

Climate Change and Sustainability

Practice Note

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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).

This practice note is intended to provide advice to support the implementation of policies BCS13-16 prior to the possible future preparation of a Supplementary Planning Document.

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. 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:

<i>Policy</i>	<i>Required information</i>	<i>Scale of development</i>
BCS13	Sustainability Statement, <i>including:</i>	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*

* Subject to exceptions set out in part 2.3 of this practice note.

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

To be effective, measures to mitigate and adapt to climate change have to be planned into development from the earliest stage, as they directly affect the layout and design of development. For example, to make the best use of solar power, a development will require south-facing roof slopes. It is also a requirement of Policy BCS13 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. Appendix 2 of this Practice Note sets out model conditions that may be used at this stage.

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

The requirement for a sustainability statement only applies to applications for planning permission. It does not apply to applications under any other consent regime, e.g. applications for listed building consent or advertisement consent, applications for certificates of lawfulness or prior notifications under the General Permitted Development Order.

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

1. “Householder” applications for alterations and extensions to dwelling houses.
2. Alterations and extensions to existing non-residential buildings, including:
 - Extensions of up to 10% additional gross internal floorspace, to a maximum of 250m².
 - External works where no additional floorspace is being created, such as:
 - New air-conditioning units
 - New shopfronts
 - New windows
3. Applications for planning permission proposing a “change of use” **only** (unless over 1,000m² floorspace).

The exemption for changes of use is only offered to proposals that involve no increase in floorspace or subdivision of units. For example:

- An application that sought only to change the use of a retail unit from a shop to a building society, potentially including some external works e.g. a new shopfront, would be exempt.
 - An application that sought both to change the use of a retail unit from a shop to a building society and also to extend the premises would **not** be exempt.
 - An application that proposed the conversion of a house to two flats or the conversion of an office block to multiple units of student housing would **not** be exempt.
4. Applications that are themselves solely for the installation of energy efficiency measures or renewables.

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 or the conversion of an existing building to five flats 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 to 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 will normally 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 CO₂ 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. Energy strategies will not be sought where a Sustainability Statement is not required (see part 2.3 of this practice note).

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 CO₂ emissions, using the present 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 CO₂ emission savings achieved. 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 CO₂ 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 CO₂ 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 SBEM².
2. Reduce energy consumption by amending the design to include additional energy efficiency measures and the use of CHP where appropriate³.

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.

3. Recalculate the predicted CO₂ emissions to take account of these additional energy efficiency measures – the result being the “residual emissions” referred to by policy BCS14.
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 CO₂ emissions, to offset at least 20% of the residual emissions⁴.

The applicant should clearly set out in the energy strategy, cross-referenced to the application drawings where appropriate, the measures to be incorporated.

A standard template for an energy strategy is set out in Appendix 1 to this practice note. Alternatively, the council also accepts energy strategies produced using the Enplanner tool. The tool has been developed by the Carbon Trust and Encraft to provide information on how the energy requirements of the Core Strategy are met. This web-based software will help you to assess and develop your design, and give an indication of whether your proposals meet the requirements of policy BCS14. When a final version is agreed this can then be saved in PDF format and submitted in the usual way.

Enplanner:

<http://www.enplanner.com/>

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);
- Mechanical ventilation with heat recovery (MVHR);
- 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.

The applicant should clearly set out in the energy strategy, cross-referenced to the application drawings where appropriate, the measures to be incorporated.

⁴ This can include the use of renewable fuel sources to power CHP 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 take the form either of directly linked or near-site provision or a financial contribution to a citywide low carbon scheme or commercial renewable energy project.

Directly linked and near-site provision

“Near-site provision” refers to the provision of renewable energy sources outside but near to the application site. This could apply where, for example, solar panels could be installed on an existing building adjacent to the proposed development. This might be appropriate if, for example, the adjacent building is more favourable in terms of orientation or shading.

“Directly linked” refers to the provision of renewable energy sources at other sites that are related to the application site. This could apply where, for example, renewable technology could be installed more effectively in terms of cost and / or output at a different site within the estate of the applicant.

In both cases, installations will need to be deliverable on land in the control of the applicant and will need to be genuinely additional, not involving existing installations. Such installations will be secured by condition or legal agreement and will need to be completed prior to the occupation of the new development. When directly linked or near-site provision is proposed, it would be helpful to have as supporting evidence some information on the strategic thinking behind the proposal, for example whether it is part of a wider energy strategy or carbon management plan.

Financial contributions

At time of writing, the council is not in a position to collect financial contributions as allowable solutions as there is no citywide low carbon scheme in place to which development can contribute. However, using European funding obtained through ELENA, the council is working to set up an Energy Service Company (ESCo) to deliver renewable and low-carbon energy infrastructure across Bristol, to which it may be possible for development to contribute in the future.

When proposing allowable solutions, applicants should have reference to the emerging guidance from the Zero Carbon Hub⁵ 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.

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:

<i>Technology</i>	<i>Building characteristics</i>	<i>Uses</i>	<i>Scale</i>	<i>Considerations</i>
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 Can also be used to provide cooling, especially in buildings with no openable windows.
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.

In energy strategies, the use of district heating is treated as an **energy efficiency** measure.

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.

In energy strategies, the use of gas powered CHP is treated as an **energy efficiency** measure.

If powered by renewable fuels, the use of CHP is treated both as an **energy efficiency** measure and as a **renewable energy** measure.

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 the 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 project⁶ acts as a broker, connecting woodfuel suppliers with demand.

In energy strategies, the use of biomass to power heating, hot water or a CHP system is treated as a **renewable energy** measure.

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.

In energy strategies, the use of heat pumps is treated as a **renewable energy** measure.

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.

In energy strategies, the use of heat pumps is treated as a **renewable energy** measure.

⁶ <http://www.westwoods.org.uk/>

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.

In energy strategies, the use of solar thermal panels is treated as a **renewable energy** measure.

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.

In energy strategies, the use of photovoltaic panels is treated as a **renewable energy** measure.

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

In energy strategies, the use of wind turbines is treated as a **renewable energy** measure.

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 that go beyond BREEAM and the Code.

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 in the form of a site waste management plan. The Sustainability Statement should incorporate both of these issues.

Where demolition is proposed, developers will be asked to maximise the recycling and re-use of demolition materials. A demolition audit should ideally be carried out and submitted with a planning application to identify which materials can be recycled – for example bricks, wooden floors or panelling. Alternatively the sustainability statement must include an appropriate commitment to carry out an audit at an appropriate stage to enable this aspect to be conditioned. The Bristol Wood Recycling Project⁷ is a local not for profit organisation which collects wood for recycling and can also supply wood for construction projects. Where possible, developers will be encouraged to specify a percentage of construction materials which are recycled. WRAP⁸ can provide assistance with sourcing recycled materials. Where demolition waste is crushed for hardcore, it is best if this can be done on or near site.

Further policy content on recycling and refuse storage in new development is set out in draft policy DM30 of the emerging 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 Specification⁹ would be a good starting point for negotiation.

The web site “GreenSpec”¹⁰ has further useful information on materials, including branded products.

⁷ <http://www.bwrp.org.uk/>

⁸ <http://www.wrap.org.uk/>

⁹ <http://www.thegreenguide.org.uk/>

Flexibility and adaptability

The need for new development to be flexible in its layout and design, as set out in policies BCS15 and BCS21 of the Core Strategy, is further emphasised by draft policies DM25 and DM27 of the emerging Site Allocations and Development Management DPD.

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.

Consideration should also be given to how a future extension through, for example, a loft conversion or conservatory, could be achieved without compromising the energy efficiency of the building. Integrating Lifetime Homes standards will allow building occupiers to remain in existing homes and reduces the need for specialist provision. In residential developments, including live/work units or space that enables home working can reduce the need to travel. Design and specification that enables the deconstruction and re-use of building elements at a future date can also be considered.

Biodiversity

The need for new development to incorporate green infrastructure, as set out in policies BCS9, BCS15 and BCS21 of the Core Strategy, is further emphasised by draft policies DM13-20 and DM24-27 of the emerging Site Allocations and Development Management DPD.

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.

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.

Other measures that can be considered include Internet enabled smart meters that allow building users to track and reduce energy and water consumption, with information sent to workstations, tablets or smartphones. This data can then be combined with other sustainability information including real time public transport information, recycling information, car club booking and community messaging.

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 is used for very large developments, and has a wider scope to include issues such as community involvement and place making. It is designed to work with

¹⁰ <http://www.greenspec.co.uk/>

the planning process, so that submissions can be made at outline and at reserved matters stages. 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.

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.

After the BREEAM and/or CSH pre-assessment is submitted with its target ratings, this can be subject to negotiation with the case officer to agree an appropriate rating for the scheme. Once this is agreed, this will be subject to a planning condition which will require post construction certification. To avoid delay, collection of the necessary evidence by the assessor through the project is recommended.

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. Where development is proposed on sites at risk of flooding, Policy BCS16 usually requires the application of a Sequential Test (and where necessary an Exception Test), which is undertaken with reference to the climate change flood zones as set out in Bristol's latest flood risk data.

Flood mitigation measures should be outlined in Flood Risk Assessments submitted with applications for planning permission. These measures will generally consist of onsite works, but offsite works to protect the site may in some cases be acceptable provided that they would be local in nature and would fully address the outstanding flood risk. Any such offsite works will be secured through a Section 106 agreement.

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 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 to set out the level of improvement that it would be most appropriate to seek 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. Where development is adjacent to watercourses buffer strips and planting of trees as well as reducing runoff also help to reduce sediment loss that affects water quality.

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, as part of the Sustainability Statement, 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.

To adapt to climate change, development will need to be resilient to more frequent extreme weather events, rising temperatures and changes in rainfall. In the case of applications for healthcare, education, sheltered housing or similar social care purposes, it will be particularly important for applications to demonstrate how comfortable conditions (indoor and outdoor) will be maintained for people in high risk groups vulnerable to high temperatures.

Adaptation measures should be based on an assessment of the risks particular to both the specific development and the application site in general, with details of effective adaptations for minimising these risks. In preparing their response, applicants will be encouraged to draw on evidence provided by the UK Climate Impacts Programme on risks from climate change and relate this to the proposed development over its lifetime. As a minimum we recommend using the Medium Emissions scenario for the 2050s from the UK Climate Projections 2009¹¹.

Valid and effective adaptations should not be discounted simply because they are either difficult to model e.g. shading from trees, or that they are not required by existing regulations or standards which are focused solely on low carbon targets. As well as making the development resilient in and of itself, solutions that make a contribution towards neighbourhood level resilience will be particularly encouraged.

6.1. Site layouts and approaches to design and construction which provide resilience

Increased temperatures and more extreme weather events pose a number of risks to development in terms of its ability to provide a comfortable living or working environment, and site layout and building design should respond to this.

Layout

- Higher summer temperatures may be exacerbated by the urban heat island effect in high-density development, which limits overnight cooling. Layouts should allow sufficient space between buildings to mitigate this. Street grids with a permeable layout to regulate airflow between blocks should be considered.
- Street trees should be provided of sufficient density and canopy structure to provide shade and to buffer wind.
- Accessible external space should be provided wherever possible, whether private (balconies, courtyards, gardens) or public (landscaped squares, community gardens, greenways).
- External spaces should include an element of shade through measures such as trees, canopies and awnings.

¹¹ <http://www.ukcip.org.uk/>

Built form

- Modelling techniques are available to demonstrate that comfortable internal temperatures can be maintained when external temperatures are high for a long period (with reference to UKCP projections).
- Buildings and spaces for people in high-risk groups (e.g. the elderly, those suffering from chronic and severe illness, plus those with an inability to adapt behaviour to keep cool) will need additional measures to keep cool during a heatwave. This is particularly relevant for the following buildings:
 - Care homes and nursing homes;
 - GP surgeries, clinics and hospitals;
 - Nurseries and schools;
 - Social housing/high density/high-rise housing;
 - Temporary accommodation such as bedsits and hostels.

In certain circumstances, provision of a 'cool room' may be necessary to accommodate more vulnerable occupants. This can be a room in the ground floor or basement of the north side of the building, or a room with supplementary low-carbon cooling and ventilation systems.

- Thermal mass can be used to provide passive cooling.
- Heating systems which can be configured to also provide cooling (e.g. ground source and air source heat pumps) can be considered to avoid the use of air conditioning.
- Living walls and green roofs help to cool and shade buildings.
- Tall buildings are more challenging to ventilate, particularly where single aspect accommodation is included. Sufficient internal space should be provided to mitigate this, particularly in relation to floor to ceiling height.
- Openable windows should be provided, and where possible should be designed to be left open for ventilation without compromising security.

6.2. Conserving water supplies and minimising the risk and impact of flooding

Increased temperatures and more frequent extreme weather events pose a number of risks to development in respect of water supplies and flooding:

- Drinking water will be increasingly in short supply;
- Drains may be overwhelmed by extreme rainfall;
- Foul sewers may fail to function properly as we use less water;
- Extensive work may be required to existing sewers;
- Groundwater levels may change;
- Recurring flooding will require investment to improve defences;
- There will be increased risk of surface water flooding.

There are a number of adaptation measures that can help to address these issues. Larger capacity building gutters, downpipes and drainage may be needed to cope with additional rainfall. Effective water management will be essential, and blue amenity space

(accommodating water) will play an increasingly important role. Development will have to manage and, where possible, avoid the risk of flooding.

Section 5 of this practice note provides further guidance on these issues.

6.3. Using green infrastructure to minimise and mitigate heating

The incorporation of green infrastructure in development can provide shading and cooling and thereby reduce and mitigate heating of the urban environment. Green space can be multi-functional, providing play and amenity space or walking and cycling routes, as well as adaptation to climate change.

Blue infrastructure (water) can also be used to temper the urban heat environment.

Providing new development with private outdoor space such as gardens provides significant additional opportunities for green infrastructure and urban cooling.

Well-thought-out adaptations to climate change as part of new development, particularly those involving green infrastructure, have the potential to contribute positively to the resilience of the wider area as well as that of the development itself. Ways in which new development can contribute to neighbourhood-level resilience include:

- Improving food security e.g. community orchards and allotments;
- Improving the local microclimate e.g. enhancing the tree network and tempering the urban heat environment;
- Well-adapted public realm e.g. shaded, accessible seating areas including the use of tensile or temporary structures.

6.4. Avoiding responses to climate impacts which lead to increases in emissions

Adaptation and mitigation measures will need to be considered in a complementary way. For example, passive low carbon means to combat overheating should be specified in preference to active cooling systems wherever possible. Similarly, insulation should be specified that both reduces heating demand and combats overheating risk.

Smart technology can be used to improve not only the energy efficiency of buildings and infrastructure but also provide useful data to increase the comfort conditions for building users e.g. by reporting on thermal performance. This allows for building management systems to respond more rapidly to changes in external conditions.

The resilience of infrastructure networks can be improved through the provision of backup supplies, on-site energy generation and recognising the need to design networks that reduce the risk of cascade failure. This will be particularly important in developments such as hospitals or nursing homes.

6.5. Useful references

Gething, B (2010) Design for future climate: Opportunities for adaptation in the built environment Report T10/040. Technology Strategy Board, Swindon
<http://www.innovateuk.org/ourstrategy/innovationplatforms/lowimpactbuilding/design-for-future-climate-report-.ashx>

Shaw, R, Colley, M, and Connell, R (2007) Climate change adaptation by design: a guide for sustainable communities. TCPA, London
<http://www.tcpa.org.uk/pages/climate-change-adaptation-by-design.html>

Richard Partington Architects (2012) Understanding overheating - where to start: An introduction for house builders and designers Report NF44. NHBC Foundation, Milton Keynes

<http://www.nhbcfoundation.org/Researchpublications/UnderstandingoverheatingwheretostartNF44/tabid/515/Default.aspx>

Appendix 1: Standard template for Energy Strategies

Bristol City Council also accepts energy strategies prepared using Enplanner. See explanation in section 3.1 of this Practice Note for more information.

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 CO₂ 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 CO₂ 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 (%)	

Appendix 2: Model conditions that may be used to secure compliance with aspects of policies BCS13-16

Other conditions may also be used as appropriate to deal with individual cases.

Sustainable Urban Drainage System (SUDS)

No development shall take place until a detailed design of surface water drainage for the site using sustainable drainage methods has been submitted to and approved in writing by the Local Planning Authority. The approved development shall be implemented in accordance with the approved detailed design prior to the use of the building commencing.

Reason: To ensure that the principles of sustainable drainage are incorporated into this proposal.

Code for Sustainable Homes (CSH)

No development shall take place until evidence that the development is registered with a CSH certification body and a pre-assessment report (or design stage certificate with interim rating if available) has been submitted indicating that the development can achieve the stipulated final CSH level. No dwelling shall be occupied until a final Code for Sustainable Homes (or any such equivalent national measure of sustainability for home design which replaces that scheme) Certificate has been issued certifying that Code Level (SPECIFY) has been achieved for this dwelling, unless the Local Planning Authority agrees in writing to an extension of the period by which a Certificate is issued.

Reason: To ensure that the dwelling (s) achieve Level (SPECIFY) of the Code for Sustainable Homes (or any such equivalent national measure of sustainability for home design which replaces that scheme) and assessment and certification shall be carried out by a licensed CSH assessor and to ensure that the development contributes to mitigating and adapting to climate change and to meeting targets to reduce carbon dioxide emissions.

BREEAM

No development shall take place until evidence that the development is registered with a BREEAM certification body and a pre-assessment report (or design stage certificate with interim rating if available) has been submitted indicating that the development can achieve the stipulated final BREEAM level. No building shall be occupied until a final Certificate has been issued certifying that BREEAM (or any such equivalent national measure of sustainable building which replaces that scheme) rating (SPECIFY) has been achieved for this development, unless the Local Planning Authority agrees in writing to an extension of the period by which a Certificate is issued.

Reason: To ensure that the development achieves BREEAM rating level (SPECIFY) (or any such equivalent national measure of sustainability for building design which replaces that scheme) and assessment and certification shall be carried out by a licensed BREEAM assessor and to ensure that the development contributes to mitigating and adapting to climate change and to meeting targets to reduce carbon dioxide emissions.

Appendix 3: Climate Change and Sustainability FAQs

The following 'Frequently Asked Questions' are also available separately on the council's web site.

Could my application be exempt from the requirement for a sustainability statement or energy strategy?

The requirement for a sustainability statement and energy strategy only applies to applications for planning permission. It does not apply to applications for listed building consent, conservation area consent, advertisement consent, certificates of lawfulness, prior notifications under the General Permitted Development Order or applications under any other consent regime.

Section 2.3 of this practice note also offers exemptions for certain kinds of planning application. This includes applications proposing a "change of use" only. However, applications for changes of use are only exempt if they involve no increase in floorspace or subdivision of units. For example, an application that sought only to change the use of a retail unit from a shop to a building society would be exempt, but the conversion of a house to two flats or the conversion of an office block to multiple units of student housing would not be exempt and a sustainability statement and energy strategy would be required.

I'm only proposing a small change to an existing building. Do I really have to submit a detailed sustainability statement and energy strategy?

Policy BCS13 of the Core Strategy states that sustainability statements should be "proportionate to the scale of development proposed". Some form of sustainability statement will usually be required to accompany your planning application, but the requirements for, for example, a small extension to an existing business premises will be very different from the requirements for a proposal for one or more new dwellings.

Section 2.4 of this Practice Note provides further guidance on how sustainability statements can be proportionate to the scale of development proposed. In some cases, the proposal may be exempt for the requirement to produce a sustainability statement as set out in section 2.3.

Why are you focusing on renewables rather than energy efficiency?

Policy BCS14 of the Core Strategy requires a 20% reduction in emissions through the use of renewables. However, development is first expected to minimise its energy requirements through the use of energy efficiency measures. Both energy efficiency and renewables are therefore very important. Section 3.1 of this Practice Note provides further guidance on how to respond to these requirements in your energy strategy.

How do you define "renewables"?

Section 3.2 of this Practice Note defines which technologies we consider to be "renewables" and which we would instead treat as energy efficiency measures.

Why can't we deal with renewables and energy efficiency at a later stage, after planning permission has been granted?

To be effective, energy efficiency measures and renewables have to be planned into development from the earliest stage, as they directly affect the layout and design of development. For example, to make the best use of solar power, a development will require south-facing roof slopes. Unfortunately, as set out in Section 2.2 of this Practice Note, it is

therefore impossible to delay considering the issues until after planning permission has been granted.

Why are you asking us to undertake SAP or SBEM calculations at the planning stage?

In order to know how much renewable energy provision is required to achieve a 20% reduction in emissions, the council must first have an estimate of what the emissions of a development are likely to be.

Until benchmark data becomes available that provides a reliable estimate for what the regulated emissions of different development types are likely to be, SAP and SBEM calculations will remain the only reliable way of providing this estimate.

