value of the building) are not generally affected that significantly by their energy bills, which reduces their incentive to pay for a very high performing building
- payment arrangements for energy bills in commercial buildings can be complex and create split incentives: either because the occupier pays the bills but does not have the power to dictate changes in the building, or in the reverse, where energy costs are managed by the landlord of a commercial building and incorporated in rents, in which case tenants will not even see the impact of their behaviour and will have little incentive to demand better building performance.

1.7 An associated benefit should also be increased resilience to energy supply threats, simply because by building more efficient buildings, our demand on electricity is lowered.

1.8 Various other policies are in place or being developed that are also intended to incentivise the reduction of carbon emissions, and that will impact on the use of buildings. Carbon trading schemes have a major role to play in this. The EU ETS covers major heavy industry including electricity generation, and will therefore also be reflected in all electricity bills. The CRC will require larger businesses and public sector organisations to purchase allowances to cover carbon emissions across the whole of their estate. The disconnects between energy

prices, building valuations and the market incentives on developers justify the supplementing of these approaches with point of build regulation. Such an approach will also help to ensure that the costs of additions to overall energy demand from new buildings will primarily be attributed to that development, rather than being spread across the whole economy through increases in the cost of carbon in trading schemes.

- 1.9 The zero carbon standard needs to work with these schemes, because together they have the potential to increase the overall effectiveness of government's carbon reduction strategy and form a virtuous circle. For example, if the price of carbon increases as carbon trading scheme caps are lowered and the market in carbon matures, then the incentive to occupy a better performing building should increase.
- 1.10 We also believe this policy could help towards the UK's renewable energy<sup>6</sup> and carbon reduction goals, by increasing the potential demand for larger district schemes incorporating both homes and non-domestic buildings, and providing funding to deliver those networks, partly by exploiting the potential for larger non-domestic buildings to act as 'anchor-loads' for district schemes, or to provide financial certainty to new infrastructure schemes. This will require domestic and non-domestic developers to work together, and more sophisticated energy/heat planning locally and regionally.
- 1.11 Another important policy lever aimed at lowering emissions from buildings is the requirement for Energy Performance Certificates and Display Energy Certificates. The former are required for new and existing buildings on construction, sale or rental and provide an assessment of the overall energy performance potential of the building and advice on how to improve this. The latter are required for larger public buildings and demonstrate how they are actually being managed.
- 1.12 The Energy Performance of Buildings Directive, which introduced Energy Performance Certificates and Display Energy Certificates and had a significant impact on the way we calculate energy performance in the current 2006 Building Regulations, is currently being revised in EU negotiations. While the text is not finalised, it could well impact on this policy, as it covers issues such as increasing the numbers of 'low energy' or 'nearly zero energy' buildings, and is likely to set a definition for those buildings (to be interpreted at Member State level). It may also set requirements which (as for the first Directive) impact on the way we assess and report on performance standards for new buildings. The Directive will have to be transposed into UK law once adopted, and we will need to ensure that the future plans for the zero carbon standard (for both homes and non-domestic buildings) meet its requirements.

<sup>6</sup> Government's Renewable Energy Strategy intends that 15 per cent of the UK's energy needs will be met from renewables by 2020.

1.13 Further details on these policies and initiatives are set out in Annex 1.

## Guiding assumptions for 'zero carbon'

1.14 The zero carbon standard for new non-domestic buildings should adopt an approach that is as **consistent** as possible with the arrangements for zero carbon homes. This will ensure that builders, planners, building control officers, enforcement agencies and industry in general are not forced to work to two different systems for no reason. Consistency is especially important in the context of mixed domestic and non-domestic developments.

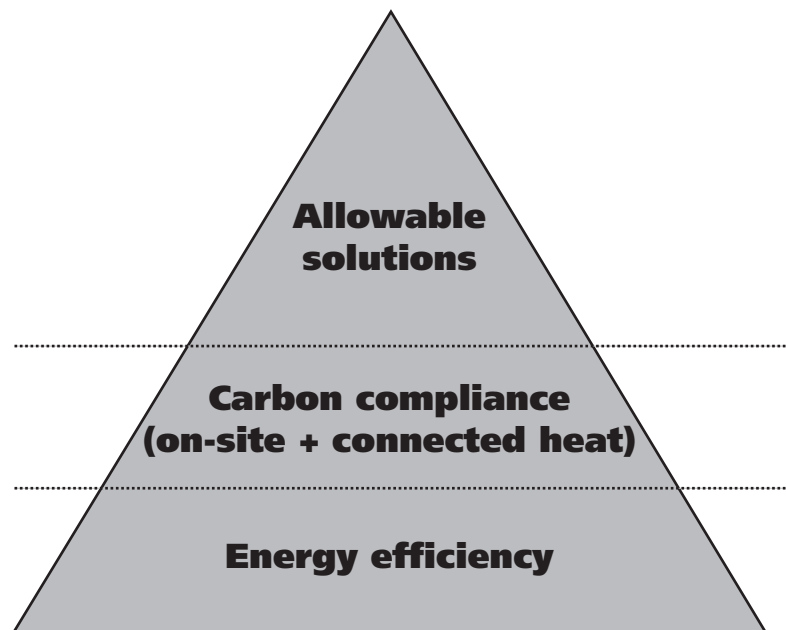
1.15 At the same time, when merited, the non-domestic programme will diverge, so that **the standard will respect the differences between homes and non-domestic buildings, and the diversity of the non-domestic stock**. Non-domestic buildings are constructed, managed, leased, sold and used in a wide variety of different ways, and this impacts significantly on their energy use and carbon emissions.

1.16 In this light, the zero carbon ambition for new non-domestic buildings, as for homes, will be based on the following key features:

- zero carbon is essentially a **design** or **'point of build' standard** that will be assessed when a building is signed off. Ensuring buildings are able to be operated to their full potential design potential – and that this actually happens – are important issues. The Government will continue to develop its policies to reduce emissions from buildings in use through the Heat and Energy Saving Strategy
- this assessment will not include the embodied carbon impact of the building (i.e. from construction through to disposal)<sup>7</sup>
- it will be determined as a net calculation of the building's expected emissions over a year – reflecting imports and exports of energy and smoothing the variances in energy uses through different seasons.

1.17 Therefore the broad zero carbon hierarchy, established for homes, will also be the basis of the policy for zero carbon non-domestic buildings. The specific approach to the three stages of energy efficiency, on-site or directly linked heat (i.e. 'carbon compliance') and primarily off-site (i.e. 'allowable solutions') will be covered in following chapters.

<sup>7</sup> Work is continuing in the European standardisation body (CEN) on EU standards for building life cycle impacts. We do not want to pre-empt the results of this work by regulating on life cycle impact assessment, although this does not prohibit industry from pursuing voluntary initiatives.



1.18 The most important differences from homes that need to be reflected in the zero carbon non-domestic buildings policy are:

- The much wider variation in buildings, which can impact on both potential solutions and costs. Reflecting this, in the consultation on changes to the Building Regulations for 2010<sup>8</sup>, we indicated a preference for an 'aggregate approach', to deliver the 25 per cent improvement in the most cost-effective way. This means that an overall 25 per cent improvement will be achieved across all new build, but that individual building types will be required to contribute to different levels based upon cost-effectiveness. Pending final decisions on the regulatory step for 2010, we have been modelling a range of 20 different non-domestic building scenarios for this consultation (see the impact assessment), continuing to use the aggregate approach
- Non-domestic buildings are often more complex and larger scale than homes, so each such development more regularly involves greater technical input in design and construction and a closer level of Building Control involvement and oversight
- Non-domestic buildings often have greater potential for on-site renewables (e.g. more roof space) and to play a critical role in the viability of community heat or energy networks. Both of these are valuable, so we need to determine what balance of these opportunities we want to adopt.

<sup>8</sup> [www.communities.gov.uk/publications/planningandbuilding/part1f2010consultation](http://www.communities.gov.uk/publications/planningandbuilding/part1f2010consultation)

- 1.19 While compliance will be measured on a per-building basis, the aim of the policy is not to build independently high performing buildings that have negative impacts on the surrounding area (for example, if there are no controls on the escape of excess heat from combined heat and power systems). Zero carbon buildings must therefore **respect wider sustainable development and planning considerations**. It is also vital that we develop building regulations and non-regulatory mechanisms that will mean new buildings can respond to **climate change adaptation**, and that we look ahead long term to understand how the use of non-domestic buildings will change (for example, greater demand for cooling).
- 1.20 We want to encourage and stimulate **innovation** and its mainstreaming in the wider marketplace. Many of the potential carbon reductions needed from buildings are both possible and cost-effective using technologies and solutions that exist already. But the move towards zero carbon creates opportunities for the whole of the building chain to find new ways to respond, and we want to support opportunities for innovation and creativity, and help learning from development of low carbon new non-domestic buildings to spill over into the retrofit market. Hence the approach of determining a route-map towards zero carbon over a period of time, creating greater certainty about future regulatory intentions, and providing more time for the market to develop the most cost-effective means of meeting new standards. To support this, the delivery mechanisms for the zero carbon standard (whether regulatory or non-regulatory) should be non-prescriptive and technology neutral, and we will also look to exemplar programmes to promote new technologies. This is discussed further in Chapter 7.
- 1.21 The Government also intends that **public sector** bodies should act as pioneers in building to zero carbon standards. Public sector projects can provide a market for new technologies and the reliable, long-term demand necessary to anchor community schemes. Central government will therefore show leadership in achieving the zero carbon ambitions for new non-domestic buildings – not only by meeting the new build standard overall from 2018, a year earlier than we propose for non-domestic buildings generally, but in demonstrating and driving innovation and exemplary practice.

# Chapter 2

## Energy efficiency for new non-domestic buildings

- 2.1 A zero carbon buildings policy must, as a priority, seek to promote cost-effective energy self-sufficiency. There are two main routes for this – reducing energy needs overall and meeting remaining needs through on-site low and zero carbon generation or directly connected heat. However, between these two aims there is also a hierarchy – with the focus being on reducing energy first.
- 2.2 The reasons for setting a high level of energy efficiency for non-domestic buildings are exactly the same as those for homes:
- **Whole life cost:** in general, energy efficiency measures will often entail lower life-cycle costs than low and zero carbon technologies (fuel, maintenance, replacement). Because those cost differentials may not be fully reflected in the market price of the building, the developer might, in the absence of a minimum energy standard, choose a carbon compliance strategy which does not minimise whole life costs
  - **Robustness:** energy efficiency measures are less dependent than low and zero carbon technologies upon the behaviour of occupants in order to realise carbon savings. For example, occupants cannot easily ‘turn off’ the insulation in an exterior wall, and will not need to service or replace that insulation in order to maintain its effectiveness. That is not equally true of low and zero carbon technologies
  - **Future-proofing:** buildings are long-lived assets (although non-domestic buildings tend to be renovated more frequently than homes), and the cost of retrofitting is high. It may therefore be appropriate to seek an energy efficiency standard which we will not regret at a later date, once the implications of long-term carbon reductions and energy security are better understood. At the same time, future-proofing also means building to a standard which we will not regret in terms of climate change adaptation (in particular overheating)
  - **Energy security:** in general, reducing energy demand by a given amount should be more conducive to our energy security goals than meeting that energy demand with on-site low and zero carbon technologies. Low and zero carbon technologies may be intermittent (not generating energy when it is most needed, e.g. solar photovoltaics) or require scarce resources (e.g. biomass). Hence demand reduction provides greater energy security than providing equivalent on-site energy.

- 2.3 Therefore, the zero carbon standard should include a regulatory minimum energy efficiency standard to be met by new buildings.
- 2.4 It is also important that energy efficiency standards follow the current principles of the Building Regulations: that they are **functional, non-prescriptive** requirements which are **technologically neutral** and do not stifle innovation.

## How will energy efficiency levels be set for new non-domestic buildings?

### Modelling method and results

- 2.5 The modelling underpinning this consultation has looked at eleven building types and development scenarios representing a variety of sizes, uses and building locations. The full methodology for this work is set out in the impact assessment which accompanies this document.
- 2.6 For this consultation, our modelling has used the same energy efficiency specifications used for the Part L impact assessment, and applied these to different buildings<sup>9</sup>. The modelling shows that there is a wide range in how far energy efficiency measures can reduce carbon emissions in different buildings. The **maximum** potential improvement (at any cost) for the building types modelled goes from around 10 per cent (for supermarkets) to around 60 per cent improvement (for some warehouses).

Building type	Emissions reduction achieved through energy efficiency measures <sup>9</sup>
Large supermarket	10%
Mini-supermarket	14%
City centre HQ	21%
Shopping centre	21%
Speculative office	21%
5* hotel	33%
3* hotel	33%
2* hotel	33%
Small office	38%
Retail warehouse	52%
Distribution warehouse	55%

<sup>9</sup> [www.communities.gov.uk/publications/planningandbuilding/partlf2010consultation](http://www.communities.gov.uk/publications/planningandbuilding/partlf2010consultation)

<sup>10</sup> Impact assessment, Table 3.2. Note that this is based on the application of the Advanced Practice Energy Efficiency standards, so is indicative only, as no decision has been taken on what energy efficiency standard would apply for zero carbon non-domestic buildings.



2.7 Given the progress on the work to identify energy efficiency targets for homes, we have not sought to push the modelling for non-domestic buildings to the stage of suggesting particular energy efficiency targets for this consultation.

### **Zero carbon homes**

2.8 In summer 2009 a task group of stakeholder experts was set up under the coordination of the Zero Carbon Hub to consider energy efficiency metrics and standards to support the zero carbon homes target<sup>11</sup>. The task group have presented their analysis and recommendations to government, and these will be published in full by the Hub. CLG is grateful to the Hub and all concerned for their work.

2.9 Government welcomes the findings, and an initial response and proposed next steps will be set out in the forthcoming consultation on amendments to the Code for Sustainable Homes. Whatever the outcome of that initial consultation, further work will be needed before the recommendations could be incorporated into regulation, including formal consultation on any changes to the Building Regulations, and assurance that the standards will meet the new (and as yet un-finalised) requirements of the recast Energy Performance of Buildings Directive.

2.10 The key recommendations are that:

- the standard should be based on the delivered energy required to provide space heating and cooling
- it should take into account the fabric and passive design features only, without regard to the services providing space heating and cooling such as heating and ventilation systems. Similarly, internal gains from hot water should be excluded from the calculation
- the standard should be expressed in kilowatt-hours of delivered energy consumed per square metre per year (kWh/m<sup>2</sup>/year)
- it should be supported by indicative 'design guidance' for key components of the fabric and construction
- a different level of kWh/m<sup>2</sup>/year should apply to different dwelling types.

<sup>11</sup> The July 2009 Ministerial Statement on the definition of Zero Carbon Homes announced the formation of a specialist task group to 'examine the energy efficiency metrics and standards which will realise our ambition of the highest practical energy efficiency level realisable in all dwelling types'

## **Energy efficiency for non-domestic buildings**

- 2.11 In the interests of consistency and simplicity, and not duplicating existing work, the Government is minded to apply this same delivered energy kWh/m<sup>2</sup>/year metric covering space heating and cooling to non-domestic zero carbon buildings. The use of a delivered energy metric received broad support in responses to the 2010 Part L proposals, and some also said that this should be restricted to fabric measures (like heating and cooling), leaving system issues to be dealt with through minimum efficiency standards.
- 2.12 Obviously further work would be needed to understand how this could be applied to non-domestic buildings (and to different building types). As with homes, we would expect this to be seeking to deliver the 'highest practicable level' of energy efficiency. However, given the considerably broader range in variation of types and uses of non-domestic buildings, we would expect this to lead to either a range of different standards for different building types or an aggregate approach, within which the individual standard for particular buildings could be calculated.
- 2.13 The homes standard also proposes design guidance for the building fabric and components – while this would seem sensible for the non-domestic sector, again we would need to consider application to different non-domestic building types.
- 2.14 As well as identifying the metric and level of standard to be required against it, together with any design guidance, further work will be needed to determine the right timing for introduction of the overall standard and whether any interim steps or phasing should be incorporated into the overall route-map to zero carbon.
- 2.15 As for the domestic metric, any proposed metric for non-domestic buildings would also need formal consultation before incorporation in the Building Regulations, and an assessment against the recast Energy Performance of Buildings Directive requirements.

## Consultation proposals

2.16 We propose that:

- In terms of a metric for these standards, we will **follow the zero carbon homes approach of a delivered energy metric (kWh/m<sup>2</sup>/year) covering space heating and cooling**.
- Based on the results of our modelling (and the responses to the Part L 2010 consultation), **energy efficiency standards should be differentiated by building type**.
- We will **work with stakeholders on the detail of how this standard could be applied** to different non-domestic building types and the timing and potential phasing of its introduction.

### Consultation question

**Q1.** Do consultees agree that we should establish challenging energy efficiency standards for non-domestic buildings covering space heating and cooling, and measured on a kWh/m<sup>2</sup>/year basis?

If not, why not, and what approach to setting energy efficiency standards would you prefer?

# Chapter 3

## Beyond energy efficiency: balancing on-site and off-site measures

Why is it important to drive further carbon reductions onsite?

- 3.1 Fabric and energy efficiency measures can only go so far, and there are further emission savings that can be made on-site and/or through direct connection of low and zero carbon heat (not necessarily on-site). Therefore the Government proposes that in addition to challenging energy efficiency standards, regulatory levels for on-site carbon abatement should also be set – termed as ‘carbon compliance’ in the zero carbon hierarchy.
- 3.2 As well as cutting emissions, the deployment of further on-site measures (in addition to energy efficiency backstops) should also:
  - help meet the UK’s renewables and grid decarbonisation targets by incentivising on-site renewable electricity generation, and providing a return from Government incentive schemes: the Renewable Heat Incentive (RHI) and Feed In Tariffs (FITs)
  - help drive innovation in new technologies and new markets
  - provide a degree of future-proofing and help mitigate some of the uncertainties surrounding large scale grid decarbonisation.

### **Why regulate when energy and carbon trading schemes should be driving change?**

- 3.3 Maximising the performance of the building on-site should also complement Government’s carbon trading schemes. In the long term, the CRC and the EU ETS should drive the market towards higher performing buildings as tighter caps drive the price of credits or allowances up, and impact on energy costs. But while carbon prices remain low, the market will not respond to the trading schemes, and prices will remain volatile. Regulating building performance is one way in which government can drive developers to make the energy/carbon saving changes that will help stabilise the market in allowances.

## Options for onsite measures

3.4 Just as for zero carbon homes, the precise combination of measures used for any particular development will not be specified by this policy (provided that an energy efficiency backstop is met). Building on the work done as part of the zero carbon homes standard, CLG is assuming that the following measures would meet the 'carbon compliance' definition:

- further energy efficiency measures, beyond those selected to meet the energy efficiency standard
- low and zero carbon generation technologies which are directly incorporated into the fabric of the building (e.g. roof-mounted solar panels)
- low and zero carbon energy installations built within the development (e.g. development-scale combined heat and power (CHP))
- directly connected heat or coolth, where the 'physical connection' can be easily demonstrated through the physical pipework.

3.5 As for zero carbon homes, the situation for electricity is different. The 'direct connection' principle could result in the construction of unnecessary distribution infrastructure purely for the purposes of meeting the carbon compliance requirements, and could lock new building occupiers into supply from the new network.

## Approaches to determining the onsite/off-site split

### Modelling a 'carbon compliance' target

3.6 CLG's modelling has looked at how far different building types can reduce their carbon emissions through energy efficiency measures and an indicative range of low and zero carbon technologies. While the technologies were ranked in order of cost (so it was assumed that the cheapest would be applied first) no account was taken of the cumulative cost. So the modelling demonstrates how far each building type could go overall if money were no object.

3.7 The analysis has also looked at different scenarios for the availability of district heating schemes, and for the main costs and benefits assessment, we have assumed that 40 per cent of urban buildings will have access to a district heating scheme (in association with a housing development) and 60 per cent will be stand-alone. This assumes that the use of district heating will increase, prompted by the zero carbon (homes and non-domestic buildings) programmes and government incentives under the Heat and Energy Saving Strategy and Renewable Energy Strategy.

- 3.8 The modelling has also looked at access to biomass (as opposed to gas) heating or CHP, either onsite or as part of a district scheme. While the modelling assumes that biomass CHP is an option, this is limited to the capacity needed to meet the heating needs of the building and does not assume that unlimited amounts of electricity can be generated. Costs can be cut significantly if biomass CHP can also be used to generate electricity, but as many non-domestic buildings have a high power load and a low heat load, this would create large amounts of excess heat which would need to be used or disposed of.
- 3.9 Exporting excess heat should be encouraged where there is sufficient demand (for example, a large domestic development nearby) to use it.
- 3.10 The use of effective plan making at the local or community level could even be helpful for identifying long-term opportunities for exporting heat, and even for increasing/creating heat loads that support development of networks that otherwise would not have been viable. But there are potential negative environmental impacts on air quality from the use of biomass as a fuel. There are also negative effects associated with the disposal of excess heat from buildings into the atmosphere. It would therefore be inadvisable to assume that the unlimited use of biomass CHP in this way is feasible in every development scenario as there may not always be a use for the excess heat.

### **Indicative scenarios for the on-site/off-site split**

- 3.11 The modelling has been used to develop three possible scenarios. All three include considerable ranges in the individual targets for different building types, which simply represent the extent to which different building types are able to abate carbon on-site. To respect this diversity, we will be continuing with the aggregate approach (different regulatory carbon emission reduction targets for different types of buildings) already proposed for the changes to Part L of the Building Regulations in 2010<sup>12</sup>, and all three scenarios assume this, with step changes in 2013 and 2016.
- 3.12 These scenarios and trajectories are presented to give an overall indication of how different approaches could apply. Further analysis, consultation and impact assessment would be needed before any final numbers could be set in regulation.

<sup>12</sup> [www.communities.gov.uk/publications/planningandbuilding/partlf2010consultation](http://www.communities.gov.uk/publications/planningandbuilding/partlf2010consultation)

3.13 In brief, the three scenarios are:

- **Off-site rich:** this prioritises the new building's contribution to off-site measures by setting lower carbon compliance targets and increasing the use of allowable solutions.
- **Balancing on-site and off-site:** this sets stretching on-site targets, but at a lower capital cost per building than for the 'on-site rich' scenario, and deploys allowable solutions for the remaining emissions.
- **On-site rich:** this sets ambitious on-site measures, pushing almost as far as is technically possible for 2019, reflecting the principle behind the approach taken for homes.

### Scenario 1 – off-site rich

3.14 This scenario sets a modest overall carbon compliance level (**44 per cent improvement on 2006 standards**) for 2019, and assumes that the remainder of emissions would be covered by off-site allowable solutions.

3.15 This is considerably less ambitious in terms of on-site requirements than is proposed for homes – whose next step in 2013 will be an improvement to 44 per cent, before stepping up to 70 per cent in 2016.

3.16 The main intention (and benefit) of this would be to actively prioritise the development of off-site community-scale schemes like district heating networks. The expectation would be for larger non-domestic buildings to act as anchor loads for such schemes and/or to export heat to surrounding buildings and provide greater financial security and stability to what can be seen as high risk schemes. Obviously the scope for such schemes will need to be assessed on a case by case basis, to understand the heat and power needs of the new building and the new or existing homes and non-domestic buildings nearby, and the feasibility of building or extending a heat network. This will need to be considered further with the zero carbon homes programme, local planners and industry in the wider context of other government policies to increase district heating.

3.17 This also results in the lowest cost per tonne of carbon saved of the three scenarios, and the lowest capital cost to developers.

3.18 On the other hand, it would need to be accepted that some buildings that could go further on-site would not be asked to do so through the regulations, although this would remain an option for developers. Occupiers would potentially benefit less from ongoing income streams under the RHI and FITs incentive schemes due to less reliance on on-site renewables, but may benefit

from lower sale/rental prices due to the lower initial capital costs to build (unless the market begins to reflect the value of sustainability more).

			Scenario 1 – off-site rich <sup>13</sup>		
	2006	2010	2013	2016	2019
<b>Aggregate improvement</b>	<b>0%</b>	<b>25%</b>	<b>30%</b>	<b>37%</b>	<b>44%</b>
<b>Building type</b>					
Large supermarket	0%	11%	11%	11%	11%
Mini supermarket	0%	11%	11%	11%	16%
Spec office retail park	0%	19%	19%	22%	27%
City centre HQ	0%	19%	19%	22%	28%
Shopping centre	0%	33%	33%	33%	33%
Small office rural	0%	27%	27%	37%	53%
Retail warehouse	0%	36%	51%	57%	59%
2* hotel	0%	25%	25%	37%	71%
3* hotel	0%	25%	25%	48%	72%
5* hotel	0%	25%	25%	40%	79%
Distribution warehouse	0%	36%	51%	76%	85%

### Scenario 2 – balancing on-site and off-site

3.19 The second, middle way scenario we are considering is an attempt to set more challenging on-site carbon compliance targets than the off-site rich scenario, but without increasing capital costs as far as for the on-site rich scenario. This would seek to reflect the greater potential for onsite renewables in non-domestic buildings (often because of the scale of buildings), while still reflecting the more significant role these can play in creating critical mass for community scale solutions.

3.20 Overall, **a 54 per cent improvement on 2006 standards** would be achieved. As modelled, this would also match the 2013 improvement for homes to 44 per cent.

<sup>13</sup> All tables on trajectories taken from Section 4 of the impact assessment. Note that there are some differences between the building types modelled for 2010 Part L and this consultation, which has a slightly wider scope, so although the moves from 2010 to 2013 are broadly comparable, further work will be needed to finalise regulatory steps.



			Scenario 2 – balancing on-site and off-site		
	2006	2010	2013	2016	2019
<b>Aggregate improvement</b>	<b>0%</b>	<b>25%</b>	<b>44%</b>	<b>49%</b>	<b>54%</b>
<b>Building type</b>					
Large supermarket	0%	11%	11%	11%	13%
Mini supermarket	0%	11%	16%	17%	22%
Spec office retail park	0%	19%	27%	33%	42%
City centre HQ	0%	19%	28%	31%	36%
Shopping centre	0%	33%	33%	33%	33%
Small office rural	0%	27%	53%	70%	91%
Retail warehouse	0%	36%	59%	63%	68%
2* hotel	0%	25%	71%	79%	86%
3* hotel	0%	25%	72%	80%	86%
5* hotel	0%	25%	79%	84%	84%
Distribution warehouse	0%	36%	85%	98%	100%

### Scenario 3 – on-site rich

3.21 The on-site rich scenario aims towards a **63 per cent improvement on 2006 standards** in 2019. This pushes close to the maximum of what is technically possible on-site (on aggregate).

			Scenario 3 – on-site rich		
	2006	2010	2013	2016	2019
<b>Aggregate improvement</b>	<b>0%</b>	<b>25%</b>	<b>44%</b>	<b>53%</b>	<b>63%</b>
<b>Building type</b>					
Large supermarket	0%	11%	11%	13%	42%
Mini supermarket	0%	11%	16%	22%	22%
Spec office retail park	0%	19%	27%	40%	58%
City centre HQ	0%	19%	28%	36%	38%
Shopping centre	0%	33%	33%	33%	39%
Small office rural	0%	27%	53%	87%	100%
Retail warehouse	0%	36%	59%	66%	89%
2* hotel	0%	25%	71%	84%	93%
3* hotel	0%	25%	72%	84%	96%
5* hotel	0%	25%	79%	84%	84%
Distribution warehouse	0%	36%	85%	100%	100%

3.22 The advantages of this approach would be the consistency with the principle adopted for zero carbon homes, and a greater contribution to renewable energy targets. It also helps push those building types that can more easily abate carbon much further, and means that onsite technologies are ‘locked in’ from the point of build.

3.23 It would also maximise the benefits for developers and/or occupants from the Clean Energy Cashback schemes, which provide funding for the installation of onsite renewable heat or energy generation. Occupiers subject to the CRC should also benefit from lower energy bills and carbon emissions.

3.24 But this is also the highest cost option, both in terms of cost per tonne of carbon saved, and capital cost for builders.

### Indicative costs

3.25 Costs and carbon savings for all three scenarios are shown below. As can be seen from this, the off-site rich scenario has the lowest cost per tonne of carbon saved by some way. Scenario 2 (balance between on and off-site) is the most equivalent to the zero carbon homes trajectory in terms of costs overall (£114/tonne for homes, against £95/tonne for non-domestic).

	From 2013	From 2016	From 2019	Net present benefits or (costs) 2013-29	Cost per tonne non-traded CO <sub>2</sub> saved	Million tonnes CO <sub>2</sub> saved over life of assets
<b>Scenario 1 – off-site rich</b>	30	37	44% + AS	£190m	£42	66 (non-traded) 54 (traded)
<b>Scenario 2 –balancing onsite and off-site</b>	44	49	54% + AS	(£3,273m)	£95	65 (non-traded) 62 (traded)
<b>Scenario 3 – onsite rich</b>	44	53	63% + AS	(£6,973m)	£160	61 (non-traded) 69 (traded)

3.26 It is important to note that these costs and benefits include (from 2019) that 100 per cent of regulated energy is covered, **plus** the standardised allowances for unregulated energy (see Chapter 5) assumed in the SBEM software, covered by allowable solutions. The figures also assume that allowable solutions are introduced in 2019, and not beforehand. Other possibilities for the earlier introduction of allowable solutions are set out in the next chapter.

## Impacts on viability

3.27 The modelling has also assessed potential increases in capital costs, to give an indication (based on Scenario 2) of the impact on costs for different building types, shown below.

	Base build cost – 2006 standards per m <sup>2</sup>	Increase in capital cost (relative to 2010) in 2019 for Scenario 2 – 54% aggregate improvement	
		Stand alone	With district heating
2* Hotel	£1,120	12%	n/a
3* Hotel	£1,830	7%	4%
5* Hotel	£2,375	4%	2%
Convenience store	£1,315	8%	38%
Large office	£2,250	6%	5%
Medium office	£940	14%	16%
Shopping centre	£3,560	6%	6%
Small office	£865	15%	n/a
Supermarket	£1,325	9%	5%
Distribution warehouse	£320	28%	30%
Retail warehouse	£745	17%	17%

3.28 This is offered for consultation as an indication, rather than as an assessment of whether these costs represent viable increases in building costs. Although the impact assessment includes some sensitivity testing to show the effect of higher building costs resulting in lower build rates for some types, further work will be done to understand:

- the sensitivity of different sectors to increases in build costs
- the effect of changes in build rates both on businesses and on this policy and how this will drive behaviour (for example, whether increased build costs drive businesses to occupy older less efficient buildings in the short term)
- how the increase in cost to build to zero carbon standards will affect viability in different sectors (and in the construction sector itself), especially in the current economic conditions.

3.29 This will be an important consideration in setting any regulatory targets for different types. Views or evidence on the likely impact on viability in different sectors, and the significance of building costs (as opposed to other costs) in different sectors, would be welcomed as part of this consultation to help inform this future work.

## Conclusions

3.30 The three scenarios are presented here as an indication of possible directions and priorities for the zero carbon standard: principally whether to focus more on developing community based schemes (at a lower cost overall), or whether to maximise the performance of individual buildings (at a higher cost overall). More work is needed to understand the impacts on different building types, and on what the appropriate steps to each end-target should be – including the issue of when and how to introduce allowable solutions for non-domestic buildings (discussed in the next chapter).

### **Consultation questions**

- Q2.** Which of the three scenarios would you favour as a basis for setting on-site aggregate targets for zero carbon trajectories and why?
- Q3.** What views do you have on the impact of the costs of building to zero carbon standards in different sectors? How and why does sensitivity to new build costs differ between sectors?

# Chapter 4

## Off-site measures: form and timing

- 4.1 To achieve net zero carbon emissions on-site through energy efficiency and onsite measures can be prohibitively expensive and for most building types and locations is not technically possible. This means that there will be remaining/residual emissions which need to be tackled in order to meet the zero carbon standard through (predominantly) off-site measures, or 'allowable solutions' as they are termed in the zero carbon hierarchy.
- 4.2 The case for including an off-site element in the zero carbon policy is based on:
- incentivising additional energy efficiency or on-site contributions beyond the regulatory standards where cost-effective – thus maximising the energy self-sufficiency of new build. This is particularly important in the context of non-domestic buildings given the range of building types, locations and uses which can never be fully reflected in modelling and an aggregate approach. So we know that some buildings will be able to go considerably further than regulation in a cost-effective way
  - ensuring that the carbon implications of new build are fully considered at the build stage, reflecting the 'polluter pays' principle, rather than simply being added to the national carbon emissions challenge
  - promoting, particularly for non-domestic buildings, the potential of such developments to contribute to the overall viability of community energy network development, particularly for heat networks.

### The approach to 'allowable solutions' for non-domestic buildings

- 4.3 The deployment of off-site measures is also an important part of the zero carbon homes programme. We are intending to adopt a common approach for both homes and non-domestic buildings. The benefits of this include simplicity for delivery and enforcement bodies, economies of scale for the overall allowable solutions market as it develops, and simplicity for mixed use developments.
- 4.4 A list of those allowable solutions which received support in the December consultation responses was published in the July 2009 written ministerial statement on zero carbon homes. These were:
- further carbon reductions on-site beyond the regulatory standard (increased carbon compliance) to abate residual emissions, to account for circumstances (e.g. larger sites) where going further on carbon compliance is more cost-effective than other allowable solutions

- energy efficient appliances meeting a high standard. This could incentivise IT-focused businesses towards using low-energy hardware
- advanced building control systems which reduce the level of energy use
- exports of low carbon or renewable heat from the development to other developments (Renewable heat imported from near the development would be included as part of the carbon compliance calculation)
- investments in low and zero carbon community heat infrastructure.

4.5 Other options also remain under consideration.

4.6 We consider that these measures would also be suitable for non-domestic buildings. However, we would welcome views on any potential issues with any of these and whether there are any other options which should specifically be applied to non-domestic buildings.

4.7 Work to develop a delivery programme for allowable solutions is ongoing, and there was a strong response from the July statement that industry needs practical arrangements for delivery. The issues being looked at include:

- how developers should be required to deliver these solutions: whether independently or through third parties (or both/either)
- the role of local authorities in shaping developers' choices about allowable solutions
- how allowable solutions will be measured and assessed, and by whom.

4.8 Further information will be published on this work in due course.

## Timing for the introduction of off-site measures for new non-domestic buildings

4.9 The systems for the delivery of allowable solutions will need to be up and running by 2016 on a major scale<sup>14</sup>, when they will be introduced for homes. We are therefore minded to introduce a requirement to deploy **some** allowable solutions for new non-domestic buildings at the same time.

<sup>14</sup> An approach to allowable solutions will need to be in place before then if proposals, shortly to be consulted upon, to amend the Code for Sustainable Homes to reflect the zero carbon policy are agreed. However, this will not reach a significant scale until the 2016 regulatory step is taken.

## 4.10 This would:

- provide greater certainty and commercial opportunity to new businesses starting up to service the allowable solutions market, increasing the volume and thus the viability of the market overall in its early years
- enable the use of allowable solutions for non-domestic buildings at the same time as homes would allow domestic and non-domestic developers to work together to exploit economies of scale, and reflect the opportunities for non-domestic developments to contribute to community energy and heat solutions
- create market certainty for investors and developers of community scale infrastructure (like heat networks) when undertaken with long-term strategic energy planning
- provide a more consistent framework for mixed developments, avoiding a situation whereby half the development would be required to deploy allowable solutions and half would not.

4.11 For instance, with allowable solutions we could set a level of 70 per cent improvement from 2016 for new non-domestic buildings, rising to 100 per cent of regulated energy from 2019 (plus whatever allowance is decided on to account for unregulated energy use – see Chapter 5).

4.12 This option has been modelled in the impact assessment as an illustration. In practice this would mean that the individual carbon compliance levels would still be required, but then all buildings would be required to ‘top up’ to meet the 70 per cent reduction, either by going further on-site or by deploying allowable solutions. So for some buildings that (under Scenario 2) already have carbon compliance levels of more than 70 per cent there would be no change, but those with much lower carbon compliance levels, they would have to deploy allowable solutions. This is illustrated below.

	<b>Regulatory reduction in emissions at 2016 (onsite)<sup>15</sup></b>	<b>Overall target for reduction – 2016</b>	<b>Percentage reduction to be met by off-site measures</b>
Small rural office	70%	70%	0%
Distribution warehouse	98%	70%	0%
Large supermarket	11%	70%	59%

<sup>15</sup> As explained in Chapter 3, these numbers are **illustrative**, and are not being consulted on as possible regulatory targets.

- 4.13 This increases the overall capital costs to developers of the policy, as more buildings would need to pay for allowable solutions sooner, but also increases overall carbon savings. On an individual sector basis, it will also increase costs for those sectors impacted (by increasing build costs sooner). This is discussed in more detail in the impact assessment.
- 4.14 But it could also have the benefit in increasing understanding of the use of allowable solutions, and smoothing their implementation from 2019. If this also helps to create a single, more efficient market in allowable solutions, it could result in lower costs for delivery too.
- 4.15 This (70 per cent) has been modelled as one option for illustration, but other levels are also possible, provided that the level was set high enough above the regulatory 2016 carbon compliance level to ensure that a significant market was being created. We would be interested in consultees' views on the proposal for introducing allowable solutions for non-domestic buildings in 2016, and then further detailed proposals will be developed.

#### **Consultation questions**

- Q4.** Do you agree that we should adopt the same measures and approaches for allowable solutions for non-domestic buildings as those for homes?
- Q5.** Are there any extra allowable solutions that should be used specifically for non-domestic buildings?
- Q6.** Do you agree with the proposal to introduce an element of allowable solutions for non-domestic buildings at 2016? What views do you have on the level at which this should be set, and the impact this will have?



# Chapter 5

## Defining the zero carbon destination

### 'Regulated' & 'unregulated' emissions and the approach for homes

5.1 Only some of the carbon emissions from buildings are currently covered through regulation – giving a distinction between 'regulated' and 'unregulated' energy.

For non-domestic buildings:

- **'Regulated'** energy use in non-domestic buildings currently covers the energy used by the building fabric and fixed building services. This includes fixed systems for internal lighting, heating, hot water service, air conditioning and mechanical ventilation<sup>16</sup>. But it excludes some services which could be classed as 'fixed', including some forms of external lighting and vertical transportation (lifts and escalators). The extension of the Regulations to cover these is discussed in the June 2009 Part L Future Thinking Paper.
- **'Unregulated'** energy is all other energy use (that is, energy used for computers, machinery or other processes carried out day to day in the building).

5.2 For **homes**, the zero carbon definition covers net regulated and unregulated emissions over the whole year. In homes, unregulated emissions relate primarily to appliances and are calculated as a proxy amount for cooking, electrical appliances and normal occupation. This proxy amount is calculated as an additional improvement of around 50 per cent on top of the 100 per cent reduction in regulated emissions, meaning that the allowance for unregulated energy accounts for around a third of the overall improvement being required in domestic building emissions in 2016. Since the carbon compliance level is 70 per cent, all unregulated energy use is covered by allowable solutions.

5.3 The decision to include unregulated energy in the homes standard reflects the fact that unregulated domestic energy use is not in general covered by carbon reduction schemes (although domestic electricity use will fall under the EU ETS).

### The case for covering unregulated emissions for non-domestic buildings

5.4 **Government proposes that, as a minimum, 100 per cent of regulated energy will be covered by the zero carbon standard.**

<sup>16</sup> ADL2A, p.28: [www.planningportal.gov.uk/uploads/br/BR\\_PDF\\_ADL2A\\_2006.pdf](http://www.planningportal.gov.uk/uploads/br/BR_PDF_ADL2A_2006.pdf)

- 5.5 Further to this, **we will also be considering whether to extend the coverage of Building Regulations to cover certain excluded energy uses** discussed in the Part L Future Thinking Paper. There was general support for widening the scope of Part L in responses to the Future Thinking Paper but some difference of views on whether these services should be included in the overall calculation of the building's emissions, or whether minimum performance standards could be set instead. This justification for this concern was that this could create an incentive to cut back on or downgrade essential services such as security lighting or access for disabled people to a building. There was almost universal agreement that air curtains should be included. **CLG will consider these issues further.**
- 5.6 We are also proposing in this consultation that **an element of unregulated energy should be included in the zero carbon standard**, in order to:
- incentivise further on-site activity where cost-effective – recognising that some building types are likely to have carbon compliance levels at or close to 100 per cent
  - reflect the 'polluter pays' principle, given that the development of new buildings will add to overall UK carbon emissions
  - maximise the potential contribution of non-domestic developments as 'anchor-loads' for community networks
  - maintain continuity with the zero carbon homes approach.
- 5.7 The practicalities of accounting for unregulated energy use are discussed below. Because our modelling has confirmed that only a very small number of buildings can go beyond 100 per cent improvement on current standards through the use of on-site 'carbon compliance' measures alone, it can be assumed that the unregulated energy allowance for nearly all buildings would be met (as for homes) through allowable solutions.
- 5.8 Stakeholders have already indicated broad support for the inclusion of some element of unregulated energy in the zero carbon approach for non-domestic buildings in responses to the December 2008 consultation. There were concerns raised that the inclusion of process energy could create a very complex system, or result in 'double counting' between the zero carbon standard and the carbon trading schemes, although it is important to note that the ETS and CRC do not distinguish specifically between 'regulated' and 'unregulated' energy uses. There were also views that the inclusion of some allowance for unregulated energy would provide consistency between homes and non-domestic buildings, and views that it would be wrong to establish a 'zero carbon' standard that took no account of the energy used in the building.

## How could unregulated energy be accounted for?

- 5.9 There is considerable variety in the use of 'unregulated' energy between different businesses and industries, and even within some building types that can be used for different purposes. For example, an office can be used either very intensively (for a call centre or financial trading) or more lightly (for businesses where there are generally fewer employees and computers like law firms).
- 5.10 For the purposes of impact assessment, we have used the allowances given to different building types which are part of the SBEM software (shown below). SBEM takes account of loads resulting from small power and operational equipment (like computers) within the building and space functions using standardised use levels and hours of occupancy, but only to work out heat gains. It does not take account of any industrial process loads (such as machinery or refrigeration, which explains why the supermarket figures are low compared to the allowances for offices). Even with this limited scope, the range of figures for different building types is wide, and it can be assumed that further work to establish more accurate figures and add in other energy loads would increase (and change) the SBEM range.

<b>Building type</b>	<b>Unregulated emissions as % of regulated emissions</b>
Retail warehouse	5
Shopping centre	7
Mini-supermarket	7
Large supermarket	7
Distribution warehouse	15
5* hotel	24
3* hotel	24
2* hotel	24
City centre HQ	37
Speculative Office	37
Small office	67

- 5.11 If we wanted to include very specific unregulated energy allowances for different building uses within the broader building types then further detailed research would be needed to establish these levels, perhaps on the basis of different allowances for different planning classes. We would also need to confirm (as raised in the December 2008 consultation) whether some industrial processes would be exempted. Developers could then be asked to assess both the building type (for the energy efficiency and carbon compliance targets) and declare the building use (to determine their unregulated energy target) in order for the specific overall zero carbon target to be calculated. This could be calculated and measured by a new element in the SBEM software, but this would require significant development work, not least because of concerns that the allowances in SBEM need to be reconsidered to ensure that the basis for the figures' calculation is clear and to bring them up to date.
- 5.12 **CLG's view is that this would be a complex system to implement and enforce, and we are not minded to pursue this approach.**

## Proposals for consultation

- 5.13 Therefore, in the interests of simplicity and proportionality, we are minded to introduce a flat rate allowance of **either 10 or 20 per cent extra improvement** for the unregulated energy use in a building, to be met through deployment of allowable solutions.
- 5.14 The costs and benefits of a set 20 per cent allowance for unregulated energy have been modelled for the impact assessment (using Scenario 2, 'balanced on and off site'). This shows that overall, the costs of applying a 20 per cent flat rate (to be met by all buildings by paying for off-site measures under allowable solutions) is about equivalent to the costs of using the allowances assumed in SBEM as a proxy for unregulated energy use. But of course individual building types would be affected differently within this, with 20 per cent being higher than the SBEM assumed rate (increasing costs) for some, and lower than the SBEM rate for others (reducing costs).

### Consultation questions

- Q7.** Do you favour an approach of setting a flat rate requirement above 100 per cent regulated emissions to account for unregulated emissions?
- Q8.** Would you favour the 10 per cent allowance, the 20 per cent allowance or another rate? Why?

# Chapter 6

## Zero carbon for new public sector buildings

6.1 In Budget 2008, the Government announced an ambition that new public sector buildings should be zero carbon from 2018, one year in advance of the commercial new non-domestic buildings sector. It defined the scope<sup>17</sup> of this ambition as covering the central (but not local) government estate, hospitals, the defence estate, prisons, courts and schools (although the latter are subject to a separate 2016 zero carbon ambition under the Building Schools for the Future programme). A Whitehall task force was established in order to advise how this could be achieved. The evidence produced by the task force during the past year is being used to inform our recommendations.

### Existing initiatives

- 6.2 The Government has already set challenging Sustainable Operations in Government Estate (SOGE) targets, which cover the buildings and land managed by all central government departments and their Executive Agencies. Non Departmental Government Bodies are covered on a case by case basis. The devolved administrations, schools and hospitals are not included. Government is currently conducting a review of SOGE and will report on this shortly. Departments outside SOGE's monitoring remit (Health, Defence and Schools) have set up their own sustainability action plans for new and existing buildings.
- 6.3 In addition, government departments have committed to adhering to Part L standards for new buildings and major works on existing buildings, even though some parts of the government estate have Crown immunity from such formal regulation.
- 6.4 The monitoring of ongoing actual energy consumption of buildings will clearly be important in ensuring that its in-use performance is consistent with its build standard and that carbon savings are realised. Tools to do this already exist within the public sector, such as display energy certificates. Action to improve ratings will be the focus of separate policies which might pay particular attention to issues such as occupant behaviour or appliance performance in buildings, and there may also be new requirements or arrangements for display

<sup>17</sup> This scope differs from the scope for display energy certificates, which are required for all 'public buildings'. A 'public building' under the Energy Performance of Building Regulations is one with a total useful floor area over 1,000m<sup>2</sup> that is occupied by a public authority or an institution providing a public service to a large number of persons and therefore visited by those persons. This is a wider scope than the zero carbon ambition, as it includes local authority buildings such as libraries or municipal leisure centres (subject to the floor area requirement).

energy certificates arising from the recast Energy Performance of Buildings Directive in the next couple of years. In addition, most departments have signed voluntary agreements to buy energy efficient products under the Energy Services Directive which came into force in 2006, as a means to enhance end-use energy efficiency across the EU (the list of signatories includes Health and Defence among many others).

6.5 However, the focus of the 2018 ambition, and the work of the public sector task force, has been on new buildings owned, commissioned or run by central government from 2018; these are estimated to represent around 1.2 million m<sup>2</sup> of new non-domestic space per year.

### Public sector leadership potential

6.6 The 2008 white paper *Innovation Nation*<sup>18</sup> proposed that government could have an important role to play in addressing market failures and taking the lead in the climate change agenda. Government can:

- send a clear signal to consumers about a technology's future, for instance by assisting standard-setting organisations or becoming an early adopter
- create demand directly – government has a role in creating markets where they may not exist or demonstrating the viability of innovations that others will not necessarily adopt. Through procurement it has the potential to act as a leader on its own, pulling innovative products and services through from the UK economy
- play a critical role in guaranteeing the framework in which businesses can innovate and in providing direct support where the market fails
- promote innovative places in the UK – government can drive innovation by bringing together public, private and third sector organisations to come up with innovative solutions to local or regional challenges.

6.7 The Committee on Climate Change report *Meeting carbon budgets – the need for a step change*<sup>19</sup> notes that the majority of respondents in Defra surveys say that they are looking for Government to provide a lead on tackling climate change, and that they would be prepared to act if Government were to act first. A stronger signal from Government through actively leading and participating in taking forward implementation of measures to improve energy efficiency would therefore raise confidence that measures will be successfully implemented. Therefore, there could be direct and indirect positive implications for a number of policies affecting all government departments and the commercial building sector: e.g. the zero carbon agenda could contribute towards meeting carbon budgets and CRC obligations.

<sup>18</sup> [www.dius.gov.uk/reports\\_and\\_publications/~media/publications/S/ScienceInnovation\\_web](http://www.dius.gov.uk/reports_and_publications/~media/publications/S/ScienceInnovation_web)

<sup>19</sup> [www.theccc.org.uk/reports/progress-reports](http://www.theccc.org.uk/reports/progress-reports)

6.8 The Renewable Energy Strategy<sup>20</sup> (published in July 2009), stated Government's intention to help households, communities and businesses who want to install renewable generation by introducing new mechanisms for financial support, improving advice and ensuring robust industry standards. The Strategy document stressed that implementation will seek to ensure that the public sector leads by example, through tough low-carbon targets for government departments, robust assessment of renewable potential, and increasing the incentives for renewable deployment on its own land. Pursuing the 2018 zero carbon ambition could incentivise central government, as well as local authorities (which are outside the scope of the ambition), to look for finance and procurement mechanisms in order to maximise their potential from on-site renewables, as well as heat networks.

### **Early adoption in the public sector: challenges and benefits**

6.9 Being an early adopter implies costs and risks alongside any potential benefits. Various technologies, such as renewable energy generation, will have different learning rates depending upon the maturity of the technology and there are different risks involved in constructing and maintaining low and zero carbon technologies. Some technologies are very capital intensive with small running costs – for instance, wind or solar photovoltaics. Others, such as biomass, may involve economies of scale, but also ongoing fuel costs and risks associated with fuel availability. We need to learn more about the challenges and practical opportunities which arise from constructing and maintaining low and zero carbon buildings for the public sector and, in turn, for commercial buildings.

6.10 Just as in the commercial sector, the public sector is currently facing financial pressures, and the pressure to deliver vital public services like health and defence to increasingly constrained capital spending limits. If departments are to play a leading role in the new non-domestic buildings agenda, they will also need to:

- find ways to finance the additional up-front capital costs involved (including through capturing future revenue streams from lower energy bills)
- manage the financial implications of risks associated with the 2018 ambition (including risks arising from deployment of new technology)
- manage new procurement and contractual processes which will be required in the context of public sector buildings becoming producers of energy.
- understand how the energy element of PFI contracts might relate to community scale projects – for example if a hospital needs to remain locked into a long-term energy contract to ensure a heat network remains viable.

<sup>20</sup> [www.decc.gov.uk/en/content/cms/what\\_we\\_do/uk\\_supply/energy\\_mix/renewable/res/res.aspx](http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/res/res.aspx)

- 6.11 While the 2008 Budget stated that sectors such as hospitals, prisons and defence establishments might face particular challenges, the results of our modelling show that these buildings are not radically different from other commercial buildings (e.g. deep plan offices and hotels) in terms of regulated energy use patterns or technological potential for improvement. All the types of public sector building modelled<sup>21</sup> can reach 80 per cent reductions on-site apart from the acute hospital. Schools, some military buildings and prisons are all able to achieve close to 100 per cent reductions on-site.
- 6.12 This is generally because many public sector buildings tend to be less energy intense (in terms of process/unregulated energy) and have larger roof areas in comparison to gross internal floor area than other non-domestic buildings. This enables them to attach a higher quantity of solar photovoltaics. They also tend to have larger boiler loads which can be dealt with by biomass heating options.
- 6.13 Where public sector buildings are in a position to take part in district heating schemes, they can also be better placed than some other commercial buildings to act as reliable, long term anchor loads (e.g. a hospital is not very likely to change use and alter its energy consumption profile fundamentally every five or 10 years).
- 6.14 Examples of good practice can help provide detailed information on building to pioneering standards and can play a valuable role in accelerating the learning process for all non-domestic buildings. If the lessons are shared with the wider industry, there is great potential to help bring build costs down for UK businesses more generally. There are already examples of public sector leadership and excellence. Zero carbon buildings should be an asset for the public sector, so we need to find realistic ways to make innovation and leadership in zero carbon buildings a valid and worthwhile goal.

<sup>21</sup> This includes a hospital, prison, secondary school, primary school, defence armoured vehicle storage facility and a cultural auditorium.



**Case study: Lion House, Alnwick (Defra)**

Modern flexible office accommodation, which incorporates passive design principles and renewable sources of energy (e.g. medium wind turbines, photovoltaic panels, a solar thermal system, a biomass boiler burning local wood chip and rain-water harvesting). Defra designed this building to be zero carbon, or as close to it as currently possible, while using on-site technologies.

A 25-year life cycle cost model underpinned the project's business case, justifying a 23 per cent cost premium on sustainability to deliver a Building Research Establishment Environmental Assessment Method (BREEAM) Excellent building with an energy performance certificate rating of A+. A New Engineering Contract ([www.neccontract.com/](http://www.neccontract.com/)), with a Sustainability Charter at its heart, helped guide the project through a partnering arrangement to identify and manage risk. This charter enabled, for example, 91 per cent recycling of construction waste and included carbon and water monitoring of onsite construction activities.

Awards:

- BREEAM – winner of 2008 Award for Offices.
- Property Week – winner of the Sustainable Achievement of the Year (October 2008).
- CIBSE Low Carbon Awards – winner of the Low Carbon Building of the Year (November 2008).
- Building Awards – winner of the Project of the Year (February 2009).

**Case study: Howe Dell School, Hatfield**

Howe Dell School is a new building which opened in September 2007 when the school moved to a new site. It includes a children's centre and a community hall.

The project was intended to test a range of technologies: high levels of insulation with heat recovery from ventilation systems; a heat store to capture solar radiation (via playground surfaces) during summer for use as a heat source during winter; and several renewable energy systems (wind turbine, photovoltaics, solar thermal, and ground source heat pump combined with inter-seasonal heat storage).

The school curriculum follows the principles of Education for Sustainable Development – 'almost an experiment in how green and sustainable a building can be'. ([www.howedell.herts.sch.uk/eco\\_issues/sustainable\\_elements.pdf](http://www.howedell.herts.sch.uk/eco_issues/sustainable_elements.pdf))

## Proposals for taking forward the zero carbon ambition

6.15 Government is committed to showing leadership through the public sector where possible, and this consultation confirms the Budget 2008 ambition that the public sector should aim to make the move to zero carbon for new buildings a year ahead of regulation i.e. from 2018.

6.16 The zero carbon standard will apply to public sector buildings in just the same way as is proposed for other non-domestic buildings: by prioritising energy efficiency measures, then through the appropriate balance of on and off-site measures to abate remaining emissions. As for all non-domestic buildings, further detailed modelling will be needed to understand how to set firmer trajectories for different public sector building types, and consider how these could be delivered. The task force will continue to work with departments on the business cases for individual capital programmes.

6.17 The task force will take forward a number of supporting workstreams:

- a programme of exemplar public sector new buildings
- exploring the scope to trial allowable solutions in public sector buildings in advance of commercial buildings. This could also be a good way in which to explore with local government the role for local leadership in the development of zero carbon new non-domestic buildings
- developing possible financial mechanisms to support capital costs through capturing future revenue streams and benefits
- ensuring central monitoring and reporting of progress by central government departments, their agencies and key estates (schools, NHS, prisons, courts, defence) of steps towards zero carbon for new buildings, linked into the wider SOGE arrangements.

### **An exemplar buildings programme**

6.18 We are proposing to establish a programme of exemplars for a variety of types of public sector buildings in a variety of locations (urban, suburban and rural), to enable testing and learning of technologies and techniques that will support the pursuit of the 2018 ambition. This approach will help ensure that the public sector:

- plays its role in reducing carbon emissions from new buildings
- realises the benefits of increased learning rates and expertise
- helps demonstrate and mainstream renewable technologies
- helps government departments and the commercial sector adapt for a world of carbon budgets, CRC obligations and any future tightening of carbon emission reduction targets.

6.19 The Technology Strategy Board (TSB)<sup>22</sup> has been set up to advise Government on how to remove barriers to innovation and accelerate the exploitation of new technologies. It is engaged in a range of activities to support industry to deliver the challenges of the low-carbon agenda. Among these activities, TSB will be running competitions to stimulate innovation in the design, construction and operational phases of new buildings. For example, one competition enables companies constructing demonstrator buildings to apply for funding to monitor building performance, enabling comparison with predicted performance. Currently the TSB is funding new projects up to 2012.

6.20 With departments and the TSB, we need to work up an exemplar programme, including identifying funding, scale and the best means of establishing the right learning loops to maximise its impact. In principle, an exemplar programme should be set up in such a way that:

- all departments can take advantage of the opportunity to participate;
- all types of buildings are being tackled and not only the 'easy wins';
- knowledge is being disseminated across departments and the commercial sector and, importantly, across 'new' and 'retrofit' policies;
- early adopters are given adequate support and are rewarded.

6.21 A similar approach was adopted by the Department for Children, Schools and Families (DCSF). The zero carbon schools task force was established by DCSF in 2008 with a remit to advise on what needs to be done if we are to reach the goal that all new school buildings will be zero carbon by 2016. DCSF is already funding a range of exemplar projects to test measures to reduce carbon emissions in school building projects, including to zero carbon. It is likely that the task force will recommend further pilot zero carbon schools to be operational by 2016 to demonstrate how this can be achieved and to provide learning for future projects.

### **Trialling allowable solutions in public sector buildings**

6.22 As mentioned earlier, where public sector buildings are in a position to take part in district heating schemes, they can play a key role as anchor loads. This consultation document has proposed that new commercial sector buildings should start deploying allowable solutions from 2016, in order to exploit synergies with the domestic sector.

<sup>22</sup> The TSB is an executive non-departmental public body established by Government in 2007. It is sponsored by the Department for Business, Innovation and Skills (BIS), and jointly supported and funded by BIS and other government departments, the devolved administrations, regional development agencies and research councils.

6.23 If new public sector buildings were to start utilising allowable solutions ahead of this – perhaps from 2015 – this could provide important learning about partnership working and practical delivery, and link into local agendas on climate change action. We will work further with other departments in order to understand the scope for this, and establish the costs and benefits involved.

### Options for financial mechanisms

6.24 Zero carbon standards for new buildings can generate a range of benefit streams; some of these will last only for the life of particular appliances initially installed in the building but others will last for the whole life of the building itself. However, it can be difficult for those responsible for designing, building and financing a new development to take into account the whole life costs and benefits, especially where departments are operating in (relatively) short term budget timescales like the Comprehensive Spending Review periods of three years and are under pressure on capital costs.

6.25 Currently, **third party financing** can be used either to retrofit existing buildings or construct new buildings. Capital is provided and, in return, a fee is payable equivalent to a portion of the energy savings achieved. One example of a delivery mechanism supporting this is Salix Finance – a revolving fund (and an independent, publicly-funded company) which accelerates public sector investment in energy efficiency technologies through invest-to-save schemes.

6.26 One way of adapting this model to help deliver zero carbon in the public sector could be a ‘zero carbon innovation fund’, a revolving fund available to government departments seeking additional financing to build to zero carbon standards.

6.27 The 2018 ambition is also likely to increase the incentive to procure energy services, for instance through Energy Services Companies (ESCOs). These not only provide access to third party finance but also enable departments to contract out the design, build, finance and operation of energy services. An ESCO delivers energy services and/or other energy efficiency improvement measures in a user’s premises and accepts some degree of financial risk in doing so.

6.28 **We will explore the options for third party financing further, including options for a central innovation fund, and the potential for increase in energy services procurement.**

### Monitoring and reporting

6.29 Individual departments will remain responsible for their own estates and performance, and departments with specialist estates or capital programmes will need to put in place work programmes to respond to the zero carbon challenge.

6.30 We are minded to rely on existing reporting mechanisms (e.g. potentially integrating zero carbon in SOGE or in departmental reporting mechanisms) if these can be shown to:

- maintain focus on the aim of the zero carbon ambition
- ensure that there is adequate reporting and evidence of outcomes
- most importantly, ensure that there are mechanisms for experience from the public sector to transfer into the commercial sector.

### Local leadership and engagement

6.31 While the original Budget 2008 statement did not relate to the local government estate, there is still considerable opportunity for local authorities to play an important role in support of the zero carbon buildings agenda. The local leadership role of local authorities in relation to climate change is well recognised and being developed. We want to work with local government as they take this forward, particularly in the light of the opportunities that the new Total Place<sup>23</sup> agenda can provide, to consider how the zero carbon buildings can be captured within this. In particular, we believe there are three broad areas where local government can demonstrate critical leadership on this agenda:

- through early adoption of higher standards or development of exemplars amongst their own new buildings
- by influencing the development of higher standards or exemplar buildings by other public sector parties in their area
- by planning for and facilitating links into community energy networks.

#### Consultation questions

- Q9.** Do you agree with the overall work programme we have outlined for the public sector?
- Q10.** Are there other ways in which you think the public sector could usefully provide leadership for the move to zero carbon?
- Q11.** Do you agree that the public sector should start trialling allowable solutions from 2015?
- Q12.** What role(s) do you think local government can play in contributing to public sector leadership on zero carbon buildings?

<sup>23</sup> Total Place is a new initiative that applies a 'whole area' approach to public services – [www.localleadership.gov.uk/totalplace](http://www.localleadership.gov.uk/totalplace)

# Chapter 7

## Delivery and next steps

- 7.1 The main aim of this consultation is to set out the policy options for establishing a regulatory route-map for zero carbon, and ask where the ambition should be taken from here, for both commercial and public sector buildings.
- 7.2 This is only one part of the issue, and there is a great deal of further work to be done in understanding how the zero carbon ambition could be delivered. These are issues that we will continue to work with stakeholders on during and after the consultation period. Some of the key issues are set out in this chapter, with some markers for further pieces of work being planned. It also sets out some of the basic assumptions for the scope of the standard.

### Scope and practical delivery

#### Which buildings would be covered?

- 7.3 Put simply, a **non-domestic building** is any building which is not a dwelling. The intention is that the zero carbon ambition would apply to all non-domestic buildings covered by the Building Regulations, and the meaning attached to terms will follow the Regulations. A full list of exempt buildings is set out in Schedule 2 of the Building Regulations<sup>24</sup>. The exemptions include some industrial or agricultural buildings where the air is not 'conditioned' (heated or cooled), some temporary buildings and buildings which are covered by other legislation (e.g. buildings on nuclear sites). The Crown estate is also exempt (see the public sector chapter).

#### Building Regulations and enforcement by Building Control

- 7.4 The designer/developer/builder will take responsibility for meeting the standard through the planning application, design and construction stages, and the building will be signed off as 'zero carbon' at completion. The main delivery mechanism for the standard will be the Building Regulations, although the regulatory oversight for allowable solutions is not yet decided.
- 7.5 Any progression towards a zero carbon standard will be realised through **step change increases** in Building Regulations standards. A 25 per cent aggregate increase (see below) on 2006 standards has already been consulted on for 2010, with subsequent changes at (no less than three yearly) intervals thereafter.

<sup>24</sup> See [www.planningportal.gov.uk/england/professionals/en/4000000000003.html](http://www.planningportal.gov.uk/england/professionals/en/4000000000003.html). Consolidated Building Regulations are available from [www.planningportal.gov.uk/uploads/br/BC\\_Consolidated\\_Bldg\\_Regs.pdf](http://www.planningportal.gov.uk/uploads/br/BC_Consolidated_Bldg_Regs.pdf).

7.6 The December 2008 consultation asked<sup>25</sup> whether it was appropriate (in broad terms) to assume that Building Control would be responsible for checking compliance with 'carbon compliance'. This fits with our proposed approach to use Building Regulations as the primary delivery mechanism for carbon compliance levels. Although the questions were asked in relation to zero carbon homes, we are assuming that the same issues will apply for the non-domestic building sector.

7.7 Responses included the following points:

- there was considerable support for the principle that Building Control should be responsible for checking carbon compliance **but** also agreement that Building Control bodies will need new skills and training to deal with the zero carbon standard, in particular on new technologies like onsite generation
- some consultees questioned the capacity for Building Control to handle compliance when there are already concerns about low compliance with the current Part L. CLG is currently working on compliance issues both as part of the implementation of the Review of Building Control<sup>26</sup> and specifically on Part L
- consultees suggested that greater coordination between Planning and Building Control would be needed
- some consultees suggested that there might be a role for a different party, such as a Competent Persons scheme.

7.8 We are minded to continue on the assumption that Building Control will take responsibility for carbon compliance checking for non-domestic buildings. However, we recognise that much more work is needed to understand what new skills that will be needed. This is also dependent on a decision on the appropriate compliance route for allowable solutions.

## Planning and regional development

7.9 Although the roles of different agencies are yet to be confirmed, what is clear is that the move towards zero carbon (for both homes and non-domestic buildings) means that the carbon emissions of buildings will no longer be purely tackled within the building envelope, or even on the building site. Zero carbon build standards will not only require domestic and non-domestic developers to work together to understand economies of scale for renewable heating or power generation, but also for planners to consider the heating and power needs across local authority areas or regions, and ensure that schemes are appropriate.

<sup>25</sup> Question 24 (and 23 on the role of Local Planning Authorities): see page 73 of the summary of responses: [www.communities.gov.uk/publications/planningandbuilding/summaryresponsezero](http://www.communities.gov.uk/publications/planningandbuilding/summaryresponsezero)

<sup>26</sup> [www.communities.gov.uk/publications/planningandbuilding/buildingcontrolimplementation](http://www.communities.gov.uk/publications/planningandbuilding/buildingcontrolimplementation)

- 7.10 The Climate Change Planning Policy Statement (PPS) is currently being amended to incorporate the Renewables NPS and cancel the existing renewables PPS (PPS22), with the aim of consulting on a draft new PPS by the end of 2009. The new Climate Change PPS will also reflect work on the zero carbon programmes and the Heat and Energy Saving Strategy. In light of this, it will set out greater clarity for planning authorities about their role in energy mapping and energy planning, and in delivering zero carbon homes and non-domestic buildings.
- 7.11 Building Regulations is a devolved matter in Scotland and Northern Ireland, and will become devolved in Wales at the end of 2011. Planning is fully devolved. We therefore envisage that these proposals will be applied to England only, as is the intention for the 2016 zero carbon homes target. However, in line with the current arrangements the analysis has been carried out for England and Wales. (Because of the timing of future devolution, the recent Part L consultation also assumed that the Part L 2010 arrangements will apply in Wales.)

## Delivering zero carbon: tackling market barriers

### Valuing low carbon buildings

- 7.12 As discussed in previous chapters, a key barrier to increasing the take-up of high performing buildings is their relative lack of market value compared to the increase in build costs. Government is proposing to regulate to help to address this market failure, but we also need to understand whether it is possible to address these challenges through non-regulatory mechanisms.
- 7.13 This means understanding the relationship between the costs and benefits accruing to developers and occupants of buildings, as well as the interplay with other relevant policies and market mechanisms relating to energy use and carbon emissions. Having established the extent to which improved energy efficiency or access to low and zero carbon technologies currently impact on the market value of non-domestic buildings, we will support further work with the Royal Institution of Chartered Surveyors and other organisations who are addressing the challenges and opportunities of valuation, to explore how the market might develop alongside progress towards zero carbon buildings.

### Energy Services Companies

- 7.14 Another issue which has been mentioned is the problem of who might take on responsibility for the costs and maintenance of low and zero carbon technologies installed in buildings. Developers are unlikely to want to take on ongoing responsibilities once the building is completed and sold. Occupiers or building managers may not have (or want) the skills needed to manage generation plant, and it may not be efficient to provide this service on a per-building basis. One option would be to introduce a third party into the relationship: most likely in the form of ESCOs, as mentioned in the previous



chapter. The role of such a body would be to take on responsibility for ownership and ongoing operation and maintenance of generating plant, and return income to the occupiers of the building.

- 7.15 This is also part of a larger question related to the potential for a market in heat generation and the future role of ESCOs. As well as being an important consideration in how allowable solutions are delivered (see chapter 4), this is a key element in the Government Renewable Energy Strategy. This is another area where we will need to work with the Department for Energy and Climate Change (DECC) to understand how a market might develop over the coming years.

## Delivering zero carbon: assessment tools

### **National Calculation Methodology software: SBEM**

- 7.16 SBEM is the main software tool for Building Regulations compliance checking for non-domestic buildings. For more complex/larger buildings, approved Dynamic Simulation Models (DSMs) are also used. Both SBEM and approved DSMs are tools which reflect the National Calculation Methodology for judging the energy performance of new buildings – a requirement under the Energy Performance of Buildings Directive.

- 7.17 It is clear that SBEM will need to be adapted in the coming years for a number of reasons:

- to reflect changes in the way electricity is credited in the software as decarbonisation lowers the carbon intensity of electricity
- to review the software's fitness for purpose in light of some current issues raised by industry
- to ensure that the software is able to reflect the proposed zero carbon hierarchy.

- 7.18 Similar work is currently being undertaken in relation to the Standard Assessment Procedure (SAP), the equivalent tool for domestic buildings, and the aim is to have changes in place before Building Regulation changes in 2013. CLG will continue to work with DECC (who are responsible for SAP) to agree long term strategic needs for regulatory assessment tools (for both dwellings and non dwellings) and then to consider changes.

### **Proposals for a Code for Sustainable Buildings**

- 7.19 In March 2009 the UK Green Building Council (UK GBC) published proposals for a 'Code for Sustainable Buildings'. These suggested establishing a code covering both new and existing non-domestic buildings and set regulatory targets for a range of sustainability indicators (including energy, waste and water) and provide for ongoing MOT-style building checks on performance. It also proposed a full life-cycle assessment approach.

7.20 Since this publication, CLG has been working with the UK GBC to understand how the proposals could most usefully be taken forward. While government is not considering regulatory trajectories for all the indicators suggested in the proposals at the moment, industry research is uniquely placed to test what appetite there is for change and suggest where standards should go in the future.

7.21 Longer term, the issue of what tools and assessment methods industry will need remains open, and we welcome industry leadership – for example, the BREEAM suite of assessment methods is widely used and is developing into new areas in response to industry demand. However, we are mindful of the European work on building environmental performance standards which is ongoing. Although this work is incomplete, we should avoid setting up conflicting assessment methods if harmonised methods will be available in the next few years.

## Delivering zero carbon: working in partnership

### **A delivery body to support the move to non-domestic zero carbon**

7.22 The Zero Carbon Hub was set up in June 2008 in response to the need, identified in the Callcutt Review of Housebuilding Delivery, for a new independent private-public partnership to take day-to-day operational responsibility for co-ordinating delivery of low and zero carbon new homes and overcoming barriers.

7.23 The Zero Carbon Hub supports and reports to the 2016 Task Force, which is chaired jointly by the Minister for Housing and Planning and the Executive Chairman of the Home Builders Federation. Its purposes are to:

- develop and drive a programme for the energy efficiency aspects of low carbon homes leading to the delivery of mainstream zero carbon homes from 2016
- develop and drive a programme for the energy aspects of delivering low and zero carbon homes
- capture practical experience and use this to accelerate mainstream adoption of low and zero carbon methods and technologies
- ascertain the current level of knowledge within the industry to build to low and zero carbon standards and determine where additional skills and training are required
- help raise consumer awareness and generate demand for low and zero carbon homes.

7.24 Recent work of the Hub has included the development of proposals for the homes energy efficiency metric and standard, and collaboration in work on the options for allowable solutions.

7.25 Some of this work is already relevant for non-domestic buildings, but the purpose and focus of the Hub and the 2016 Task Force is on homes. Similar work will need to be pursued for new non-domestic buildings, and the work of the Zero Carbon Hub so far has demonstrated the value for government, industry and other stakeholders of this private-public partnership approach.

7.26 Given the principle of seeking consistency wherever relevant between the approaches taken towards zero carbon homes and non-domestic buildings, we want to follow this model of working closely with stakeholders, but also avoid:

- diverting the intended focus of the Zero Carbon Hub on homes (as reflected in its governance and funding arrangements to date) or
- duplicating the structure or the efforts of the Hub itself on those areas of work where there is some overlap between homes and non-domestic buildings – especially considering those organisations with an interest in both sectors.

7.27 We will therefore put in place similar arrangements to support the delivery of zero carbon new non-domestic buildings, aiming to link with the work on homes as appropriate, but ensure that there is sufficient dedicated capacity to deal with delivery issues for the non domestic sector.

## Next steps

7.28 The main issues for short term development are:

- establishing appropriate energy efficiency standards for different building types
- scoping and starting work on the review of the non-domestic building assessment software (SBEM)
- based on views on the carbon compliance scenarios, working up more detailed modelling on the technical and economic feasibility for different building types. The end result of this work would be changes for Part L in 2013 (and subsequently in 2016 and 2019), and we may therefore choose to roll the zero carbon modelling work into the Part L analysis
- working with the zero carbon homes programme on a framework for allowable solutions
- further develop the public sector leadership offer.

### Consultation question

**Q13.** Does this package of measures and proposals for next steps address the key delivery issues to make progress towards the zero carbon ambitions? If not, what action is needed and by whom?

# Annex 1

## Related policies

- 1.1 The Government ambition for new non-domestic buildings sits within a context of policies at EU, national and local level. This is an attempt to highlight some of the most relevant initiatives.
- 1.2 The list is not intended to be exhaustive, or to indicate everything that would need to be considered in future development or implementation of a zero carbon new build standard. The intention is to explain the context for the proposals.

## Zero carbon homes: policy and progress

- 1.3 The approach proposed for zero carbon non-domestic buildings is modelled closely on the proposals for zero carbon homes.
- 1.4 In July 2007, following a public consultation, CLG announced that all new homes would be zero carbon homes from 2016<sup>27</sup>. The high-level definition put forward was that homes would be net zero carbon across the year, taking account of:
  - all energy used in the home (including cooking and appliances as well as the uses already covered by Part L of the Building Regulations)
  - carbon emissions associated with imported and exported energy (including from energy imported via a direct physical connection).
- 1.5 In December 2008, following advice from the UK GBC Zero Carbon Definition task group, CLG consulted on the detailed definition of zero carbon homes<sup>28</sup>. The December 2008 consultation retained the high-level definition set out above but recognised that it would not be practical to require all of the carbon abatement to come from on-site (or directly connected) energy sources. A three step approach to reaching the zero carbon homes standard was therefore proposed, based on:
  - a high level of **energy efficiency** in the fabric and design of the dwelling
  - **'carbon compliance'** – a minimum level of carbon reduction to be achieved from on-site technologies (including directly connected heat networks); and

<sup>27</sup> [www.communities.gov.uk/publications/planningandbuilding/building-a-greener](http://www.communities.gov.uk/publications/planningandbuilding/building-a-greener)

<sup>28</sup> [www.communities.gov.uk/publications/planningandbuilding/zerocarbondenition](http://www.communities.gov.uk/publications/planningandbuilding/zerocarbondenition)

- **‘allowable solutions’** – a range of measures available for achieving zero carbon beyond the minimum carbon compliance requirements.

1.6 In July 2009, the Minister for Housing and Planning confirmed in a Ministerial Statement<sup>29</sup> the approach that had been proposed in the consultation and set out some further details of the definition and the further steps that would be required in order to finalise the remaining details. In particular, he announced:

- the formation of a specialist task group to examine the energy efficiency metrics and standards which would realise our ambition of the highest practical energy efficiency level realisable in all dwelling types
- that the carbon compliance level would be a reduction of 70 per cent of regulated energy use compared to 2006 regulations and that this would be updated, as necessary, in light of certain technical changes
- that on-site renewables installed as part of zero carbon homes would be eligible for the RHI and FITs
- that allowable solutions would cover carbon emitted from the home (after taking account of carbon compliance) for 30 years after build
- that certain of the measures proposed as allowable solutions commanded broad support and that we would consider with stakeholders the practical arrangements that would be required to permit them to be put in place and to ensure that standards are achieved in practice; and
- the intention to set a guideline maximum price that industry would be expected to bear in implementing allowable solutions in light of further work on costs.

1.7 The Task Group’s proposals on an energy efficiency standard and metric were presented to Government in early November 2009.

## Initial consultation on zero carbon new non-domestic: responses

1.8 The December 2008 Zero Carbon Homes definition consultation included a chapter on the ambition for new non-domestic buildings to be zero carbon. This set out CLG’s initial thinking on the policy options, developed since the Budget announcement in March 2008.

<sup>29</sup> [www.communities.gov.uk/statements/corporate/ecozerohomes](http://www.communities.gov.uk/statements/corporate/ecozerohomes)

1.9 The consultation received 270 responses overall, and a full summary of responses was published on 17 July 2009<sup>30</sup>. Those that focused on the non-domestic issues included commercial property developers and managers, big businesses (such as food and general retailers) and technical consultants.

1.10 In summary, the chapter asked for views on:

- whether respondents broadly supported the ambition (Q28 and 29)
- the inclusion or exclusion of 'unregulated' and/or industrial process energy (Q30 and 31)
- development of assessment tools for non domestic buildings, and what broad areas these should cover (Q35 and 36)
- whether the non domestic policy should follow the homes policy, and whether milestones should be set in a similar way in the run up to 2019 (Q32 and 34)
- estimated costs of meeting energy efficiency and carbon compliance levels (Q33).

1.11 Overall, there was strong support for the ambition for non-domestic buildings, and for staying consistent with the homes objectives and framework as far as possible. Respondents were also keen to see clear trajectories set for step changes in requirements up to 2019. Views on the inclusion or exclusion of unregulated/process energy were more mixed, as were views on whether a 'Code' is needed, and what such an assessment tool could cover.

1.12 The more detailed responses also included some very useful discussion on the complexity of the non-domestic sector and the barriers which would need to be overcome to achieve the ambition. Many of these issues are picked up in this consultation, where the themes listed above are explored in more detail.

1.13 Another strong theme of the detailed comments was the need to recognise that this is not a policy which can be made in isolation. Businesses are already subject to obligations under other government or EU schemes on energy or emission reduction, and the building regulation and planning systems are requiring higher levels of building energy performance and renewable generation. Industry is also making its own voluntary moves towards more sustainable construction and ongoing building use.

<sup>30</sup> [www.communities.gov.uk/documents/planningandbuilding/pdf/1284549.pdf](http://www.communities.gov.uk/documents/planningandbuilding/pdf/1284549.pdf)

## Energy Performance of Buildings Directive

- 1.14 Following full implementation of the Directive in the UK in 2008, Energy Performance Certificates (on construction, sale or rent) and Display Energy Certificates (for ongoing display in large public buildings) are now required<sup>31</sup>. Communities and Local Government is responsible for the implementation of these certificates, and is currently looking at options for how better use can be made of both of these as a driver both for improving the performance of the existing stock and increasing the value attached to higher rated buildings.
- 1.15 The Directive is currently being revised, and while the text is still in negotiation, it seems likely that the requirements on Member States will become tighter. Any changes to the regime, and any policies proposed under the zero carbon programme will have to provide compliance with the new Directive.

## EU standards on life cycle assessment

- 1.16 The EU standardisation body CEN are currently developing a suite of standards<sup>32</sup> to describe how to assess the life cycle impact of buildings against a range of sustainability indicators. The standards are due for completion between 2010 and 2011, but following this there will be significant further work needed to understand how to apply these standards at the individual product or building level.
- 1.17 CLG recognises that there is increasing interest from industry and other stakeholders in the embodied energy/carbon of both products and buildings, but while the EU's work is ongoing, we are not minded to begin regulating in this area. Industry (especially the products industry) is already making voluntary moves to demonstrate the environmental impacts of their products, and this kind of market-driven change is strongly supported.

## Consultation on 2010 changes to Parts L and F

- 1.18 The June 2009 consultation on changes to Parts L and F to the Building Regulations for October 2010 closed on 17 September 2009. As Part L will be the main delivery mechanism for zero carbon, the two programmes are obviously closely linked in all respects, but in particular the consultation discussed some issues which are particularly pertinent to these zero carbon proposals:
- the consultation suggested using an aggregate approach to achieving reductions in carbon emissions. This involves different target improvements for different building types, and reflects practical limitations: the extent to which different building types can achieve savings at an equivalent cost

<sup>31</sup> Further detail on the implementation of EPBD can be found at [www.communities.gov.uk/planningandbuilding/theenvironment/energyperformance/](http://www.communities.gov.uk/planningandbuilding/theenvironment/energyperformance/)

<sup>32</sup> For information on CEN's work see: [www.cen.eu/CENORM/Sectors/TechnicalCommitteesWorkshops/CENTechnicalCommittees/CENTechnicalCommittees.asp?param=481830&title=CEN%2FTC+350](http://www.cen.eu/CENORM/Sectors/TechnicalCommitteesWorkshops/CENTechnicalCommittees/CENTechnicalCommittees.asp?param=481830&title=CEN%2FTC+350)

- consultees were asked for views on how the software used to reflect the National Calculation Methodology principally (SBEM) might need to evolve in the future
- the consultation also included a Future Thinking Paper to discuss possible options for the Regulations in reviews after 2010. This suggested a potential change to the metric for assessing building energy efficiency
- the Future Thinking Paper also discussed bringing in (currently unregulated) fixed services into the requirements, including external lighting and internal transportation (i.e. lifts and escalators), both of which can represent a significant proportion of overall energy use.

## Cross-government energy policy

1.19 The Low Carbon Transition Plan<sup>33</sup> sets out plans to deliver 40 per cent of the UK's electricity from low carbon sources by 2020 and to achieve complete decarbonisation of the electricity grid by 2050. The plan is overseen by the DECC.

1.20 There are numerous links across to a zero carbon building standard, for example, on the extent to which government should use regulation on building performance to incentivise renewable heat or rely on the availability of zero carbon electricity in the future. There are also implications for the way in which we measure a 'zero carbon' standard, for example, the appropriate carbon intensity for electricity in assessment models for buildings which are put up now, but which may well still be in use in 100 years time.

1.21 CLG will continue to work closely with DECC as the UK's long term energy strategy develops.

### **EU Emissions Trading Scheme**

1.22 Under the ETS, each Member State is allocated a carbon allowance to be distributed free to participants, although the UK's auction system means that businesses (or other organisations) can also purchase additional allowances or sell back surplus allowances. Industries which are directly covered by the ETS are:

- electricity generation
- iron and steel
- mineral processing industries such as cement manufacture
- pulp and paper processing industries.

<sup>33</sup> DECC Energy White Paper, July 2009 [www.decc.gov.uk/en/content/cms/publications/lc\\_trans\\_plan/lc\\_trans\\_plan.aspx](http://www.decc.gov.uk/en/content/cms/publications/lc_trans_plan/lc_trans_plan.aspx)



1.23 Allowances are set for four year periods, and we are currently in Phase II (2008-12). This will impact on both homes and non-domestic electricity consumers, as all electricity generation falls under the 'traded sector' and costs of the scheme will be passed through to consumers by generators. In addition, some other heavy industrial users are directly covered. As the caps are lowered and the cost of carbon rises, the impact on electricity bills will increase, and occupiers of higher performing buildings should therefore benefit increasingly from lower energy bills as the ETS raises energy prices.

### **CRC Energy Efficiency Scheme**

1.24 The UK CRC Energy Efficiency Scheme (CRC) covers organisations not included in the EU ETS or covered by a voluntary Climate Change Agreement. A qualifying organisation is one that:

- has at least one half-hourly settled electricity meter, and
- used over 6,000 megawatt-hours (MWh) of half-hourly metered electricity in 2008.

1.25 Generally, organisations that are part of a group (e.g. a chain of shops or hotels) will participate as one entity. DECC estimate that when the CRC begins in 2010 this will cover around 4,000 – 5,000 participants including supermarkets, water companies, banks, local authorities and all central government departments, with another 15,000 organisations required to make an information disclosure of half-hourly settled meter ownership and consumption.

1.26 Participants will be required to determine and register their current annual emissions, then purchase allowances to cover these for 2011-12 and 2012-13. The scheme will then change from 2013 onwards, when a cap on the total number of allowances available will be introduced. Unlike the Building Regulations or the proposed zero carbon standards, the CRC will not distinguish between the emissions from heating and cooling a building and those used in running the building – for CRC purposes these are reported as one figure (overall emissions).

1.27 Building to the zero carbon standard will create a cost for both physical measures which will directly impact the carbon emissions of the building (energy efficiency and carbon compliance) and allowable solutions, which will cover the remaining emissions but which will not have a direct effect on the performance of the building. Both of these costs will be incurred by the developer of the building, and then be either sunk or passed on to the occupier in the purchase or rental price.

- 1.28 Because zero carbon buildings will not be net zero energy on-site, CRC participants will still need to declare some emissions and purchase allowances to cover these. Responses to the December 2008 consultation commented that this could result in the 'same' energy being paid for twice through two different government initiatives (although, as noted above, the CRC does not distinguish between, for example, energy used for heating and energy used for computers or machinery).
- 1.29 CLG is working with DECC to understand how CRC and the zero carbon programme can complement one another. Some of the initial issues are:
- the obvious benefit will be that occupiers of more efficient buildings will use less energy and will make a saving from needing to purchase fewer allowances. This will create a demand from tenants/landlords for low energy buildings to limit their liabilities under CRC
  - as carbon emissions from buildings will fall as a result of improving building performance, this will also mean that fewer credits will be needed overall, so either the price will fall (a cost saving for business) or the cap can be lowered (a carbon saving)
  - where emissions are covered in the zero carbon standard by 'allowable solutions' then these will not show up as any direct reduction in energy use. We thus need to consider how the different issues for developers and occupiers can be reflected and incentivised in the policy package, although we are not proposing that developers should have the option of purchasing CRC allowances as an allowable solution, as this could distort the CRC market
  - not all zero carbon buildings will be occupied by CRC participants (because eligibility is based on the organisation, not the building) so occupiers of different zero carbon buildings will be subject to different drivers and incentives
  - we will also need to consider practicalities such as the fact that the costs of meeting the zero carbon standard will apply per building, and CRC reporting and trading is done on a per-organisation basis. We will need to consider whether overall organisational performance could or should be taken account of in assessing the emissions of individual buildings.
- 1.30 It is important to establish a framework as soon as possible, but in practice the schemes are unlikely to interact significantly in the next few years. The CRC will be in its introductory phase until 2013 (with the capped auctioning phases starting thereafter) but until 2016 (at least) the regulations will only cover energy efficiency and on-site measures, which should provide a direct benefit for CRC participants **CLG will continue to work with DECC on establishing a framework for zero carbon and the CRC during and after the consultation period.**

## Government Renewable Energy strategy

- 1.31 The Renewable Energy Strategy, published in July 2009, sets out the Government's plans for meeting the UK's target to source 15 per cent of our energy from renewables by 2020.
- 1.32 In order to provide long term incentives and support for the development of community or small scale renewable generation, the Energy Act 2008 introduced powers for government to create a renewable heat incentive (RHI) for heat generation and feed in tariffs (FITS) for electricity generation up to 5MW capacity. The schemes apply to both domestic households and businesses. RHI payments will be provided by government directly and funded by a levy on suppliers of fossil fuels for heat (mainly licensed gas suppliers – but possibly also suppliers of coal, heating oil, LPG etc). FIT payments (on a p/kWh basis) will be funded by energy suppliers.
- 1.33 A DECC consultation on the FITS regime closed in October 2009, with the aim of getting the system up and running by April 2010. The target is to have the RHI operational a year later. Both schemes will be open for applications until at least 2020.
- 1.34 The modelling carried out for this consultation has concentrated on the **capital cost** of building to a zero carbon standard, and does not include potential income from renewable heat or energy generation through government incentive schemes. This is because of the difficulty of assigning costs and benefits fairly: in theory, the costs of building will fall to the developer, while the benefits from electricity or heat generation will accrue to the occupier (unless of course, they are the same person). This is not a straightforward issue, and we need to understand the context of the commercial property market better, and the factors which affect rental and purchase prices.
- 1.35 In the Ministerial statement on zero carbon homes in July 2009, it was announced that onsite heat and energy generation installed in homes to meet carbon compliance targets would be eligible for payments under either FITS or RHI, provided that the appropriate systems can be put in place, and the same principle should apply to non-domestic buildings.

# Annex 2

## Consultation questions

### Chapter 2

**Q1.** Do consultees agree that we should establish challenging energy efficiency standards for non-domestic buildings covering space heating and cooling, and measured on a kWh/m<sup>2</sup>/year basis? If not, why not, and what approach to setting energy efficiency standards would you prefer?

### Chapter 3

**Q2.** Which of the three scenarios would you favour as a basis for setting onsite aggregate targets for zero carbon trajectories and why?

**Q3.** What views do you have on the impact of the costs of building to zero carbon standards in different sectors? How and why does sensitivity to new build costs differ between sectors?

### Chapter 4

**Q4.** Do you agree that we should adopt the same measures and approaches for allowable solutions for non-domestic buildings as those for homes?

**Q5.** Are there any extra allowable solutions that should be used specifically for non-domestic buildings?

**Q6.** Do you agree with the proposal to introduce an element of allowable solutions for non-domestic buildings at 2016? What views do you have on the level at which this should be set, and the impact this will have?

### Chapter 5

**Q7.** Do you favour an approach of setting a flat rate requirement above 100 per cent regulated emissions to account for unregulated emissions?

**Q8.** Would you favour the 10 per cent allowance, the 20 per cent allowance or another rate? Why?

## Chapter 6

**Q9.** Do you agree with the overall work programme we have outlined for the public sector?

**Q10.** Are there other ways in which you think the public sector could usefully provide leadership for the move to zero carbon?

**Q.11.** Do you agree that the public sector should start trialling allowable solutions from 2015?

**Q12.** What role(s) do you think local government can play in contributing to public sector leadership on zero carbon buildings?

## Chapter 7

**Q13.** Does this package of measures and proposals for next steps address the key delivery issues to make progress towards the zero carbon ambitions? If not, what action is needed and by whom?

