Targets for renewable energy generation and energy efficiency in new developments in Milton Keynes

An update to our 2008 report for Milton Keynes Council
by Impetus Consulting Ltd and Climate Works Ltd
EXECUTIVE SUMMARY

In 2008, Impetus Consulting Ltd and Climate Works Ltd developed an evidence base for Milton Keynes Council, in relation to the council’s proposed Core Strategy policies on renewable energy and energy efficiency targets.

Milton Keynes has now progressed on its Core Strategy and is preparing to submit the document to the Government, prior to its examination, hopefully later this year. Much has changed since the 2008 report was produced; new planning policies have been published, we have a new political administration and a different economic climate. This addendum has therefore been produced to support the original evidence base.

Policy framework
England’s planning policies are currently in flux. The new government is abolishing Regional Spatial Strategies and is understood to be planning to replace Planning Policy Statements with a national planning policy framework, though there is currently no indication of what the latter might contain. Meanwhile, a consultation on a proposed climate change PPS only closed on 1st June; the proposed PPS was broadly supportive of policies like those included in the Milton Keynes pre-submission draft core strategy (albeit stating that, with planned building regulation changes, local requirements for building to achieve higher standards on carbon emissions than those required nationally will be seen to be unnecessary after 2013).

The new government is supportive of the legally binding carbon reduction targets already in place and has indicated that it will be seeking to accelerate the development of renewable energy capacity. Moreover, it is committed to ‘localism’ in terms of giving Local Planning Authorities powers and freedom to set their own policies. These factors indicate that stretching targets in terms of local carbon developments may be supported, if that is what local communities want.

Revisions to the building regulations and rolling out the Code for Sustainable Homes
The Code for Sustainable Homes is optional for all private development. Until recently, all new homes had to include a Code certificate in the Home Information Packs (HIPs), though these could be zero rated. However, the new government has abolished HIPs and, with them, the requirements for a Code certificate.

At present, developments funded by the Homes and Communities Agency (HCA) must be built to Code Level 3, with plans to increase this to Code Level 4 in 2011 (subject to the outcome of a recent HCA consultation).

It is currently planned that energy and water requirements of Code Level 3 will become mandatory for all buildings under the building regulations from October 2010, and Code Level 4 by 2013.

Developments granted planning permission prior to the adoption of the Core Strategy will be required to meet the national minimum requirements (specified by the Building Regulations) that are in place at the time that construction commences, unless permission was conditional on any future local requirements being met.
Milton Keynes’ Policy CS14 part B needs to set out the baseline against which development is expected to achieve any reduction in carbon emissions, as explained on p.124 of our original report: “Our recommendation is that the policy requirement of renewable energy should be part of the 44% reduction of the DER.” The policy therefore needs a footnote adding to section B, along the following lines: “Of the reduction of the DER achieved by meeting these standards, 10% must come from renewable energy/low carbon technologies.”

**District heating**

The previous government was very supportive of the role that district heating can play in cutting carbon emissions; it is less clear what the new administration’s view is on this. However, the design characteristics of district heating and combined heat and power (CHP) systems and changes in the design specifications of new buildings, most notably reductions in the demand for heat, mean that there may be significant technical and financial barriers to using decentralised energy to provide low carbon heat in new housing. We recommend that Policy CS15 is reworded as follows (with new text in italics):

**Policy CS15: Community Energy Networks and Large Scale Renewable Energy Schemes**

The Council wishes to promote the use of *low carbon* and renewable energy schemes where it can be demonstrated that there will not be any negative social, economic, or environmental results from the scheme.

*The Council also has the following requirements for new developments:*  
- Applications should show that the potential for community energy networks has been explored as a means of providing low carbon heat and electricity. Particular attention should be given to the potential to connect to existing local energy networks. Unless it can be demonstrated it is unfeasible, all new developments will be expected to connect to existing local energy networks, where they exist.
- Where an existing network does not exist, consideration should be given to the opportunities for, and viability of, supplying heat to existing domestic and non-domestic buildings and to the use of renewable/low carbon energy as part of new community energy networks.

**Viability of proposals**

Since the energy and water elements of Code Level 3 will be mandatory from October 2010, and since these make up the vast majority of the additional cost requirements of meeting Code Level 3, the additional cost burden of meeting Code Level 4 equates only to the difference between meeting Code Level 3 and 4 (and that only until 2013, when the energy and water elements of Code Level 4 become mandatory). These costs equate to around 3-6% of total build cost. These additional costs will in part be offset by the running costs of a Code Level 4 home.

While the housing market has suffered during the downturn, prior to the budget there were some signs of a recovery, though it is impossible to say whether this will continue once the measures announced in the budget are implemented.

**Other Local Planning Authorities’ (LPAs’) core strategies**

Since our original report was published, several LPAs have proposed stretching sustainability standards in their Core Strategies and have had
these found sound and adopted, whilst others have been found to be unsound. For example:

- Ashford Borough Council – Code Level 4 for urban extensions and Greenfield urban sites, Code Level 3 for town centre and brownfield urban sites and Code Level 2 for villages (found sound and adopted).
- London Borough of Havering is requiring Code Level 4 from 2010 and Code Level 5 from 2013 (found sound and adopted).
- Dover District Council – requiring district heating on two large mixed used developments (found sound and adopted).
- Reigate and Banstead Council – the council’s proposed policy of requiring Code Levels to be met two years ahead of national timeframe found unsound.

It is hard to conclude much from these as the context (political and economic) in which the examinations took place was very different than that likely to be in place for the Milton Keynes Examination in Public (EiP).
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1.0 INTRODUCTION

In 2008, Impetus Consulting Ltd and Climate Works Ltd developed an evidence base for Milton Keynes Council, in relation to the council’s proposed Core Strategy policies on renewable energy and energy efficiency targets.

Milton Keynes produced a submission Core Strategy in February 2010, which was due for submission later this year, prior to its examination. This is currently on hold pending consideration of the implications of the recent revocation of the RSS targets. However, after the last round of consultation there were are few areas where some updating of the original report, in the form of an addendum, would be beneficial to support a future submission or amendments to the plan.

This report contains the following updates/supplemental information:

- An update on national policy;
- Further information requirements regarding the Code for Sustainable Homes;
- Further information regarding justifying the inclusion of community energy networks;
- An update on the impact of the council’s proposed policies on the viability of new development; and
- A summary of what other councils are including in their Core Strategies and how they have fared at their Examination in Public.
2.0 TASK 1 – UPDATE ON NATIONAL POLICY

2.01 Introduction

In May 2010, a new coalition Conservative/Liberal Democrat Government was elected. Since coming into power, a number of announcements have been made that indicate radical changes to the planning system in England (as summed up in a Planning Portal press release on 20th May 2010, see below).

Planning Portal press release 20 May 2010 - Radical planning reform on Government agenda
Ministers have confirmed that “radical” reform of the planning system will be central to the new coalition Government’s programme with the scrapping of Regional Spatial Strategies, the abolition of the Infrastructure Planning Commission and the adoption of the Conservative’s ‘localism’ agenda.

These include:

➢ Possible plans to scrap all Planning Policy Statements (PPS) and replace them with a single ‘National Planning Policy Statement’ (there has, as far as we can see, been no official announcement on this as yet, so we have included our review of the Low Carbon PPS consultation, below).
➢ Plans to abolish Regional Spatial Strategies (with Planning Minister Eric Pickles having written to every local planning authority (LPA) and the Inspectorate highlighting the coalition Government’s plans to abolish regional spatial strategies and stressing that decisions on housing supply “will rest with LPAs without the framework of regional numbers and plans”).

At the time of writing (5 July 2010), no further detail is known regarding these two developments. However, we do know that the new government:

➢ Is committed to meeting the legally binding carbon reduction targets already in place (including 34 per cent from 1990 levels by 2020 and of 80 per cent by 2050).
➢ Is committed to increasing the target for renewable energy in the UK (currently set at 15% by 2020, as per the EU Directive on Renewable Energy).
➢ Is committed to encouraging and supporting ‘localism’ and increasing the powers of local planning authorities to set their own plans (with indications that the role and powers of Planning Inspectors will be reduced).

On this basis, it is likely that stretching policies on carbon reduction and renewable energy generation will be encouraged.

2.02 The Consultation on PPS – Low Carbon Future

On 9 March 2010, the government consulted on a new draft PPS on Planning for a Low Carbon Future in a Changing Climate. It was planned that this new PPS will replace the 2007 and 2004 PPS and it is proposed that it will become a consolidated supplement to PPS 1³.

³ http://www.communities.gov.uk/publications/planningandbuilding/ppsclimateconsultation
The reason the government consulted on a new PPS two years after publishing the Planning and Climate Change supplement, is that a significant amount of new legislation and policy has been put in place that affects planning and the policies that underpin plan-making and development management. For example:

- The Climate Change Act 2008 introduced a statutory target of reducing carbon emissions by 80 per cent below 1990 levels by 2050, with an interim target of 34% by 2020.
- EU Directive 2009/28/EC on the promotion of the use of energy from renewable sources, where the UK has committed to sourcing 15% of its energy from renewable sources by 2020.
- The Low Carbon Transition Plan and the Renewable Energy Strategy were both published on 15 July 2009 and set out how the UK will achieve dramatic reductions in emissions and meet targets on renewables.
- The Household Energy Management Strategy was published on 2 March 2010, and placed a greater emphasis on district heating schemes and identified a essential role for planning in facilitating delivery of these and other community scale energy schemes.
- Publication of the proposed definition of zero carbon homes. Meeting the zero carbon standard involves a combination of energy efficiency measures and the use of decentralised energy solutions, to be set out through Building Regulations and through use of a range of ‘allowable solutions’, the details of which are still to be decided.

“Planning should give local communities real opportunities to take action on climate change and should be doing so now.”

Proposed policies, of relevance to the Milton Keynes Core Strategy Policies CS14 and CS15, are listed below, with comments on the implications for the Milton Keynes policies. (Please note that these are proposed policies at the moment; the consultation only closed on 1st June 2010.)

**Policy LCF 1: Evidence base for plan-making**

LCF1.4 Local planning authorities should assess their area for opportunities for decentralised energy. The assessment should focus on opportunities at a scale which could supply more than an individual building and include up-to-date mapping of heat demand and possible sources of supply. Local planning authorities should in particular look for opportunities to secure:

i. decentralised energy to meet the needs of new development;

ii. greater integration of waste management with the provision of decentralised energy;

iii. co-location of potential heat suppliers and users; and,

iv. district heating networks based on renewable energy from waste, surplus heat and biomass, or which could be economically converted to such sources in the future.

In preparing the evidence base for plan-making consideration should be given to joint working across local planning authority boundaries and between tiers (in two-tier areas) to develop assessments for sub-regions, including city-regions.

*This suggests that Milton Keynes could be expected to undertake a heat mapping exercise before requiring community energy networks for all developments over a certain size.*
Policy LCF 3: Local planning approach for a low-carbon future in a changing climate

LCF3.1 Local development frameworks should support the move to a low-carbon economy and secure low-carbon living in a changing climate. This should be reflected in the vision for how the area and the places within it should develop and respond to local challenges and opportunities.

This broadly supports the proposed MK policies.

Policy LCF 4: Local planning approach for renewable and low-carbon energy and associated infrastructure

LCF4.1 Local planning authorities should:
iv. set out how any opportunities for district heating (to supply existing buildings and/or new development) identified through heat mapping will be supported.

Policy LCF 7: Local planning approach to setting requirements for using decentralised energy in new development

LCF7.1 Local requirements for decentralised energy should be set out in a development plan document (DPD) and be derived from an assessment of local opportunities in line with LCF1.4. Local requirements for decentralised energy should:

i. relate to identified development areas or specific sites;
ii. be consistent with giving priority to energy efficiency measures; and,
iii. focus on opportunities at a scale which developers would not be able to realise on their own in relation to specific developments.

LCF7.2 Local requirements should be consistent with national policy on allowable solutions set out in support of the zero carbon homes and buildings policy.

‘Allowable solutions’ refers to the measures permitted for dealing with residual emissions remaining from a home or other building after taking account of carbon abated through on-site technologies and connections to low and zero carbon heat networks in order to achieve zero carbon status. In a July 2009 Written Ministerial Statement, the Minister for Housing and Planning announced a list of measures that received broad support as allowable solutions. The government had planned to announce the final definition of allowable solutions in the final PPS document; since this will no longer be produced it is currently unclear how or when there will be a final definition. However, to be consistent with the national approach to allowable solutions, Policy CS14 part B could specify: “Minimum carbon dioxide reduction through renewable energy and/or low carbon technology, achieved through allowable solutions.”

LCF7.3 Where there are existing, or firm proposals for, decentralised energy supply systems with capacity to supply new development, local planning authorities can expect proposed development to connect to an identified system, or be designed to be able to connect in future. In such instances, and in allocating land for development, local planning authorities should set out how the proposed development would be expected to contribute to the decentralised energy supply system.

2 www.parliament.the-stationery-office.co.uk/pa/cm200809/cmhansrd/cm090716/wmstext/90716m0002.htm
This is in line with the third bullet point of the MK Policy CS15.

LCF7.4 If a local requirement is set out as a target for the use of decentralised energy in new development the target should be expressed as either:

- the percentage reduction in CO\(_2\) emissions to be achieved. In doing so, local planning authorities should set out how the target relates to standards for CO\(_2\) emissions set by Building Regulations; or,
- an amount of expected energy generation expressed in KWh.

The first bullet point is partly met by Policy CS14 part B, though clarity is needed as part of part B in terms of what the benchmark is – see notes below.

LCF7.5 Where a local requirement relates to a decentralised energy supply system fuelled by bioenergy, local planning authorities should not require fuel sources to be restricted to local sources of supply.

**Policy LCF 8: Local planning approach to setting authority-wide targets for using decentralised energy in new development**

LCF8.1 The progressively demanding standards for CO\(_2\) emissions set through Building Regulations, together with the assessment of local opportunities for renewable and low carbon energy, will help drive greater use of decentralised energy. Targets for application across a whole local authority area which are designed to secure a minimum level of decentralised energy use in new development will be unnecessary when the proposed 2013 revisions to Part L of the Building Regulations (for both domestic and non-domestic buildings) are implemented. As an interim measure until the coming into force of the 2013 revisions, the Secretary of State will support the application of authority-wide targets where these are included in the development plan.

At the local level, any target should be in a DPD and have met the tests in LCF11.

By 2013, new homes will have to be built to achieve a 44% improvement in DER over TER, as per the requirement of Code Level 4, which is what the MK Policy CS14 currently specifies. MK could continue to stretch targets by requiring, for example, Code Level 5 to be achieved from 2013; however, the wording of the proposed policy above indicates authority-wide targets would only be supported by the (previous) Secretary of State until the 2013 revisions come into place. Part B of the policy could still be applied to new developments (until they are required to be zero carbon).

**Policy LCF 9: Local planning approach to setting requirements for sustainable buildings**

LCF9.1 Any local requirement for a building’s sustainability should be set out in a DPD and:

i. relate to a development area or specific sites and not be applicable across a whole local authority area unless the justification for the requirement can be clearly shown to apply across the whole area;

**Policy LCF 11: Testing local planning requirements**

LCF11.1 A local requirement relating to decentralised energy, a building’s sustainability or for electric vehicle charging infrastructure, will only be acceptable where the local planning authorities can demonstrate that it:
i. would not make new development unviable having regard to the overall costs of bringing sites to the market, including the costs of any necessary supporting infrastructure;

ii. is, in the case of housing development, consistent with securing the expected supply and pace of housing development shown in the housing trajectory required by PPS3, and does not inhibit the provision of affordable housing; and

iii. will be implemented and monitored without duplication of applicable rating or assessment systems.

2.03 The South East Plan

Although the government will be abolishing Regional Spatial Strategies, at the time that pre-submission version of the Milton Keynes core strategy was consulted on, the South East Plan was in place and so it may have a bearing on the Examination in Public. (The timing of the EiP is currently uncertain given recent government announcements.)

The South East Plan, includes the following policy on energy:

**POLICY CC4: SUSTAINABLE DESIGN AND CONSTRUCTION**

The design and construction of all new development, and the redevelopment and refurbishment of existing building stock will be expected to adopt and incorporate sustainable construction standards and techniques. This will include:

i. consideration of how all aspects of development form can contribute to securing high standards of sustainable development including aspects such as energy, water efficiency and biodiversity gain

ii. designing to increase the use of natural lighting, heat and ventilation, and for a proportion of the energy supply of new development to be secured from decentralised and renewable or low-carbon sources

iii. securing reduction and increased recycling of construction and demolition waste and procurement of low-impact materials

iv. designing for flexible use and adaptation to reflect changing lifestyles and needs and the principle of ‘whole life costing’.

Local planning authorities will promote best practice in sustainable construction and help to achieve the national timetable for reducing carbon emissions from residential and non-residential buildings. There will be situations where it could be appropriate for local planning authorities to anticipate levels of building sustainability in advance of those set out nationally, for identified development area or site-specific opportunities. When proposing any local requirements for sustainable buildings, local planning authorities must be able to demonstrate clearly the local circumstances that warrant and allow this and set them out in development plan documents.

This policy states that it may be appropriate for LPAs to set higher levels of sustainability for identified development area or site-specific opportunities. MK Policy CS14 includes a blanket requirement of Code Level 4 for developments over a certain size, which goes beyond what the South East plan is suggesting.
POLICY NRM11: DEVELOPMENT DESIGN FOR ENERGY EFFICIENCY AND RENEWABLE ENERGY

Local authorities should:

i. promote and secure greater use of decentralised and renewable or low-carbon energy in new development, including through setting ambitious but viable proportions of the energy supply for new development to be required to come from such sources. In advance of local targets being set in development plan documents, new developments of more than 10 dwellings or 1000m² of non-residential floorspace should secure at least 10% of their energy from decentralised and renewable or low-carbon sources unless, having regard to the type of development involved and its design, this is not feasible or viable.

ii. use design briefs and/or supplementary planning documents to promote development design for energy efficiency, low carbon and renewable energy.

iii. work towards incorporation of renewable energy sources including, in particular, passive solar design, solar water heating, photovoltaics, ground source heat pumps and in larger scale development, wind and biomass generated energy.

iv. actively promote energy efficiency and use of renewable and low carbon energy sources where opportunities arise by virtue of the scale of new development including regional growth areas, growth points and eco-towns.

Local authorities and other public bodies, as property owners and managers, should seek to achieve high levels of energy efficiency when refurbishing their existing stock.

The first bullet point is similar to MK Policy CS14, part B, though expressed in terms of a percentage of energy rather than a percentage reduction of CO₂. (As explained in our 2008 report, the original Merton rule, on which this policy is based, began by requiring developments to meet 10% of their energy through renewables, but changed it to a reduction in CO₂ to ensure that developers avoid installing carbon intensive technologies, such as electric heating.)

POLICY NRM12: COMBINED HEAT AND POWER

Local development documents and other policies should encourage the integration of combined heat and power (CHP), including mini and micro-CHP, in all developments and district heating infrastructure in large scale developments in mixed use. The use of biomass fuel should be investigated and promoted where possible.

Local authorities using their wider powers should promote awareness of the benefits of mini and micro-CHP in the existing build stock.

While supportive of CHP, this policy does not suggest that local authorities should specify development sizes above which CHP would be mandatory.
3.0 TASK 2 – ROLLING OUT THE CODE LEVELS

This section provides information on the latest plans in terms of rolling out the Code Levels and how these relate to the planned revisions to the building regulations.

Please note, the pre-submission Core Strategy states that all homes have to be built to Code Level 3 by 2010; this is not correct. The code is only mandatory for publicly supported developments, with achievement of Code level 3 or higher required since April 2008. For private housing, proposed changes to the building regulations will mean that all new housing has to comply with the energy and water aspects of the Code as follows:

- By 2010 – 25% improvement in DER over TER (as per Code Level 3).
- By 2013 – 44% improvement (Code Level 4).
- By 2016 – zero carbon (Code Level 6).

3.01 Latest developments

Currently, use of the Code is voluntary for private developers. Until recently, Home Information Packs (HIPs) for every new home had to include a Code rating where an assessment had been made or a nil-rated certificate where it has not. However, the new government suspended HIPs from 21 May 2010. This means that homes marketed for sale on or after this date will no longer require a HIP. The requirement for sellers to give a sustainability certificate (either a Code for Sustainable Homes certificate or a nil-rated certificate) to buyers of newly constructed homes has also been suspended. (However, The Code for Sustainable Homes is still operational and remains the Government’s national sustainability standard for new homes.)

At the time of writing (5 July 2010), there are various consultations that had recently closed relating to the timeframe of proposed changes to the building regulations, requiring higher levels of the code for publicly funded housing, and proposed changes to the Code. These include:

- The Homes and Communities Agency’s (HCA’s) consultation, “HCA Proposed Core Housing Design and Sustainability Standards Consultation”. This closed on 17th June 2010 so we won’t know the outcome for some time. It states, “Dependent on the outcome of the consultation, we could propose to apply the new HCA core housing standards (which include minimum Code for Sustainable Homes Level 4) to scheme allocations made under new programmes from April 2011.”

- CLG’s consultation on changes to the Code for Sustainable Homes. Published 16th December 2009, closed 24th March 2010. See table below for proposed changes, which don’t affect Code Level 4 (the level specified in Policy CS14) and therefore would not directly impact upon the MK Core Strategy.

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3 www.homesandcommunities.co.uk/public/documents/Consultation_All.pdf
3.02 Requirement for an early Code design stage report or pre-assessment certification

The pre-submission Core Strategy includes the following: “Planning applications to which the policy applies must be accompanied by an early Code for Sustainable Homes design stage report or BREEAM Pre-assessment. Certification, showing the required performance level has been achieved, will be required as evidence to discharge the planning condition.”

During the consultation, a couple of respondents questioned this requirement. However, it is standard practice to require a design stage assessment prior to granting planning permission. The Code is a two stage process – design stage assessment (when an interim certificate is issued) and then a post construction assessment (final certificate). The Post Construction Stage (PCS) assessment confirms that dwellings have either been built to the Design Stage specifications.

An example of how the process works is provided below: (taken from West Berkshire):

1. Submission of applications for new homes should be accompanied by a Design Stage Report or a ‘Pre assessment estimator’ which should show the likely rating to be achieved under a formal assessment. It should be demonstrated that the proposed home(s) will meet a minimum of three stars under the Code for Sustainable Homes. Failure to do so will result in an application being refused permission.
2. If permission is granted, a condition will be attached requiring the submission and approval of a Design Stage Report and BRE Interim Certificate for the development prior to development commencing if they were not submitted with the application in the first instance. The
Design Stage report and certificate should demonstrate that the development will attain a minimum of three stars. The condition will also require the development to take place in accordance with the approved Design Stage Report and require that a Post Construction Review Report is submitted by a licensed assessor prior to the occupation of any home.

3. Prior to occupation of any home, the submission of a Post Construction Review Report carried out by a licensed assessor and a BRE Final Code Certificate will be required. Approval by the council will enable the planning condition to be fully discharged.

3.03 Delay between granting planning permission and construction commencing – which standards apply

The building regulations at the time of construction apply, not at the time of planning permission being granted. However, where local standards exist which require new developments to exceed the minimum standards required by the building regulations (such as MK’s proposed Policy CS14), then the local standards in place at the time of granting planning permission, not at the time of construction, apply (assuming that the local standards are more stringent than building regulations), unless there is a requirement to adhere to any new local standards.

(See Planning Inspector’s report on Reigate and Banstead in section 6 below.)

It should also be noted that the version of the Code (i.e. the technical guidance) that was in place when the planning permission was granted will apply. Once a developer registers a housing site with BRE, this registration lasts for five years and enables the version of the Code to be set such that even if the Code is updated, the version of the Code used across the site will remain the same.

3.04 Wording of Policy CS14 Part B

Policy CS14 part B needs to set out the baseline against which development is expected to achieve any reduction in carbon emissions, as explained on page 124 of our original report: “Our recommendation is that the policy requirement of renewable energy should be part of the 44% reduction of the DER.” The policy therefore needs a footnote adding to explain that in section B, it’s saying that ‘Of the reduction of the DER achieved by meeting these standards, 10% must come from renewable energy/low carbon technologies.”
4.0 TASK 3 - CLARIFICATION OF RATIONALE REGARDING COMMUNITY ENERGY NETWORKS

Diagram showing the efficiency benefits of combining heat and power production.

4.01 Objectives

This section of the report sets out to explain:
- Why the Government considers community energy networks to be the most appropriate means of delivering energy efficient (and low carbon) developments, particularly where most growth will be post 2016.
- Where district heating or CHP might not be the most appropriate option or be technically or financially difficult for developers to achieve.

Within it we have also suggested amendments that might be made to the Core Strategy to take account of the latest guidance on this issue.

4.02 The role of decentralised heat and power production in the Government’s carbon reduction strategy

4.02.1 What is ‘decentralised heat and power production’?

The term ‘decentralised heat and power production’ is a general term which refers to community and district heating (DH) systems which generate heat from one or more energy sources and deliver it to users via distribution pipes. In the case of Combined Heat and Power (CHP) the system produces electricity and heat. The electricity produced is normally fed into the electrical distribution system (grid) and the heat, which is a bi-product of generating
electricity can be used to provide space and water heating for domestic and non-domestic buildings.

DH systems can use fossil fuels such as gas and oil, and renewable fuels such as biomass (e.g. wood chip). In Scandinavia DH systems are now combining heat inputs from solar thermal systems with those from other fuels.

**4.02.2 Why is the Government promoting district heating and combined heat and power?**

The Government regards district heating and combined heat and power systems as significant tools for delivering heat and power more efficiently, reducing costs to consumers and cutting CO$_2$ emissions. A district heating system, whereby a single boiler (or boilers working in combination) provides heat to a network of dwellings and other buildings, can often do so more efficiently than if each dwelling has its own heating system.

In many cases district heating also provides greater opportunities for the use of renewable fuels such as biomass, than would be the case if each building had its own individual heating system. This is particularly true where building densities are high.

In the case of CHP, as the illustration below shows, combining the production of heat and power can provide significant efficiency benefits.

An important characteristic of both district heating and CHP systems is that whilst electricity can be distributed relatively easily from where it is generated to where it is used via the grid (distribution network), heat cannot be distributed so easily or cheaply. Heat is generally distributed by moving hot water through insulated steel or plastic pipes, buried underground to the buildings where it is needed.

The cost of laying and fitting the heat distribution network makes up a significant proportion of the total cost of a system, and is itself influenced by a range of other factors which are discussed in more detail below.

**4.02.3 The future role of planning in delivering decentralised energy production**

As discussed earlier in this report, in March 2010 the Government published a consultation document: Planning Policy Statement: Planning for a Low Carbon Future in a Changing Climate. The intention of the previous administration was that the new PPS would become a consolidated supplement to PPS 1. It would also support and provide a framework for PPS 25 on Development and Flood Risk and emerging planning policies on green infrastructure. (On which a separate consultation was taking place).

Appendix 1 lists the policies set out in the consultation on Planning Policy Statement: Planning for a low Carbon Future in a Changing Climate which make direct reference to decentralised energy.

The new Coalition Government has said that it will abandon work on the revised Planning Policy statement. At the time of writing the exact implications of this are uncertain. What is clear is that up until the election in May the previous administration regarded decentralised energy as central to reducing emissions from new and existing buildings.
Despite current uncertainty the consultation document underlies a desire to use the Building Regulations to impose increasingly demanding standards for CO₂ emissions on new buildings.

It also acknowledges one of the consequences of a tightening of Building Regulations; that when the proposed 2013 revisions to Part L of the Building Regulations are implemented targets for minimum level of decentralised energy use in new development will be unnecessary. Both issues are relevant to the framing of policies within the Core Strategy.

4.03 **Key implications for the use of decentralised energy from recent guidance**

4.03.1 **Decreasing demand for space heating and hot water**

Guidance published in the last 18 months on the use of decentralised energy (based on installations in the UK and Europe) together with government policy provides a clearer picture of when, from the technical perspective, decentralised energy is likely to be the most appropriate option for achieving carbon reductions in new buildings.

The key factors which affect the viability of district heating and CHP in new developments is the demand for heat and the heat density. Overall heat demand is dictated by the requirement for space heating and domestic hot water (DHW). As the thermal efficiency of new buildings has improved (as defined by BREEAM and the Code for Sustainable Homes) the requirement for space heating has reduced. The Code for Sustainable Homes also establishes minimum requirements for water consumption (for its different levels) which also serves to reduce the requirement for hot water.

The requirement for heat and hot water in new housing will continue to reduce as developers build homes to higher code levels and Part L of the building regulations becomes more stringent. By 2016 the total heat load in new domestic properties is expected to be dominated by DHW. Space heating will account for less than a third of total heat load and may continue to decline further depending on the design strategies employed.

This reduction in heat demand is important because it is key to determining the scale, costs and viability of district heating and CHP systems especially in phased developments.

4.03.2 **Factors which determine the viability and cost of district heating and CHP systems**

Load profile - the pattern of demand for heat and power:

- District heating and CHP systems are commonly sized to meet the base heat load for the development they are serving. This is the heat demand which is constant throughout the year. In practice this will be a fraction of the total heat requirement because demand for heat varies seasonally, winter to summer, and during the course of the day.

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5 SAP 2005 currently calculates the DHW needs assuming a standard occupancy profile related to the floor area of the dwelling, and does not use the water consumption maximum allowances as defined in the Code for Sustainable Homes. Given that for a new flat built to code level 4 DHW can account for 59% of the total annual heat requirement this discrepancy is significant for developers considering the use of district heating or CHP.

Daily variation is significant in developments comprised solely of housing as the requirement for heat is generally high in the morning and evening and low during the middle part of the day.

- For CHP electricity is more valuable than heat so this can influence system design though again the design objective is usually to use as much of the heat as possible. In order to achieve attractive economic returns CHP plants need to run for at least 4,000 to 5,000 hours per annum\(^7\). This is equivalent to running the plant about 13-14 hours every day of the year. In order to meet the threshold criteria for ‘good quality’ CHP it is necessary for the majority of heat to be used.

- Designers deal with the fluctuations in the demand for heat in a variety of ways:
  
  - By mixing loads - e.g. domestic and commercial/industrial. As heat demand from housing falls off during the day, the demand for heat from commercial/industrial users increases helping to smooth out the heat demand across the system.
  
  - By using modular systems. The highest efficiency boilers are used to meet the continuous base load, with small (and sometimes less efficient) boilers providing additional heat at times of peak demand.
  
  - Through the use of thermal stores to smooth out peaks and troughs of demand. At times of low demand heat is stored for use during times of peak demand.
  
  - Through the use of seasonal storage. In Scandinavia systems are being designed which store heat underground during the summer which is recovered and used to meet the winter demand.
  
  - Through the use of renewable energy (solar thermal) to meet the summer demand for heat during which time the main boilers are switched off.

A constant demand for heat is particularly important for district heating and CHP systems using biomass. Biomass boilers work most efficiently with a constant and high heat load.

Heat density:

- Heat density (the amount of heat required per square metre of land or per pipe length) is a key factor in determining the viability of district heating and CHP systems. This is due to the high capital and installation costs of the heat distribution network. The heat density of a development will be related to the building density of the site and the demand for heat in each building.

- Historically it has been assumed that developments with densities above 50 dwellings per hectare, e.g. a development of flats, are needed to make district heating economically viable. However, as the need to reduce emissions from new homes increases (driven by building regulations and planning requirements linked to the Code for Sustainable Homes) the likelihood is that it will be necessary to apply district heating schemes to lower densities (e.g. housing). This will mean lower heat densities and higher costs.

Where design criteria do require the use of district heating in lower density developments maximising the amount of heat delivered for a given length of pipe will be essential.

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\(^7\) Source: As footnote 2.
Factors influencing heat distribution costs

The costs for heat distribution networks may be broken down as follows:
- Capital costs of the distribution system.
- Distribution losses due to the heat losses in the distribution network.
- Distribution costs due to pumping losses.
- System maintenance costs.

The capital expenditure per unit of heat delivered by a district heating network is dependent on the costs associated with the installation of the distribution system, the pipe diameter and the amount of heat delivered per pipe length.

The initial capital investment costs can be reduced by:
- Reducing the cost of installing the distribution network.
- Using smaller diameter pipes.
- Increasing the heat density.

The implications for district heating and CHP of phased developments

Developments phased over time pose particular challenges to the successful implementation of district heating. This is especially the case where later phases will be subject to what are expected to be more stringent building regulations (post 2013) or higher code levels imposed by local planning authorities. This is largely to do with the reductions in the demand for heat in each dwelling, which decreases the heat density.

A strategy for providing heat and power to dwellings constructed in the earlier phases of a development may not provide the required reductions in CO$_2$ emissions needed in the later phases, or may be deemed too expensive. For example, in a development designed around gas district heating or CHP, it may not be cost effective to extend the distribution network to serve areas with very low heat densities, unless other heat demands can be identified and incorporated.

Developers are likely to bring forward a variety of strategies to meet the requirement for heat in phases of a development where heat densities could be very low, whilst making significant reductions in emissions. One approach may be to reduce the requirement for space heating to the point where the dwellings can be passively heated (and cooled) - what is now being badged as ‘self heating homes’. This is usually achieved by reducing the fabric and ventilation losses to a point where the heat absorbed from the occupants, appliances and the sun is sufficient to maintain the dwelling at a comfortable temperature year round.

To date developers have been reluctant to adopt this approach, on the grounds that it will be difficult to sell properties with no visible primary heat source. SAP has also dealt poorly with dwellings designed in this way particularly where they make use of thermal mass to provide passive heating and cooling. There are indications from the Government that future

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8 For example it is cheaper to lay pipes in open areas such as parks and gardens, particularly if excavated materials can be stored on site prior to back filling.
9 In combination with the use of thermal mass.
10 SAP has tended to significantly over estimate the space heating requirement in homes designed to be passively heated and cooled, making it very difficult to achieve the required number of credits in the Energy and CO$_2$ module of the Code for Sustainable Homes.
11 Verbal response from a representative from DECC to a question on the use of SAP in passive homes, at the Energy Efficiency Partnership for Homes Annual Conference, 20th July 2010,
revisions to SAP will take account of passive design/‘self heating homes’ and there are signs that developers are starting to see the value of this approach\textsuperscript{12}. Given the practical difficulties of lowering emissions in dwellings with very low heat densities and anticipated rises in the cost of energy we would expect developers to start presenting this type of design strategy to local authorities in the next few years.

Another approach will be to deploy district heating, and reduce emissions by using a fuel with a lower carbon factor such as biomass. The system might be based around biomass from phase one, or biomass integrated into the system at a later date.

One of the advantages of district heat is that the fuel source can be changed without needing to upgrade the distribution network. However, the characteristics of biomass mean there are several other issues which would need to be taken into account when considering this approach.

- Biomass energy centres comprising the boilers, thermal storage, fuel storage, pumps and control equipment require a greater land area than those for gas. Land must be set aside for the delivery of wood fuel, to give lorries access to the site, turning space, and space/facilities to deliver the fuel.
- Disruption from continuous deliveries of fuel must be allowed for. The frequency of deliveries will depend on the type and moisture content of the fuel, heat demand, thermal storage and fuel storage on site.
- Using current technologies, biomass CHP systems only work well on a large scale. In a phased development, there may only be a sufficient demand for heat to justify biomass CHP when the whole development is complete.

Biomass systems require a constant heat load. Options for dealing with this include the use of thermal storage, to smooth out peaks and troughs in demand, and to design the biomass system to meet the continuous base load and use gas boilers to provide supplementary heat during times of peak demand\textsuperscript{13}.

4.03.5 Heat requirements for new dwellings post 2016

Under the current time table for delivering zero carbon homes, new dwellings constructed post 2016 (to the energy requirements of Code Level 6) must be not only ‘true zero carbon’, but also achieve a heat loss parameter (HLP) of 0.8 W/m\textsuperscript{2}K. This is equivalent to a heat requirement of 15kWh/m\textsuperscript{2} per year - similar to the PassivHaus standard. Whilst the need for zero carbon might favour the use of heat from biomass, the heat demands will be very small and dominated by the demand for hot water, 50\% of which could be met by solar hot water heating\textsuperscript{14}. This means that heat densities for dwellings constructed post 2016 will be very low. It makes it considerably more difficult to make the case for district heating and CHP, unless systems can supply heat to other

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\textsuperscript{12} Woodbrook Housing Development, Northern Ireland. First phase of the development is based on biomass district heating. Latter phases are described as ‘self heating’. Source: http://www.carbontrust.co.uk/emerging-technologies/technology-directory/buildings/Pages/woodbrook-housing-development.aspx

\textsuperscript{13} The supplementary use of gas will increase net emissions. This needs to be accounted for when designing the system to ensure compliance with carbon reduction targets.

\textsuperscript{14} Given appropriate orientation and roof form of a dwelling.
building types (industrial, commercial, leisure etc) or older housing which will have a much higher heat demand.

4.03.6 Allowable solutions and implications for decentralised energy

In December 2008 CLG consulted on the detailed definition of zero carbon homes\(^\text{15}\) and the allowable means by which this standard might be achieved. Recognising 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 was proposed.

- 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 energy efficient fabric and on-site technologies (including directly connected heat networks); and
- ‘Allowable solutions’– a range of measures available for achieving zero carbon beyond the minimum carbon compliance requirements.

A July 2009 statement by the Housing Minister provided further clarifications on how a zero carbon standard should be achieved:

- A 70 per cent reduction in carbon emissions against 2006 standards through a combination of energy efficiency, on-site low and zero carbon energy supply and/or connections to low carbon heat networks (‘carbon compliance’);
- The remaining emissions, including a calculated amount to cover the use of appliances, would be addressed through a system of ‘allowable solutions’ (including achieving further reductions on-site and a range of off-site measures);
- 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 the Government 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.

The relevance of this to Milton Keynes is threefold.

- Firstly, it underlies the importance attached to decentralised heat and power by the Government in the transition to zero carbon.

\(^{15}\) http://www.communities.gov.uk/publications/planningandbuilding/zerocarbondefinition
Secondly, though the proposals in the draft core strategy refer to Code Level 4, for phased developments, part of which are developed post 2016 the hierarchical approach show above will apply.

Thirdly, ‘allowable solutions’ may themselves include investment in ‘low and zero carbon community heat infrastructure’. The use of allowable solutions presents the possibility of developers being able to meet some of the requirements for low carbon electricity on site (through measures such as PVs) and the balance from allowable solutions. These could include investment in other technologies such as wind which are not connected to the development itself.

Further clarification on what would constitute ‘allowable solutions’ was expected by the end of 2009. As far as we are aware this was not published prior to the election.

4.04 The land use implications of district heating and CHP

Though there is no published guidance available on the land use implications of district heating and CHP this will be determined by:

- The output (heat and electrical) of the system;
- The technology (reciprocating engine, gas turbine etc) and fuel (gas, biomass etc) used;
- The amount of thermal storage needed; and
- The requirement for back-up and standby capacity (back-up boilers).

The size of the plant will be specific to the development and the design strategy employed. Where gas district heating systems and CHP systems are replacing for example oil district heating, or older (gas fuelled) plant the volume required for the new system will usually be the same or less than that for the old system.

For the distribution network the key factor will be the diameter of the pipework which will determine the size and cost of the trenches.

The biggest change in land use comes in moving from gas to biomass. This is particularly important where there is a possibility or intention to switch from gas to biomass at a later date. For biomass systems the following factors need to be allowed for:

- The type of boiler or plant that will be used - biomass boilers are larger than gas appliances of the same output.
- Whether back-up boilers will operate in parallel with the biomass plant.
- The degree of thermal storage required. Biomass systems may require greater thermal storage capacity than an equivalent gas based system to provide the boiler with a continuous load.
- The fuel type, quality and moisture content, i.e. wood pellets have a greater energy density than wood chip. The higher the moisture content of the fuel, the lower the heat content and therefore the more fuel will be needed for a given heat output.
- The quantity of fuel that will be stored on site at any one time.
- The type of fuel store, i.e. below ground, above ground, hook lift bin etc.
- How fuel will be delivered on site, i.e. hook lift bin, tipper trailer, blower.
- The turning circle for vehicles delivering fuel.

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These factors in combination will determine the land area and size of the plant needed for the system. For biomass systems, unlike gas, fuel will need to be delivered to site usually by lorry. The number and frequency of deliveries is related to the moisture content of the fuel, size of the on-site fuel store, and heat output of the plant. Unlike gas, access to the site and the disruption and noise from lorry movements will need to be allowed for when planning biomass fuelled systems. For this reason a proposed location for a gas DH or CHP system may be completely inappropriate for a biomass system.

Though difficult to give precise figures the land area needed for a biomass system (allowing for lorry access, and turning) could be in the order of 2 to 4 times that of a gas based system, depending on the technology, fuel type, fuel storage, and thermal storage selected. Please see Appendix 4 for further information.

4.05 Setting planning guidance within Core Strategy on the use of decentralised energy in new dwellings

It is evident from strategies, policy guidance and consultations published prior to the election, that the Government regarded decentralised energy as a major tool for delivering carbon reductions in new homes and non-domestic buildings.

However, as discussed above the design characteristics of district heating and CHP systems and changes in the design specifications of new buildings, most notably reductions in the demand for heat, mean that there may be significant technical and financial barriers to using decentralised energy to provide low carbon heat in new housing.

Decentralised energy is particularly well suited to applications where there is a continuous demand for heat, and a high heat density. Housing developments produce an uneven demand for heat, and can have low heat densities.

To some extent these difficulties can be addressed where the demand for heat from new housing can be combined with that from commercial and industrial users (to smooth the load profile). Equally supplying heat to existing as well as new housing helps to raise the heat density of a district heating system (though this will not necessarily improve the load profile).

For the reasons discussed above in most cases it will be inappropriate to specify the requirement to investigate the use of decentralised energy (‘community energy networks’), or prove that these are not feasible based on the number of units in the development.

Energy density, which is related to the built form and layout of the development is more important than the number of units in determining the potential to use decentralised energy. Consideration will also need to take account of future development of a site which may necessitate the use of biomass based district heating or CHP to achieve needed carbon reductions.

Given that the heat demand and heat density for existing housing will be considerably higher than that for housing built to code level 4 and above, it is important that the opportunities to meet this requirement are not missed.
With this in mind we have suggested some revised wording for policy CS 15 which the council may wish to consider. (Amended text is shown in italics).

**Policy CS 15: Community Energy Networks and Large Scale Renewable Energy Schemes**

The Council wishes to promote the use of *low carbon* and renewable energy schemes where it can be demonstrated that there will not be any negative social, economic, or environmental results from the scheme.

The Council also has the following requirements for new developments:

- Applications should show that the potential for community energy networks has been explored as a means of providing low carbon heat and electricity. Particular attention should be given to the potential to connect to existing local energy networks. Unless it can be demonstrated it is unfeasible, all new developments will be expected to connect to existing local energy networks, where they exist.
- Where an existing network does not exist, consideration should be given to the opportunities for, and viability of, supplying heat to existing domestic and non-domestic buildings and to the use of renewable/low carbon energy as part of new community energy networks.

### 4.06 Guidance on achieving Code Level 4

Earlier guidance (2007-8) suggested that new dwellings could achieve Code Level 3 with improvements to the fabric and reductions in ventilation and infiltration heat losses. At Code Level 4 and above the assumption was that improvements in fabric and ventilation would need to be supplemented with some form of renewable energy.

Reviewing the most recent guidance this still appears to be the case. The options and permutations available under the Code for Sustainable Homes mean there is no single solution for achieving Code Level 4 in new housing. In Energy Efficiency and the Code for Sustainable Homes (CE291) the Energy Saving Trust looked at four combinations of measures for each major house type for achieving Code Level 4.

For a semi-detached house these were (heating system only):

- Gas boiler with either solar water heating or PV;
- Biomass boiler;
- Ground source heat pump;
- Communal gas CHP.

In each case the designs included mechanical heat recover ventilation. This illustrates the range of measures available to designers at this level of the code.
5.0 TASK 4 - UPDATE ON THE VIABILITY OF POLICY PROPOSALS

Our previous guidance to Milton Keynes Council on the cost implications of policies proposed for inclusion within the Core Strategy was prepared before the economic down turn and ‘credit crunch’. As part of this addendum we have reviewed the latest published evidence on the cost of complying with Code Level 4 and above, the projected increases in the cost of energy, and activity within the house building market.

5.01 Cost of building to Code Level 4 and above

In July 2008 Cyril Sweett published Cost Analysis of the Code for Sustainable Homes on behalf of the department of Communities and Local Government (CLG). In March 2010 this was superseded by Code for Sustainable Homes - Cost Review prepared by Element Energy and Davis Langdon on behalf of CLG. This provides the most comprehensive assessment of the cost of building to standards defined by the Code for Sustainable Homes at the present time.

The Cost Review considers the ‘extra over’ cost of building to the Code above constructing homes to comply with Building Regulations (2006). Development scenarios were created using four dwelling types which were combined in a variety of ways such as the number of dwellings, dwelling mix, and dwelling density. The methodology was designed to identify the lowest cost means of achieving each Code level for each scenario (dwelling and development type). The cost data was obtained through a direct consultation with the house building industry and was validated in order to retain the costs of typical mass market measures, whilst filtering out atypical costs for bespoke measures.

The report shows significant variation in the additional costs of meeting each code level, between dwelling type and across the development scenarios. But expressed as a percentage of the base build costs, these are:

- < 1% for Code Level 1
- 1–2% at Level 2
- 3–4% at Level 3
- 6–9% at Level 4
- 25–30% at Level 5
- 30-40% at Level 6.
The analysis is based on the following baseline costs and floor areas:

<table>
<thead>
<tr>
<th>Dwelling type</th>
<th>Gross floor area (m²)</th>
<th>Total Capital Cost (£)</th>
<th>Cost (£/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 bed mid-floor flat</td>
<td>61</td>
<td>£59,725</td>
<td>£980</td>
</tr>
<tr>
<td>2 bed mid-terraced</td>
<td>73</td>
<td>£86,470</td>
<td>£1,185</td>
</tr>
<tr>
<td>3 bed semi-detached</td>
<td>88</td>
<td>£93,940</td>
<td>£1,070</td>
</tr>
<tr>
<td>4 bed detached</td>
<td>118</td>
<td>£99,975</td>
<td>£850</td>
</tr>
</tbody>
</table>

The table below shows the Extra Over cost of constructing to Code Levels 3 and 4 for each dwelling type.

The table shows that moving from Building Regulations to code level 3 requires additional (extra over) costs in the order of 3% to 4%, and the additional cost of moving from Building Regulations to code level 4 is in the order of 6% to 9%.

However, the more useful figure is the additional cost of moving from Code Level 3 to Code Level 4. The figures provided by the review suggest this is in the order of 3% to 6%.

17 Figures and calculations shown in the table and graphs 1, 2 and 3 are taken from ‘Code for Sustainable Homes – Cost Review’, prepared by Element Energy and Davis Langdon, on behalf of CLG, March 2010.
<table>
<thead>
<tr>
<th>Dwelling type</th>
<th>Flat</th>
<th>Terraced House</th>
<th>Semi-detached</th>
<th>Detached</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline costs</td>
<td>£59,725</td>
<td>£86,470</td>
<td>£93,940</td>
<td>£99,975</td>
</tr>
<tr>
<td>Extra over costs at code level 3</td>
<td>£2463</td>
<td>£2420</td>
<td>£3019</td>
<td>£2681</td>
</tr>
<tr>
<td>Extra over costs at code level 3 as % of baseline</td>
<td>4%</td>
<td>3%</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Extra over costs at code level 4</td>
<td>£5611</td>
<td>£7363</td>
<td>£8142</td>
<td>£6029</td>
</tr>
<tr>
<td>Extra over costs at code level 4 as % of baseline</td>
<td>9%</td>
<td>9%</td>
<td>9%</td>
<td>6%</td>
</tr>
<tr>
<td>Extra over costs of moving from code level 3 to 4</td>
<td>£3148</td>
<td>£4943</td>
<td>£5123</td>
<td>£3348</td>
</tr>
<tr>
<td>Total cost of building to code level 3 (Baseline plus e/o costs)</td>
<td>£62,188</td>
<td>£88,890</td>
<td>£96,959</td>
<td>£102,656</td>
</tr>
<tr>
<td>E/O costs of constructing to code level 4 as percentage of code level 3 build costs</td>
<td>5%</td>
<td>6%</td>
<td>5%</td>
<td>3%</td>
</tr>
</tbody>
</table>

Appendix 2\(^{18}\) gives a summary of the extra-over costs of building to each level of the Code in each of the dwelling types and for a range of development scenarios. It also provides tables with the extra over costs, by category (Energy, Water, Materials etc) for a small brownfield development built to Code Level 3 and Level 4.

The graphs below illustrate that:
- The extra over costs of moving from Code Level 3 to Code Level 4 are two to three times those of moving from Building Regulations (2006) to Code Level 3.
- At Code Level 3 roughly two thirds of the extra over costs are due to Energy and CO\(_2\).
- At Code Level 4 Energy and CO\(_2\) accounts for roughly 80-90% of the extra over cost of compliance.

\(^{18}\) The figures given in Appendix 2 are not region specific, so baseline costs must be adjusted accordingly. However, extra-over costs expressed as a percentage do give an indication of the cost of meeting Code Level 4 and above based on an analysis of the market since the economic downturn.
Graph 1 - Total extra over costs for code levels 3 and 4

Total Extra Over costs for code levels 3 and 4

- Flat
- Terraced house
- Semi-detached
- Detached

- Code level 3
- Code level 4
Graph 2 - Graph showing breakdown of energy/CO₂ and other costs at Code Level 3

Graph 3 - Graph showing breakdown of energy/CO₂ and other costs at Code Level 4
The review reiterates previous findings that meeting the mandatory reduction in carbon emissions is the most critical factor in determining the total cost of building to the Code for Sustainable Homes.

Up to Code Level 3 fabric improvement measures may be sufficient to achieve the required reduction in Dwelling Emission Rate. At Code Level 4 and above it becomes necessary to employ some form of low or zero carbon technology to meet some or all of the dwelling’s thermal and/or electrical demands. It is these costs which tend to dominate the overall expense of meeting a given Code Level for all dwelling types.

The review highlights differences in Code costs between development scenarios and relates these to the variation in energy strategy costs. These can be dependent on the development’s scale and density. This is particularly pertinent when the energy strategy is based around some common, site wide infrastructure such as a district heating system.

This research also supports the findings and guidance discussed above that development scale and/or density may restrict the technology options available. The report cites the example of biomass CHP which when connected to a district heating network may be an attractive means of meeting the very high DER reductions required at Code Levels 5 and 6.

However, current limitations in the technology mean that this is only an option where there is a large demand for heat (heat load). This will require a significant scale development so may not be appropriate for developments comprised solely of new housing, especially where phased in over the next five to ten years.

5.02 Projected changes in the cost of energy

The unit cost of energy paid by consumers is the result of a range of factors acting in combination. These include the state of the economy and demand for energy nationally and internationally, the availability of energy on the global market, and the cost of funding UK carbon reduction initiatives such as the Carbon Emission Reduction Target, and Feed-in Tariff.

The number and range of these variables makes it very difficult to predict with any certainty what energy prices will do in the future. However, there is a consensus that energy prices are more likely to increase, rather than fall over the next 5 to 10 years. Drivers for higher energy prices include the cost of upgrading the UK’s energy infrastructure and distribution network, meeting the cost of carbon reduction initiatives, switching to low carbon electricity generation, developing carbon abatement technologies such as carbon capture and storage, the impact of weather and climate related events, and meeting an increased demand for electricity for transport. In October 2009, the energy regulator Ofgem published a consultation document entitled Project Discovery - Energy Market Scenarios which was revised, based on consultation feedback, in February 2010. The report looks at four scenarios, all of which take account of the economic downturn, for meeting the UK’s demand for electricity and gas over the next decade (up to 2020).

19 To replace aging infrastructure and accept an increasing proportion of energy generated from renewable sources.
The scenarios are Green Transition, Dash for Energy, Green Stimulus and Slow Growth. An explanation of each is provided in Appendix 3. The report provides a range of potential increases in the cost of energy to domestic consumers of between 13% and 19% by 2020, with increases in domestic bills peaking at 52% in 2016 before falling back down again under the Dash for Energy scenario.

The average domestic consumer bill is modelled to be between just over £500 and £600 by 2020 and the average gas bill between £800 and £900. These are modelled projections so need to be regarded with suitable caution, however, they lend weight to the view the energy prices are likely to increase, possibly steeply over the next decade.

Further research by the Association for the Conservation of Energy provides details on the potential impact of carbon trading and reduction measures on domestic fuel bills. This shows an increase in domestic bills of £103 annually as a result of the EU Emission Trading Scheme, the Carbon Emission Reduction Target, Feed-in Tariff and Renewables Obligation.

The additional costs of constructing to Code Level 4 as opposed to Code Level 3 will be partially offset by a reduction in the energy running costs of the dwellings. Should energy prices rise as predicted, the energy cost savings of living in a Code 4 house rather than a Code 3 house will increase.

5.03 Current status of the house building market in England

Statistics published by Communities and Local Government in May 2010 show a 13% increase in the number of house building starts in England in the March quarter 2010, compared to the previous quarter. This puts the figure of 24,930 house building starts 62% above the same period in 2009, though still 49% below their March quarter 2007 peak.

The figures suggest that the increase in new starts is being driven by the private sector, with private enterprise starts 16% higher than in the December quarter 2009. By comparison starts by registered social landlords remained unchanged in the previous quarter.

The graph below shows the most recent figures for new starts and completions, published by CLG.

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21 EU ETS: £47, CERT: £41, FIT: £10, Renewables Obligation: £5.
What is not possible to predict is the effect of the measures announced in the June 2010 Budget on the housing market in general and the number of new starts and completions in particular. Figures published prior to the Budget suggested a tentative recovery in the house market. The Land Registry House Price Index\(^{23}\) for May 2010 shows an annual increase in house prices of 8.2% despite a fall of 0.2% in the previous month. The Land Registry makes the following comments on the figures, ‘Annual house price change in England and Wales has remained positive for seven months in a row, but May house prices are down 0.2 per cent since April. It is the first time since March 2009 that the annual change figure has not increased from the month before’.

The number of mortgage approvals for house purchase is also indicative of the turnover in the housing market, and the value of loans is an indicator of the trend in gross mortgage lending\(^{24}\).


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\(^{23}\) [http://www.landregistry.gov.uk/](http://www.landregistry.gov.uk/)

\(^{24}\) Data are net or cancellations. Graph b includes banks, building societies and other specialist lenders. Graph C includes Banco, Santander, Barclays, HSBC, Lloyds Banking Group, Nationwide and RBS. Some data prior to 2008 have been estimated.

\(^{25}\) Bank of England Inflation Report May 2010. [www.bankofengland.co.uk/publications/inflationreport/ir10may1.ppt](http://www.bankofengland.co.uk/publications/inflationreport/ir10may1.ppt)
Perhaps the most that can be said with any confidence at the present time is that the recovery in the housing market appears fragile.
6.0 TASK 5 - EXAMPLES OF POLICIES THAT HAVE BEEN THROUGH EXAMINATION IN PUBLIC

There are a number of examples of councils including policies similar to those in the MK Core Strategy26. We list below some which have gone through the Examination in Public, and how they fared.

6.01 Relating to the Code for Sustainable Homes

London Borough of Havering
The London Borough of Havering’s Core Strategy was found sound and adopted in March 2008. In requiring high standards of construction for major new developments, Policy DC49 ‘Sustainable Design and Construction’ sets out the following timetable for residential developments to attain minimum levels of the Code:

- Code level 4 from 2010-2013.
- Code level 5 from 2013-2016.
- Code level 6 from 2016 onwards.

The justification for this policy is based on acceptance of the Code as a single national standard for sustainability of dwellings, encompassing minimum standards for energy and water consumption, alongside other key aspects of pollution, waste, materials and ecology.

A number of reports informed the evidence base for Havering including a housing capacity study, demographic projections, sites of importance for nature conservation and a strategic flood risk assessment. A Supplementary Planning Document on Sustainable Construction will sit alongside the Core Strategy to support the Code requirements.

Dover District Council
Dover District Council’s Core Strategy was found sound in October 2009 and adopted in February 201027. Policy CP5 states that new development will be required to meet Code level 3 from April 2013 and Code Level 5 from April 2016. In energy and water terms, these requirements do not go beyond those required by the building regulations, but developers will have to meet the other requirements of the Code standards (which are not currently required under building regulations).

Ashford Borough Council
Ashford Borough Council’s Core Strategy was found sound and adopted in July 2008. It includes the following policy:

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26 Unless otherwise specified, these are taken from the following document: [http://www.energysavingtrust.org.uk/business/Global-Data/Publications/Energy-Saving-Trust-planning-policy-recommendations-Case-studies](http://www.energysavingtrust.org.uk/business/Global-Data/Publications/Energy-Saving-Trust-planning-policy-recommendations-Case-studies)

POLICY CS10: Sustainable Design and Construction

All major developments (as defined in paragraphs 9.57 and 9.58) must incorporate sustainable design features to reduce the consumption of natural resources and to help deliver the aim of zero carbon growth in Ashford.

Unless it can be demonstrated that doing so is not technologically practicable, would make the scheme unviable or impose excessive costs on occupiers, developments are expected to:-

A) Achieve the standard set out below or specified in a later DPD, or an equivalent quality assured scheme, with a strong emphasis on energy, water and materials. These requirements will be met through:

(a) Energy and water efficiency,
(b) Sustainable construction materials, and,
(c) Waste reduction.

B) Reduce carbon dioxide emissions through on-site sustainable energy technologies at the percentage set out below or at such other level as may be specified in a subsequent DPD.

C) Be carbon neutral which can be met through a combination of (A) and (B) above, with any shortfall being met by financial contributions to enable residual carbon emissions to be offset elsewhere in the Borough.

<table>
<thead>
<tr>
<th>Ashford LDF 2007 - 2014</th>
<th>(CS3) Town Centre &amp; (CS4) Brownfield Urban Sites</th>
<th>(CS5) Urban Extensions &amp; (CS4) Greenfield Urban Sites</th>
<th>(CS6) Tenterden, the Villages</th>
<th>Existing and refurbishment</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) BREEAM</td>
<td>Residential</td>
<td>Code Level 3</td>
<td>Code Level 4</td>
<td>Code Level 2</td>
</tr>
<tr>
<td>Overall level</td>
<td>Very Good</td>
<td>Excellent</td>
<td>Good</td>
<td>Very Good</td>
</tr>
<tr>
<td>Energy Credits</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
</tr>
<tr>
<td>Water Credits</td>
<td>Maximum</td>
<td>Maximum</td>
<td>Excellent</td>
<td>Excellent</td>
</tr>
<tr>
<td>Material Credits</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Very Good</td>
<td>Very Good</td>
</tr>
<tr>
<td>(B) Minimum Carbon Dioxide Reduction</td>
<td>20%</td>
<td>30%</td>
<td>10%</td>
<td>10%</td>
</tr>
</tbody>
</table>

Policy CS10 will be applied at major developments, defined as 10 or more dwelling units or on residential sites of 0.5 hectares or more in area, or for non-residential developments, any scheme of at least 1000 sq m gross external floorspace or, any development on a site 1 hectare or more in area.

The planning inspector’s report\(^\text{28}\) included the following:

\(^\text{28}\) [www.ashford.gov.uk/pdf/Planning_FINAL_REPORT.pdf](http://www.ashford.gov.uk/pdf/Planning_FINAL_REPORT.pdf)
“Taking all this into account I consider that it is not inherently unsound for the CS to seek to achieve Code Level 4 in the areas proposed. On the contrary in a growth area, where decisions taken now will affect a large number of dwellings to be built in the near future and where exemplary standards might be expected, I consider that an aspiration to such a level is appropriate. However, other parts of Ashford seem to have less potential and I consider it reasonable for the standards to take this into account.

Another area of concern relates to the Policy’s specific targets for minimum CO₂ reductions. These differ from those in the Code as they take into account only the use of low or zero carbon technologies, whereas the Code also has regard to energy efficiency. This appears to have caused some confusion and it would have been helpful if the CS had made this point clearer.”

London Borough of Hillingdon
On 13th July 2010, Sustainable Homes reported that the London Borough of Hillingdon had won its planning appeal to enforce Code Level 3[^29].

Hillingdon had required that “No development shall take place until an initial design stage assessment ... for the Code for Sustainable Homes and an accompanying interim certificate, stating that each dwelling has been designed to achieve Level 3 of the Code, has been submitted to and approved in writing by the local planning authority.” Interestingly, Hillingdon did not have a requirement in their development plan for Code level 3.

The developer challenged Hillingdon on the grounds that it was premature to ask for it, and there was no development plan policy in place. The council successfully argued that although there was no development plan policy, the principal of the PPS1 supplement, the London Plan and the need to develop beyond building regulations was sufficient justification enough.

Reigate and Banstead Borough Council
Reigate and Banstead Borough Council’s submitted Core Strategy was found unsound in January 2010[^30]. The council required achievement of certain Code for Sustainable Homes (CFSH) levels 2 years in advance of the related planned changes to the Building Regulations. Amongst the comments made by the Inspector was the following:

“I find some force in the argument that the Growth Point status, which requires an early acceleration in delivery of the overall requirement, should be linked to an acceleration in the building standards for those homes that are being built sooner rather than later. But the passage of time and good progress on short term housing delivery has greatly weakened this link. This would have been the case even if the CS had been adopted last year. The substantial sites that will deliver before 2016 (by when zero carbon housing is expected to be a national regulatory requirement) have already got planning permission or have a resolution to grant permission. These permissions do not require adherence to any local standard.”

6.02 Relating to BREEAM requirements

Poole Borough Council
The Borough of Poole had its Core Strategy found sound in January 2009 in which high standards of construction are required for non-domestic buildings. Policy PCS33 requires the following:

- BREEAM ‘Very Good’ or equivalent for developments up to 1,000m$^2$.
- BREEAM ‘Excellent’ or equivalent for developments in excess of 1,000m$^2$.

Both of these policies also require the use of on-site renewable sources or to link or contribute to available off-site renewable sources to meet 10% or 20% of predicted energy use respectively.

6.03 Relating to a minimum carbon dioxide reduction through renewable/low carbon technologies

Sheffield City Council
Sheffield City Council had their Core Strategy adopted in March 2009. In Policy CS 65 Renewable Energy and Carbon Reduction they state that: 
"All significant developments will be required, unless this can be shown not to be feasible and viable, to:

- provide a minimum of 10% of their predicted energy needs from decentralised and renewable or low carbon energy; and
- generate further renewable or low carbon energy or incorporate design measures sufficient to reduce the development’s overall predicted carbon dioxide emissions by 20%. This would include the decentralised and renewable or low carbon energy required to satisfy (a). The renewable or low carbon energy technologies must be operational before any new or converted buildings are occupied."

6.04 Relating to district heating/CHP

Sheffield City Council
Sheffield City Council had their Core Strategy adopted in March 2009. In Policy CS 65 Renewable Energy and Carbon Reduction they state that: 
"Where appropriate, developments will be encouraged to connect to the City Centre District Heating Scheme. Shared energy schemes within large developments or between neighbouring developments, new or existing, will also be encouraged.” (Policy CS 65 Renewable Energy and Carbon Reduction).

Dover District Council
Dover District Council has requirements that two of its mixed use development sites include district heating: Dover Waterfront and Dover Midtown.

6.05 Relating to carbon neutrality

Ashford Borough Council
Ashford Borough Council in its Core Strategy Policy CS10 has required that carbon neutrality is met, ideally through a combination of energy efficiency and on-site sustainable energy technologies. The council has set out a matrix against which carbon neutrality should be delivered.
However, where this is not feasible ‘because of economic viability or technological barriers’ developments must deliver carbon neutrality through financial contributions or carbon offsetting.

Para. 9.61 states that this method of achieving carbon neutrality "will be through a financial contribution and/or off-site renewable energy facilities, energy efficiency schemes and tree planting as part of Ashford’s Green and Blue Grid.”
APPENDIX 1


Policy LCF1: Evidence base for plan-making
LCF1.4: Local planning authorities should assess their area for opportunities for decentralised energy. The assessment should focus on opportunities at a scale which could supply more than an individual building and include up-to-date mapping of heat demand and possible sources of supply. Local planning authorities should in particular look for opportunities to secure:

i. decentralised energy to meet the needs of new development;

ii. greater integration of waste management with the provision of decentralised energy;

iii. co-location of potential heat suppliers and users; and,

iv. district heating networks based on renewable energy from waste, surplus heat and biomass, or which could be economically converted to such sources in the future.

Policy LCF2: Regional planning approach
LCF2: regional strategies (RS) should support the move to a low-carbon economy and secure low-carbon living in a changing climate. The RS should therefore plan for substantial new development in locations and ways which:

i. reduce the need to travel and enable the fullest possible use of sustainable low carbon transport;

ii. provide for energy, in particular heat, to be gained from existing decentralised energy systems, including those integrated with waste management, or where there are clear opportunities for new or extended decentralised energy systems; and,

iii. avoid increased vulnerability to impacts arising from climate change, unless it is viable to manage likely risks through suitable measures so as to provide resilience. In areas of water stress, and so as to secure development that would otherwise be unacceptable for its proposed location, resilience should be provided by setting sub-regional standards for water usage in new development.

Policy LCF 2.2 also refers to targets for renewable energy as follows:

LCF2.2: The RS should set ambitious targets for renewable energy and a clear strategy to support their delivery. Each RS should include targets for renewable electricity generation. Targets should be set taking account of the assessment of the region’s renewable energy resource and any contribution from imported resources should be clearly identifiable. Targets should be expressed as the minimum amount of installed capacity in megawatts and be set for 2015, 2020 and 2030. Any targets for renewable heat generation should build on policies in the RS which support the development of identified
opportunities. Targets for renewable energy should be treated as minima not maxima.

Policy LCF4: Local Planning approach for renewable and low-carbon energy and associated infrastructure
LCF4.1: Local planning authorities should:
  i. set out how any opportunities for district heating (to supply existing buildings and/or new development) identified through heat mapping will be supported;

  ii. set out the decentralised energy opportunities that can supply new development proposed for the area; and,

  iii. support opportunities for community-led renewable and low carbon energy developments, including the production, processing and storage of bioenergy fuels.

Policy LCF5: Local planning approach for adapting to a change climate
LCF5.1: Local development frameworks should set out how the local authority area will be planned to adapt to the opportunities and impacts arising from changes in the climate. In their local development framework, local planning authorities should therefore:
  i. plan green infrastructure so as to optimise its many benefits, and as part of wider green infrastructure networks, in order to support local biodiversity and healthy, living environments, including through providing urban cooling\(^{31}\), local flood risk management, and local access to shady outdoor space.

Policy LCF6: Local planning approach for selecting sites for new development
LCF6.1: Local planning authorities should assess the suitability of sites for new development, and for what type and intensity of development, against the following criteria:
  i. the extent to which existing or planned opportunities for decentralised energy could contribute to the energy supply of new development on the site;

  ii. the potential for new development on the site to contribute heat demand where a heat network exists or could be provided.

Policy LCF7: Local planning approach to setting requirements for using decentralised energy in new development
LCF7.1: Local requirements for decentralised energy should be set out in a development plan document (DPD) and be derived from an assessment of local opportunities in line with LCF1.4. Local requirements for decentralised energy should:
  i. relate to identified development areas or specific sites;

  ii. be consistent with giving priority to energy efficiency measures; and,

\(^{31}\) CHP can be used to generate heat, cooling and electricity. Known as tri-generation.
iii. focus on opportunities at a scale which developers would not be able to realise on their own in relation to specific developments.

LCF7.2: Local requirements should be consistent with national policy on allowable solutions set out in support of the zero carbon homes and buildings policy.

LCF7.3: Where there are existing, or firm proposals for, decentralised energy supply systems with capacity to supply new development, local planning authorities can expect proposed development to connect to an identified system, or be designed to be able to connect in future. In such instances, and in allocating land for development, local planning authorities should set out how the proposed development would be expected to contribute to the decentralised energy supply system.

LCF7.4: If a local requirement is set out as a target for the use of decentralised energy in new development the target should be expressed as either:
- the percentage reduction in CO$_2$ emissions to be achieved. In doing so, local planning authorities should set out how the target relates to standards for CO$_2$ emissions set by Building regulations; or,
- an amount of expected energy generation expressed in KWh.

LCF7.5: Where a local requirement relates to a decentralised energy supply system fuelled by bioenergy, local planning authorities should not require fuel sources to be restricted to local sources of supply.

Policy LCF8: local planning approach to setting authority-wide targets for using decentralised energy in new development

LCF8.1: The progressively demanding standards for CO$_2$ emissions set through Building regulations, together with the assessment of local opportunities for renewable and low carbon energy, will help drive greater use of decentralised energy. Targets for application across a whole local authority area which are designed to secure a minimum level of decentralised energy use in new development will be unnecessary when the proposed 2013 revisions to Part L of the Building regulations (for both domestic and non-domestic buildings) are implemented. As an interim measure until the coming into force of the 2013 revisions, the Secretary of State will support the application of authority-wide targets where these are included in the development plan. At the local level, any target should be in a DPD and have met the tests in LCF11.

Policy LCF13: Designing for a low carbon future in a changing climate

LCF13.2: In determining planning applications, local planning authorities should expect proposed new development to:
   i. be designed to reduce greenhouse gas emissions by:
      a. using landform, layout, building orientation, massing and landscaping to reduce likely energy consumption;
      b. using the layout, density and mix of development to support identified opportunities for decentralised energy;
c. connecting to an existing decentralised energy supply system where there is capacity to supply the proposed development, or being designed for a future connection where there are firm proposals for such a system;

ii. provide public or private open space as appropriate so that an accessible choice of shade and shelter is offered, recognising the opportunities for people, biodiversity, flood storage and carbon management provided by multi-functional greenspaces and green infrastructure networks;

iii. give priority to the use of sustainable drainage systems, paying attention to the potential contribution to be gained to water harvesting from impermeable surfaces and layouts that accommodate waste water recycling.

Policy LCF14: renewable and low carbon energy generation
LCF14.2: In determining planning applications for the development of renewable or low-carbon energy, and associated infrastructure, local planning authorities should:

i. expect developers of decentralised energy to support the local planning approach for renewable and low-carbon energy set out in the local development framework and, if not, provide compelling reasons consistent with this PPS to justify the departure; but, otherwise, not question the energy justification for why a proposal for renewable and low carbon energy must be sited in a particular location;

Policy LCF15: safeguarding renewable and low carbon energy supplies
LCF15.1: In determining planning applications, planning authorities should consider the likely impacts of proposed development on:

i. existing or other proposed development and their supply of, or potential for using, decentralised energy; and,

ii. existing, or proposed, sources of renewable or low carbon energy supply and associated infrastructure.
APPENDIX 2

Summary of extra-over costs of building to each level of the Code in each of the dwelling types and for a range of development scenarios.

<table>
<thead>
<tr>
<th>Code Level</th>
<th>2b-Flat</th>
<th>2b-Terrace</th>
<th>3b-Semi</th>
<th>4b-Detached</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E/O cost</td>
<td>%</td>
<td>E/O cost</td>
<td>%</td>
</tr>
<tr>
<td>Small brownfield (20 dwellings at 80 mph)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>£310</td>
<td>0.5%</td>
<td>£230</td>
<td>0.3%</td>
</tr>
<tr>
<td>2</td>
<td>£1,670</td>
<td>2.5%</td>
<td>£1,620</td>
<td>1.9%</td>
</tr>
<tr>
<td>3</td>
<td>£2,460</td>
<td>4.1%</td>
<td>£2,420</td>
<td>2.8%</td>
</tr>
<tr>
<td>4</td>
<td>£5,610</td>
<td>9.4%</td>
<td>£7,360</td>
<td>8.5%</td>
</tr>
<tr>
<td>5</td>
<td>£17,740</td>
<td>29.7%</td>
<td>£24,370</td>
<td>28.2%</td>
</tr>
<tr>
<td>6</td>
<td>£28,510</td>
<td>47.7%</td>
<td>£34,810</td>
<td>40.3%</td>
</tr>
</tbody>
</table>

| Medium Urban (350 dwellings at 80 mph) |            |            |            |            |
| 1          | £250     | 0.4%       | £150     | 0.2%       |
| 2          | £1,560   | 2.6%       | £1,500   | 1.7%       |
| 3          | £2,340   | 3.9%       | £2,000   | 2.3%       |
| 4          | £5,440   | 9.1%       | £7,190   | 8.3%       |
| 5          | £15,700  | 29.4%      | £24,200  | 28.0%      |
| 6          | £19,580  | 32.9%      | £26,650  | 30.2%      |

| Large Urban (3600 dwellings at 80 mph) |            |            |            |            |
| 1          | £230     | 0.5%       | £130     | 0.3%       |
| 2          | £1,620   | 2.7%       | £1,560   | 1.8%       |
| 3          | £2,160   | 3.6%       | £2,120   | 2.5%       |
| 4          | £5,350   | 9.0%       | £7,150   | 8.3%       |
| 5          | £11,310  | 29.0%      | £29,260  | 31.1%      |
| 6          | £17,650  | 46.3%      | £37,450  | 43.3%      |

| Small greenfield (10 dwellings at 40 mph) |            |            |            |            |
| 1          | £270     | 0.5%       | £190     | 0.2%       |
| 2          | £1,550   | 2.6%       | £1,500   | 1.7%       |
| 3          | £2,090   | 3.5%       | £2,050   | 2.4%       |
| 4          | £5,280   | 8.8%       | £7,080   | 8.2%       |
| 5          | £17,240  | 28.9%      | £26,900  | 31.1%      |
| 6          | £24,080  | 40.3%      | £31,250  | 36.1%      |

| Medium edge of town (650 dwellings at 40 mph) |            |            |            |            |
| 1          | £270     | 0.5%       | £190     | 0.2%       |
| 2          | £1,550   | 2.6%       | £1,500   | 1.7%       |
| 3          | £2,090   | 3.5%       | £2,050   | 2.4%       |
| 4          | £5,280   | 8.8%       | £7,080   | 8.2%       |
| 5          | £17,240  | 28.9%      | £26,900  | 31.1%      |
| 6          | £24,080  | 40.3%      | £31,250  | 36.1%      |

| Large edge of town (1,360 dwellings at 40 mph) |            |            |            |            |
| 1          | £270     | 0.5%       | £190     | 0.2%       |
| 2          | £1,550   | 2.6%       | £1,500   | 1.7%       |
| 3          | £2,090   | 3.5%       | £2,050   | 2.4%       |
| 4          | £5,280   | 8.8%       | £7,080   | 8.2%       |
| 5          | £17,240  | 28.9%      | £26,900  | 31.1%      |
| 6          | £24,080  | 40.3%      | £31,250  | 36.1%      |

Table showing breakdown of Extra Over costs for small brownfield development built to code level 3. Source: Code for Sustainable Homes - A Cost Review March 2010, CLG.

<table>
<thead>
<tr>
<th>Category</th>
<th>Flat E/O Cost</th>
<th>Terraced House E/O Cost</th>
<th>Semi-detached E/O Cost</th>
<th>Detached E/O Cost</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy/CO₂</td>
<td>£1668</td>
<td>£1505</td>
<td>£2104</td>
<td>£2126</td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>£200</td>
<td>£250</td>
<td>£250</td>
<td>£290</td>
<td></td>
</tr>
<tr>
<td>Materials</td>
<td>£0</td>
<td>£0</td>
<td>£0</td>
<td>£0</td>
<td>Assumes a total of 17 zero cost credits for this module</td>
</tr>
<tr>
<td>Surface water</td>
<td>£0</td>
<td>£0</td>
<td>£0</td>
<td>£0</td>
<td>Assumes development is in an area of low flood risk.</td>
</tr>
<tr>
<td>Waste</td>
<td>£55</td>
<td>£25</td>
<td>£25</td>
<td>£25</td>
<td></td>
</tr>
<tr>
<td>Pollution</td>
<td>£0</td>
<td>£0</td>
<td>£0</td>
<td>£0</td>
<td></td>
</tr>
<tr>
<td>Health and wellbeing</td>
<td>£300</td>
<td>£400</td>
<td>£400</td>
<td>£0</td>
<td></td>
</tr>
<tr>
<td>Management</td>
<td>£75</td>
<td>£75</td>
<td>£75</td>
<td>£75</td>
<td></td>
</tr>
<tr>
<td>Ecology</td>
<td>£165</td>
<td>£165</td>
<td>£165</td>
<td>£165</td>
<td></td>
</tr>
<tr>
<td>Total Extra Over Cost</td>
<td>£2463</td>
<td>£2420</td>
<td>£3019</td>
<td>£2681</td>
<td></td>
</tr>
<tr>
<td>Total Extra Over Cost Energy and CO₂</td>
<td>£1668</td>
<td>£1505</td>
<td>£2104</td>
<td>£2126</td>
<td></td>
</tr>
<tr>
<td>Total Extra Over Cost all other modules</td>
<td>£795</td>
<td>£915</td>
<td>£915</td>
<td>£555</td>
<td></td>
</tr>
</tbody>
</table>
Table showing breakdown of Extra Over costs for small brownfield development built to code level 4. Source: Code for Sustainable Homes - A Cost Review March 2010, CLG. Code Level 4

<table>
<thead>
<tr>
<th>Category</th>
<th>Flat E/O Cost</th>
<th>Terraced House E/O Cost</th>
<th>Semi-detached E/O Cost</th>
<th>Detached E/O Cost</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy/CO$_2$</td>
<td>£4611</td>
<td>£6243</td>
<td>£7022</td>
<td>£5219</td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>£200</td>
<td>£250</td>
<td>£250</td>
<td>£290</td>
<td>Assumes a total of 17 zero cost credits for this module</td>
</tr>
<tr>
<td>Materials</td>
<td>£0</td>
<td>£0</td>
<td>£0</td>
<td>£0</td>
<td></td>
</tr>
<tr>
<td>Surface water</td>
<td>£55</td>
<td>£55</td>
<td>£55</td>
<td>£55</td>
<td>Assumes development is in an area of low flood risk, and site wide SUDS system cost of £1100 split between all dwellings</td>
</tr>
<tr>
<td>Waste</td>
<td>£55</td>
<td>£75</td>
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<tr>
<td>Pollution</td>
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<td>£0</td>
<td>£0</td>
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<tr>
<td>Health and wellbeing</td>
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<td>£500</td>
<td>£500</td>
<td>£150</td>
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<tr>
<td>Management</td>
<td>£75</td>
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<td>£75</td>
<td></td>
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<tr>
<td>Ecology</td>
<td>£165</td>
<td>£165</td>
<td>£165</td>
<td>£165</td>
<td></td>
</tr>
<tr>
<td>Total Extra Over Cost</td>
<td>£5,611</td>
<td>£7,363</td>
<td>£8,142</td>
<td>£6,029</td>
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</tr>
<tr>
<td>Total Extra Over Cost</td>
<td>£4611</td>
<td>£6243</td>
<td>£7022</td>
<td>£5219</td>
<td></td>
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<td>Total Extra Over Cost</td>
<td>£1000</td>
<td>£1120</td>
<td>£1120</td>
<td>£810</td>
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APPENDIX 3

Summary of Ofgem Project Discovery Energy Market Scenarios


The four scenarios developed by Ofgem for this report are:

Green Transition in which:
- There is a rapid economic recovery and significant new investment globally
- A global agreement on tackling climate change is reached
- Energy efficiency measures are effective
- New nuclear and CCS demonstration projects come on-line before 2020
- Gas prices are moderate, carbon prices are high, and coal prices are relatively low as demand is suppressed by the high carbon prices
- GB gas demand falls but electricity demand grows on the back of wider deployment of heat pumps and electric vehicles

Green Stimulus in which:
- There is a slow recovery from recession and restricted availability of finance
- A global agreement on tackling climate change is reached and governments implement ‘green stimulus’ measures
- Energy demand falls globally in the near term
- Fuel prices are relatively low
- The combination of relatively high carbon prices and direct government support to nuclear, CCS and large scale renewables promote rapid decarbonisation of the generation sector

Dash for Energy in which:
- Global economies bounce back strongly
- Security of supply concerns prevail over environmental concerns: there is no global agreement on tackling climate change
- Gas supply is tight and fuel prices are high
- Investment is forthcoming but not always timely
- Significant expansion of CCGT generation capacity
- Planning and supply chain constraints prevent new nuclear plant becoming operational before 2020
- Planning delays push back storage investment

Slow Growth in which:
- Impact of recession and credit crisis continues
- Low levels of investment
- Low commodity and carbon prices, reducing incentives for renewables, nuclear and CCS
- Generation build is dominated by CCGTs
- Energy efficiency measures have limited impact but demand is low initially due to slow economic growth
APPENDIX 4

Land requirement for district heating schemes

Overview
The land area or ‘footprint’ of a biomass district heating or CHP scheme (excluding the distribution network itself) will be determined by:
- The number, and output of the boilers.
- The fuel or combination of fuels used e.g. biomass only, biomass boilers working in combination with gas boilers.
- The volume of thermal storage required.
- The volume of fuel storage required.
- The area required to give access to the site for delivery and service vehicles, including turning.

Boilers
Biomass boilers will be in the order of four times larger than a gas boiler of equivalent output. The size of the boiler and related components is related to the fuel (wood chip, pellets, logs etc) and the way in which this fuel is moved from the fuel store to the boiler and how it is processed within in the boiler itself.

Thermal storage
Thermal storage is used to smooth out peaks and troughs in demand for heat, and to reduce the output of a boiler required to meet peak demand. Heat is stored as hot water in large insulated tanks. Because these tanks are large, the amount of thermal storage required will have a strong influence of the overall footprint of a scheme.

Fuel storage
In this context fuel storage generally refers to the fuel stored on site prior to the point of use, and assumes that the fuel has already been processed to bring it to the appropriate moisture content and quality. The volume of the fuel store on site is related to:
- The energy density of the fuel which in turn relates to:
  - The type of fuel, i.e log, chip, or pellet.
  - The moisture content, and quality of the fuel.
- The heat demand, and the specified frequency of fuel deliveries.

The higher the moisture content of the fuel, the lower the calorific value, (heat content). So for a specified heat demand, a greater volume of fuel will be required if the moisture content is raised from 30% to 35% which will entail more fuel deliveries. The maximum allowable moisture content for wood fuel is determined by the boiler(s). Some boilers can burn wood with a moisture content of up to 50-60% others require wood with a much lower moisture content say 30%. For this reason the specification of the boiler will directly affect the volume of the fuel store required and the frequency of deliveries.

Access
The area needed for access to the energy centre will relate to the method by which fuel will be transported to the site and the type of fuel store.
Generally fuel is delivered to site by a lorry and trailer or tractor and trailer, and is either carried in a container which is left on site (and removed when empty), or deposited into a silo. There are a variety of containerized delivery systems which include containers with walking floors (to move the fuel out of the container), and hook lift bins. Silos can be below or above ground. If below ground they have to be designed so that lorries can tip the fuel into the silo. When above ground the fuel must either be blown into the silo, transferred using an auger (screw) feed or tipped using a scissor lift trailer (see photo). In addition to the space requirements, noise during deliveries must also be taken into account. In some cases it will be necessary to restrict delivery times to reduce the impact of deliveries.

Case studies

Sheffield Road Flats, Barnsley
In 2005 Barnsley Metropolitan Borough Council installed two wood chip boilers in Sheffield Road Flats, a social housing complex of 166 flats in three seven-storey blocks. The two linked boilers of 320kW and 150kW replaced an aging coal boiler as part of major refurbishment works. A gas boiler plant with 100% back-up capacity was installed at the same time, to provide continuity during the change-over and to reassure residents about the risk of biomass supply interruption.

Fluctuations in demand are managed through the use of thermal storage, and by switching off the larger of the two biomass boilers during the summer.

The boilers and thermal storage were installed in the existing plant room (see right). A new above ground wood store was constructed (see photos page 2) at the front of the flats, into which fuel is deposited using a scissor lift trailer (see photo page 2). Prior to delivery the fuel is stored in a local off-site depot designed to hold approximately 200 tonnes of wood chip.

Glenshellach Biomass District Heating Scheme
This project saw the installation of a 600kW biomass district heating system to provide heat to 90 homes in Oban built and owned by the West Highland Housing Association (WHHA). The system was designed to be implemented in two stages, stage one 44 homes, and stage two a further 46 homes.

The dimensions of the energy centre incorporating the boilers, thermal storage and fuel storage was 8m by 4m.

Ceredigion County Council - Penmorfa Biomass District Heating Scheme
Ceredigion County Council installed a wood-fuel heating
system as part of the rationalization of the systems at their Penmorfa headquarters in Aberaeron.

The Penmorfa development comprises offices for over 150 council staff and elected members. Adjacent is the Min-y-Mor residential care home and Penrodyn sheltered housing flats, each of which cater for about 30 residents. The three buildings have a total floor area of 6,608m², and demand about 1,250MWhrs annually to provide heating and hot water. They were originally heated by a combination of oil and electric boiler systems.

The system uses a Binder 550kW boiler, supplied and installed by Wood Energy Ltd. The installation can use either wood pellets or locally sourced wood chip, delivered into a specially designed fuel store. A 300mm diameter, auger system automatically feeds fuel to the boiler in response to heat demand.

The energy centre comprising the biomass boiler, back-up oil boiler, fuel store and thermal storage has a footprint of 6m by 8m.

Woodbrook Biomass Community Heating Scheme Belfast
Woodbrook is an ‘Eco-Village’ in Belfast; part of a larger urban extension of the 2000 home Brokerstown Village. Built by The Carvill Group, the development included a target for a 75% reduction in CO₂ emissions. Vital Energi was appointed to deliver a £2 million biomass district heating system servicing 358 homes as part of phase one of the scheme. The contract included responsibility for the detailed design and construction of the energy centre, the underground pipe network distributing heat and hot water to the dwellings, the heat interface units inside the homes and also a prepayment metering solution allowing residents to pre pay for heating, hot water and electricity.
The installation features four (two duty and two stand-by) 500kW wood burning boilers, with the wood chip being produced from willow currently being grown by local farmers. The scheme runs entirely on biomass, with no requirement for an oil back up facility.

The original proposals involved locating the energy centre building on a large piece of land at the edge of the site. However as a result of a tree preservation order (TPO) enforced by the local Council, the energy centre had to be re-located. Vital Energi worked with the M&E consultants to re-engineer the outline designs, and proposed the idea of two storey energy centre, located on the slope of a hill.

The design involves the energy centre plant and equipment including biomass boilers, pumps and controls on the first floor with the wood chip fuel store at basement level.

The re-positioning of the energy centre meant that the proposed road layout would make it virtually impossible and also dangerous for articulated lorries making deliveries of wood chips to site to manoeuvre. Using real examples, road and pavement layouts were modified to allow sufficient room for these vehicles to access the site, and make deliveries. At the time of writing information on the footprint of the energy centre and access roads is not available.