

**Bracknell Forest Borough
Local Development Framework**

**Sustainable
Resource
Management**

**Supplementary Planning
Document**

**Bracknell Forest Council
October 2008**

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FOREWORD

The construction and use of buildings has a huge direct and indirect impact on the environment. Constructing and using buildings not only uses resources such as energy and raw materials, it also generates waste and potentially harmful atmospheric emissions.

To illustrate, the construction industry in the UK is responsible for nearly a third of all industrial pollution incidents, and the energy used in constructing, occupying and operating buildings leads to approximately half of all greenhouse gas emissions in the UK, which contributes towards climate change.

To address these issues, Bracknell Forest Council has produced this Supplementary Planning Document to help make the Borough's buildings more environmentally friendly.

This document calls for developers to design buildings in such a way that: there are improved standards of energy efficiency; renewable energy technology is incorporated into buildings; water is conserved; and, measures are included to benefit wildlife. There will also be requirements relating to a building's construction, with developers having to demonstrate they have used materials which have less of an environmental impact, and pollution and waste production are minimised.

The aims and targets for all new development are summarised in Table 2 (page 14) and these aim to protect and enhance the Borough's environment both now and in the future. This document is split into two parts: Part 1 provides information on the production of a Sustainability Statement and Part 2 provides technical information on specific sustainability topics.

As sustainable construction is a quickly changing area, the SPD will be reviewed when appropriate to remain in line with national policy and technological changes.

GLOSSARY

Climate Change – A change in climate attributable directly or indirectly to human activity, such as the burning of fossil fuels, which alters the composition of the atmosphere and causes changes in weather patterns on a large scale.

Embodied Energy – The total life cycle energy used in the collection, manufacture, transportation, assembly, recycling and disposal of a given material or product.

Life Cycle Approach – Assesses the impacts of a product or operation on the environment throughout its life i.e. production and manufacture, operational and maintenance, through to final demolition/disposal.

Major Development – Some elements of this SPD relate to “major development”. The definition of major development is based upon that contained in the Berkshire Structure Plan. It relates to development involving a net increase of more than:

- 100 dwellings; or
- 2,500m² retail floorspace; or
- 2,500m² office floorspace; or
- 4,600m² industrial floorspace; or
- 6,700m² storage and distribution floorspace.

Sustainable Construction – The use of design and construction methods and materials that are resource efficient and that will not compromise the health or wellbeing of the environment or the building occupants, builders, the general public or future generations.

ABBREVIATIONS

BRE – Building Research Establishment. Provides research, consultancy, testing and certification on sustainability issues for the built environment.

BREEAM – Building Research Establishment Environmental Assessment Method.

CSH – Code for Sustainable Homes.

DPD – Development Plan Document. A Local Development Document which forms part of the statutory development plan, examples include the Core Strategy, Proposals Map and Area Action Plans.

FSC – Forestry Stewardship Council. Certifies timber from renewable sources that are managed according to sustainable environmental standards.

LDD – Local Development Document – comprising two types, Development Plan Documents and Supplementary Planning Documents, which together form the Local Development Framework.

LDF – Local Development Framework. The portfolio of Local Development Documents which sets out the planning policy framework for the Borough.

PPS – Planning Policy Statement. Guidance documents which set out national planning policy. PPGs (Planning Policy Guidance Notes) are being reviewed and updated and are gradually being replaced by PPSs.

SEP – South East Plan. The Regional Spatial Strategy for the South East.

SPD – Supplementary Planning Document. An LDD which does not form part of the statutory development plan, but is part of the LDF. SPDs elaborate upon policies and proposals in a DPD.

PART 1 – PRODUCING A SUSTAINABILITY STATEMENT AND ENERGY DEMAND ASSESSMENT

SECTION 1: INTRODUCTION

1.1 Document status

The Local Development Framework (LDF) is the Borough's spatial framework for development covering the period from 2006-2026. The overarching document within the LDF is the Core Strategy Development Plan Document (DPD), which outlines policies that will take the whole of the LDF forwards. Supplementary Planning Documents (SPDs) expand on or provide further guidance on policies in DPDs. SPDs are not part of the statutory development plan, but are part of the Local Development Framework and are subject to consultation and sustainability appraisal. They are also a material consideration in the determination of planning applications.

The Bracknell Forest Borough Core Strategy DPD sets spatial objectives which all Local Development Documents need to help achieve. Objective K aims to promote the sustainable use and disposal of resources and Objective L aims to mitigate and adapt to climate change.

The primary role of this document is to provide guidance to ensure new development delivers Core Strategy objectives, in addition to national, regional and local sustainable resource management, energy and climate change targets. It provides guidance for the construction industry, the Council and the public on how new developments should be constructed in a sustainable way to meet or exceed current best practice standards.

This SPD has been prepared in order to define what the Council considers to be the relevant best practice standards, as this provides a flexible way of ensuring standards and requirements are up-to-date. It provides interpretation of policies within the Core Strategy DPD (adopted February 2008) and is consistent with national and regional policy.

Consultation

This SPD has been prepared in line with the Town and Country Planning (Local Development) (England) Regulations 2004 (as amended) and the adopted Bracknell Forest Borough Statement of Community Involvement (adopted July 2006). Between 30 November 2007 and 11 January 2008 the draft Sustainable Resource Management SPD and Sustainability Appraisal were made available for public inspection at the Council offices, Town and Parish Council offices and local libraries. The documents were published on the Council's website and a notice placed in the local newspaper. Letters were also sent to 173 key stakeholders informing them of the consultation and inviting comment.

All duly made representations were considered and, where appropriate, changes were made to the SPD. In addition to this final SPD, the Council has prepared:

- A Representation Statement summarising all representations received;
- A final Sustainability Appraisal Report.

On 21 October 2008, this document was considered at a meeting of the Council Executive and, by resolution of the Executive, it was adopted as a Supplementary Planning Document.

1.2 Sustainable development

'Sustainability' underpins the new planning system. The concept of sustainability covers a wide range of related issues; however, the overarching principle is to ensure development meets current needs without compromising the needs of future generations. The government's sustainable development strategy, 'Securing the Future' (2005), identifies four priority areas for immediate action, two of which are especially relevant to this Supplementary Planning Document:

- Natural resource protection and environmental enhancement; and
- Climate change and energy.

Natural resource protection and environmental enhancement

Natural resources are vital to our existence and have their own intrinsic value. Our health and wellbeing are closely linked to the quality of our air, water, soils and biological resources, and our economy and key industrial sectors are directly and indirectly reliant on functioning ecosystems.

Natural resources include:

- **Raw materials** - minerals, such as fossil fuels, metal ores, gypsum and clay are non-renewable because they cannot be replenished within a human timescale;
- **Environmental media** - resources such as air, water and soil sustain life and support biological resources upon which we depend;
- **Flow resources** - wind, geothermal, tidal and solar energy cannot be depleted, but require other resources to harness them. For example, energy and materials are needed to build wind turbines or solar cells;
- **Biological resources** - plants, animals and other organisms maintain the life-sustaining systems of the earth. Their variability (biodiversity) is also a resource and includes the diversity within species, between species and of ecosystems.

Climate Change and Energy

The effects of a changing climate are increasingly apparent. Temperatures and sea levels are rising, ice and snow cover are declining, and the consequences could be catastrophic for society. Scientific evidence points to the release of greenhouse gases into the atmosphere by human activity as the primary cause of climatic change.

The six greenhouse gases responsible for causing climate change are: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride. The first three account for 99% of global warming impact, with CO₂ accounting for 63%¹.

This document and other planning policies provide measures to mitigate against climate change by reducing emissions, and adapt to the inevitable climatic changes.

¹ Climate Change and the Greenhouse Effect, Hadley Centre.

1.3 Development's impact on natural resource use

The need for Sustainable Resource Management

Building construction and operation have a huge direct and indirect impact on the environment. Buildings not only use resources such as energy and raw materials, they also generate waste and potentially harmful atmospheric emissions.

The construction industry in the UK is responsible for nearly a third of all industry-related pollution incidents, and 32% of annual waste arising is produced by construction and demolition². The energy used in constructing, occupying and operating buildings represents approximately 50% of greenhouse gas emissions in the UK.³

Therefore, sustainable design and construction techniques are necessary in order to meet development needs for the economy and society, whilst minimising their impacts on the environment. It is evident that legislation regarding sustainable design and construction is responding to this and becoming increasingly demanding. As a result, this SPD aims to pull together a range of guidance on sustainable resource management and sets targets for environmental performance.

Other benefits of Sustainable Resource Management

In addition to key environmental benefits, sustainable design and construction can also deliver positive social and economic benefits such as:

- Improvements to the internal conditions of buildings through natural day-lighting and ventilation which can create comfortable, attractive and healthy places for people to live and work;
- Reduced running costs of buildings for both householders and businesses;
- Reduced construction costs in some cases through minimising wastage of construction materials, energy, water use etc;
- Improved reputation for businesses;
- Benefits to the local community as high quality developments can instil a sense of purpose and place and help to reduce crime and improve safety.

1.4 Policy framework

This document is consistent with and based upon policy within the adopted Core Strategy Development Plan Document. This was found sound by an independent Inspector following an Examination in Public and was adopted in February 2008. The principle of sustainable development is embedded within the Core Strategy in Policy CS1: Sustainable Development Principles and is supported by additional policies such as Policy CS10: Sustainable Resources and CS12: Renewable Energy. The Sustainability Appraisal of the Core Strategy identified that such policies were necessary to mitigate the environmental impacts of development.

Therefore, in line with Planning Policy Statement Planning and Climate Change: Supplement to Planning Policy Statement 1 (2007), the requirements for renewable

² Waste Strategy for England (DEFRA, 2007)

³ www.environment-agency.gov.uk

energy and sustainable buildings are set out in an adopted DPD, with this SPD providing additional guidance on implementation.

Policy CS10: Sustainable Resources requires the production of a **Sustainability Statement**, which demonstrates how current best practice in the sustainable use of natural resources has been incorporated into development proposals. The supporting text states that the Council will expect developers to have regard to best practice standards over and above Building Regulations, for example the Code for Sustainable Homes. The Core Strategy DPD states that subsequent guidance will be provided in further Local Development Documents and lists the aspects of sustainable resource management to be included within a Sustainability Statement.

Policy CS12: Renewable Energy sets targets and thresholds for on-site renewable energy production, which have been subject to independent scrutiny and testing alongside other Core Strategy policies.

Additional information on the policy framework at the national, regional and local levels can be found in Appendix 1.

The intention of this SPD is not to duplicate Building Regulations or other statutory requirements, but to ensure that developers have regard to best practice and to set out circumstances where they should exceed statutory requirements.

1.5 Scope of the SPD

This SPD relates to the impacts on sustainable resource use arising from both individual buildings and the layout and design of whole developments. Sustainable resource management should be considered at all stages of development from site selection through to demolition of the buildings.

1. Site selection and location

Although the selection of a development site will have a bearing on a range of sustainability factors, this SPD does not duplicate site selection and locational issues which are dealt with by policy within other local and national documents.

In particular, the production of two Development Management DPDs will provide additional policy guidance on the locational constraints in site selection:

- *Housing, Commercial Policies and Sites* – currently being produced; and
- *Environmental, Recreation and Transport Policies and Sites* – commencing 2010.

These documents will include information on:

- Provision of green infrastructure and open space;
- Use of previously developed land;
- Consideration of archaeological and heritage constraints;
- Proximity to services;
- Flood risk;
- Biodiversity - this document concentrates solely on how specific measures can be designed into a building and throughout a development to protect and enhance biodiversity.

Therefore, the above topics have not been reiterated within this SPD and are instead covered within the Development Management DPDs.

2. Design and layout of buildings and whole developments

Consideration of sustainable resource management measures at the early design stage of development is the most efficient way of reducing demand for resources, in particular energy and water. This can be in both building design and layout of larger developments. The early integration of the principles described throughout this document will ensure that the most cost effective solution is achieved and this should avoid the need for expensive 'retro-fitting'.

3. Procurement and construction phase

The materials and techniques specified during the design stage and used in the construction of the development will also have a considerable impact on natural resource use and pollution. Careful selection and procurement of materials and good standards of site environmental management will reduce these effects.

4. Building operation

The time taken to design and construct a development is only a small proportion of the time over which most developments are used. User behaviour is outside of the control of the planning system, but measures put in place during the design and construction phases can provide people with the opportunity to use the development in a sustainable manner and encourage a more sustainable lifestyle.

5. Demolition of the building

Taking a life cycle approach, consideration should be given during the design process, and through material specification, as to what will ultimately happen to materials upon demolition of the development. Choosing materials for their durability and recyclability will mean that the waste produced at the end of a building's life can be minimised.

1.6 How to use this document

Part 1 of this document deals with how the policy requirements will be measured through a Sustainability Statement and summarises the requirements and thresholds.

Part 2 of the document provides technical information by topic and is divided into the two main stages of development: design and construction. However, there is considerable overlap between topics so each stage should not be viewed in isolation. Within Part 2 each section has a brief background of the key issues relating to the topic. This is followed by an implementation section setting out the technical measures to be considered, followed by requirements and standards within a text box. This identifies the information which will need to be provided within the Sustainability Statement. Finally, details are provided on where to get further information on each topic, and any links to existing certification schemes, such as the Code for Sustainable Homes or Building Regulations. All measures within this document should be considered early in the design process.

SECTION 2: SUSTAINABILITY STATEMENT

2.1 What is a Sustainability Statement?

The Sustainability Statement should be an objective report evidencing the relevant information in support of the planning application. The report should show how a development is designed to meet the interpretation of sustainable development as set out in:

- Supplement to Planning Policy Statement 1 (PPS1): Planning and Climate Change (2007);
- Bracknell Forest Council's Core Strategy DPD (2008);
- This Supplementary Planning Document; and,
- Other relevant policy documents.

Any Sustainability Statement should follow the following principles:

- The level of information should be proportionate to the scale of the proposed development (in accordance with paragraph 11 of PPS1 Supplement);
- Instead of duplicating information, the Statement can cross-refer to sections within other assessments submitted with the planning application, such as those submitted for transport or Design and Access;
- If an Environmental Impact Assessment (EIA) is required, there is no need to duplicate information within a Sustainability Statement. In this case, the Environmental Statement will be treated as the Sustainability Statement, so should address all of the topics within this SPD in addition to the legal requirements. The EIA will therefore require further information on some additional topics, such as renewable energy and water conservation.

In accordance with PPS1 Supplement on Planning and Climate Change, there is no replication of other legislative requirements; however, in some cases this document seeks higher standards than currently set out, for example in Building Regulations. The remainder of this section sets out the current best practice standards that proposals must consider and demonstrate.

2.2 Independent accreditation

One of the purposes of this SPD is to provide guidance on implementing Core Strategy Policy CS10: Sustainable Resources and set out the scope of information that will need to be presented in a Sustainability Statement submitted alongside a planning application. The requirement to demonstrate "*current best practice in the sustainable use of resources*" is set out in the Core Strategy DPD.

The Code for Sustainable Homes

THE SUSTAINABILITY STATEMENT FOR RESIDENTIAL DEVELOPMENT MUST INCLUDE A FORMAL ASSESSMENT OF DWELLINGS AGAINST THE CODE FOR SUSTAINABLE HOMES INDICATING HOW A MINIMUM OF CODE LEVEL 3 WILL BE ACHIEVED.

Current best practice for residential development is encompassed within the government's Code for Sustainable Homes. The Code is an assessment and rating system aimed at improving the environmental impact of new homes. It supersedes the BREEAM assessment of residential schemes, Eco-homes. The Code introduces standards in 9 key areas of the design and construction of new homes:

- Energy and CO₂;
- Water;
- Materials;
- Surface water runoff;
- Waste;
- Pollution;
- Health and wellbeing;
- Management; and,
- Ecology.

The Code contains mandatory minimum standards for energy, water, materials, waste and surface water runoff. There are further non-mandatory standards within each of the 9 key areas, therefore flexibility exists to design development around the most appropriate principles in the Code. Points are awarded for each sustainability feature; these are then combined and a rating allocated accordingly.

From April 2008, all new social housing must be built to a minimum of Code Level 3 and from May 2008 it is mandatory for all new homes to be rated against the Code.

Table 1 shows the different stages of assessment and how these link with a planning application.

Table 1. Stages of assessment against the Code for Sustainable Homes

Stage of assessment	CSH stage	Links to planning application
Registration	<p>Firstly, a Code Assessor should be contacted who will register a housing site with the Building Research Establishment (BRE). BRE work on behalf of the government to train individuals and license organisations to perform Code assessments. For a list of licensed and registered assessors please visit www.breeam.org.</p>	<p>Must take place before a planning application is submitted.</p>
Pre-assessment estimator / Design Stage Assessment	<p>This first stage of assessment is carried out during the design of the development. A qualified assessor will be able to advise during this process on the most suitable and cost-effective measures for the site.</p> <p>The assessor will need to work closely with the design team to:</p> <ul style="list-style-type: none"> • Evaluate the performance of each environmental feature; and 	<p>It is recommended that this is carried out prior to applying for planning permission, as the sustainability measures required to meet Code Level 3 may have implications for design, appearance and siting.</p> <p>The Sustainability Statement submitted with the planning application must be accompanied by the Design Stage Report <u>or</u> pre-assessment estimator showing how the proposed home(s) will</p>

Stage of assessment	CSH stage	Links to planning application
	<ul style="list-style-type: none"> Assemble and check evidence provided by the developer and design team and other consultants to show the intended specification. This means a good level of detail will be needed on a range of subjects at this stage. <p>When the assessor is satisfied with the performance under the Code, he or she can either sign off a pre-assessment estimator report to be submitted with the planning application or submit a report to BRE to receive 'Interim' Code certification.</p>	<p>meet a minimum of Code Level 3.</p> <p>It is acknowledged that all the required information may not be available at the planning application stage, in particular for outline applications. In such cases, a condition will be attached requiring the submission and approval of a pre-assessment estimator or Design Stage Report and BRE Interim Certificate for the development prior to development commencing. These should demonstrate that the development will attain a minimum of Code Level 3.</p>
<p>Post Construction Review</p>	<p>As each dwelling type is completed, the assessor will gather evidence to demonstrate that it has been built in accordance with the details provided in the pre-assessment estimator or in the Design Stage Report. This assessment is known as an 'Initial Post Construction Review (PCR) Assessment'.</p> <p>When the assessor is satisfied with the performance under the Code, they will submit a report to BRE to receive Final Code certification for the development. It is this final code certification to a minimum of Code Level 3 that will be required to discharge a condition attached to the planning application.</p>	<p>A condition will be imposed on any relevant planning permission to require the submission of a Post Construction Review Report carried out by a licensed assessor and a BRE Final Code Certificate prior to the occupation of any home.</p> <p>These must demonstrate that the development will attain a minimum of Code Level 3.</p> <p>Submission of these documents to Bracknell Forest Council will enable the planning condition to be fully discharged.</p>

Further information is available online:
<http://www.planningportal.gov.uk/england/professionals/en/1115314116927.html>

BREEAM

THE SUSTAINABILITY STATEMENT SHOULD SHOW HOW NON-RESIDENTIAL DEVELOPMENT MEETS BREEAM STANDARD 'VERY GOOD' OR 'EXCELLENT'.

The Building Research Establishments' Environmental Assessment Method (BREEAM) is currently the best practice industry standard for sustainable buildings. It is a flexible, widely recognised and quality assured scheme that independently assesses the environmental performance of buildings. The following building types are covered:

- Offices (class B1);
- Industrial (class B1, B2/B8);

- Retail (class A uses);
- Schools.

There is also a bespoke category covering developments such as hotels and laboratories.

BREEAM assesses the performance of buildings in the following areas:

- Management;
- Energy use;
- Health and wellbeing;
- Pollution;
- Transport;
- Land use;
- Ecology;
- Materials;
- Water.

Credits are awarded in each area according to performance and then a set of environmental weightings enables the credits to be added together to provide a single score.

The stages are the same as with the Code for Sustainable Homes (see Table 1, page 7). The Sustainability Statement with the planning application must include a Pre-assessment estimator showing how the development will meet BREEAM 'Very Good' or 'Excellent' standards. Full accreditation from a registered assessor is required to demonstrate the development has been constructed to either 'Very Good' or 'Excellent' standards. A condition attached to the planning permission will restrict occupation until this has been submitted to the Local Planning Authority.

Further guidance can be found online at: www.bre.org.uk

2.3 Energy demand information

A Sustainability Statement submitted with a planning application will be expected to include an **Energy Demand Assessment** demonstrating how carbon dioxide emissions will be reduced by at least 10% and how the development will provide at least 20% of its energy requirements from on-site renewable energy generation. This is in order to meet the requirements of Core Strategy Policy CS12 (for full policy wording see Appendix 1).

The Energy Demand Assessment component of the Sustainability Statement must therefore include:

- An assessment of the predicted **energy demand** of the proposed development including all on-site energy requirements, such as street lights, car park lighting, heating and lighting of communal areas and lifts;
- An assessment of the predicted **CO₂ emissions** generated by the proposal;
- Key **energy efficient** design measures, including consideration of heating and cooling system;
- Choice of **renewable energy** technology;
- A **summary** of the above information.

2.3.1 Energy demand and CO₂ emissions

Applicants should demonstrate the predicted heating, cooling and electricity demand of the whole development site in kWh⁴ for each fuel type used (e.g. gas and electricity). The first stage should estimate the predicted energy use in the absence of various energy efficiency measures and technologies. This should include space heating, water heating, lighting and use of appliances.

Because not all energy is equal, the associated baseline carbon dioxide emissions should also be calculated. For example, the CO₂ emissions from electricity are much higher than from gas:

Electric energy: 1 kWh per annum = 0.43 kg of CO₂ per annum;
Gas energy: 1 kWh per annum = 0.19 kg of CO₂ per annum⁵.

It should be noted that a reduction in carbon dioxide (CO₂) emissions is not the same as a reduction in carbon (C). In order to reduce carbon by 1kg, CO₂ emissions must be reduced by 3.67kg.

Various benchmarks and methodologies can be used to predict energy requirements as noted below; Sustainability Statements must specify the methodology or benchmarks used. Advice for house builders can be obtained from the Energy Saving Trust and for commercial development from the Carbon Trust (see 'further information' section for contacts).

For residential uses:

Part L of the Building Regulations (2006) sets a Target Emission Rate (TER), which is a building's maximum allowable CO₂ emissions in kg/m². This is measured using Standard Assessment Procedure (2005), the government's approved procedure for assessing home energy efficiency and carbon emissions from space heating and hot water. SAP approved software can be found at www.bre.co.uk/sap2005.

However, SAP does not include calculations for cooking, lighting or appliances, so the impact of these uses should be estimated and a clear indication given of the source of information. A number of software models make these calculations, for example the National Home Energy Rating Scheme (NHER). In the case of small developments, an additional 20% can be added to the initial SAP calculation to account for the excluded elements.

BREDEM-12 is a model for estimating the energy consumption in dwellings for space heating, hot water, lighting, cooking and electrical appliances.

An example of predicted energy use under 2006 Building Regulations:

Property type	Energy Use (kWh/m ² /pa)			Carbon emissions (kg CO ₂ /m ² /pa)		
	Gas	Electricity	Total	Gas	Electricity	Total
Flat	72	18	90	13	9	22

⁴ kWh = kilowatt-hour. This is the basic unit used to measure energy in this context and relates to 1 kilowatt of energy (i.e. the power) consumed over an hour. This is a common term for all fuels.

⁵ A full list of CO₂ emission factors is provided in Part L of the Building Regulations

Non-domestic buildings:

BRE and the government have developed a software tool for non-domestic buildings, the Simplified Building Energy Method (SBEM), which simplifies the calculation methodology required to comply with Part L of the Building Regulations. This can be downloaded from <http://www.ncm.bre.co.uk/>.

Table 6 of the London Renewables Toolkit (see web address in 'further information') sets out energy benchmarks for non-domestic building types. In addition, the Carbon Trust produces a variety of documents which include energy efficiency and benchmarking data for various development types.

2.3.2 Energy efficient design measures

As described in section 3.1, according to the hierarchy of energy use, in the first instance developers should seek to improve energy efficiency through passive design and use of materials, prior to considering renewable energy provision. Part L of the Building Regulations 2006 is the baseline standard for energy use that all new buildings must meet. If a proposed development aims to exceed these standards, i.e. improve the Dwelling Emission Rate (DER) over the Target Emission Rate (TER), the Energy Demand Assessment should set out the architectural and building fabric measures specific to the scheme which demonstrates how this will be achieved. Code Level 3 of the Code for Sustainable Homes requires the DER to show an improvement of 25% over the TER.

Where energy efficiency is improved over Building Regulations, the Energy Demand Assessment must also set out the predicted heating, cooling and electricity demand (in kWh) and CO₂ emissions **after** the application of suitable energy efficiency measures. This baseline, which takes into account a reduction in demand from energy efficiency measures, should be used to calculate the amount of renewable energy to be provided.

2.3.3 Calculating the renewable energy requirement

Having calculated the energy demand and CO₂ emissions once energy efficiency measures are incorporated, applicants should use this figure to calculate the quantity of on-site renewable energy required. This should be at least 20% of the site's energy needs (heat, cooling and power) or at least 10% for proposals of less than 5 dwellings or other development with a floor area less than 500m². Green tariff electricity is not counted towards the consideration of on-site generation or of a scheme's ability to meet the 20% target.

The more energy efficient a building, the less the predicted energy consumption; therefore the quantity of renewable energy necessary to meet the 20% (or 10%) targets will be proportionally reduced.

2.3.4 Renewable energy technologies

The Sustainability Statement must set out the effectiveness of different renewable technologies, measured in both energy consumption (kWh) and carbon emissions (kg/CO₂ per year). Where the 20% target cannot be achieved, scheme-specific justification is required.

The following information should be set out for each technology; see section 3.2 (page 24) for details of technology types to be considered:

- Type of technology;
- Baseline information (kWh/year and kgCO₂/m²/year);
- Size of system (in kW or m² panel size);
- Renewable energy generated (kWh/year);
- Total energy required to operate renewable technology (if relevant);
- Type of energy displaced (gas, electric, other);
- Percentage of end use displaced;
- Percentage of CO₂ emissions saved;
- Total capital cost.

Much of the above data can be obtained from suppliers and the London Renewables Toolkit can also be used to estimate feasibility of each renewable option.

For the chosen technology (or technologies), the following details should be provided where they are known:

- Location and visual impact of equipment – for example to include roof plans and elevations for solar panels, wind turbines and flues for biomass boilers;
- Planning impacts of ongoing use, for example storage for biomass and access for deliveries;
- Lifespan of the technology;
- How the technology integrates with the heating system.

2.3.5 Information to provide

When assessing the Energy Demand Statement the following will be checked:

1. Have the energy demand (in kWh) and carbon emissions (in kg/CO₂) for the site been predicted?
2. Have all assumptions been provided, i.e. whether these have come from Building Regulations or benchmarks?
3. Are all energy uses covered, i.e. buildings, communal lifts, street lighting etc.
4. Have full details of energy efficiency measures been provided?
5. Have the energy demand and carbon emissions for the site been predicted, taking into account energy efficiency measures?
6. Has a thorough analysis of CHP and/or community heating been provided?
7. Has a thorough renewable energy feasibility study been provided for all relevant technologies?
8. Is there a clear statement of what renewable energy systems are proposed and the associated energy and carbon savings?
9. Is the longer term maintenance of the equipment considered?
10. Are there justified reasons if 20% (or 10% for smaller developments) is not achieved? The 'undue burden' test should specify whether this is due to economic viability or physical feasibility (e.g. noise sensitive receptors, storage space etc).
11. If 20% on-site places an undue burden, have off-site options been considered?
12. Is a summary of the above information provided?

2.3.6 Outline planning applications

It is recognised that, at the outline planning application stage, sufficient information may not be available to inform a full assessment of the energy demand. However, as energy savings are made most effectively when considered early in the design process, outline planning applications still need to address and commit to energy

measures. Model results can be obtained at outline planning stage by modelling a number of representative dwelling types based on a developer's standard specification or by using existing SAPs already calculated for existing developments with similar house/flat types. Information should be provided on all the aspects set out above in order to provide a framework for consideration within subsequent reserved matters applications.

Planning conditions will be used to secure the outcome of proposed energy efficiency and renewable energy measures in detailed designs and to ensure that commitments are implemented.

Further information:

London Renewables Toolkit –

http://www.london.gov.uk/mayor/environment/energy/docs/renewables_toolkit.pdf

Building Research Establishment – www.breeam.org; www.bre.co.uk

The Carbon Trust – www.carbontrust.co.uk

Energy Saving Trust – www.est.org.uk

Energy Saving Trust. Meeting the 10 per cent target for renewable energy in housing – a guide for developers and planners. Can be downloaded from:

<http://www.energysavingtrust.org.uk/uploads/documents/housingbuildings/CE190%20-%202010%20per%20cent%20guide.pdf>

Combined Heat and Power Association – www.chpa.co.uk

National Home Energy Rating scheme – www.nher.co.uk

The Standard Assessment Procedure (SAP) ODPM, 2005

Energy efficiency in Buildings Guide F. CIBSE, 2004

2.4 Other best practice guidance

SEEDA's Sustainability Checklist is an online tool devised specifically to guide the design of new developments. The Checklist covers regionally specific sustainability and planning issues within the context of current policy, emphasising those of higher priority.

The Checklist complements BREEAM and the Code for Sustainable Homes by looking at issues relevant to the overall development scale, as opposed to individual development sites. The tool identifies a range of sustainability issues covered in the Regional Spatial Strategy for the South East, enabling users to assess to what extent a design proposal will deliver on each issue.

A completed checklist can help inform the final design and provides information for input into a Sustainability Statement.

Further guidance can be found online at: www.sustainability-checklist.co.uk.

2.5 Flexibility

The Council recognises that in some circumstances it may not be reasonable to require a development to meet all the best practice standards set out in this SPD. Where an applicant considers that a specific requirement is not viable on a particular site, then they will need to demonstrate the reasoning behind this. Justification should be provided in the context of the overall development and in comparison with

other design solutions. Any evidence must also consider the long-term, whole life costs associated with particular measures and not just address initial capital outlay. In such a study, ‘viability’ is taken to mean technical and/or economic viability of the available options to meet the relevant standards. The Council may choose to seek independent advice to verify the submissions.

2.6 Summary of information required

Boxed text throughout sections 3 and 4 of this SPD explain targets and requirements relating to the Code for Sustainable Homes, BREEAM and other local issues. These are summarised in Table 2.

In addition to the CSH / BREEAM certification, the Sustainability Statement must compile information to show how each of the topics has been addressed. The Council’s assessment of the information within this Statement will form an important material consideration when determining a planning application.

It should be noted that while the CSH / BREEAM has both mandatory and optional elements, the Council requires the developer to demonstrate how all the aspects of sustainable resource management set out in this SPD have been considered and provide reasonable justification where the SPD’s objectives have not been achieved.

The ‘Scale’ column indicates the scale of development to which the information requirement relates. Within the context of this table, ‘All’ development refers to:

- **Residential development** – any net additional dwelling or replacement dwelling;
- **Non-residential development** – over 100m² floorspace.

The following developments are excluded:

- Household extensions;
- Change of use within an existing building.

Table 2. Summary of information required

No.	Summary of information	Scale	Links to Policy and Best Practice
1.	Include an assessment of the energy demand of the development and predicted CO ₂ emissions (see section 2.3).	All	<ul style="list-style-type: none"> • Core Strategy policy CS12 • SEP policy EN1(i) • Building regulations Part F: Ventilation and Part L: Conservation of Fuel and Power • London Renewables: Integrating renewable energy into new developments: toolkit for planners, developers and consultants

No.	Summary of information	Scale	Links to Policy and Best Practice
2.	Demonstrate how the energy demand has reduced CO ₂ emissions by at least 10% of the predicted level (see section 2.3).	All	<ul style="list-style-type: none"> • Core Strategy Policy CS12 • SEP policy EN1(i) • CSH Ene1 (Code Level 3 requires 25% reduction) • BREEAM Offices/Retail/Industrial/Multi-residential E 01 (Energy) • London Renewables: Integrating renewable energy into new developments: toolkit for planners, developers and consultants
3.	Demonstrate the % of energy to be provided from on-site renewable generation, including an explanation of the proposed choice of renewable energy technology (see section 2.3).	- 10% required for proposals less than 5 net additional dwellings or 500m ² . - 20% required for all other development.	<ul style="list-style-type: none"> • Core Strategy Policy CS12 • CSH Ene7 • BREEAM Offices/Retail/Industrial/Multi-residential P 11 (pollution)
4.	Demonstrate the measures to ensure that average domestic water use will be 105 litres/capita/day and for non-residential best practice standards will be exceeded.	All	<ul style="list-style-type: none"> • Core Strategy Policy CS1(iv) and CS10 • SEP policy CC2 (iii) & CC 3 (ii) & NRM 1 • CSH Wat 1 (same as mandatory Code Level 3 requirement) • BREEAM Offices/Retail/Industrial/Multi-residential W01 onwards (water)
5.	Indicate flooding conditions prior to development and the measures in place to ensure peak runoff rates and annual volumes of runoff do not exceed current site conditions.	Sites exceeding 1 hectare	<ul style="list-style-type: none"> • SE Policy NRM 3 (ii) • CSH SUR 1 (mandatory) & SUR 2 • BREEAM Offices/Retail/Industrial/Multi-residential P07 (pollution) • Bracknell Forest Council Strategic Flood Risk Assessment
6.	Show the % of attenuation achieved through SUDS, including an explanation of the type of SUDS and management.	Sites exceeding 1 hectare	<ul style="list-style-type: none"> • SEP policy CC2 (iii) & NRM 3 (ii) • CSH SUR 1 (mandatory) • BREEAM Offices/Retail/Industrial/Multi-residential P07 (pollution) • Bracknell Forest Council Strategic Flood risk Assessment
7.	Show how adaptation to microclimate is considered through design principles and the use of shading.	All. Car parks with more than 10 spaces must consider shading.	<ul style="list-style-type: none"> • Core Strategy Spatial Objective L • SEP policy CC2 (ii)

No.	Summary of information	Scale	Links to Policy and Best Practice
8.	Demonstrate there is adequate storage for waste and recycling containers.	All	<ul style="list-style-type: none"> • Core Strategy Policy CS13 (para 139) • SEP policy Policy W2 • CSH Was 1 (mandatory) • BREEAM Offices/Retail/Industrial/Multi-residential MW 12 (Materials)
9.	Set out an assessment of the feasibility of green roofs in the scheme.	All	<ul style="list-style-type: none"> • Core Strategy Policy CS1 (Viii) & 7(iii) & 10 • CSH Eco 2
10.	Show the measures included to enhance biodiversity.	All	<ul style="list-style-type: none"> • Core Strategy Policy CS1 (Viii) , 7(iii) and CS10 • SEP policy NRM4 • CSH Eco 1 & 2 • BREEAM Offices/Retail/Industrial/Multi-residential LE 03, 04 & 05 (Land use)
11.	Demonstrate the ratings of materials used, as set out in the BREEAM Green Guide to Specification. Materials should all be Rating B and above, with over 60% A rated.	Full or reserved matters applications.	<ul style="list-style-type: none"> • Core Strategy Policy CS 10 • SEP policy CC4 (iii) • CSH Mat 1 (mandatory) • BREEAM Offices/Retail/Industrial/Multi-residential MW01 (Materials) • BREEAM Offices/Retail/Industrial/Multi-residential M 04 (Management)
12.	Indicate how site waste will be managed to: <ul style="list-style-type: none"> • Maximise reclamation of materials following demolition; • Demonstrate the % of construction materials which are from recycled or reused content; • Demonstrate the % of local reclaimed or recycled materials to be used in road construction. 	Full or reserved matters applications. Major developments (see page v) must also produce a Site Waste Management Plan.	<ul style="list-style-type: none"> • Core Strategy Policy CS 10 & 13 • SEP policy CC4 (iii) • CSH Mat 2 & 3 • BREEAM Offices/Retail/Industrial/Multi-residential MW05, MW06 & MW07 (Materials)
13.	Maximise the % of locally sourced materials (i.e. within 35 miles of the site).	Full or reserved matters applications.	<ul style="list-style-type: none"> • Core Strategy Policy CS 10 & 13 • CSH Mat 2 & 3

No.	Summary of information	Scale	Links to Policy and Best Practice
14.	Show that all timber, timber products and engineered boards (e.g. plywood) are Forest Stewardship Council (FSC) certified or equivalent.	Full or reserved matters applications.	<ul style="list-style-type: none"> • Core Strategy Policy CS 10 • CSH Man 3 (assessment criteria F) • BREEAM Offices/Retail/Industrial/Multi-residential M 05 (Management)
15.	Show the measures included to prevent light pollution.	Full or reserved matters applications.	<ul style="list-style-type: none"> • Core Strategy Policy CS 10 • BREEAM Offices / Retail / Industrial / Multi-residential: HW 05 and HW 06 (Health and Wellbeing)
16.	Show the measures included to minimise adverse impacts of noise.	Full or reserved matters applications.	<ul style="list-style-type: none"> • SEP policy NRM 8 • CSH Hea 2 • BREEAM Industrial: P 13 (Pollution)
17.	Include details of all insulation materials and demonstrate that foamed insulation materials have a GWP of less than 5.	Full or reserved matters applications.	<ul style="list-style-type: none"> • Core Strategy Policy CS 10 • SEP policy NRM 7 • CSH Pol 1 & 2 • BREEAM Offices/Retail/Industrial/Multi-residential P 01 & 04 (Pollution)
18.	Show that new gas boilers produce low levels of NO _x .	Full or reserved matters applications.	<ul style="list-style-type: none"> • Core Strategy Policy CS 10 • SEP policy NRM 7 • CSH Pol 2 • BREEAM Offices/Retail/Industrial/Multi-residential P 06 (Pollution)
19.	Set out any measures to reduce water pollution, such as reed beds.	All	<ul style="list-style-type: none"> • Core Strategy Policy CS 10 • SEEDA Sustainability Checklist: Question 6.8 • CSH Man 2 • BREEAM Offices / Retail / Industrial / Multi-residential: M 05 and HW 06 (Management)
20.	Include a contaminated land assessment and a remediation strategy where relevant	Major developments (see page v)	<ul style="list-style-type: none"> • CSH Man 2 • BREEAM Offices/Retail/Industrial/Multi-residential LE02 (Land Use)
21.	Include details of an accredited site environmental management system.	Major developments (see page v)	<ul style="list-style-type: none"> • CSH Man 2

PART 2 – SUSTAINABILITY TOPICS

SECTION 3: SUSTAINABLE DESIGN

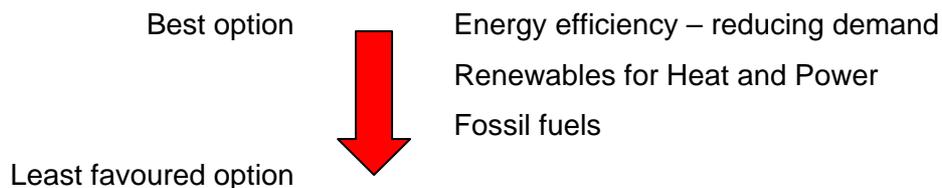
3.1 Energy Efficiency

Aim: To reduce the demand for energy

Background

As previously stated, the energy used in constructing, occupying and operating buildings represents approximately 50% of greenhouse gas emissions in the UK, with the majority of the related energy consumption occurring during the operation of a building.

Energy use in buildings should minimise emissions of carbon dioxide in accordance with the widely recognised energy hierarchy, which gives priority to reducing the demand for energy by minimising energy use and promoting energy efficiency.



The major factors in reducing demand are through building design and improving the operation of buildings. For example, incorporating energy efficiency principles in the early design of new development can considerably reduce the demand for energy for heating, lighting and cooling and as a result reduce CO₂ emissions.

The remaining demand for energy should be supplied in the least environmentally damaging way possible, for example through renewable energy (see section 3.2, page 24). Increasing the energy efficiency of a building reduces its overall energy requirement and so makes it easier for a proportion of its energy demand to be met by on-site renewable energy production.

Development proposals will be required to demonstrate how the design has maximised the opportunity to incorporate current best practice in energy efficiency and energy conservation into their design, layout and orientation.

Technologies are also available which make the most efficient use of required energy, for example Combined Heat and Power and Ground Source Heat Pumps.

There are statutory requirements relating to energy efficiency arising from Parts L1A and B and L2A and B of the Building Regulations 2006. These Regulations require that reasonable provision shall be made for the conservation of fuel and power in buildings by limiting heat gains and losses and they set out minimum energy performance requirements. In addition, the European Directive of Energy

Performance in Buildings (EU Directive 2002/91/EC) states that new buildings with a total useful floor area over 1,000m² must consider the technical, environmental and economic feasibility of alternative energy systems before construction starts.

It is not the intention of this document to duplicate the requirements of the Building Regulations. This SPD aims to extend the requirement for energy efficiency to the operation of the building and to set out circumstances where energy efficiency can exceed those set out by statutory requirements.

Implementation

The following issues should be addressed in an assessment of energy efficiency:

- How the development has been designed to optimise the use of energy from the sun (**passive solar gain**);
- How the development has been designed to optimise controlled **natural ventilation**;
- How the design of the building will make **efficient use of energy**, for example through the use of materials with a high thermal mass or levels of insulation;
- How energy will be generated in the most efficient way, for example through Combined Heat and Power;
- How the choice of energy-efficient appliances can result in a reduction in energy use and systems during the development's operation, where these are fitted.

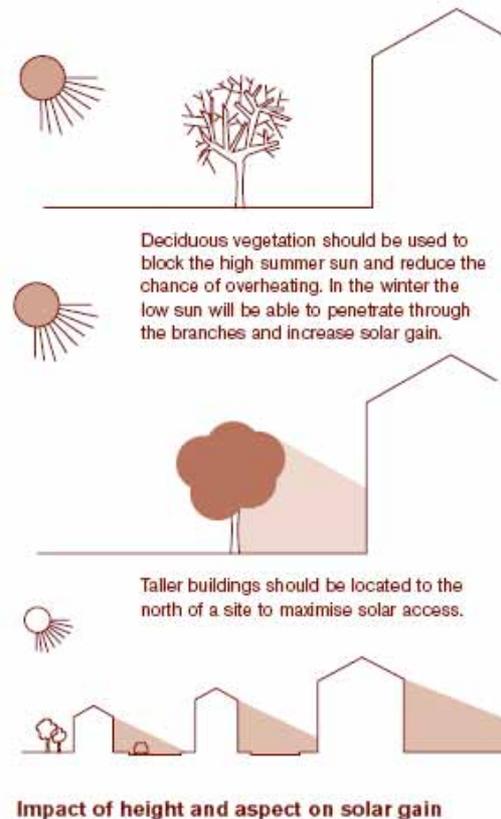
Passive Solar Gain

The need for artificial light, heat, cooling and ventilation can be reduced by designing a layout which takes advantage of natural heat and light from the sun (known as 'passive solar gain') and uses air movement for ventilation.

A combination of passive solar and energy conservation measures can reduce a new building's conventional heating requirements by 50% to 80%⁶.

Different approaches are required depending on the size and use of buildings, but all should consider how the principles of passive solar gain could be applied as outlined in the following sections on site layout, landscaping, building design, natural daylighting and materials used.

⁶ Centre for Alternative Technology



Site Layout

Key principles to be considered when addressing the layout of a development site:

- East-west alignment of roads will enable the optimal orientation of houses for passive solar gain, i.e. within 30° of south as described in the following section.
- On north-south roads, detached units provide greater flexibility for maximising solar gain. In this case plots should be set at an angle (e.g. northeast-southwest) for maximum passive solar gain.
- Apartments are likely to be most appropriately located to the areas north of access roads, with houses to the south to ensure south-facing private gardens and main living rooms can be balanced with privacy and screening.
- Over-shading should be minimised by locating taller buildings to the north of the site, or to the south of road junctions, open spaces or car parks.
- Car parking and garages should be located to the north of housing.

Landscaping

Existing trees and new planting can assist when planning for passive solar energy, however care must be taken to avoid overshadowing, and obstruction of sunlight. A site plan should consider:

- Use of land over-shadowed by tall trees for parking (where the shading may be beneficial in summer);
- Placing shelter belts to the south-west of development and distanced 3-4 times their mature height from south-facing elevations;
- Trees that will grow above the shadow line should be deciduous as they allow sunlight to pass through when at a low angle in winter and provide beneficial shading in summer.

Building design

The implementation of passive solar design in individual buildings need not be significantly different in construction or appearance to conventional housing. The key principles to follow are:

- Keep the main orientation of the building within 30° of south - development orientated east of south will benefit more from morning sun, while those orientated west of south will catch late afternoon sun delaying the evening heating period.
- Design frequently used rooms, which require the most heating, on the south side of the dwelling (i.e. living room).
- Rooms that contain machinery or equipment that generate heat should also be located on the northern sides of buildings. North facing rooms should have smaller windows to minimise heat loss.
- To minimise the requirements for additional space heating, elevations to the south should have increased areas of glazing compared to those facing north. Windows should be large enough to provide adequate day lighting - at least 15% of a room's floor area.
- A responsive, programmed and zoned heating system can automatically cut in when and where necessary.
- Avoid the use of high pitched roofs which overshadow neighbouring buildings.
- Arrange internal layout to distribute solar energy gains using through-rooms.
- Conservatories or sun-spaces (glazed elevations within conventional walls) should be carefully designed to: ensure effective distribution of heat around the home; to avoid heat loss through large glazed areas (e.g. through the use of low-e glazing); to avoid heat loss through the ability to thermally isolate a conservatory from the rest of the house; and, to prevent overheating in summer.

Natural daylighting

Natural daylighting is the controlled entry of natural light into a building through windows, skylights, atria, and other building envelope components. In larger commercial offices as much as 40% of energy costs can be accounted for by lighting so good access to natural light should be a key design parameter. In addition to significantly reducing overall energy consumption, natural light also offers occupants a pleasant living and working environment.

A properly designed daylighting system should distribute daylight evenly and avoid glare and overheating. The daylighting benefits of large areas of glazing need to be considered against thermal loss and other properties of glazing.

Design features to avoid excessive solar gain should be incorporated such as moveable shutters and external blinds to provide shade in high summer sun but still allowing maximum daylight.

Natural Ventilation

With predicted increases in summer temperatures, building design will need to ensure there is adequate cooling to prevent excessive solar gain resulting in uncomfortable internal temperatures. In addition, some buildings may need to reduce the risk of overheating, for example offices with IT equipment giving off heat.

Natural ventilation should be used in preference to conventional mechanical air cooling systems which generate high energy demands and in some cases rely on refrigerants that are far more harmful to climate change than CO₂.

Natural ventilation can be increased by a variety of measures:

- Cross ventilation – openings on opposite walls (or even adjacent walls) can draw air through a space or roof-mounted turbines can draw air in through the top floor windows to reduce overheating in the summer. Windows should be openable and trickle vents or other such devices should be installed to provide controllable background ventilation.
- The 'passive stack effect' and pressure differentials bring cool fresh air from outside the building without the use of mechanical systems.
- Neutral solar control glass to minimise solar heat gain in the summer whilst maximising natural daylight.
- Mechanical ventilation may be required to supplement natural ventilation. This can be very energy efficient, requiring only small levels of energy to run, yet achieve significant benefits in a development. This may be through motorised windows which open and close automatically using a thermostat.

Thermal mass

Materials with a high thermal mass (e.g. concrete) can buffer against heat fluctuations and provide cooler conditions in summer. Using such materials within the masonry walls can allow the sun to be 'soaked up' during daylight hours and released into the building at night. This will prevent overheating during the summer and avoids cold conditions during the winter.

Generally, heavy materials such as stone and concrete have a high specific heat capacity whilst more lightweight materials such as wood have a lower specific heat capacity.

Green and brown roofs can also provide buildings with greater thermal mass, i.e. prevent heat loss in winter as well as keeping buildings cool in summer. A green roof is one that has been surfaced with a growing medium, with vegetation on top of an impermeable membrane. Brown roofs work on the same concept but with a broken substrate, e.g. broken bricks replacing the organic growing medium. See section 3.7 (page 44) for further details.



Insulation

To maximise energy efficiency, the heat losses from the building envelope must be kept to a minimum. Heat loss can be prevented by applying high levels of insulation to the roof, walls and floors. Insulation can also be improved through the joining of units to increase the thermal mass (as above) and reduce heat loss through exposed walls. Heat loss from windows can be further reduced through double or triple glazing; however, adequate ventilation is essential to avoid condensation problems.

Combined heat and power

Combined heat and power plants (CHP) or trigeneration of cooling, heating and power (CCHP) can use fuels such as wood, gas and coal in a way which considerably improves the energy efficiency of developments. CHP units generate electricity through an engine and capture the by-product, combustion heat, for use in heating and hot water systems. They can reach 85% efficiencies as opposed to 30% from traditional electricity generation where the heat is wasted.

With this in mind CHP or CCHP plants require a relatively large and constant demand for heat or cooling to be effective. They are therefore seen as suitable for a community energy scheme serving a large number of properties. In particular tall residential blocks often have inefficient electric heating due to the stringent safety and ventilation requirements for gas supply, so a CHP can offer considerable improvements in efficiency over such heating types. Opportunities for CHP can also be exploited in large buildings (offices, shopping centres), hospitals, leisure centres and refurbished buildings. CHP works most effectively as part of mixed-use developments that include residential, as they balance heat and power needs through the daily cycle.

Opportunities to extend new CHP/CCHP schemes to serve adjoining areas and to link with other schemes should be sought. Energy savings from CHP/CCHP should be included with other energy efficiency savings before renewables are considered.

Micro CHP/CCHP is the production of heat and/or electricity on a small scale. This uses emerging technology, which enables the benefits of combined heat and power to be made available at the domestic level. It involves the replacement of a traditional boiler with a gas fired micro CHP generator, which can provide a house with all its heating needs and a significant proportion of its electricity needs. The house would remain connected to the National Grid to supplement the electricity not provided by

the CHP unit. Micro CHP can work at 90% efficiency, helping to reduce energy costs to the consumer and reduce carbon emissions. However, this is still in developmental stages and is only suitable where there is a constant heating and hot water requirement.

Information required

A Sustainability Statement submitted with a planning application will be expected to provide details of how the proposal has addressed energy demand. The level of information needed will depend if an outline, reserved matters or full application is being made.

In general this information must include:

- An assessment of the **energy demand** of the proposed development, including all on-site energy requirements, such as street lights, car park lighting, heating and lighting of communal areas and lifts;
- Key energy efficient design measures;
- Heating and cooling system incorporated (including outcome of CHP/Trigeneration feasibility study);
- Choice of renewable energy technology (see section 3.2).

Full details of the requirements are set out in Section 2.3 (page 9).

Links to:

Building Regulations Part F: Ventilation and Part L: Conservation of fuel and power

3.2 Renewable Energy

Aim: To increase the use of renewable energy

Background

Renewable energy is that which is generated from resources that are unlimited, rapidly replenished or naturally renewable such as wind, water, sun, wave and refuse, and not from the combustion of fossil fuels.

Renewable energy provision within a development can make a significant contribution to the overall energy supply. At present approximately 80% of the world's CO₂ emissions comes from the burning of fossil fuels. Using renewable energy helps to ensure that no net greenhouse gases are released which contribute to climate change.

This use of renewable energy has other benefits which should be considered including:

- Reducing reliance on fossil fuel and potentially lowering of energy bills;
- Providing possible backup if fossil fuel supply fails;
- Improving business 'green' credentials;
- The potential to provide capacity to sell renewable electricity to a distributor;
- Support the benefit of the local economy through developing supply chains.

The development of renewable energy can be part of a stand-alone scheme or incorporated into a development.

Implementation

Development in the Borough needs to demonstrate that it generates some of its energy demand from renewable resources and meets the minimum policy thresholds and targets as set out in CS12 (see Appendix 1). Only where an applicant can satisfy the Council why the higher target of 20% if relevant cannot be achieved will the lower target of 10% be applied.

The following considerations need to be addressed in any development proposals:

- The feasibility of all technologies outlined in this document, both technically and commercially;
- The percentage of renewable energy to be achieved and by what mix of technologies;
- The impact on noise levels, air pollution and visual amenity, including the impact on any designated sites.

Technologies for consideration

The technologies in the table below should be considered and evaluated for the sites specified. This list is not prescriptive and other renewable technologies may be considered by developers. Not all technologies will be suitable for all sites and a mixture is often the most feasible solution.

Table 3. Summary of technologies appropriate to Bracknell Forest

Development type	Area (m ²)	Photo-voltaics	Solar collector	Small scale wind	Local biomass	Central-ised biomass	CHP / CCHP
Single domestic property	85+	✓	✓	?	✓	x	?
Block of flats	3,000+	✓	✓	✓	✓	x	?
Multiple blocks of flats	5,000+	✓	✓	✓	✓	✓	?
Mixed domestic development	2,000+	✓	✓	✓	?	✓	x
Small commercial	1,000+	✓	?	✓	?	✓	x
Large commercial	30,000+	✓	?	✓	✓	✓	?
Mixed use	100,000+	✓	✓	✓	✓	✓	✓
Educational	12,000+	✓	✓	✓	✓	?	x

Key:

- Appropriate technology to be considered ✓
 Technology not appropriate X
 Technology may be appropriate depending on circumstances ?

Photovoltaics

Photovoltaics (PV) convert energy from the sun into electricity. They can supply energy to the building on which they are located or to the grid.

The following may be considered when assessing the feasibility of photovoltaics:

- PVs are relatively straightforward to install and integrate into schemes;
- They are technically reliable and easy to obtain;
- PVs provide a visual commitment to renewable energy;
- They allow for the avoidance of the climate change levy on non-domestic buildings;
- They can be integrated into the design of the building and add to architectural quality;
- PVs are generally low maintenance;
- They are suitable for all types of development – retail, housing, office and leisure;
- The performance of the technology is dependent on location and orientation of development. Sites may not always be suitable;
- Payback periods of photovoltaics can currently exceed their lifetime;
- They can only provide part of a site's electricity requirements.



Solar Water Heating

Solar water heating can provide hot water at temperatures between 55°C and 65°C. Solar panels absorb energy from the sun and use heat exchangers to heat water. The equipment is usually mounted on the roof.

The following may be considered when assessing the feasibility of solar water heating:

- Solar panels require a south facing or flat roof of a suitable size (not usually suited to small buildings);
- The technology is reliable and easy to obtain;
- Buildings must be able to obtain a hot water supply sufficient for their needs;
- The technology may be costly to integrate with water services in commercial properties;
- Solar water heaters can be designed discretely into new build properties.

Wind

Wind turbines produce electricity by capturing the natural power of the wind to drive a generator. There are three types:

- Large-scale – usually in ‘wind farms’ in remote areas and electricity is exported to the grid;
- Freestanding – smaller turbines providing on-site generation, usually in non-residential areas;
- Building-mounted wind turbines – usually on the roof of buildings to provide on-site generation.

Wind provides an intermittent supply of electricity and does also require connection of the site to the grid. There are currently no large-scale wind turbines in Bracknell Forest.

The following may be considered when assessing the feasibility of wind turbines:

- Large-scale and freestanding wind turbines are a proven technology (building mounted turbines are still developing);
- They are widely available, especially small scale turbines;
- They provide a visual commitment to renewable energy;
- Wind power is demonstrated as a cost effective technology on suitable sites;
- The maintenance of turbines is low;
- Wind speed of a site needs to be suitable;
- Impacts of noise and flicker need to be considered;
- Visual impact can cause local opposition;
- Landscape designations may affect viability.



Ground Source Heat Pumps

Ground source heat pumps use the natural constant high volume/low level heat of the ground below the surface and convert it into low volume/high grade heat using heat pumps. This can be then used to heat space and water in dwellings.

The following may be considered when assessing the feasibility of ground source heat pumps:

- Ground source heat pumps are economic on a higher density scheme;
- There are no visual issues as the system is underground;
- They can be integrated into design of new buildings for most efficiency;
- Ground source heat pumps are only suitable in certain ground conditions (using deep boreholes or shallow trenches);

- Their cost is dependent on length and depth of pipes to be installed;
- Heat pumps require more maintenance than other technologies;
- Heat pumps use electricity to convert the state of the heat and as such are not entirely renewable in their own right.

The Environment Agency issues guidance on the implementation of ground source heat pumps within Section 10 of '*Groundwater Protection: Policy and Practice: Part 4*' (available at www.environment-agency.gov.uk).

Biomass

'Biomass' refers to a wide variety of organic material, which can be used for the generation of heat and electricity. Biomass can be burnt directly to provide heat to buildings or be used for CHP schemes. Fuel is obtained from forests, urban tree pruning, farmed coppices or waste. Fuel is most commonly in the form of pellets or wood chips. Biomass is considered carbon neutral as the carbon dioxide emitted during the burning process is balanced with the carbon dioxide absorbed during the growth of vegetation.

As with other fuels, biomass needs to be purchased and therefore commercial viability is affected by local supply chains. Supply chains are still emerging but their development can have considerable benefits for the local economy. There are existing supply chains for the Bracknell Forest area. A local supply is important or else the environmental impacts arising from transportation of the biomass can outweigh the benefits arising from this renewable energy source.

Direct combustion systems can be used across all types of developments, including single domestic properties. The limiting factors include the space required for the combustion plant and storage facilities.

The benefits of combined heat and power are outlined under energy efficiency. At present, most CHP and CCHP schemes are not based on renewable technologies, but are gas or waste fired. Biomass CHP requires the same heat demand as larger, conventional, district energy based CHP. If CHP (both micro and district) is developed based on fossil fuels, the infrastructure should be future-proofed to enable conversion to renewable technologies as markets develop.

District biomass CHP is generally commercially viable based on larger developments. Where significant future development is planned but a district biomass scheme is not seen as feasible due to the current commercial and technical climate, consideration should be given to designing buildings and developments with the necessary infrastructure to connect to district CHP schemes, should they be developed in the future.

The following may be considered when assessing the feasibility of biomass:

- Payback can be short for biomass CHP under the right commercial conditions;
- The use of biomass fuel supports the local economy through developing supply chains;
- Use of the technology is dependent on local fuel supply;
- Storage and provision for ash disposal needs to be considered as part of development proposals;
- Local opposition may arise to the flue required for the emissions;

- Biomass CHP is only viable where there is a high heat demand, such as on a large mixed-use scheme;
- Higher maintenance than other technologies although ESCo⁷ solutions can negate this cost;
- The reliability of emerging biomass CHP technology has yet to be fully demonstrated;
- Technology must comply with legislation such as the Clean Air Act (1993).

Other Issues to be considered in development proposals

As part of development proposals, the quota for renewable energy must be provided on-site or from local and interconnected (such as in the case of biomass CHP) sources. Connected facilities should supply renewable energy to the development and not just provide an electricity connection to the grid. The purchase of green energy from the grid will not contribute towards meeting the targets for renewable energy provision.

Developments must provide for 'at least' the percentage of renewable energy required under the policy but higher percentages are welcome.

The application of energy efficiency measures outlined in section 3.1 should be considered before establishing the baseline of energy demand. This baseline should then be used to calculate the percentage of energy to be achieved from on-site renewable energy. Developers can reduce the overall amount of energy required through energy efficiency to reduce the quantity of energy provided from renewable sources. Assessments should be based on predicted energy use and not consider the retrospective application of renewable technologies. The contribution of non-renewable sources to support the application of renewable energy technologies (such as the use of electricity to power ground source heat pumps) needs to be excluded from the renewable energy calculation, but included in the baseline energy calculation.

Consideration should be given to the technical and commercial constraints of incorporating renewable energy technologies. Development proposals will be required to demonstrate that they have considered the use of all technologies in this document and carried out an assessment of their feasibility. The use of a mixture of technologies may be more viable. If the renewable energy requirements cannot be met on-site, the opportunities for near-site provision should be assessed as part of a package of measures.

As set out in section 2.5, detailed justification will be expected from developers who do not consider it viable to provide the required proportion of renewable energy in the policy. The justification will need to demonstrate that the inclusion of renewable energy will:

- Jeopardise the viability of an entire development;
- Place an undue burden upon the developer; or
- Be unfeasible in technical terms.

It is the responsibility of the developer to provide evidence as to why the policy cannot be met.

⁷ Energy Services Company – this aims to implement measures which reduce energy consumption and costs in a technically and financially viable manner.

As part of development proposals, consideration should be given to innovation and the wider benefits of renewable energy development. This may include consideration given to future-proofing developments (e.g. developing gas-fired CHP which can be upgraded to renewable energy technologies as they emerge) and the broader effects on the local economy of incorporating renewable energy. Development proposals should also outline any innovation in the area of renewable energy, especially where this may impact on the quota required under policy CS12 (see Appendix 1). The Council will be flexible on renewable energy requirement where innovation and a genuine commitment to lower carbon emissions are demonstrated, for example through the use of a district CHP scheme.

Information requirements

The strategic context for the following requirements is set by adopted thresholds and standards within Core Strategy Policy CS12: Renewable Energy. The full text of this policy is available in Appendix 1.

Applicants must ensure that, as a minimum, the quota of renewable energy outlined in the policy is achieved on-site (or locally if better suited to chosen technology). The policy for the incorporation of renewable energy states that development proposals of five or more dwellings, or more than 500 m² gross external area (GEA) for other development, needs to provide at least 20% of the energy from on-site renewable generation. Only where the developer can satisfy the Council that the 20% target cannot be achieved will the 10% target be applied. Developments for less than five net dwellings or 500 m² GEA of floor area for other development will provide at least 10% of their energy requirements from on-site renewable generation.

See section 2.3 for further details, but in summary the Sustainability Statement must include:

- An assessment of the energy demand of the proposed development incorporating all energy efficiency measures;
- The percentage of energy to be provided from on-site renewable generation;
- An explanation of the feasibility study of all of the renewable energy technologies outlined in this document, including technical and commercial viability. These must be based on a site/project specific analysis;
- The proposed choice of renewable energy technology based on the feasibility studies and its contribution to meeting the policy;
- Consideration given to visual, noise and air pollution and compliance with relevant legislation and protection of designated sites (the use of wind and biomass production proposals should be informed by the landscape character assessment and environmental impact assessment if required). This information may already be provided within a separate document to which the Sustainability Statement should cross-refer.

If the minimum target for renewable energy provision cannot be achieved, applicants must clearly demonstrate why, clearly identifying the technical and commercial barriers on a site/project specific basis. This must include clear evidence of why it will jeopardise the viability of a scheme or place an undue burden on the developer.

Proposals should also assess the wider benefits of incorporating renewable energy, especially for stand-alone schemes or where flexibility on the policy requirement is proposed.

Further Information:

Thames Valley Energy - www.tvenergy.org

Ground Source Heat Pump Club - www.nef.org.uk/gshp

British Wind Association - www.bwea.com

British Photovoltaic Association - www.pv-uk.org.uk

Solar Trade Association. www.solartradeassociation.org.uk

'Integrating renewable energy into new developments: Toolkit for planners, developers and consultants' -

http://www.london.gov.uk/mayor/environment/energy/renew_resources.

Renewable Energy Sources, Opportunities for Business - www.carbontrust.co.uk

3.3 Water efficiency

AIM: To minimise the consumption of water

Background

Water is a precious and finite resource. Domestic water consumption has increased 70% in the past 30 years and is now, on average, over 150 litres per person per day⁸. This water is purified to very high standards using high levels of chemicals and energy, yet a third of this water is just for flushing the toilet, whilst another third is used for washing clothes, cleaning and watering the garden.

The need for reducing the demand on water supplies has become more apparent recently with the South East experiencing water shortages, particularly during the dry summer months, coupled with increases in housing growth in the region.

Climate change is predicted to result in climatic extremes, leading to hotter, drier summers. In addition to a reduced rainfall, an increase in temperature may further increase domestic water use, for example for laundry and garden watering. As a result, water conservation and efficiency should be an increasing priority.

The main areas of water consumption in new developments are:

- Water consumed within buildings for the purposes of drinking, washing and flushing toilets;
- Water use for watering plants, irrigating, landscaping and washing cars.

Energy is also needed to process and pump water, so improving water efficiency can have the positive knock-on effects of saving energy.

Implementation

Water efficiency measures can be designed into new developments as well as renovations and conversions. To illustrate, in commercial and domestic buildings the demand for water can be reduced by as much as 50% using a variety of simple and innovative strategies that are integrated into the plumbing and mechanical systems, as well as the design of the building and its surroundings.

⁸ www.ofwat.gov.uk

Incorporating water saving devices

Appropriate specification of water efficient bathroom and kitchen appliances can help to achieve major savings in water consumption throughout the life of the building.

- **Dual / low flush toilets** – water regulations require that new toilets have a maximum flush of only 6 litres, although best practice dual-flush toilets can have flush volumes as low as 4 and 2 litres.
- **Waterless urinals** – standard urinals use around 6-10 litres of water to flush, waterless urinals use none. Waterless urinals can be retro-fitted to replace existing flushing systems. Buildings with high occupancy rates such as schools, hotels or offices benefit quickly from the installation of waterless urinals. In addition to saving significant volumes of water, they are also very low maintenance as they have no mechanical components. Urinals with high levels of usage can offer savings of more than £1,000 a year.
- **Taps** – spray and low flow taps, self-closing or infrared controlled taps and flow restrictors are cost-effective and easy to fit. They need to be set to ensure minimal consumption of water per use.
- **Water-saving white goods** – low water use alternatives and economy options should be selected where available for washing machines and dishwashers.
- **Bathing** – showers (excluding power showers) use less than half the water needed to take a bath. Specification of aerated spray and low flow showerheads will reduce water consumption further. An alternative is the installation of low volume baths.

Rainwater Harvesting

Rainwater harvesting is the collection of water that would otherwise have gone either into the drainage system, into the ground or been lost to the atmosphere through evaporation. Where possible, harvested rainwater should be substituted for mains water as this reduces demand on mains water use.

A rainwater harvesting system can be complex, or as simple as a water butt which collects rainwater from a downpipe to use on gardens. A typical example of a more sizeable system would be rain collected from a medium/large surface area, such as a roof or driveway, which is filtered and collected in a storage tank (usually underground). This water can supply toilets and outside taps for watering plants/gardens, topping up ponds, and for general cleaning tasks such as car washing. Sustainable Urban Drainage Systems (SUDS) can also be integrated with rainwater harvesting schemes and can be designed to provide water attenuation during storms. Further information on water harvesting methods can be obtained from the Environment Agency (www.environment-agency.gov.uk).

Rainwater harvesting systems can be installed in both new and existing buildings, and the resulting water used for all purposes except drinking.

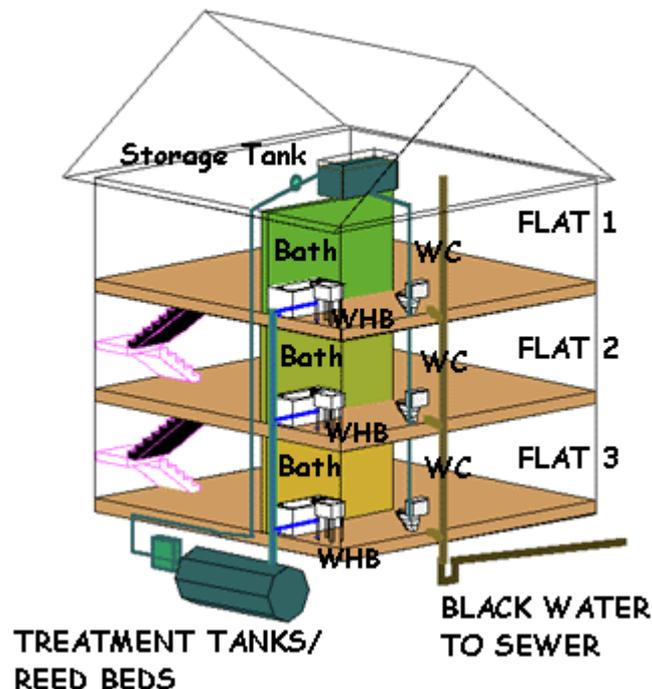
Systems should also be connected to the mains supply to ensure that water is always available, even at times of low rainfall.

Greywater Recycling

Greywater is water that has already been used in washbasins, showers and baths. This can be filtered and disinfected on-site and used again in toilet flushing and other non-potable activities (e.g. watering the garden or washing the car). It cannot be

used for drinking, washing, cooking and food production, therefore dual potable and non-potable systems should be considered to keep these uses separate.

Proposed Grey Water System



Blackwater Recycling

It is also possible to recycle blackwater (water used for toilet flushing and washing up) by passing it through a blackwater recycling system that breaks down solids and purifies the water ready for reuse for non-potable uses. Blackwater recycling has high maintenance costs, and can be impractical to use on confined sites or sites of less than 150 properties, although it can be suitable for larger developments.

Both grey and blackwater systems should be checked for functionality and certified safe.

Designing low water use landscaping / gardens

At the design stage of both residential and commercial developments, the operational demand for water can be reduced by careful consideration of cleaning and watering needs. For example:

- Plant dry or low water use gardens and landscaping. This can be achieved by working with or imitating the existing natural vegetation (on either brownfield or greenfield sites), selecting drought-resistant plants, or using water-retaining mulches.
- Automatic drip irrigation systems are water efficient and cost-effective solutions that provide regular watering as required depending upon weather conditions.
- Where water features such as fountains are used, they should be closed systems recycling water.

Information requirements

Applicants are encouraged to incorporate water efficiency measures wherever possible in their developments.

Given the regional pressure on water resources, the Council requires that **residential developments are designed to achieve an average water use in new dwellings of 105 litres/capita/day**. This exceeds proposed building performance standards and is equivalent to Level 3 under the Code for Sustainable Homes. It is recommended this is calculated according to the methodology used in the Code for Sustainable Homes.

For non-residential uses, applicants are required to exceed current statutory requirements and indicate the percentage improvement beyond this minimum requirement which is likely to be achieved. This can be against benchmarks provided by CIRIA and the BREEAM water calculator should be used for estimating any savings.

Planning applications must provide a schedule of the measures to be included in a development to achieve this standard. The implementation of these measures will be a condition of the planning application.

If an outline application is being submitted, basic information and commitments to good practice targets should be made, with further detail of the measures proposed to meet these targets provided at the reserved matters stage. For a full application, all of this information should be submitted.

If water-saving measures are not included, the Sustainability Statement must show, to the Council's satisfaction, why these are not appropriate. This should include provision of a feasibility study on the potential to incorporate grey water recycling at the design stage.

Further information:

Reclaimed Water KS1 (CIBSE, 2004)

A Toolkit for Delivering Water Management and Climate Change Adaptation through the Planning System. (SEERA/Environment Agency, 2005)

Guidance on the Integration of Biodiversity and Water Attenuation (CIRIA, 2005)

Environment Agency Factsheet (2001) Conserving Water in Buildings

KPIs for water use in hotels and offices - <http://www.ciria.org>

Envirowise - <http://www.envirowise.gov.uk/>

UK Rainwater Harvesting Association - www.ukrha.org

Links to:

- Code for Sustainable Homes: Wat 1 (Internal Potable Water Use) and Wat 2 (External Potable Water Use)
- SEEDA Sustainability Checklist: Question 6.7
- BREEAM Offices / Retail / Industrial / Multi-residential: W 01 onwards (Water)

3.4 Flooding

Aim: To provide Sustainable Urban Drainage Systems (SUDS)

Background



The traditional drainage method of removing water from a site as quickly as possible causes a range of potential impacts such as:

- Increasing flooding downstream through sudden rises in water levels and flow rates;
- Increasing sewer flooding, which can in turn result in pollution of watercourses;
- Accumulations of contaminants in surface runoff leading to poor water quality;
- Depleted groundwater if rainfall is diverted by piped systems.

Conversely, SUDS aim to move rainwater to an identified discharge point by practices and/or structures to ensure impacts on water quantity (flooding), water quality (pollution) and amenity (e.g. biodiversity) are balanced. This provides a much more holistic approach to drainage management than traditional methods.

The benefits of SUDS are:

- Reducing overall quantity of water flowing into watercourses or sewers from developed sites reduces flood risk from peak flows;
- Improving water quality by removing pollutants from diffuse sources, preventing watercourse pollution during construction and use;
- Improving amenity value and nature conservation value of developments over 1 hectare by providing additional open space and creation of new habitats to enhance biodiversity, e.g. wetlands;
- Potential cost savings by using natural features, e.g. existing vegetation.

SUDS can be designed to fit into all developments as there are many design options, however different types are appropriate for different developments. The technical considerations resulting in the choice of SUDS are likely to be the type and size of development, the amount and type of pollutants present in the runoff, the size of drainage strategy for the catchment area, the hydrology of the area and infiltration rate of the soil and whether there is a Groundwater Source Protection Zone or contaminated land in the area. SUDS are most cost effective if proposed at the design stage to retain and work with existing natural landscape features. The results

of such technical investigations should be provided to the Council along with the proposals for a drainage system included with the planning application.

Implementation

Construction and Maintenance

In order to ensure that SUDS are successful, they should be considered in the early stages of site design, as retro-fitting cannot realise the most sustainable approaches.

Early consideration must also be given to how the drainage system will be adopted and maintained in the future as it is likely these decisions will influence the design just as much as the technical considerations.

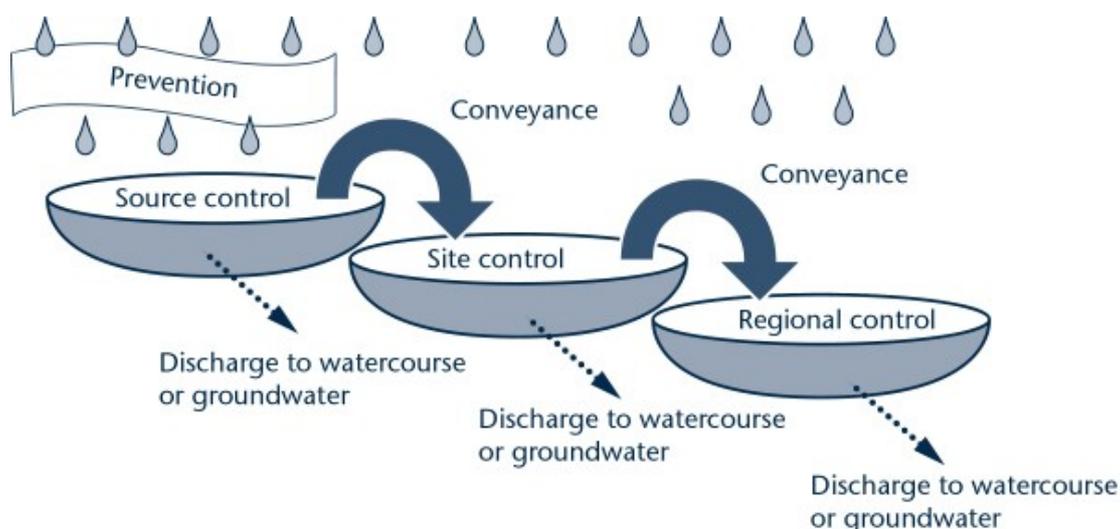
Without a maintenance agreement uncertain responsibilities can result in SUDS becoming less effective over time, for example through silting during construction or use. The Council does not generally take on responsibility for maintaining SUDS.

In addition, consideration must be given to maintaining some flow in existing sewers to avoid blockage.

Types of SUDS

SUDS fall generally into three groups which aim to:

1. Reduce the quantity of runoff from the site (source control techniques e.g. Green Roofs⁹);
2. Slow the velocity of runoff to allow settlement filtering and infiltration. For example, this includes shallow, vegetated channels (e.g. swales) mimicking natural drainage patterns, increasing infiltration and reducing peak flow;
3. Provide passive treatment to collected surface water before discharge into groundwater or to a watercourse, for example at site-level (e.g. soakaway) or regional level (e.g. wetland).



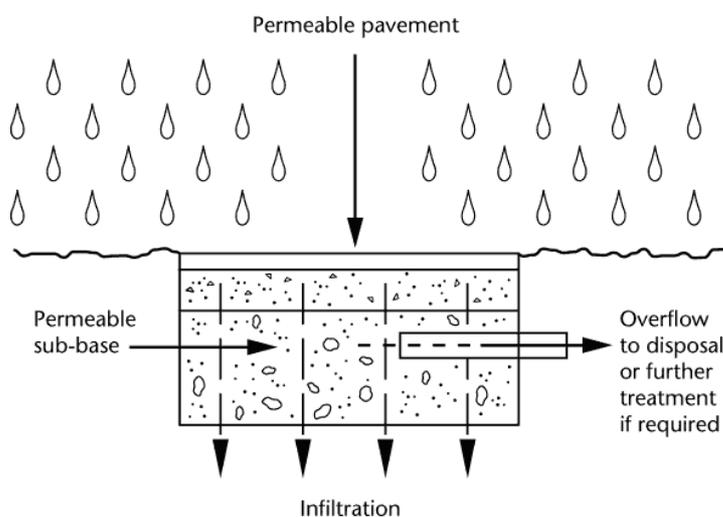
⁹ See biodiversity section for additional information on green roofs.

Source Control Techniques

The preferred option is to reduce the amount of water which reaches a watercourse or sewer; this can be through interception or infiltration measures.

1. Interception

Type	Use
<p>Permeable Pavements - this alternative to conventional paving allows the water to permeate through the hard surface, rather than draining off. The surface and the sub-grade must be designed with this function in mind. The paving can be made from materials such as gravel, grasscrete, purposefully designed concrete blocks or porous asphalt. Dependent upon the permeability of the subsoil, water can either drain direct into the ground, or alternatively can be stored in a reservoir structure under the paving for reuse, infiltration or delayed discharge.</p>	<p>Appropriate for all types and sizes of development</p>
<p>Green roofs - these are discussed in more detail in section 3.7 (page 44). In addition to biodiversity, they offer significant benefits in terms of reductions in the amount of water running off a roof, the rate of runoff and quality.</p>	<p>Appropriate for all types and sizes of development</p>



2. Infiltration

The following types are more appropriate for sites over 1 hectare.

Type	Use
<p>Infiltration trench - this is a shallow, excavated trench that has been backfilled with stone to create an underground reservoir. Storm water flowing into the trench gradually infiltrates into the subsoil. The closer they are to the runoff the more effective they will be. With appropriate management they can be effective in reducing the levels of solids and pollutants by filtering the runoff.</p>	<p>This is most effective in areas where the soil is relatively permeable and there is not a high water table. They usually serve small catchment areas (2-3 hectares). Infiltration techniques may not be effective if the infiltration rate is below 10mm/hr for the upper soil layers.</p>

Type	Use
Infiltration basin - this is a shallow, surface impoundment where storm water runoff is stored until it gradually infiltrates through the basin floor. With appropriate management they can be effective in reducing the levels of solids and pollutants by filtering the runoff.	This is most effective in areas where the soil is relatively permeable and there is not a high water table. They usually serve catchment areas of up to 10 hectare.
Filter (or French) drains - these underground drains move runoff water slowly towards a receiving watercourse. They comprise a trench, filled with gravel wrapped in a geotextile membrane. Water from the development is led to the drain either directly or through a pipe system.	These are commonly used for road drainage. A mix of infiltration systems and filter drains is effective for both residential and industrial developments.
Swales - these are grassed depressions which lead surface water overland from the drained surface to a storage or discharge system, typically using the green space of roadside margins. A swale is shallower and wider than a conventional ditch. Swales can be lined below the soil to protect the aquifer from pollutants.	This provides temporary storage for storm water and reducing peak flows. They can form part of a network within a larger development, linking storage ponds. They are most effective on sites with small gradients and can be designed to mimic natural processes. Swales and ponds are more tolerant of poor soils. In highly permeable soils, wet ponds need to be lined.

Passive treatment systems

These use natural processes to remove and break down pollutants from surface water runoff. They can vary in size.

Type	Use
Filter strips - vegetated section of land designed to accept runoff as overland flow. They should be 5-15m wide and can adapt to any natural vegetation (grassy meadow, wood etc) although dense cover provides better pollutant removal.	Small-scale system, best designed into the landscape area sited upstream of other SUDS. They are best employed in small catchment area (2 hectares) to protect character of water courses. Useful for pollutant removal before discharge to an infiltration system.
Detention basins - these are designed to hold back storm water to allow for settlement of solids and are dry outside storm periods. Drainage is through an outlet.	Appropriate where solids removal is necessary. Management of the outlet must be considered as it can be prone to silting.
Retention ponds - these hold a certain volume of water at all times, although should allow for variation in water levels during storms.	Appropriate in areas where visually attractiveness is important.

Type	Use
	They usually serve catchment areas of up to 5 hectares in an area with a reliable baseflow.
Wetlands - these are enhanced retention ponds which incorporate shallow areas planted with marsh or wetland vegetation. They therefore provide a greater degree of filtering.	They usually serve catchment areas of up to 5 hectares in an area with a reliable baseflow.

Information requirements

PPS25 (see Appendix 1) requires that all planning applications for development proposals of 1 hectare or greater in Flood Zone 1, and all proposals for new development located in Flood Zones 2 and 3, must be accompanied by a **Flood Risk Assessment**.

Surface water flood risk assessment: Applicants must ensure that peak runoff rates and annual volumes of runoff after the development do not exceed the previous conditions for the site; therefore the Sustainability Statement must include relevant data to demonstrate this. This should make an allowance for climate change and have regard to the Strategic Flood Risk Assessment for the Borough; enhancement should be sought wherever practicable.

River flooding: If appropriate, measures should be provided to attenuate 50% in low flood risk areas and 100% in high flood risk areas (zone 3 of the Environment Agency flood maps for river flooding).

SUDS options should be explored on all new developments, and where implemented, the management arrangements must be set out and agreed with the Council.

Further information:

Sustainable drainage systems (SUDS): A guide for developers. Environment Agency - www.environment-agency.gov.uk/developers

CIRIA website - www.ciria.org.uk/suds.

Development and Flood Risk: A Practice Guide Companion to PPS25 - www.communities.gov.uk/documents/planningandbuilding/pdf/324694

Links to:

- Code for Sustainable Homes: Category 4 - Sur 1 (Reduction of Surface Water Runoff from Site) and Sur 2 (Flood Risk)
- SEEDA Sustainability Checklist: Question 6.7 and 6.8
- BREEAM Offices / Retail / Industrial / Multi-residential: W 01 onwards (Water)

3.5 Microclimate

Aim: To adapt to microclimatic changes arising from climate change

Background

Even if significant reductions in greenhouse gas emissions are made immediately, some impacts of climate change are inevitable. Adapting to climate change is therefore an essential part of ensuring our communities remain desirable places to live and work.

Implementation

One of the key elements is adapting to the higher temperatures which are predicted as a result of climate change. Climate change will exacerbate the temperature gradient that rises from the rural fringe to city centres, known as the 'urban heat island' effect. The massing and configuration of buildings can have a significant localised effect on the climatic conditions, funnelling wind or creating suntraps. Design can therefore positively contribute to the temperature gradient and ensure a comfortable microclimate is maintained in built-up areas.

The following design principles should be taken into consideration with regard to microclimate:

- **Provision of urban green space** (trees, grass and shrubs) contributing towards green infrastructure. These have a number of beneficial impacts on the microclimate of our towns and cities where the consequences of climate change will be most severe. By creating daytime shade and evaporative cooling at night, green space can moderate the urban heat island. Green space also reduces storm water runoff, and helps to lower the risk of urban flooding.
- **Orientation of buildings and streets** to reduce excessive solar glare. South facing, enclosed or semi-enclosed areas can trap the sun and become unbearably hot in summer if there is no means for providing shading, given the predicted temperature rise from climate change.
- **Shading** using vegetation or other means can reduce excessive solar gain in outdoor spaces. Efforts to maximise shade in summer will need to take into account the need for light and warmth in winter.
- **Cool pavement materials** in locations with wide expanses of tarmac. Such areas can be excessively hot and contribute to raising the urban heat island effect. Use of lighter coloured materials can increase surface reflectivity and reduce solar heat gain.
- **Passive ventilation** between buildings should be encouraged through the orientation and morphology of buildings and streets.



Other adaptation measures are covered within the sections of this SPD on designing for water efficiency (section 3.3) and flood risk (section 3.4).

Information requirements

The Sustainability Statement must show that adaptation to the impacts on microclimate arising from climate change has been considered. The statement must show how the design principles set out previously have been incorporated.

The statement should identify outdoor locations which may form suntraps due to orientation and degree of enclosure, either at the current time or in the future. This must be supported by proposals for appropriate shading.

The Council requires that all new areas of extensive hard surface, such as any car parks of more than 10 spaces, must show how measures for shading, such as tree planting and other landscaping, have been considered.

➤ *Further information:*

Climate Change Adaptation by Design (TCPA, 2007)

3.6 Designing for waste and recycling

Aim: To provide facilities to recycle or compost household, commercial and industrial waste

Background

Disposing of waste to landfill has numerous environmental impacts, including ecological damage from contaminating landfill sites, depleting resources and contributing to climate change.

The waste hierarchy provides a framework for sustainable waste management:

1. Prevention – i.e. reduce the amount of waste generated;
2. Reuse;
3. Recycling / composting;
4. Recovery (of energy and materials);
5. Disposal - this is the least desirable option within the waste hierarchy.

This applies at all stages of development, design, construction and operation.

Implementation

Designing for Waste

The design of a development is critical to ensure that sustainable waste management can be achieved. Facilities required for residential and commercial waste will be different. Likewise the density of the development will affect the nature of the provision of facilities. However, there are generic principles which should be considered when planning waste and recycling facilities in any type of development:

- Storage areas need to have sufficient space for all the necessary waste and recycling containers;
- Storage areas should be conveniently located with easy access for users;
- Storage areas need to be accessible by vehicles - if not, arrangements will need to be made for bins/boxes to be moved to a point where a collection vehicle can get access.

Current Residential Collection

Bracknell Forest Council provides an alternate weekly collection of refuse, recycling and garden waste for residential properties. One week recycling and garden waste is collected and on the alternate week refuse for landfill is collected. Residents are provided with a 140-litre or 240-litre green wheeled bin for landfill waste and they have a choice of a blue 240-litre blue bin for cans and plastic bottles and one or more 55-litre recycling boxes for mixed paper and cardboard. Residents can opt to have boxes for both of these materials. A 240-litre brown bin can be purchased for garden waste or residents can purchase biodegradable sacks.

Storage

Individual or shared waste sorting and recycling facilities should be designed into a development from the outset; this includes the provision of storage bins in kitchens and integrating recycling bins or composting areas into the building or site fabric. This needs to take account of storage needs identified for current residential collections and meeting the future higher recycling standards. Bin dimensions can be found in Table 4. These have been taken from the 'Requirements for Refuse and Recycling on New Developments: Guidance Notes for Applicants and Agents' (Waste and Recycling Section, Bracknell Forest Council). Suitable recycling storage facilities should be incorporated into non-domestic developments following consultation with the Council.

Table 4. Bin dimensions for waste collection

Individual Bins	Dimensions	(mm)
140-litre standard bin Capacity 2 sacks	H	1066
	W	500
	D	540
240-litre bin - for larger families Capacity 3-4 sacks	H	1075
	W	580
	D	715
360-litre - shared bin	H	1100

Individual Bins	Dimensions	(mm)
6 x 1-bedroom flats – capacity 5/ 6 sacks. This provision not made on mixed developments of flats and houses	W	600
	D	870
660-litre - communal bin 5 x 2-bedroom or 6 x 1-bedroom properties Capacity approx 12 sacks	H	1300
	W	1370
	D	770
1000-litre - communal bin 8 x 2-bedroom or 10 x 1-bedroom properties Capacity approx 20 sacks	H	1300
	W	1370
	D	1050
55-litre recycling box	H	330
	W	553
	D	406

Provision of shared local facilities

This can encourage uptake of recycling and reduces the need to drive to a central facility. Siting of recycling facilities should consider vehicular access to the site, and potential nuisance (noise) impacts on amenity.

Composting

In properties with gardens or landscaped space the provision of a container for composting can help minimise waste. In some developments, particularly those without gardens, it may be appropriate to provide a communal composting facility.

Information requirements

Proposals for housing must demonstrate that there is adequate storage for the containers used in Bracknell Forest Council's collection/recycling scheme or the minimum capacity of waste storage calculated from British Standard 5906 (at least 0.8m³).

Further information:

Bracknell Forest Council. Requirements for Refuse and Recycling on New Developments: Guidance Notes for Applicants and Agents. Available at:
<http://www.bracknell-forest.gov.uk/refuse-and-recycling-planning-guidelines.pdf>

Links to:

- Code for Sustainable Homes: Category 5 - Was 1 (Household Waste Storage and Recycling Facilities), Was 2 (Construction Site Waste Management) and Was 3 (Composting).
- SEEDA Sustainability Checklist: Questions 6.9 and 6.11.
- BREEAM Offices / Retail / Industrial / Multi-residential: MO 05
- Building Regulations Part H - drainage and waste disposal.

3.7 Biodiversity

Aim: To protect and enhance biodiversity in the design of developments

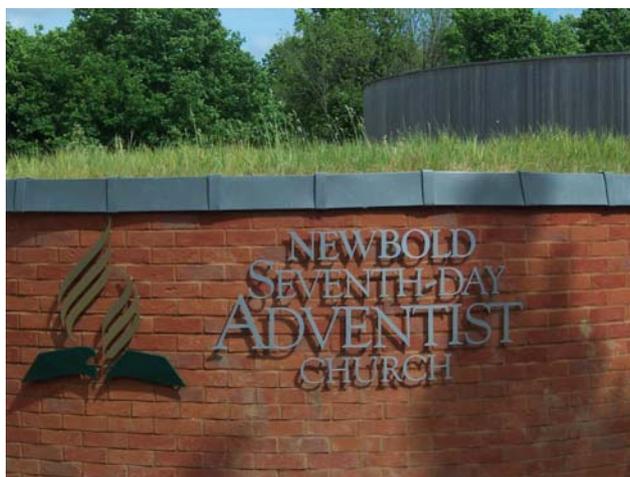
Background

The built environment can make a significant contribution to supporting biodiversity. For example, buildings can help to provide suitable habitats to support a wide range of species that flourish in urban environments. Productive built habitats can include green roofs, walls, roof gardens, terraces, balconies, fences and window boxes. Taken together, habitats associated with buildings can act as 'stepping stones' within a wider network of connected green spaces, allowing wildlife to move more freely.

In addition, almost all development sites, including brownfield, will have some existing or potential value as a wildlife habitat. Site design and landscaping should first seek to identify existing habitats, species and features and this will form the basis of a scheme to protect and enhance biodiversity. Good site design and landscaping would involve habitat reinstatement, restoration and/or enhancement. Bracknell Forest's sites of nature conservation importance and important species are detailed in the Bracknell Forest Biodiversity Action Plan (2006-2011).

Implementation

Green roofs



Green roofs not only provide a useful wildlife habitat but can also provide access to open space and link in with a wider green infrastructure network.

In theory, it is suggested that almost any habitat/planting design could be recreated on a roof. However, in practice, technical and financial constraints mean that grasslands, sedum mats and mosses tend to be most appropriate. Care should be taken in selecting appropriate species as the roots of some pioneer species may compromise the integrity of the roof (e.g. buddleia).

The benefits of green roofs are not restricted to biodiversity. They can also reduce storm water runoff, reduce heat loss from the building, provide an aesthetically pleasing surface, remove CO₂ and absorb pollutants from the air.

There are three main types of green roof:

- Intensive (High maintenance) - roof gardens, similar to gardens or parks at ground level, usually constructed over reinforced concrete decks, normally accessible, requiring frequent maintenance. If relevant these can be created to imitate specific habitats depending on the location of the development, for example near heathland. They can also be designed to encourage specific species, such as rare birds;
- Simple intensive (Medium maintenance) - vegetated with lawns, ground covering plants and requiring regular maintenance including irrigation. Moderate demands are placed upon the building structure, with occasional access required;
- Extensive (Low maintenance) - vegetation normally consists of mosses, succulents, herbs or grasses intended to be self-sustaining and not irrigated, with minimal maintenance requirements. This type is normally not accessible, except for basic maintenance, and is the least demanding on the building structure. Examples include a sedum or aggregate roof.

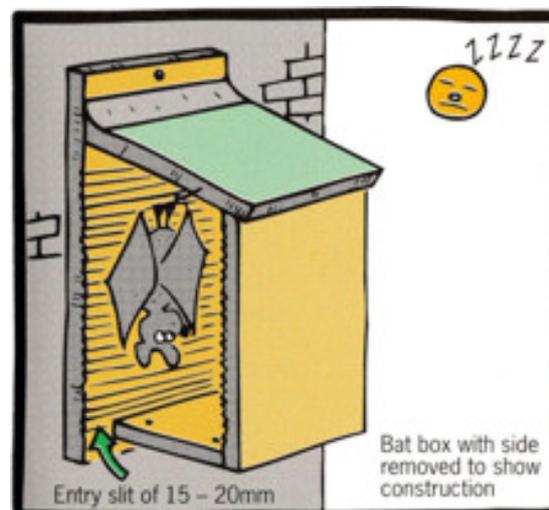
Design and construction of green roofs need to take into account:

- Building structure (load weight or wet soils and plants etc.);
- Waterproofing (e.g. membranes);
- Building fabric;
- Growing medium/soil depth;
- Species (mosses, succulents, sedum, wild flowers, shrubs, trees etc);
- Drainage (drainage layer);
- Irrigation;
- Climate (wind etc);
- Accessibility.

Nest boxes and bat bricks

Installation of nest boxes for bird and bats at suitable locations can provide valuable habitats. Consideration should be given to the landscaping in the placement of nest boxes.

Bat bricks which incorporate cavities to accommodate bats can be integrated into the fabric of the building. These range from simple bat access bricks to bat roosting units with roughened inside faces to facilitate roosting.



Bird and bat boxes come in many different designs for different species. Species that can benefit from bird/bat boxes include: swifts, sparrows, long-eared bats and noctule bats.

Hedgerows and buffer strips

During the design of developments, the inclusion of hedgerows and buffer strips should be considered where relevant. The design should enhance the landscape and ecological features. In addition to providing wildlife corridors which link habitats, buffer strips along water courses and around water bodies such as ponds can also protect their integrity, for example by allowing natural processes of bank erosion and deposition and reducing the risk of accidental pollution from runoff.

A buffer zone should be managed so as to foster a natural character, with native species of trees and shrubs used and any grass areas left unmown or mown only later in the season to enhance habitat value.

Information requirements

The Sustainability Statement should set out the feasibility of including wildlife features in the scheme and identify where biodiversity requirements have been designed in, not only for adequate mitigation but also to demonstrate a long-term enhancement and biodiversity gain.

Further information:

Bracknell Forest Council Biodiversity Action Plan 2006–2011
Biodiversity by Design (2004) Town and Country Planning Association - www.tcpa.org.uk/downloads/TCPA_biodiversity_guide_lowres.pdf
Natural England (2003) Green roofs: their existing status and potential for conserving biodiversity in urban areas – www.english-nature.org.uk/news/news_photo/Greenroofs.pdf
www.livingroofs.org
www.bats.org.uk
www.rspb.org.uk/advice/helpingbirds/nestboxes/index.asp

Links to:

- Code for Sustainable Homes: Category 9 - Eco 1 (Ecological Value of Site), Eco 2 (Ecological Enhancement), Eco 3 (Protection of Ecological Features) and Eco 4 (Change of Ecological Value of Site).
- SEEDA Sustainability Checklist: Questions 5.1 to 5.4.
- BREEAM Offices / Retail / Industrial / Multi-residential: LE 03 to LE 05 (Land Use)

SECTION 4: SUSTAINABLE CONSTRUCTION

4.1 Materials

AIM: To promote the use of materials with a low environmental impact

Background

420 million tonnes of materials are used in construction in the UK each year, which equates to 7 tonnes per person¹⁰. The total consumption of all materials in the UK amounts to some 678 million tonnes or 11.3 tonnes per person, so construction accounts for over half of our resource use by weight.

Sustainability can be greatly enhanced through the careful specification of any materials used in a development during its construction and landscaping. It is recognised that this must also have regard to the need to construct aesthetically attractive and well-designed developments.

In general, applicants must demonstrate that the selection of new materials has considered the issue of a sustainable supply and materials which have the least possible energy consumption involved in their manufacture and delivery.

The remainder of this section provides more detailed requirements under each heading.

Implementation

Life cycle environmental impact

For new developments, a 'life cycle' approach to materials specification should be adopted which considers the environmental impact of the whole supply chain. This will include: the impacts arising from the extraction of raw materials; the processing and manufacture of construction materials (such as insulating materials and paints); and the transport of materials and disposal at the end of a building's life.

The key impacts to consider during the assessment and specification of materials are:

- Impacts on the landscape arising from mineral extraction;
- The total energy consumption associated with manufacture and transport of the materials;
- The toxic chemicals used and emitted during the manufacturing process;
- The level of water consumption associated with complete manufacture;
- Biodiversity impacts, such as the use of peat, weatherworn limestone and other materials from vulnerable habitats;
- The level of recycled content of the materials;
- The degree and ease to which the product is itself recyclable.

¹⁰ Construction Materials Report, Bioregional Development Group

Manufacturers are now frequently able to provide information on the wider environmental impacts associated with such materials. For instance, materials can be sourced from suppliers and manufacturers that have a proven environmental management record in place (i.e. ISO14001 Environmental Management Systems).

If the manufacturer is unable to provide information, it is possible to determine the life cycle impacts of a range of different types of materials from the BRE's Green Guide to Specification (www.bre.co.uk/greenguide). However, if a material or specific product is not present in the BRE Green Guide, then it does not necessarily mean that it has poor environmental performance; other sources of information may need to be sought to confirm actual supply chain impacts of the material or product in question.

The Environmental Profiling methodology used by BRE complies with an internationally established approach for analysing life cycle impacts of products and processes, as discussed above. It measures environmental performance throughout a product's life, through manufacture, operational use in a building and in demolition. The system has been developed by the BRE and it measures a material's impacts in 12 areas, including climate change, toxicity and waste disposal. The impact of the material in each area is compared with the average impact of each UK citizen and given a score known as an 'Ecopoint score'.

Information requirement

Developers should only specify materials correlating to the BRE Green Guide to Specification Rating B and above (the current guide uses an A, B, C ranking system; A equals least environmental impact). Higher ratings (i.e. A) are strongly encouraged, in line with the SEEDA Sustainability Checklist, which sets out a 'good' rating for proposals which include 60-80% of Green Guide A rated or equivalent.

Where a developer wishes to specify materials with a higher environmental impact, or materials or products not included in the BRE Green Guide to Specification, then they must provide justification.

The Council will also consider evidence in the Sustainability Statement that materials are locally appropriate and capable of long-term maintenance and sympathetic repair.

Further information:

- Building Research Establishment - www.bre.co.uk
- Considerate Constructor Scheme - www.considerateconstructorscheme.org
- Association for Environment Conscious Buildings - www.aecb.net
- The Green Guides to Specification produced by BRE provides more detailed information on the incorporation of materials into specifications. Green Guide to Specification, 3rd Edition 2002, BRE

Responsible use of timber

In the last 30 years, natural forest cover has reduced by 11% and logging for timber is one of the main activities responsible for this deforestation. The use of timber is significant in the building industry and the consumption of timber is increasing. Although timber is theoretically a renewable resource, it can only be considered as such if it comes from sustainably managed woodland. The Forestry Stewardship

Council (FSC) is one independent and recognised international labelling scheme for timber and timber products. The scheme certifies forestry that is managed in an environmentally appropriate way.



DEFRA has created a Central Point of Expertise in Timber (CPET), which has evaluated 5 major certification schemes.

Developers should use timber from FSC sources. The Sustainability Statement will be expected to show that all timber, timber products and engineered boards such as plywood are Forest Stewardship Council (FSC) certified or equivalent. This is as set out as good practice in SEEDA's Sustainability Checklist.

Where other temperate timber is used, it should be from a known and identified source with a sustainable purchasing policy.

Further information:

- Forest Stewardship Council website - www.fsc.org
- Friends of the Earth Good Wood Guide - www.foe.co.uk

Maximise use of materials with recycled and reused contents

The Waste & Resources Action Programme (WRAP) has devised a recycled content toolkit that should be used at the design stage to assess how use of recycled and reused materials can be maximised. This includes 'quick wins' which can be used to increase the recycled content of a development. The common quick wins are:

- Bulk aggregates (sub-base, pipe bedding, fill, etc);
- Ready-mix concrete (foundations, floor slabs, etc);
- Asphalt;
- Drainage products/pipes;
- Pre-cast concrete products (paving, slabs);
- Concrete tiles and reconstituted slate tiles;
- Dense blocks;
- Lightweight blocks;
- Clay facing bricks;
- Plasterboard;
- Ceiling tiles;
- Chipboard and other wood-based boards;
- Insulation (floor, wall and roof); and
- Floor coverings (carpet, underlay, etc).

The applicant should demonstrate that the 'quick win' opportunities to increase the materials which are derived from recycled or reused content have been identified.

Applicants should also note that the incorporation of recovered and recycled demolition materials in the new build phase will count towards the overall target for recycled and reused content.

A good practice level of recycled content should be achieved wherever technically and commercially viable. Tools and guidance are freely available from WRAP (Waste Resources Action Programme) to enable assessment with the minimum of effort. WRAP case studies have shown that the 10% minimum requirement is readily achievable in various building types with no increase in cost of materials, using mainstream products and materials of equal quality.

The Sustainability Statement must show the percentage of the total value of materials which is derived from recycled and reused content in products and materials selected. Justification must be provided where this is less than 10%.

In road construction the Sustainability Statement must show the percentage of local reclaimed or recycled materials that will be used for road construction as set out as good practice in SEEDA's Sustainability Checklist. This must be balanced with issues of highway design and safety and justification must be provided where the percentage is less than 25%.

Further information:

Choosing Construction Products: Recycled Content of Mainstream Products, WRAP Recycled Content Toolkit, WRAP - <http://rctoolkit.wrap.org.uk/>
Opportunities to Use Recycled Materials in Building, Reference Guide, WRAP

Maximise use of recyclable materials

The proportion of materials and components that can be reused or recycled at the end of the building's life should be maximised. This can be by designing for deconstruction and disassembly and avoiding where possible the use of composite materials that are particularly hard to recycle. Materials used on site should be capable of separation for reuse and in a fit state for reuse, e.g. use of lime mortars means that bricks can be more easily cleaned and reused.

Careful consideration should be given to the reuse or recycling of materials at the end of the useful life of the building.

➤ Further information:

Demolition Protocol Implementation Document. Institute of Civil Engineers (ICE) - www.ice.org.uk

Optimise use of local materials

Sourcing and procuring materials from the locality of a development site has a number of environmental benefits, mainly a reduction in the amount of energy required for transportation.

Wherever possible, this procurement should include equipment and materials to be used in the construction of the development. However, it is recognised that for primary aggregates, steel and glass in particular, it is not always practical nor the most sustainable solution to obtain these materials locally.

The definition of 'locally sourced' may vary between materials, however it is generally accepted that this is usually defined as within 35 miles of a site (SEEDA Sustainability Checklist).

The Sustainability Statement must show the percentage of materials sourced from a factory/plant, quarry, wharf, railhead or recycling centre within 35 miles of site. This percentage must be maximised.

Embodied energy and CO₂

The embodied energy of a material is the energy required in its abstraction, processing, manufacturing and transportation, measured in GU/tonne. The embodied energy of a material needs to be considered over the lifespan of the material. For example, aluminium is a highly durable material with a lifespan of 60 years and may be an appropriate solution in some cases, despite its high embodied energy.

It is often more useful to consider a material in terms of its embodied CO₂ rather than embodied energy as it is the CO₂ emissions that contribute to greenhouse gases and lead to global warming.

The Sustainability Statement must show the materials' levels of embodied energy, as defined by the summary ratings within the Green Guide to Specification. If materials with a high embodied energy are included, the Sustainability Statement must set out the whole life energy or technical case for its use.

Pollution and health

Materials should be procured that have low life cycle toxicity impacts. These impacts include minimising the use of the toxic chemicals and products that have emissions damaging both to the wider environment or internal air quality. For example, insulation foams using HFCs or residual emissions of volatile organic compounds from man-made materials should be avoided.

See section 4.3 for further details on reducing pollution through material specification.

Insulation materials containing substances known to contribute to stratospheric ozone depletion or with the potential to contribute to global warming should not be used. The Sustainability Statement must include the assessment criteria as set out in the Code for Sustainable Homes Pol 1 and Pol 2.

Use of appropriate materials

The choice of materials should not be limited to the sustainability issues above, but should include wider considerations including the character of the area in which the development sits.

The required performance of materials and components over their design life should be considered, including the time period for refurbishment particularly for commercial buildings, Listed Buildings or those in Conservation Areas.

Links to:

- Mat 1 (Environmental Impact of Materials), Mat 2 (Responsible Sourcing of Materials - Basic Building Elements) and Mat 3 (Responsible Sourcing of Materials - Finishing Elements), Pol 1 (Global Warming Potential of Insulants) and Pol 2 (NO_x emissions) in the Code for Sustainable Homes
- Questions 6.2 to 6.6 of the SEEDA Sustainability Checklist

- MW 01 onwards (Materials) in BREEAM Offices / Retail / Industrial / Multi-residential

4.2 Site waste management

Aim: To minimise, reuse and recycle demolition waste and wherever possible to use reused or recycled construction materials

Construction and demolition waste amounts to 87 million tonnes deposited in landfill annually¹¹, and this waste contributes to an increasing tonnage of fly-tipping. Much construction waste is a valuable resource which can be reused or provide an income.



Site Management Plan

A Site Waste Management Plan can be used to identify quantities and types of construction and demolition waste, demonstrate how off-site disposal of waste will be minimised and managed, require better segregation for recovery of hazardous construction waste and reduce the amount of waste sent to landfill. The Plan should have regard to the waste hierarchy as set out in section 3.6, with reduction of waste being given the highest priority.

Considering demolition early in the project planning stages can lead to improved planning for the recovery of materials and cost savings. A Demolition Protocol has been produced by ICE, which identifies opportunities to minimise the waste taken off-site.

From April 2008, all construction projects over £300,000 (excluding VAT) must produce a Site Waste Management Plan which conforms to the Site Waste Management Plans Regulations 2008.

Choice of Construction Materials

During preparation for construction the following should be carried out:

- Identify resources already on the site, such as topsoil or hardcore, making provision for storage on-site to enable the materials to be put to useful effect in the new development.

¹¹ Waste Strategy for England (DEFRA, 2007)

- Refurbishment of existing buildings will most likely generate less waste than demolition and reconstruction. Consideration must always, therefore, be given to refurbishment where there are existing buildings.
- Good practice in terms of waste management should be employed, including monitoring of waste streams to meet the above objectives.
- Every opportunity should be taken to recycle materials or send waste materials to waste recovery centres.
- Opportunities should be sought to use prefabricated and standardised modulation components, which make use of many identical building components, but at the same time avoiding blandness in external appearance and being in keeping with the character of the local area. The source location of pre-fabricated elements should be considered in order to minimise transportation.
- Ensure that measures have been taken, i.e. materials selected, to enable more components of a building to be recycled during refurbishment or demolition. See the Materials section for further information.

Information requirements

Proposals including demolition should include measures to maximise the reclamation of materials for recycling and reuse by following the principles and procedures from the Institute of Civil Engineers (ICE) Demolition Protocol or equivalent standards.

Prior to commencement of work, all construction sites over £300,000 (excluding VAT) must put in place a Site Waste Management Plan in accordance with the DTI's Site Waste Management Plans - Guidance for Construction Contractors and Clients - Voluntary Code of Practice.

Applicants for Major Developments (see page v) must submit a comprehensive Waste and Recycling Management Strategy in accordance with the BS5906:2005 Waste Management in Buildings - Code of Practice.

Further information:

- BS5906:2005 Waste Management in Buildings – Code of Practice
- Demolition Protocol Implementation Document. Institute of Civil Engineers (ICE) - www.ice.org.uk
- DTI (2004) Site Waste Management Plans Guidance for Construction Contractors and Clients: Voluntary Code of Practice
- Netregs '*Simple Guide to Waste Management Plans*' contains a 9-step approach to implementing a plan - <http://www.netregs.gov.uk>

Links to:

- Code for Sustainable Homes: Category 5 - Was 2 (Construction Site Waste Management).
- SEEDA Sustainability Checklist: Questions 6.9 and 6.11.
- BREEAM Offices / Retail / Industrial / Multi-residential: MO 05

4.3 Pollution

Aim: To minimise damage to natural resources through air, ground/surface water, land, noise or light pollution

4.3.1 Light pollution

Light pollution occurs where light is misdirected or poorly controlled. This can be of varying types:

- When light reflects off particles in the atmosphere causing a general glow in the sky (cumulatively known as 'sky glow');
- When there is a sharp contrast in lighting levels which causes glare; and
- Where light strays into an area where it is not desired or required.



There is a range of impacts on natural resources associated with light pollution. These can be effects on wildlife, countryside character and energy use and associated CO₂ emissions. In addition there are social impacts; under the Clean Neighbourhoods and Environment Act 2005 light pollution can now be classified as causing a nuisance in certain circumstances.

These issues must be balanced with public safety and crime prevention, as developments built with lighting at night can enable evening activity, increase safety and security and exhibit particular buildings or landscape features.

Measures to reduce light pollution include:

- The prevention of over-lighting, i.e. the provision of lighting only where it is essential, e.g. public safety;
- Specially designed lighting equipment that minimises the upward spread of light near to or above the horizontal;
- Ensuring that the main beam angle of all lights directed towards any potential observer is kept below 70°;
- Design solutions such as screening and shielding and higher mounting heights allow lower main beam angles, which can assist in reducing glare;
- Site-wide lighting should be as uniform as possible, to avoid bright spots and dark spots, which interfere with visibility and can cause glare;
- The lights used should be the most efficient possible, taking into account energy use, cost, colour rendering and the purpose of the scheme;
- All lighting schemes should meet British Standards.

Development proposals which include new external lighting, or changes to existing lighting, should provide details of the lighting scheme including:

- An assessment of the need for lighting. This will identify the minimum requirement for the proposal, taking into account public safety and crime prevention;
- Measures to ensure light spillage is minimised (i.e. light encroaching on areas where it is not intended to be);
- Measures to ensure the proposal minimises impact to residential amenity;
- Measures to ensure the proposal minimises impact to wildlife and the landscape;
- For Major Developments (see page v) a report is required from a qualified lighting engineer or lighting company setting out the type of lights, performance, height and spacing of lighting columns that is required. The light levels to be achieved over the intended area, at the site boundaries and, for large schemes, 50m outside of the boundary of the site should be superimposed on the plan.

Information requirements

The Sustainability Statement must show an assessment of the need for lighting and that measures have been incorporated to ensure that light pollution will be minimised throughout the development. The Sustainability Statement must set out any design and management measures that will be adopted to prevent light pollution.

Further Information:

- Institution of Lighting Engineers - www.ile.org.uk
- Campaign for Dark Skies www.dark-sky.org
- National Society for Clean Air and Environmental Protection www.nasca.org.uk

Links to:

- SEEDA Sustainability Checklist: Questions 3.18 and 3.19.
- BREEAM Offices / Retail / Industrial / Multi-residential: HW 05 and HW 06 (Health and Wellbeing)

4.3.2 Noise pollution

Noise can impact upon health, productivity and quality of life, particularly at home. However, there are a number of design and layout principles that can reduce the adverse impacts of noise.

The mitigation of noise, particularly in residential development, needs to be carefully designed into new development using building design and internal layout. Developers should take into consideration existing sources of noise and overall ambient noise levels. This will be particularly relevant where new development is located near a busy road, railway lines or other noise-generating infrastructure. Additionally, the transmission of noise between dwellings such as flats and terraced properties can be a problem. The appropriate use of measures such as sound insulation, bunds and noise barriers can mitigate disturbances from noise.

The following noise mitigation measures should be considered:

- **Design stage** - at the early design stage regard should be given to any sound features to be avoided (e.g. road traffic, railway, sporting venues) or enhanced (e.g. flowing water). This can be through building form, orientation, or screening.

- **Construction stage** - noise generating activities should be identified (e.g. air handling equipment, pumps, fans, vehicle manoeuvre, loading/unloading, etc) and low noise alternatives used where practicable.
- **Internal layout of rooms** - buildings and rooms whose uses are not susceptible to noise should be located to act as screens and provide a barrier between noise sources and quiet areas. Also 'stacking' of conflicting uses, for example placing bedrooms of one flat below the living area of another flat, is likely to generate noise problems or require more acoustic treatment.
- **Use of absorbent materials** - acoustic absorbency within hard courtyard areas should normally be maximised by, for example, use of dense vegetation and acoustically soft ground.
- **Positioning of building services** - building services such as air extraction ducting should be positioned away from sensitive windows and properties and be isolated from the structure to prevent structural noise. Particular care should be taken to avoid or attenuate fan and vent noise on the 'quiet side' of buildings with passive alternatives sought wherever possible.
- **Noise insulation** - good practice includes achieving noise insulation standards beyond those required by Building Regulations, particularly for roofs, glazing and party walls and floors.

Information requirements

The Sustainability Statement must demonstrate that adverse impacts of noise have been minimised, and show which measures are proposed. Wherever practicable, these measures should either be at source or between source and receptor (including choice and location of plant or method, building design and layout, screening and sound absorption) in preference to sound insulation at the receptor.

Further references:

- *Planning Policy Guidance 24: Noise*. ODPM. 1994
- The Chartered Institution of Building Services Engineers www.cibse.org

Links to:

- Code for Sustainable Homes: Category 7 - Hea 2 (Sound Insulation)
- Building Regulations Part E
- BREEAM Offices / Retail / Industrial / Multi-residential: P 13 (Pollution)

4.3.3 Air pollution

Air is a valuable resource needed to support life; therefore proposed developments must consider any potential impact on air quality.

A reduction in the emissions produced through building use (i.e. providing heating for internal air space and water) is largely brought about via the methods used to improve energy efficiency. However, a further significant source of pollution arising from development relates to the emission of pollutants such as NO_x from the burning of natural gas, and emissions arising from insulating materials, both of which contribute towards global warming.

'Global Warming Potential' (GWP) is a relative measure of how effective a gas is at absorbing infra-red radiation compared to CO₂. It is possible to select insulating material which has a lower GWP in its manufacture or installation, therefore this contributes less towards climate change than other materials.

Low NO_x burners should be used whenever practicable. Boilers are classified on a scale of 1 to 5, with 1 indicating high NO_x emissions. Where gas boilers are used in new buildings as an essential standard, they should have a NO_x 3 rating, although the preferred standard would be a boiler of NO_x 5 rating.

Information requirements

The Sustainability Statement should include details of all foamed and non-foamed insulation materials and demonstrate that the foamed insulation material has a GWP of less than 5. BRE believe these materials to be: air, CO₂, pentane and isobutane.

The Sustainability Statement should provide evidence that any new gas boilers produce low levels of NO_x, i.e. scale 3 or above, and show which measures are in place to reduce and mitigate exposure to air pollution.

Further information:

Environmental Criteria for Design – Guide A. CIBSE 2000
Minimizing pollution at air intakes TM 21. CIBSE 2001

Links to:

- Code for Sustainable Homes: Category 6 - Pol 1 (Global Warming Potential (GWP) of Insulants) and Pol 2 (NO_x emissions)
- SEEDA Sustainability Checklist: Questions 3.6, 3.7, 4.1 to 4.14.
- BREEAM Offices / Retail / Industrial / Multi-residential: P01, P04 and P06 (Pollution)
- Building Regulations Part D - Toxic Substances

4.3.4 Land contamination

Contaminated Land Remediation

Land contamination is a material consideration¹² for the purposes of planning. Developers are responsible for ensuring that a proposed development will be safe and 'suitable for use' for the purpose for which it is intended. Applicants must therefore ensure that potential areas of contamination are identified, adequately investigated and then appropriately remediated. If there is any reason to suspect that a site might contain some historic contamination left from previous uses of the site, then the planning applicant should consult the Council.

Pollution prevention

The biggest risk of soil pollution often occurs during construction, particularly from the following activities: de-watering, digging foundations, moving contaminated soil, drainage misconnections, discharges to rivers, streams or the ground, runoff from construction materials and/or exposed ground, wheel washings and oil or chemical spills.

However, most pollution incidents can be avoided by ensuring that good environmental management practices are implemented. Environmental Management Systems can be set up at construction sites, and these can be accredited through the BS7750 or ISO14001 standards. These accreditations require a commitment towards

¹² A material consideration is a planning matter relevant to an application.

a strategy of continuous improvement in environmental management, to have pollution prevention procedures in place, and to monitor performance. Setting up such management systems and seeking accreditation is not complicated if done at the outset of a construction project or industrial activity. Smaller construction sites can achieve good management by preparing and implementing a Site Environmental Plan, which does not need to be accredited.

Information requirements

A contaminated land assessment is required for all major new developments (see page v) as well as any development where there has been a previous potentially contaminative use. Where contamination is suspected or found, then applicants must submit an investigation and remediation strategy to the Council, along with the planning application.

The Council requires that all Major Developments (see page v) must prepare and implement an accredited site environmental management system prior to commencement of demolition and construction activities.

Further information:

- Environmental Good Practice on Site, CIRIA provides guidance on preparation of Site Environmental Plans.
- Planning Policy Statement 23 – Planning and Pollution Control, Annex 2: Development on Land Affected by Contamination. ODPM. November 2004
- Model Procedures for the Management of Land Contamination (CLR 11), Environment Agency, September 2004

Links to:

- Code for Sustainable Homes: Category 8 - Man 2 (Considerate Constructors Scheme).
- BREEAM Offices / Retail / Industrial / Multi-residential: LE02 (Land Use)

4.3.5 Water / groundwater

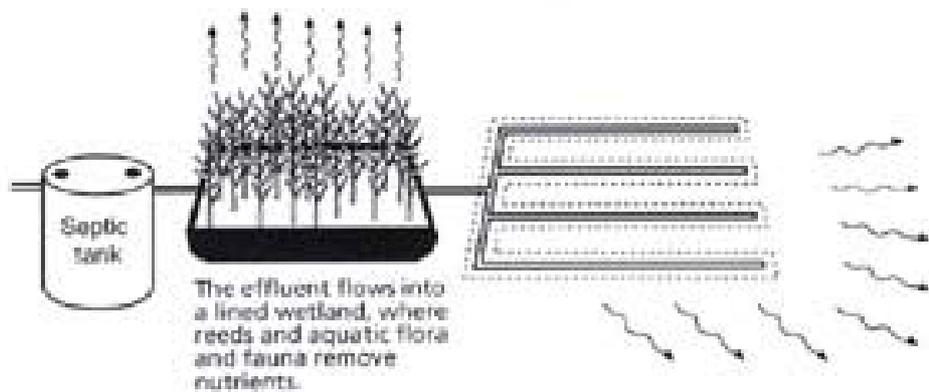
As with soil pollution, most water pollution incidents can be avoided by ensuring that good environmental management practices are implemented.

SUDS are an effective way to deal with pollution of watercourses and groundwater as long as infiltration is not through contaminated soil. See section 4.3 for full details.

Although the provision of SUDS can help to protect water sources from pollution, there are a number of other design measures that could be incorporated on a site. During the construction phase these can include:

- Oil separators;
- Clear marking of drainage systems and correcting wrong connections;
- Bunding of oil storage tanks;
- Bunded chemical storage areas;
- Designated fuel delivery areas;
- Designated area for cleaning activities;
- A foundation works risk assessment – this is necessary to identify any potential detrimental impact which may arise from piling through contaminated ground.

During the use of the building, measures, such as reed beds, can be included in design to reduce some potential water pollution prior to discharge of the water into a river or stream.



Information requirements

The Sustainability Statement must consider the need for pollution reduction measures, such as reed beds, to avoid silting or pollution of watercourses.

➤ Further information:

Groundwater Protection: Policy and Practice document. Environment Agency (www.environment-agency.gov.uk)

Planning Policy Statement 23: Planning and Pollution Control.

Links to:

- Code for Sustainable Homes: Category 8 - Man 2 (Considerate Constructors Scheme).
- Sustainability Checklist: Question 6.8
- BREEAM Offices / Retail / Industrial / Multi-residential: M05 (Management)

Appendix 1: Policy Context

LOCAL CONTEXT

Extract From the Core Strategy DPD (Adopted February 2008)

SUSTAINABLE RESOURCES

National guidance (Planning Policy Statement 1) promotes prudent use of natural resources as a fundamental principle in delivering sustainable development, and the UK Sustainable Development Strategy (2005) includes priorities on sustainable consumption and production and on natural resource protection.

Development must be carried out in a more sustainable way, especially given that the efficient use of resources will remain an issue over the entire lifetime of the development. Therefore development should be carried out in a way that minimises the resources that we use, including energy and water, and in a way that generates less pollution and waste, including less of the greenhouse gas carbon dioxide which contributes towards climate change.

Sustainability Statement

Developers will be required to submit a sustainability statement demonstrating how their proposals meet current best practice standards. A further Local Development Document will detail the issues being considered under a sustainability statement. These are likely to include the aspects of sustainable resource management listed below:

- Energy efficiency in building use and construction, including the use of appropriate design, layout and orientation to take account of microclimate;
- Efficient use of water in construction and use, including effective management of grey water;
- The use of sustainable drainage systems in the management of runoff;
- Minimising the environmental consequences of waste production by making efficient re-use of construction and demolition waste, including measures within the development to encourage recycling;
- The use of materials that have less impact on the environment including materials with low embodied energy (these use less energy in raw material extraction, production of products and materials), inclusion of eco-labelled materials and use of recycled products such as secondary aggregates;
- Protecting, and enhancing where possible, natural features of importance, including wildlife and landscapes;
- The preferred use of locally produced materials where feasible;
- On-site renewable energy production to meet the targets of the Core Strategy;
- Minimise the emission of pollutants into the wider environment, including light, noise, air, soil and water pollution, including the risk to, or effect on, groundwater.

Best Practice

The Council will expect developers to have regard to best practice standards over and above Building Regulations. BREEAM is currently the industry standard for

sustainable buildings, therefore schemes will be required to demonstrate how they meet BREEAM “Very Good” or “Excellent” standards. These standards will change and be replaced over time, so the most up-to-date should be addressed as part of the sustainability statement required by the Council. The Council will also expect developers to use the Building Regulations and the Code for Sustainable Homes to demonstrate achieving reductions in carbon emissions.

POLICY CS10 – SUSTAINABLE RESOURCES

Development proposals will be accompanied by a Sustainability Statement demonstrating how current best practice in the sustainable use of natural resources has been incorporated.

Implementation

This policy will be implemented through:

- The determination and monitoring of planning applications and appeals.
 - Subsequent guidance in further *Local Development Documents*.
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RENEWABLE ENERGY

National Guidance (Companion Guide to PPS22) indicates that renewable energy provision within development can make a significant contribution to energy supply, assist in the reduction of carbon dioxide emissions and also has the additional benefit of allowing a local community or occupiers of development to take ownership of at least part of their energy supply. Renewable energy can be produced from different types of technologies: for example solar water heating, photovoltaics, ground source heat pumps, wind turbines, biomass or woodchip. The demand for energy resulting from the use of buildings can also be reduced through their design, layout and orientation.

The Energy White Paper 2002 seeks reductions in carbon dioxide emissions of 10% by 2010, 15% by 2015 and 20% by 2020. Presently, mindful of these targets, and those for renewable energy generation, many Local Authorities are seeking a minimum of 10% of the energy requirements of development to be provided by on-site renewable energy generation. The thresholds for development required to meet this 10% minimum figure are typically:

- 10 or more net additional dwellings; and
- 1000m² or more *Gross External Area* (GEA) for other uses.

Unfortunately, there is no simple direct linear relationship between increasing renewable energy provision and reducing carbon dioxide emissions. Therefore, some Local Authorities are seeking a direct 10% reduction in Carbon Dioxide emissions in order to implement a climate change, or environmental impact, mitigation strategy.

The Core Strategy has a timescale of up to 2026. During this period renewable energy generation and carbon dioxide emission reduction targets will increase. The Council aspires to implement policies that exceed these targets to support the single purpose of the Bracknell Forest Partnership which is “to improve quality of life for local people”.

In accordance with the Town and Country Planning Association (Implementing PPS22, 2006) aim of applying the highest standard possible, the Council intends to reduce the thresholds for the typical 10% figure for renewable energy provision in association with development and require 20% renewable energy provision above the reduced thresholds. A future Supplementary Planning Document (on Sustainable Resources) will set out how reductions in carbon dioxide emissions might best be brought about and how renewable energy production would assist in meeting emission targets.

Schemes over 5 residential dwellings or a floorspace of 500 m² (GEA) for any other development will be required to be accompanied by an energy demand assessment and incorporate on-site renewable energy production to reduce the predicted carbon dioxide emissions by at least 10%.

It will be for the applicant to demonstrate the effectiveness of different renewable technologies measured in terms of both energy consumption (usually expressed as kWh) and carbon emissions (usually expressed in terms of kg/CO₂ per year). This should be presented to the Council as part of a sustainability statement identifying how the requirements of renewable energy provision and carbon dioxide reduction have been met. The Council must be satisfied there are no other environmental impacts arising from the renewable energy technology, which balance out the benefits. This may include the visual impact on listed buildings or conservation areas.

Only where a developer can satisfy the Council why the higher target of 20% if relevant cannot be achieved will the lower target of 10% be applied.

POLICY CS12 – RENEWABLE ENERGY

Development proposals for five or more net additional dwellings, or for 500 square metres (GEA) or more of floorspace for other development, will be accompanied by an energy demand assessment demonstrating how (potential) carbon dioxide emissions will be reduced by at least 10% and will provide at least 20% of their energy requirements from on-site renewable energy generation.

Development proposals for less than five net additional dwellings, or for less than 500 square metres (GEA) of floor area for other development, will provide at least 10% of their energy requirements from on-site renewable energy generation.

Implementation

This policy will be implemented through:

- The determination and monitoring of planning applications and appeals.

REGIONAL CONTEXT

The existing **Regional Planning Guidance for the South East (RPG9)** and the emerging **Regional Spatial Strategy (the South East Plan)** set out a range of policies relating to the prudent use of natural resources.

Specifically, this SPD has had regard to South East Plan Policies:

Policy CC1: Sustainable development, in particular point iv relating to living within environmental limits.

Policy CC2: Climate Change

Policy CC3: Resource Use

Policy CC4: Sustainable construction, which requires all new buildings and refurbishment to adopt and incorporate sustainable construction standards and techniques.

Policy NRM1: Sustainable water resources, groundwater and river water quality management

Policy NRM3: Sustainable flood risk management

NRM4: Conservation and improvement of biodiversity

NRM5: Woodlands

Policy EN1: Development Design for Energy Efficiency and Renewable Energy which encourages high standards of energy efficiency in all development to be achieved through design, layout and orientation. It also encourages an assessment of the energy demand of a development and sets a target of at least 10% of the energy demand to be from renewable sources for housing schemes of over 5 dwellings and commercial schemes of over 1,000m².

Policy W1: Waste reduction

Policy W2: Sustainable Design, Construction and Demolition to minimise waste production and associated impacts.

Policy M1: Sustainable Construction relating to primary aggregates.

The Regional Economic Strategy includes targets to reduce energy demand through designing energy efficient buildings and increasing the use of renewable energy (Target 11) and reducing water consumption and providing facilities to recycle or compost (Target 12).

NATIONAL CONTEXT

The **UK Sustainable Development Strategy** (2005) places sustainable development at the heart of the land use planning system and at the core of new planning guidance. Two of the four priorities within this strategy are climate change and natural resource protection.

The White Paper, '**Our Energy Future: Creating a Low Carbon Economy**' (2003), sets out the energy policy to cut the UK's climate change emissions through reducing energy consumed together with a substantial increase in renewable energy. The White Paper details the government's aspiration to generate 20% of UK electricity from renewable energy sources by 2020, and suggests that still more renewable energy will be needed beyond that date. This is further to the existing government target to generate 10% of UK electricity from renewable energy sources by 2010. Some on-site provision of renewable energy will be fundamental in helping meet these targets. Subsequently, the **Climate Change Bill** proposes a mandatory target of 60% reduction in carbon emissions by 2050.

PPS1 (Delivering Sustainable Development) stresses the efficient use of resources and states that local planning authorities should ensure Development Plans contribute to global sustainability by addressing the causes and potential impacts of climate change. This should be through policies which reduce energy use and reduce emissions, promote the development of renewable energy resources, and take climate change impacts into account in the location and design of development.

In addition, PPS1 states that Development Plan policies should take account of environmental issues such as: the management of waste in ways that protect the environment and human health, including producing less waste and using it as a resource wherever possible.

Planning and Climate Change: Supplement to Planning PPS 1 (2007) includes advice on the preparation of Local Development Documents. It asserts that planning authorities should be concerned with the environmental performance of new development and encourage the delivery of sustainable buildings. A proposed list of criteria is set out which would take into account climate change, such as incorporating passive solar design, providing a proportion of renewable energy on site and sustainable urban drainage systems.

PPS9 (Biodiversity and Geological Conservation) states that Local Authorities should take an integrated approach to biodiversity when preparing local development documents, including biodiversity within developments. A Guide to Good Practice supports this PPS.

PPS10 (Planning for Sustainable Waste Management) sets out requirements for delivering sustainable development through driving waste management up the waste hierarchy. This states that the design and layout of new development should support sustainable waste management. A Companion Guide supports this PPS.

PPS22 (Renewable Energy) states that local planning authorities should set out the criteria that will be applied in assessing applications for planning permission for renewable energy projects. Furthermore, PPS22 says that Local Development Documents may include policies that require a percentage of the energy in new residential, commercial or industrial developments to come from on-site renewable energy developments. A Companion Guide supports this PPS.

PPS23 (Pollution Control) requires planning documents to limit and, where possible reduce greenhouse gas emissions through improved energy efficiency; minimise the emission of pollutants including light, air, noise, soil and water and make suitable provision for the drainage of surface water through sustainable urban drainage systems (SUDS).

PPS25 (Development and Flood Risk) aims to reduce flood risk to and arising from new development through location, layout and design. SUDS should be considered within developments and incorporated if necessary. A Companion Guide supports this PPS.

Circular 04/06: The Town and Country Planning (Flooding)(England) Direction 2007 requires local planning authorities to notify the Secretary of State of any application for major development in a flood risk area, where it is minded to grant permission against advice on flood risk grounds from the Environment Agency.