Climate Change and Sustainability

Practice Note | September 2011

Contents

1. Introduction

This practice note offers advice on the implementation of policies BCS13-16 of the Bristol Development Framework Core Strategy. Collectively, these form a suite of planning policies relating to climate change and sustainability:

BCS13	**Climate Change** Requires development to both mitigate and adapt to climate change.
BCS14	**Sustainable Energy** Provides criteria for assessing new renewable energy schemes, with a presumption in favour of large-scale renewable energy installations. Requires new development to minimise its energy requirements and then incorporate an element of renewable energy to reduce its CO_2 emissions by a further 20%. Supports the delivery of a district heating network in Bristol.
BCS15	**Sustainable Design and Construction** Requires all development to engage with issues around sustainable design and construction. Requires larger developments to be assessed against BREEAM and/or the Code for Sustainable Homes, and super major developments to be assessed using BREEAM Communities. Contains additional policy content relating to refuse storage and broadband provision.
BCS16	**Flood Risk and Water Management** Principally addresses the issues around development in flood risk areas but also requires all development to include water management measures to reduce surface water run-off, including sustainable drainage systems (SUDS).

A supplementary planning document (SPD) on Climate Change and Sustainability will be prepared in due course. This practice note is intended to provide advice to support the implementation of policies BCS13-16 prior to the preparation of the SPD.

Chapter 2 of this practice note addresses general principles around implementation of these policies. Chapters 3 to 6 deal in more detail with individual topics.

2. Applying the Policies

2.1. New submission requirements

Following the adoption of the Core Strategy on 21 June 2011, applications for planning permission must now be accompanied by the following additional information:

Policy	*Required information*	*Scale of development*
BCS13	Sustainability Statement*, including:*	All
BCS14	Energy strategy	All
BCS15	BREEAM and / or Code for Sustainable Homes assessment	Major and super-major
BCS15	BREEAM Communities assessment	Super-major
BCS16	Water management strategy	All

Sustainability Statements should address not only the detailed matters covered by policies BCS14-16 but also the more broad-ranging view of both mitigation and adaptation to climate change offered by policy BCS13.

Sustainability Statements and related information should be clear and precise and the measures they propose should be deliverable if they are to satisfy the above policies. Expressions of intent to "consider" introducing measures will not satisfy the above policies. Where relevant, the measures set out in the Sustainability Statement should also be shown on the application drawings.

2.2. Timing of the requirements

Policy BCS13 requires that measures to mitigate and adapt to climate change be integral to the design of new development. The Sustainability Statement and related drawings must therefore be provided prior to an application being determined. Planning conditions cannot be used to defer the identification of such measures to a later stage when other aspects of the layout and design have already been determined.

Once a satisfactory Sustainability Statement has been received, planning conditions can then be used to ensure that the measures set out in that statement are delivered on the ground.

In the case of outline planning applications where layout and appearance have yet to be determined, a full response to the requirements of the above policies cannot reasonably be expected prior to determination of the application. In such cases, planning conditions will be applied that require development to deliver fully against the Core Strategy policies unless otherwise agreed in writing by the Local Planning Authority. The details of the proposed development's response to the policies can then be negotiated at the reserved matters stage.

2.3. Exceptions to the requirements

Many of the policy requirements of BCS13-16 cannot readily be applied to the following types of application, which will therefore be exempt from the requirement to produce a Sustainability Statement:

1. "Householder" applications for alterations and extensions to dwelling houses.

2. Applications for planning permission proposing a “change of use” only (with no external works or subdivision of existing unit(s)).
3. Applications under separate consent regimes such as listed building consent, conservation area consent and advertisement consent.

2.4. What does “proportionate to the scale of development” mean?

Policy BCS13 states that Sustainability Statements can be “proportionate to the scale of the development proposed”.

The following key principles apply to all Sustainability Statements:

1. Sustainability Statements should address both mitigation and adaptation as set out under policy BCS13.
2. Sustainability Statements should engage with and address the energy requirements of policy BCS14, the water management requirements of policy BCS16 and each of the key issues listed in policy BCS15.
3. In respect of each of these issues, Sustainability Statements should set out what possible measures have been explored, which measures have been adopted and integrated into the design and, where relevant, why it was not feasible to incorporate certain measures into the proposed development.
4. A failure to convincingly address each of these issues will result in a refusal of planning permission.
5. If it is argued that including sufficient measures to meet the energy requirements of policy BCS14 would render the development unviable, then evidence should be provided of this.

Where the Sustainability Statement can become “proportionate” is in the level of detail required and the different options for measures that have to be taken into account for any given site. The following principles apply:

1. Sustainability Statements for smaller scale developments can be correspondingly brief in their exploration of the different measures that could be included.
2. The scope of different measures that need to be explored can be informed by the size and constraints of the site. For example:

    - The conversion of a single dwelling to two flats where there is limited outdoor space available could be expected to explore the use of water butts and other forms of rainwater harvesting, but would not be expected to consider large-scale approaches to sustainable drainage such as swales and drainage ponds.

    Part 3.2 of this practice note offers guidance on what sustainable energy technologies may be appropriate and should therefore be considered for different scales and types of development.
3. The development will not be expected to deliver, alone, mitigation or adaptation measures of a scope greater than the development itself. For example:

    - An infill development of five houses might be expected to include site-wide community heating and be future-proofed for connection to a future district heating network, but would not be expected include the strategic infrastructure needed to roll district heating out on a neighbourhood or larger scale.

A contribution towards such measures can, however, be an "allowable solution" in lieu of on-site emission savings under policy BCS14.

An exception to this rule is in respect of water management, where an improvement to the existing levels of surface water runoff may be sought.

3. Sustainable Energy

Policy BCS14 on Sustainable Energy has four main strands:

- To encourage major freestanding renewable and low carbon energy installations;
- To promote an energy hierarchy, prioritising energy efficiency;
- To secure at least a 20% saving in CO_2 emissions from energy use in new development through on-site generation of renewable energy; and
- To encourage the use of district heating schemes in new development.

3.1. Energy strategies

Policy BCS14 states that energy strategies should be submitted with planning applications. These should include a feasibility study for sustainable energy and can form part of the Sustainability Statement required by policy BCS13.

Structure of the energy strategy

The energy strategy should project the annual energy demand for heat and power from the development together with the associated CO_2 emissions, using Building Regulations Part L as a baseline, then demonstrate how the emissions from energy use in the development will be reduced through a combination of energy efficiency measures, combined heat and power (CHP) and renewable energy sources.

An effective energy strategy will combine a **written explanation** of the measures proposed, taking account of site constraints and opportunities, with **detailed calculations** showing the CO_2 emission savings achieved (Appendix 1 to this practice note contains a standard template). Where relevant, the proposed measures should also be shown on the **application drawings**, which will provide certainty as to their detail and location and also allow an assessment to be made of how well they have been integrated into the proposed design.

> *The energy strategy is only required to address **regulated** emissions. Regulated CO_2 emissions include those which arise from heating and lighting within the development as controlled by Building Regulations. They do not include the emissions resulting from the use of appliances by the occupiers of the development.*

To demonstrate compliance with policy BCS14, an energy strategy should address each of the following steps:

1. Model buildings to comply with building regulations Part L, and predict regulated CO_2 emissions. For residential development, this is achieved using the Standard Assessment Procedure (SAP)[1]. For non-residential development, this is achieved using a standard model known as SBEM[2].
2. Reduce energy consumption by amending the design to include additional energy efficiency measures and the use of CHP where appropriate[3].
3. Recalculate the predicted CO_2 emissions to take account of these additional energy efficiency measures – the result being the "residual emissions" referred to by policy BCS14.

[1] http://www.bre.co.uk/sap2009/
[2] http://www.ncm.bre.co.uk/
[3] This can include savings achieved through the use of CHP systems but not savings from the use of renewable fuel sources to power those CHP systems.

4. Consider appropriate renewable energy technologies for the site.
5. Decide on the mix of renewable energy technologies to be used, and calculate the resulting savings in CO_2 emissions, to offset at least 20% of the residual emissions[4].

A standard template for an energy strategy is set out in Appendix 1 to this practice note.

Energy efficiency

Minimising energy use through design needs to be factored in from the beginning of the design process. Designing a shell and then considering energy later means that opportunities can be lost - for example to orientate for solar gain. Measures to consider include:

- Substantial insulation / and or wall thickness;
- Natural ventilation and daylighting (e.g. through the use of an atrium or high level windows);
- Good levels of airtightness;
- Orientation to maximise solar gain;
- Solar shading on south facing glazing to avoid overheating during hotter weather; and
- Tree planting to provide summer shade.

Even in relatively noisy locations, openable windows should be included as they allow building users the opportunity for natural ventilation at quieter times.

Once energy demand for heating and cooling is reduced to a minimum through building fabric and design, consideration should be given to:

- Use of combined heat and power (CHP) systems to make further energy savings;
- Responsive heating controls;
- Building management systems; and
- Intelligent and energy efficient lighting systems.

Renewable energy generation

The energy strategy should then contain sufficient information to demonstrate that feasibility has been fully tested for a range of renewable energy technologies. Supporting information should be provided on the likely impacts – for example, in the case of biomass, details on the proposed arrangements for the storage and delivery of fuel.

Allowable solutions

Where the full requirements of policy BCS14 cannot be delivered on-site, an off-site "allowable solution" can be considered to provide the remaining reduction in emissions required by the policy. This can be provided as a contribution to a citywide low carbon scheme, a contribution through a commercial renewable energy project or a payment provided as part of a Section 106 agreement. Applicants should have reference to the emerging guidance from the Zero Carbon Hub[5] and provide details of the proposed solution, with quantification of the resulting carbon abatement. Applicants should explore the options in their Sustainability Statement in discussion with the council.

[4] This can include the use of renewable fuel sources to power CHP systems.

[5] "Allowable Solutions for Tomorrow's New Homes – Towards a Workable Framework", Zero Carbon Hub, July 2011, http://www.zerocarbonhub.org/

3.2. Appropriate technologies for building and development type

It is important to consider the appropriate low or zero carbon energy generating technology to fit the use, type and scale of development in order to achieve the greatest reduction in energy consumption and carbon emissions. The following table summarises some of the key considerations:

Technology	*Building characteristics*	*Uses*	*Scale*	*Considerations*
Photovoltaic panels	Roof facing east to west (through south) and not overshadowed, flat roof or pitched around 30 degrees.	All uses. Especially suitable for where extensive IT use and / or lighting, e.g. offices, schools.	All scales.	To maximise potential need to consider orientation.
Solar thermal	Roof faces east to west (through south), hot water tank needed (not compatible with combi boilers).	All uses.	All scales. Can be used with other fuel source to pre-heat water and so reduce fuel consumption.	Needs a demand for hot water – domestic or canteens, showers, washrooms.
Air source heat pumps	Sited on external walls.	Any.	Any, but more likely to be appropriate at small scale.	Careful siting needed to reduce aesthetic impact. Potential noise impact. Powered by electricity, so lower carbon reduction than other technologies
Biomass	Space needed for plant, fuel storage and deliveries.	Mixed use, schools, offices, commercial, residential – especially multi-residential – best where constant energy demand.	Medium to large, viable where heat demand is above 15 kW, can be combined with gas for summer / backup use.	Air quality impact. Impact of deliveries on residents. Fuel source (is supply secured). Distance transported.
Ground source heat pumps	External space for horizontal trench or vertical borehole.	Any.	Medium to large.	Archaeology. Usually combined with underfloor heating, so slow to respond. Can combine with landscaping.

Combined heat and power	Single energy centre providing heat and power – needs space for access and servicing.	Hospitals, leisure centres, educational buildings, large scale residential and mixed use.	Large.	Need substantial heat demand to be viable.
District heating	One or more energy centres with heat distribution network.	Residential / mixed use.	Very large.	Needs substantial heat demand to be viable, can be combined with gas boilers to respond to demand variations.

District heating

District heating is a means of distributing heat and hot water from one or more energy centres through a network of underground pipes. This needs to be planned strategically so that the pipe network can be installed at the same time as other infrastructure. These networks are particularly suitable for mixed-use developments, combining residential with other uses, so that there is a constant demand for heating and hot water. Large buildings such as hospitals or swimming pools can provide a useful hub to a district heating network. Where major developments are phased an initial energy centre can be provided and later expanded, or linked to new energy centres to expand a district heating network. Opportunities to connect to adjacent development should also be considered. District heating networks are particularly suitable for dense urban environments, and in Bristol the Citywide Sustainable Energy Study has identified areas of high demand which are defined as Heat Priority Areas. In these areas, major developments should incorporate infrastructure for district heating, and connect to existing systems where available.

In the past, energy centres for district heating networks of this kind have usually been fuelled by gas, but there is considerable potential for this to be replaced by renewable fuel sources including biomass and waste to energy in the future.

Combined heat and power

Combined heat and power (CHP) is an efficient way of generating energy, where waste heat from generating electricity is captured and used for space heating in buildings. This can also be combined with cooling for summer months to give combined cooling, heat and power (CCHP). This can be done at varying scales, entirely within a development – for example in a university or hospital site - or used to distribute heat and power to surrounding buildings. Where CHP is proposed only for a single use development – e.g. a hospital – the design should be future proofed to allow connection at a later stage to a larger network.

Most CHP systems are gas powered, but other fuels can be used including biomass (wood pellets or wood chip) or waste materials. Once the distribution infrastructure is installed, the fuel can be changed later to a lower carbon fuel, and design should allow for this. The location of the energy centre and the infrastructure should be shown on drawings, together with potential future connections to adjacent schemes. In the case of biomass CHP storage and access routes for delivery and plant maintenance should be shown on drawings.

Biomass

Biomass is usually a heating and hot water system fired by a wood chip or wood pellet boiler, and biomass can also be used to fuel a CHP system. This is suitable where there is a

steady demand for heat, as the system is slow to respond to changes in temperature or use. Some systems combine biomass with a gas boiler for backup or for summer use. Biomass is often used in public buildings such as schools, but is less suitable for residential use unless as part of a mixed-use development. Storage for the fuel is needed, and access for fuel deliveries, and the location of these need to be determined early on, and shown on drawings. Appearance and volume of storage need to be considered in sensitive locations, and applicants should consider about frequency of deliveries and any potential impact on nearby residents. Arrangements for regular management and maintenance should also be considered.

The Citywide Energy Study includes a map of fuel sources within 40km of Bristol and the Westwoods woodfuel project[6] acts as a broker, connecting woodfuel suppliers with demand.

Ground source heat pumps

These draw heat from the ground through horizontal or vertical boreholes and distribute it through the building – often through underfloor heating. These work well where the building is well insulated and the heat demand is low. Horizontal systems can be difficult to implement at high density, because of the space needed, but this can be landscaped and used as amenity space. The ground conditions need to be surveyed for suitability, and for constraints such as archaeology.

Air source heat pumps

These are fitted to individual buildings and work in a similar way to air conditioning, and are powered by electricity. There are reservations about this, unless the electricity is sourced from renewables. They are suitable for small residential developments, and relatively cheap. There are some concerns about noise, and also about appearance to consider.

Solar thermal panels

Solar thermal panels can be fitted to roofs to use heat from the sun to heat water, and need to be combined with a suitable boiler. This can provide all hot water needs for a household in the summer, and in the winter preheats the water so that less energy is needed to reach the required temperature. They can be combined with other systems (e.g. biomass). There are no concerns about noise and they need little maintenance. They are only suitable for roofs which face mainly south, and the roof pitch needs to be designed to maximise the solar gain. On large developments, the overall layout and orientation should be considered at the earliest stage to maximise opportunities.

Photovoltaic panels

These generate electricity from the sun, and need to be orientated south – because they use light rather than heat they need to be clear of overshadowing from buildings or trees. They can be installed on elevations and *brises soleil* as well as roofs. They are suitable at all scales and for all building types, but are especially useful for buildings where there is high electricity use, even if heating is reduced as far as possible – for example offices and schools.

Wind

Building integrated wind turbines can be appropriate in an urban location. Potential noise and flicker need to be considered, and impact on wildlife. Vertical wind turbines are now

[6] http://www.westwoods.org.uk/

available which are quiet in operation and more acceptable aesthetically. These also operate well in urban locations where air flow is turbulent.

4. Sustainable Design and Construction

Policy BCS15 deals with the full breadth of sustainable design and construction measures.

4.1. Addressing the issues

As well as energy, which is dealt with in detail by policy BCS14, development is expected to engage with the following issues, all of which should be addressed in the Sustainability Statement. Where a BREEAM and/or Code for Sustainable Homes assessment is submitted this can form a major part of the Sustainability Statement, but there will also be site-specific opportunities and potential for innovation.

Waste and recycling

Policy BCS15 requires that development include storage space for refuse and recyclable materials. For major schemes, clarity will also be sought as to the approach to site waste management during the construction phase. The Sustainability Statement should address both of these issues.

Further policy content on recycling and refuse storage in new development will be set out in the Site Allocations and Development Management DPD.

Water

The Sustainability Statement should include a water management strategy which should address the following issues as required by policies BCS15 and BCS16:

- Water efficiency – reducing the consumption of drinkable water through the use of measures such as low water use appliances, flow restrictors, spray taps and sensors.
- Water management – minimising runoff from rainwater.

Chapter 5 of this practice note offers further guidance on these issues.

Materials

The Sustainability Statement should set out how sustainability has been taken into account in the selection of materials. A commitment to using materials rated A or B in the BRE Green Guide to Specification[7] would be a good starting point for negotiation.

The web site "GreenSpec"[8] has further useful information on materials, including branded products.

Flexibility and adaptability

The Sustainability Statement should set out how the proposed development will be adaptable to potential future changes in use or occupancy. This can include, for example, how the internal dimensions of the development (including floor to ceiling heights) and the proposed provision of building services, access and circulation arrangements will allow for future change of use, reconfiguration or extension.

Further policy content on flexibility and adaptability will be set out in the Site Allocations and Development Management DPD, particularly in the policies on urban design.

[7] http://www.thegreenguide.org.uk/
[8] http://www.greenspec.co.uk/

Biodiversity

The Sustainability Statement should demonstrate how opportunities have been sought to enhance the development's biodiversity value through the inclusion of green infrastructure. Measures which can be integrated into development include:

- Green or brown roofs;
- Living walls / balcony planting;
- Bird and bat boxes;
- Indigenous and nut or fruit bearing trees and bushes specified in landscaping.

Further policy content on green infrastructure will be set out in the Site Allocations and Development Management DPD.

ICT

The Sustainability Statement should set out how the proposed development addresses the requirement set out in policy BCS15 for new homes and workplaces to include the provision of high speed broadband access and enable provision of Next Generation broadband.

4.2. BREEAM and the Code for Sustainable Homes

Policy BCS15 requires the submission of a BREEAM and / or Code for Sustainable Homes assessment with all planning applications for major developments, and additionally a BREEAM Communities assessment for super major developments.

BREEAM for Communities, which is based on the regional sustainability checklists, is now used for very large developments, and the scope of this is wider to include issues such as community involvement and place making. This is designed to work with the planning process, so that submissions can be made at outline and at reserved matters stages, and ideally the assessor will be part of the design team.

Where applicants are required by policy BCS15 to carry out Code/BREEAM assessments, the Code/BREEAM report can be submitted as a substantial part of the Sustainability Statement, although additional information including an energy strategy and a water management strategy is also required.

BREEAM / CSH assessments are not a single stage assessment, but an iterative process – the main stages, related to the planning process are:

	Code / BREEAM	*Planning application stage*	*Action*
1	Registration with BRE and appointment of assessor	Pre-application negotiations	
2	Pre-assessment estimator report	Pre-application negotiations	Negotiate improvements, based on report
3	Revised report / ratings	Report submitted with planning application	Agree submission version of report and target rating, secure with condition
4	Design stage / interim certification	Submit with planning application wherever possible	Check achieves predicted rating
5	Initial post construction review assessment	After construction	Check against agreed target
6	Final certification	Certificate submitted	Check against agreed target, condition discharged

Although these methods are used as assessments, their purpose is to raise standards, and to influence designs from inception. It is always more effective and less costly to factor sustainability in from the outset. Applicants will be encouraged not to design down to a target BREEAM score but to use it as a starting point, and will be encouraged to innovate. BRE have recognised this, and can now award credits for innovation.

5. Flood Risk and Water Management

Policy BCS16 requires development on sites at risk of flooding to be resilient to flooding through design and layout.

Policy BCS16 also includes requirements that are applicable to all new development, not just development on sites at risk of flooding. This includes a requirement for a water management strategy as part of the Sustainability Statement. Linked to the requirements of policy BCS15, an effective water management strategy will cover the following issues:

- Reducing surface water runoff;
- Reducing water consumption by maximising water efficiency.

5.1. Flood Resilience

New development in Bristol should be directed where possible to areas with the lowest risk of flooding, taking into account the impact of climate change. Policy BCS16 requires the application of a Sequential Test (and where required an Exception Test) on the basis of the climate change flood zones as set out in Bristol's Strategic Flood Risk Assessment.

Flood mitigation measures should be outlined in Flood Risk Assessments submitted with applications for planning permission. These measures can include onsite works, offsite works or a contribution to offsite works secured through planning obligations or CIL.

Flood resilient design and construction solutions which can be integrated into developments and buildings include:

- Raising the floor levels or ground level of development (note: care is needed with this approach as it may conflict with policies to promote accessibility and active street frontages or increase flood risk elsewhere);
- Green areas set aside for sacrifice to occasional flooding;
- Landscaping to divert and retain floodwater in ponds, swales or rills;
- Bunds at the perimeter of development;
- Impermeable boundary walls, fences and gates;
- Sizing rainwater goods to contain high volumes of rainwater;
- Specification of low permeability materials;
- Flood resilient fittings – e.g. tiling for floors and ground level walls;
- Fixing points for flood shuttering;
- Locating services – e.g. electrical sockets – at a higher than usual position above floor level.

Provision should also be made for safe access to and egress from the development in the event of a flood.

The measures proposed will, in most cases, be assessed in consultation with the Environment Agency.

5.2. Reducing Surface Water Runoff

The Strategic Flood Risk Assessment considers the risk of flooding in the city from watercourses, taking account of the impact of climate change. However, there is also a risk in all city locations of localised flooding caused by rainfall. Climate change means that

intense and/or prolonged rainfall and storms are more likely to occur, and this can result in existing drainage failing to cope with the resulting volume of surface water. Policy BCS16 accordingly expects all development to incorporate measures to reduce surface water runoff in order to mitigate this risk, both to new and existing development.

The potential for improvement will vary from site to site depending on existing site conditions (these might range from a green field site to a site with 100% coverage of building or hard surfaces), local flood risk factors and the nature and extent of the new development. However, the development will be expected to maximise site specific opportunities using water management measures such as sustainable drainage systems. The proposed measures should be set out in a water management strategy submitted with as part of the sustainability statement.

An overall improvement to the total run off and the runoff rate will be sought, compared to the existing situation. Further work is to be carried out in producing the SPD to support these policies to set out the level of improvement that would be justified in Bristol, but research so far has revealed that improvements in the region of 30% are being sought by councils in other urban areas with similar risks of surface water flooding.

Measures to consider include:

- Green roofs, roof gardens and brown roofs;
- Rainwater harvesting;
- Permeable paving;
- Ponds, swales and rills.

These measures can be integrated with landscaping to the development.

5.3. Reducing Water Consumption

Reducing the consumption of potable water within buildings and developments is also an important consideration. The processing of water to drinkable quality carries a cost in terms of energy and carbon, so water efficiency can contribute to carbon reduction.

Water efficiency measures include:

- Flow restrictors;
- Spray taps;
- Percussion or sensor taps;
- Dual flush WCs;
- Eco showerheads;
- Low water use washing machines and dishwashers;
- Waterless urinals;
- Leak detection.

Using harvested rainwater for washing machines and WCs has a double benefit of reducing runoff and consumption of potable water.

6. Adaptation to Climate Change

Policy BCS13 requires applicants to set out how the design and construction of the proposed development will provide adaptation to climate change, as well as mitigation. Adaptation and mitigation measures should be considered together, and adaptation measures chosen which do not increase energy use and so exacerbate climate change – for example by avoiding the use of air conditioning.

The need for cooling in buildings will become more significant as temperatures rise, and it is important to take account of this for the health and comfort of building occupiers, and also to ensure that buildings remain fit for purpose.

Adaptation measures can include:

- Flood resilience measures (see Chapter 5);
- Designing in natural ventilation and cooling so that buildings remain cool during heatwaves (buildings should be modelled to maintain acceptable temperatures internally when external temperatures reach 30C for seven consecutive days);
- Ensuring sufficient space between buildings to minimise the heat island effect (where high density urban developments retain heat);
- Providing shading and buffering to buildings through layout and planting;
- Using green spaces to allow cooling and provide external space for building occupiers;
- Using living walls and green roofs to cool and shade buildings;
- Providing community orchards and allotments;
- Designing robust buildings which can withstand storms and high winds, and which can be easily maintained and repaired;
- Retaining existing street trees and planting additional street trees where possible.

Appendix 1: Standard template for Energy Strategies

1. Summary table

The summary table should be supported by a written explanation of the measures proposed and a full set of calculations as set out under "Detailed Measures" below. Where relevant, the proposed measures should also be shown on the application drawings.

	Energy demand (kWh pa)	**Energy saving achieved (%)**	**Regulated CO_2 emissions (kg pa)**	**Saving achieved on residual CO_2 emissions (%)**
Building Regulations Part L compliance ("Baseline" energy demand & emissions)				
Proposed scheme after energy efficiency measures and CHP ("Residual" energy demand & emissions)				
Proposed scheme after on-site renewables				
Proposed scheme offset for financial contribution or other "allowable solution"				
Total savings on residual emissions				

2. Detailed measures

2.1 Baseline energy demand

Set out the projected annual energy demand and regulated CO_2 emissions of the development as a Part L Building Regulations compliant scheme without renewable energy supply. For residential development, this is achieved using the Standard Assessment Procedure (SAP). For non-residential development, this is achieved using a standard model known as SBEM.

Baseline energy demand (kWh pa)	
Regulated emissions (kg pa)	

2.2 Heating

Justify the choice of heating systems having regard to the heat hierarchy set out in policy BCS14 of the Core Strategy.

Where CHP is used, set out the projected energy saving resulting from this and the resulting saving in CO_2 emissions (this should not include savings made from the use of renewable fuels to power such systems as this is dealt with separately under section 2.4 below).

Energy savings from the use of CHP systems (kWh pa)	
Emission savings from the use of CHP systems (kg pa)	
Total regulated emissions after CHP savings (kg pa)	

2.3 Energy efficiency

Set out what additional measures have been employed to minimise the energy requirements of the proposed developments and the resulting savings in energy demand and emissions.

Subtract the savings arising from CHP and energy efficiency from the total regulated emissions projected under section 2.1 above to arrive at the "residual emissions".

Energy savings from energy efficiency measures (kWh pa)	
Emission savings from energy efficiency measures (kg pa)	
Total regulated emissions after CHP savings and energy efficiency measures (kg pa) ("**residual emissions**")	

2.4 On-site renewables

Set out what renewable energy sources have been incorporated into the proposed development and the resulting savings in emissions.

This can include emission savings from the use of renewable fuels to power CHP.

Total renewable capacity (kW)	
Saving on residual emissions from the use of renewables (kg pa)	
Saving on residual emissions from the use of renewables (%)	

2.5 Allowable solutions

Where the full requirements of policy BCS14 cannot feasibly delivered on-site, set out any further savings that will be achieved from a financial contribution or other "allowable solution".

Additional saving on residual emissions from allowable solutions (kg pa)	
Additional saving on residual emissions from allowable solutions (%)	
Total savings on residual emissions from renewables and allowable solutions (%)	