



Office of the  
Deputy Prime Minister  
Creating sustainable communities

# *The Planning Response to Climate Change*

Advice on Better Practice



Llywodraeth Cynulliad Cymru  
Welsh Assembly Government



SCOTTISH EXECUTIVE



Office of the  
Deputy Prime Minister

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Creating sustainable communities

# *The Planning Response to Climate Change*

Advice on Better Practice

September 2004  
CAG Consultants, London  
Oxford Brookes University, Oxford

Office of the Deputy Prime Minister: London

The findings and recommendations in this report are those of the consultant authors and do not necessarily represent the views or proposed policies of the Office of the Deputy Prime Minister.

Office of the Deputy Prime Minister  
Eland House  
Bressenden Place  
London SW1E 5DU  
Tel: 020 7944 4400  
Web site: [www.odpm.gov.uk](http://www.odpm.gov.uk)

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# Glossary of acronyms

BAP	Biodiversity Action Plan
BPEO	Best Practicable Environmental Option
BREEAM	Building Research Establishment Environmental Assessment Model
CFMP	Catchment Flood Management Plan
CHP	Combined Heat and Power
CCW	Countryside Council for Wales
CHaMPS	Coastal Habitat Management Plans
CH <sub>4</sub>	Methane (a greenhouse gas)
CO <sub>2</sub>	Carbon Dioxide (a greenhouse gas)
DEFRA	Department of Environment, Food and Rural Affairs
DTI	Department of Trade and Industry
DTLR	Department for Transport, Local Government and the Regions
EA	Environment Agency
EIA	Environmental Impact Assessment
ES	Environmental Statement
ICLEI	International Council for Local Environmental Initiatives
ICZM	Integrated Coastal Zone Management
IPCC	Intergovernmental Panel on Climate Change
IPPC	Integrated Pollution Prevention and Control
LA21	Local Agenda 21
LDF	Local Development Framework
LEAP	Local Environment Agency Plan

LPA	Local Planning Authority – referring to District, Unitary and County planning authorities in England, Unitary planning authorities in Wales and Planning Authorities in Scotland
LPG	Liquid Petroleum Gas
N <sub>2</sub> O	Nitrous Oxide (a greenhouse gas)
NPPG	National Planning Policy Guideline (Scotland) see also SPP
ODPM	Office of the Deputy Prime Minister
PAN	Planning Advice Note (Scotland)
PPG	Planning Policy Guidance (England) to be replaced by Planning Policy Statements
PPS	Planning Policy Statement (England)
PPW	Planning Policy Wales
RSDF	Regional Sustainable Development Framework
RBMP	River Basin Management Plan
RCEP	Royal Commission on Environmental Pollution
RDA	Regional Development Agency (England)
RPB	Regional Planning Body (England)
RPG	Regional Planning Guidance (England)
RSS	Regional Spatial Strategy
RTS	Regional Transport Strategy
SA	Sustainability Appraisal
SAP	Standard Assessment Procedure (energy rating for housing)
SEA	Strategic Environmental Assessment
SEPA	Scottish Environment Protection Agency
SMP	Shoreline Management Plan
SPD	Supplementary Planning Document
SPP	Scottish Planning Policy (successor documents to NPPGs)
SUDS	Sustainable Urban Drainage Systems
TAN	Technical Advice Note (Wales)
UDP	Unitary Development Plan
UKCIP	United Kingdom Climate Impacts Programme
UKCIP02	The set of climate change scenarios for the UK published in 2002 by UKCIP
ZED	Zero Emissions Development

# *The planning response to climate change*

## **The purpose of this advice**

This document provides advice and is not planning policy guidance, though references to relevant policy guidance are made throughout. It is intended to provide planning professionals with an overview of the current thinking and state of knowledge on the planning response to climate change. It is recognised that planning practice on adaptation to climate change impacts is still developing. It is hoped that the advice will stimulate planners to look for new strategies to respond to the changing climate in partnership with developers and the wider community.

The advice will also be of assistance to local authorities implementing strategies to address climate change, such as those local authorities putting together action plans as part of the Councils for Climate Protection initiative.

## **Is climate change a material consideration?**

In Scotland the key reference is in SPP1: The Planning System (2002) which states that: *'The Scottish Executive is committed to tackling climate change Greenhouse gas emissions from burning fossil fuels which are the biggest single contributor to global warming. The*

*planning system can play a part in reducing emissions when guiding the location and design of development and the management of land use change. Specific actions include reducing the need to travel and encouraging sustainable forms of transport, and encouraging energy efficient design and appropriate choice of materials. The planning system should take the possible impacts of climate change, for example greater rainfall and increased risk of flooding, into account when taking decisions on the location of new development and other changes in land use.'*

The position in Wales is very clear. Planning Policy Wales (March 2002) includes the statement that: *'Planning policies and proposals should:*

*... Contribute to climate protection by encouraging land uses that result in reduced emissions of greenhouse gases, in particular energy-efficient development, and promoting the use of energy from renewable sources.*

*... Minimise the risks posed by, or to, development on, or adjacent to, unstable or contaminated land and land liable to flooding. This includes managing and seeking to mitigate the effects of climate change'.*



In England, it could be argued that climate change is also a material consideration in planning terms as PPG11: *Regional Planning* states that: '*RPBs should consider their regions' vulnerability to climate change ...*' and '*... should consider how their region's activities affect the production of the greenhouse gas emissions that cause climate change*'.

It is the intention to remove any remaining ambiguity on this matter when PPG 1: *General Policy and Principles* is revised.

In the meantime there is a real urgency to put in place regional and local planning policies on adaptation to climate change, and to strengthen policies that will mitigate and reduce greenhouse gas emissions.

## Five key points

*This advice provides a wide range of information on the planning response to climate change. Some of it is complex and requires putting in train long-term incremental change. Here are five key points on how to effect the urgent action needed to address climate change.*

- **Act now:** The impacts of climate change are not remote risks for sometime in the future, they are already with us and we need to respond now.
- **Make the links:** Many of the actions required in response to climate change can be justified for other reasons. For example, conserving water resources is an immediate environmental and economic necessity. Consequently, on many issues planning policy-makers need not be constrained by the uncertainty associated with some future climate change impacts.
- **Spread the word:** Elected members, local authority officers, developers and the public need to be aware of the impacts of climate change and how to adapt to it and avert future climate change.
- **Make the best use of existing tools:** Environmental Appraisal (EA) and Sustainability Appraisal (SA) can be effective tools for ensuring climate change is addressed in planning policy.
- **Make effective use of existing instruments:** Planners have available instruments such as conditions, agreements, obligations and informatives, all of which can be used to respond to climate change.

# *How to use this advice*

*This advice sets out the range of topics that planning authorities and developers will need to take into consideration with reference to climate change.*

It describes the issues that might be addressed in planning policies in response to the impacts of climate change and in order to mitigate greenhouse gas emissions.

The guidance draws on examples from all constituent parts of the UK – Scotland, Wales, Northern Ireland and England – and generically may prove to be helpful for planning authorities in the devolved administrations. However, it does not comprehensively reflect policy or the different arrangements in the devolved administrations. Planning authorities should be mindful of this when using the guidance.

The guidance makes provision for the changes heralded by the Green and Planning Policy Papers for England.

## **1. Context**

The scientific evidence and policy context is summarised in the first section of the guidance. The role of the United Kingdom Climate Impacts Programme (UKCIP) is set out and the UKCIP02 Scenarios are described. UKCIP is the key source for up-to-date information on climate change and climate impact scenarios in the UK. Advice is provided on how to deal with the uncertainty associated with climate change impacts. The role of

planning is laid out in tabular form on page 29. This table is a good starting point for the reader as it provides directions to relevant parts of the Topics section.

## **2. Topics**

The Topics section is at the heart of this guidance. It provides information about national policy, regional and sub-regional planning responses (for England) and strategic and local planning responses for what have been judged to be the key planning topics with reference to climate change. Reference to the national policies of the Devolved Administrations is included to provide the UK context. The term Local Planning Authority (LPA) is used throughout to refer to district, unitary and county planning authorities in England.

Unitary planning authorities in Wales and planning authorities in Scotland may find some of the advice identified in this section useful to consider as part of their response to climate change, but this should not be taken as an expression of policy of the respective administrations.

Regions are an important level at which responses to climate change can be coordinated based on the

### Current good practice

Climate change has only been taken into account in planning policy and practice in recent years. There are only a small number of developments that have systematically addressed mitigation of greenhouse gas emissions, and a handful that have attempted to take into account adaptation to climate change impacts. Insufficient time has elapsed to evaluate whether these few forward thinking examples of

developments, planning policy and practice are actually 'best practice'. Throughout this guidance examples of what is being tried by planners and developers to respond to climate change are presented in green text boxes. The examples have been chosen because they demonstrate useful approaches but it must be recognised that best practice is still evolving.

sub-UK and regional climate impacts studies. The advice for Regional Planning Bodies (RPBs) in England may also be appropriate for other areas where spatial strategies are being developed.

The interconnectedness of many of these topics must be recognised. Throughout, cross references are shown in red text to help the reader appreciate the links between topics. Although local and regional guidance is presented separately under each topic it will be important for local planners to appreciate regional responses, and for regional planning bodies to appreciate local planning responses.

### 3. Appraisal

A Climate-Sensitive Development Checklist is provided that could be incorporated into Supplementary Planning Documents (SPD) or into a wider sustainable development checklist to be used by development control officers. The role of SA and EA

in assessing development plans, LDFs, RPG and RSSs for climate change considerations is set out. The application of EIA in addressing climate change considerations is discussed. Finally, three environmental assessment and accreditation systems for buildings are described.

### 4. Implementation

A number of strategies for implementing this advice are mentioned in the Topics section. This section draws these together. It focuses on LPA and RPB roles in influencing decisions and alerting and informing the public and developers about the need to respond to climate change.

### 5. Information

This section provides further information sources for each section of the guidance. It includes written information, websites and addresses of key organisations that can provide detailed advice.

# *Context*

# Causes of climate change

*There is now a body of scientific evidence indicating that man-made greenhouse gases are having a demonstrable effect on the earth's climate.*

This means a high priority must be placed on mitigating the long-term impacts of climate change by minimising greenhouse gas emissions. Meaning that it would be advisable for new developments to adopt, at the very least, 'low carbon' and ideally 'zero carbon' standards.

## The greenhouse effect

The overall balance between energy coming in from the sun in the form of visible radiation (sunlight), and energy constantly being emitted from the surface of the earth to space, determines the temperature of the earth. Sunlight can pass through the atmosphere almost unchanged and warm the earth. The infrared radiation emanating from the earth's surface is partly absorbed by gases in the atmosphere while some of it is re-emitted downwards. This further warms the surface of the earth and the lower atmosphere. The gases that do this naturally are mainly water vapour and carbon dioxide. An analogy is made with the effect of a greenhouse which allows sunshine to penetrate the glass that in turn keeps the heat in – hence the greenhouse effect.

Without this natural greenhouse effect the earth would be over 30°C cooler and large parts of the world would be too cold to be habitable. But as

greenhouse gas concentrations rise well above their pre-industrial levels, the additional warming that will take place will change the global climate and could threaten the future sustainability of the planet.

Carbon dioxide is the main greenhouse gas but there are many others, the most important of which are methane, nitrous oxide and the hydrofluorocarbons.

## UK contribution to global greenhouse gas emissions

In 1995 the UK was responsible for about 2.2% of the world's carbon dioxide emissions, with emissions of just under ten tonnes of carbon dioxide per capita (over twice the world average). Between 1990 and 2000 UK greenhouse gas emissions fell, largely as a result of coal-fired power stations being replaced by new gas-fired ones. However, unless there are renewed efforts to mitigate emissions, they are projected to rise again as the result of factors such as continuing economic growth and the retirement of some nuclear power stations.

Energy supply, use of energy in buildings and transport are key areas for mitigating emissions. All of these areas are influenced by the land use planning system.

# Global climate change

*The impacts of climate change are a present and increasing threat to the normal operation of our society. Developers need to be aware of how these impacts will constrain new developments and result in new planning requirements. Planners need to ensure that new developments and changes in land use incorporate adaptations to climate change impacts.*

Some potential impacts of climate change may be beneficial in some parts of the world, for example the lengthening of the growing season and a decline in very cold weather.

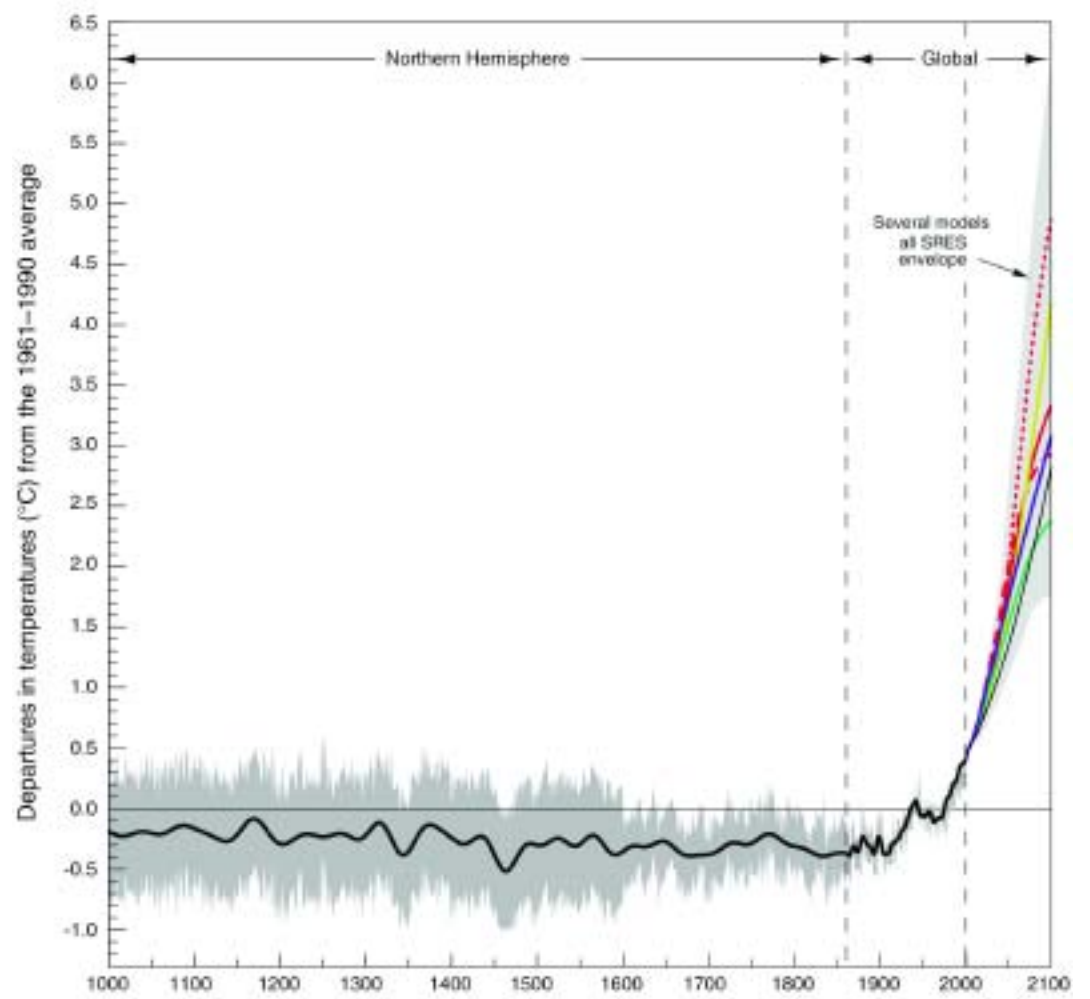
## **The global impacts of climate change**

Assessments carried out for the Intergovernmental Panel on Climate Change (IPCC) show that temperature rises in the last 100 years outstrip any naturally occurring variability experienced in the last 1,000 years. The average global temperature is warmer than any other century in the last 1,000 years. Between 0.4 and 0.8°C of warming has occurred since

1900, with land warming more than the oceans. The last two decades were the hottest in the last century.

There is also evidence that rainfall patterns are changing, sea levels are rising, glaciers are retreating, arctic sea-ice is thinning and that the incidence of extreme weather is increasing in some parts of the world.

Emissions of the greenhouse gases bringing about these changes are projected to increase in the future due to human activities such as the burning of fossil fuels. As a result the atmospheric concentration of one of the key greenhouse gases, carbon dioxide, could double or even treble by 2100.





# UK Climate Impacts Programme (UKCIP)

*The UKCIP was set up by the former DETR in 1997 to help organisations find out how they are likely to be affected by climate change so they can plan to adapt.*

## **Scenarios and tools for decision makers**

UKCIP offers tools for research into the impacts of climate change, including regional climate and socio-economic scenarios and data sets. In April 2002 the UKCIP02 Climate Scenarios were released. These provide information about possible changes to our climate at a resolution of 50km squares for the whole of the UK, up to the end of the century. These are key tools for planners and the development industry. UKCIP also provides guidance on handling risk and uncertainty and a methodology for costing the impacts of climate change.

## **Regional and sub-UK studies**

UKCIP has successfully coordinated stakeholder-led research through regional and sub-UK studies. These studies, based on expert judgement and a review of existing research, highlight the likely impacts in a given part of the UK. The findings are publicised and are available free of charge to the public. The partnerships formed to undertake initial scoping studies have continued across the UK, and have identified issues and commissioned further research related to adaptation and policy-making for the English regions and the devolved administrations. In

England they generally consist of local authorities, the Environment Agency, Government offices for the regions, Regional Development Agencies (RDAs) and local businesses. These groups are always keen to work with new members.

## **Sectoral and other studies**

In addition sectoral studies have been undertaken or are underway on the implications for biodiversity, nature conservation, health, gardens, water demand, the marine environment, the built environment and business. A first attempt has been made at an integrated assessment which considered four sectors – water resources, agriculture, biodiversity and coasts – in Northwest England and East Anglia (the REGIS study).

## **Further information**

UKCIP is the key source of information about climate change impacts in the UK and most of the publications stemming from the programme are listed in the information section. For the latest information UKCIP can be contacted on 01865 432076 or email [enquiries@ukcip.org.uk](mailto:enquiries@ukcip.org.uk). Comprehensive, accessible information about the programme and climate change is available at the website [www.ukcip.org.uk](http://www.ukcip.org.uk).



# Climate change in the UK

## Observed changes

- Central England temperatures rose by almost one degree centigrade during the twentieth century.
- The 1990s was the warmest decade in central England since records began in the 1660s.
- The thermal growing season for plants in central England has lengthened by about one month since 1900.
- Heatwaves have become more frequent in summer while there are now fewer frosts and winter cold spells.
- Winters over the last 200 years have become wetter relative to summers throughout the UK.
- A larger proportion of winter precipitation in all regions now falls on heavy rainfall days than was the case 50 years ago.
- After adjusting for natural land movements the average sea level around the UK is now about 10cm higher than it was in 1900.

## Future changes – UKCIP02 Scenarios

Throughout this advice the UKCIP02 Scenarios are used to illustrate the potential impacts of climate change on the UK over the next 100 years. These scenarios are labelled Low Emissions, Medium-Low Emissions, Medium-High Emissions and High Emissions, and relate to four scenarios of future global emissions of greenhouse gases. These scenarios are based in turn on four different models of how the world might develop in the decades to come. They are therefore four alternative views of the future. It is not possible

to say which of these scenarios is most probable as they depend on the choices made by society. What they illustrate are the possible consequences of society making some choices rather than others. For example the ratification of the Kyoto Protocol would tend to make the Low Emissions and Medium-Low Emissions climate scenarios rather more likely than if no ratification occurred.

The scenarios show changes in frequency and severity and planners should also take note of the more detailed information now contained in the UKCIP02 about changes in extremes of weather and sea level.

These extremes are the events that test the resilience of our infrastructure and buildings.

It should be recognised that the UKCIP02 Scenarios are just one more step in improving the understanding of the changing climate impacts we may see in the UK; there will be further refinements over time. Adaptation strategies should be flexible enough to cope with differences in successive generations of climate change scenarios.

### What do we know about regional impacts?

The UKCIP02 Scenarios present information on impacts at a resolution

of 50km squares. This means that it is possible to see regional variations. Broadly speaking, impacts vary in intensity on a south east to northwest axis. The biggest impacts are generally in the south east of England and the smallest in the north west of the UK. In this advice we contrast the impacts in northwest Scotland with those in southeast England but readers should refer directly to the UKCIP02 Scenarios for more information about particular regions. UKCIP warns that, although results are presented at a resolution of 50 km, users should be wary of over-interpreting the significance of geographical differences at these small scales.

#### Future changes

##### Temperature

- By the 2080s the average annual temperature in the UK may rise between 2°C and 3.5°C depending on the scenario.
- Greater summer warming in the southeast than in the northwest.
- Higher summer temperatures will become more frequent, while very cold winters will become increasingly rare.
- Thermal growing season will increase everywhere with the largest increases in the southeast.
- Heating 'degree-days' decrease everywhere.

- Cooling 'degree-days' increase everywhere<sup>1</sup>.

##### Precipitation

- Generally wetter winters for the whole of the UK.
- Heavy winter precipitation increases.
- Snowfall decreases.
- Greater contrast between summer (drier) and winter (wetter) seasons.
- Humidity and moisture.
- Summer soil moisture decreases.
- Specific humidity increases.

##### Sea level

- Sea level rises.

<sup>1</sup> See page 77 for definition of heating degree days and cooling degree days



There are regional studies being coordinated by UKCIP for all parts of the UK. Planners should become involved in, and use the results from, these regional studies.

### **Confidence in future changes to the climate**

In the scientific report for the UKCIP02 Scenarios a scale of relative confidence – high, medium and low – is utilised in presenting summary statements about future changes in UK climate. The statements shown on the left of this page describe the changes in which there is high confidence (annual results for the entire UK unless otherwise stated).

### **How far should we plan into the future?**

It should be noted that much of the climate change over the next 30 to 40 years has already been determined by historic emissions and because of

inertia in the climate system.

Consequently we are likely to have to adapt to some degree of climate change however much future emissions are reduced.

Beyond 2040, climate change will be increasingly influenced by the volumes of greenhouse gases emitted as a result of human activities now and over the coming decades.

The UKCIP02 Scenarios present impacts up to the end of this century. Looking as far ahead as this may seem unrelated to the timespan of most plans, frameworks and strategies, and hence too remote for many decision makers. However it is important to recognise that much of the infrastructure and many of the buildings developed now are likely to be still in use in 100 years time. The management of the natural environment frequently requires taking a long-term view.

# *Planning for an uncertain future*

*Responding to climate change inevitably means dealing with uncertainty. In this section we outline how to put in place policies that deal with adaptation to climate impacts while taking account of uncertainty about those impacts. A similar approach might be taken to reviewing existing policies that could include adaptation to climate change.*

For general purposes using the four UKCIP02 Climate Change Scenarios – or even the highest and the lowest – may be an adequate starting point to frame the possible extent of the climate change hazard. In several of the topics in Section 2 of this advice this range is presented for relevant impacts.

## **Planning policy-making on adaptation to climate change impacts**

It should be recognised that in many circumstances we know about the consequences of particular events even though we are uncertain as to the probability of their occurrence. For example the consequences of flooding are well known. Hence outcomes of an increase in flood frequency and magnitude can be determined with considerable confidence even if the probability of such an event is itself very uncertain.

## **No regrets and low regrets options**

There may be No Regrets options that are assessed to be worthwhile now (in that they would yield immediate net economic, environmental and/or social benefits) and continue to be beneficial irrespective of the nature of future climate. Policies to conserve water resources provide good examples of these. There may also be policies where the cost implications are relatively modest while the benefits under future climate change may be potentially large, although uncertain. In these Low Regrets options the regret associated with the cost of such policies is low or limited (for example policies about building design that promote adaptation to future climate variability or policies encouraging an increase in the margins of safety such as additional allowance in the design of coastal flood defences). No Regrets and Low Regrets decisions are instances where the uncertainty associated

with climate change impacts should not greatly constrain policy making.

### Climate-influenced and climate adaptation planning policies

Planners will need to put in place some policies where adaptation to climate change is one of several factors that need to be taken into account. These are described as **climate-influenced planning policies**.

Policies that primarily address issues or risks associated with present or future levels of climate variability, climate extremes and/or future climate change that place large costs on developers or have major economic implications are described as **climate adaptation planning policies**. Examples are policies preventing development in areas vulnerable to increased future risk of coastal flooding. Uncertainty could strongly impact on such policies and detailed risk assessments are likely to be needed which should investigate a wider range of climate change scenarios than are set out in the UKCIP02 Scenarios report. UKCIP can provide advice on the use of scenarios.

### Climate adaptation constraining policies

Planners will need to be particularly aware of planning policies that could constrain or reduce the effectiveness of future options for adaptation, for example allowing housing developments in areas vulnerable to flooding which might prevent effective flood management in the catchment in future. This is an example of a decision that has a high 'level of regret' for other decision makers.

## Decision-making framework

The diagram on page 24 summarises the recommended decision-making framework for formulating planning policies that need to take account of climate change impacts. The basic framework is appropriate to all kinds of decision making addressing all types of risks, not just those associated with climate change.

### Stakeholder involvement

The planning system is set up to provide for a high level of stakeholder involvement. It is assumed that stakeholders will be engaged in the process described here, from scoping the policy to deciding on the range of options, and to monitoring and reviewing the effectiveness of the policy. Key stakeholders will be those that will benefit from and/or suffer the consequences of the policy. Stakeholders will often hold information or have expertise that will assist in the process and help to produce more robust policies.

### The process

The framework describes a process that is:

- **Iterative:** allowing the scope of the policy, the decision making criteria, risk assessment and policy options to be refined.
- **Circular:** allowing the performance of a policy to be reviewed regularly, taking into account any new information (such as new climate change scenarios) and the effectiveness of the policy.



It should be noted that stages 3,4 and 5 do not necessarily have to be sequential. A tiered approach is recommended for certain stages in the framework such as risk assessment (stage 3) and options appraisal (stage 5). The first tier is a systematic qualitative analysis, the second tier may be a semi-quantitative analysis and the third tier may involve a fully quantitative analysis. The form of analysis will depend on the importance of the decision and how confident the planner is concerning the importance of climate change to the decision.

#### Further information

The framework presented here is a modified version of that described in the UKCIP report: R. Willows and R. Connell (2003) *Climate Adaptation: Risk, Uncertainty and Decision-Making*. Readers should refer to this report for more detailed advice on using the framework and tools and techniques to be used at each stage.

## The stages of the decision making framework<sup>2</sup>

### Stage 1: Identify the scope of the policy

This is about identifying the 'problem' that needs to be addressed. Is the policy problem one that needs to consider the influence of climate change as one of a number of uncertain factors, or is adaptation to climate change central to the policy objective? This differentiation will largely determine the approach to the risk assessment of climate impacts. It is critical that the scope of the policy is defined appropriately. The focus

should be on delivering desired policy outcomes, for example protecting regional biodiversity.

### Stage 2: Establish criteria for policy making and exposure unit

The criteria should include constraints such as the need to conform to national planning policy guidance and environmental legislation and to avoid imposing unreasonable costs on developers. Adaptation to climate change may be only one objective of the policy. Other policy objectives will also provide criteria. It may be necessary to revisit the criteria after carrying out the preliminary risk assessment and options appraisal. The exposure unit is the system or entity affected by the policy, or that which may materially influence effectiveness of the policy implementation.

### Stage 3: Assess risk

A key task is to decide which climate variables are likely to have a significant influence on the policy objectives. Information is provided throughout the Topics' sections of this advice and is summarised in the checklist on page 84. The diagram presents the questions that might be addressed at a broad preliminary level of risk assessment or first tier of assessment. An LPA may decide after a first tier assessment that a more sophisticated/quantified higher level assessment is required. In such circumstances it would be appropriate to seek advice from consultants with expertise in risk assessment.

### Stage 4: Identify options

When looking at climate-influenced policies there may already be a

<sup>2</sup> Adapted from R. Willows and R. Connell (2003) *Climate Adaptation: Risk, Uncertainty and Decision-Making*

number of policy options identified. In this situation it may be appropriate to go straight to stage 5 to appraise these options. Where climate adaptation policies are being considered a wide range of policy options should be investigated from 'do nothing' to 'do a little' to 'do a lot'. It may be necessary to go round the loop of stages 3,4 and 5 repeatedly before an appropriate range of options is identified.

### **Stage 5: Appraise options**

As with risk assessment (stage 3) a tiered approach is recommended. A key purpose of this stage is to seek ways of refining the options so as to seek those that have lower environmental, social and economic consequences. The 'best option' may be a combination of elements from the options appraised. When appraising climate-influenced policy options the main objective of this stage will be to determine the nature

of the risk presented by climate change and hence which options might perform best or worst under future climate change scenarios.

### **Stage 6: Formulate policy**

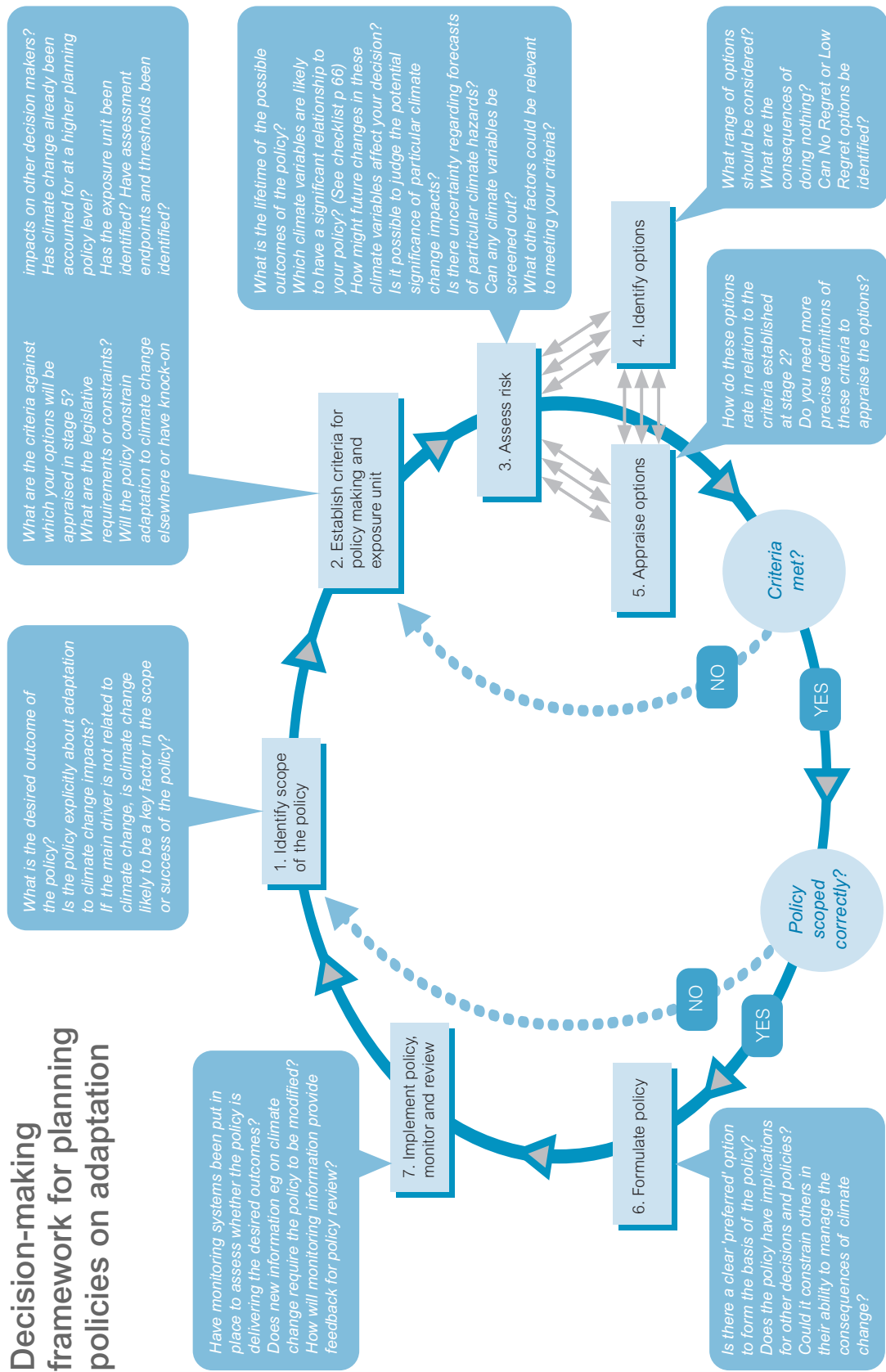
If there is no 'preferred option' it may be necessary to go back to earlier stages in the framework, as indicated in the diagram. It may be necessary to reframe the policy problem in these circumstances, especially where existing policies need to be adjusted to take account of climate change risk.

### **Stage 7: Implement, monitor and review**

Given that planning reforms will result in more frequent reviews of planning policy it will be important to establish appropriate mechanisms for monitoring the effectiveness of the policy and for taking into account new information on climate impact risk as it becomes available.



# Decision-making framework for planning policies on adaptation



# Government policy

*The UK Government continues to play a leading role in negotiating international agreements to tackle climate change.*



The land use planning system is seen as having a significant role in the UK programme to tackle climate change.

## Climate Change: the UK Programme

The Government and the devolved administrations have set out a wide-ranging programme to tackle climate change in *Climate Change: The UK Programme* (DETR 2000). It includes a domestic target to reduce the UK's carbon dioxide emissions by 20% from a 1990 baseline by the year 2010. As part of the Kyoto Protocol the UK has agreed to reduce greenhouse gas emissions by 12.5% below 1990 levels by 2008-2012.

*Climate Change: The UK Programme includes several references to planning:*

- **Planning policy**

*'The framework of planning policy guidance and its application can significantly affect the level of greenhouse gas emissions. Planning policy guidance, which is issued by the Government and the devolved administrations, provides a context for planning decisions and plan making at the regional, strategic and local levels. Future revisions of planning*

*policy guidance will reflect the aims and objectives of the climate change programme.'*

- **Transport**

*'Land use planning will be vital in changing the way people travel, both now and in the future. In line with national guidance, locating development where it can be easily accessible by walking, cycling and public transport will allow people to make sustainable transport choices. It will also help to increase the effectiveness of other transport policies that are designed to reduce the number of trips made by car.'*

- **Renewable Energy**

*'... the Government recently announced work on regional targets and frameworks. Regional Planning Guidance will define broad locations for renewable energy development and set criteria to help local planning authorities select suitable sites in their plans. This in turn will guide the preparation of development plans at the local level.'*

- **Adaptation**

*'Some of the most immediate adaptation priorities fall to organisations responsible for planning and developing major infrastructure, such*

as river and coastal flood defences, transport networks, new buildings and reservoirs. Action in these sectors must be a priority because they work to long planning horizons and the infrastructure is designed to last for 30 to 50 years or more. Decisions taken over the next few years will determine how robust the UK's infrastructure is when faced with the expected changes to the climate, particularly extreme weather events.'

See: [www.defra.gov.uk](http://www.defra.gov.uk) to access the UK Climate Change Programme documents.

### **The Energy White Paper**

The Government and the devolved administrations stated in the Energy White Paper Our energy future: creating a low carbon economy (DTI February 2003) that:

*'Our ambition is for the world's developed economies to cut emissions of greenhouse gases by*

*60% by around 2050. We therefore accept the Royal Commission on Environmental Pollution's (RCEP's) recommendation that the UK should put itself on a path towards a reduction in carbon dioxide emissions of some 60% from current levels by about 2050.'*

The White Paper puts a strong emphasis on energy efficiency and renewable energy as a means to reduce greenhouse gas emissions and states in relationship to planning that: ***'ODPM, in partnership with other Government departments, will be examining how to bring consideration of the use of renewables and energy efficiency in developments more within the scope of the planning system, in the context of the review of PPG22 and the Government's wider planning reforms, and in a way that does not impose undue burdens on developers.'***

# *The role of planning*

*This advice is designed for planning authorities, other public bodies involved in land use planning and the development industry. It is relevant to strategic and local planning and development control throughout the UK.*

In England it is relevant to Regional Planning Guidance (RPG) and Regional Spatial Strategies (RPS). The recent round of RPGs has begun to have regard to climate change in accordance with PPG11.

LPAs are advised to consider the issues in their plan making and development control functions.

## **Key considerations for planning authorities**

- **Awareness**

Local Planning Authorities (LPAs) throughout the UK and Regional Planning Bodies (RPBs) in England need to ensure they are familiar with the UK's commitments in its Climate Change Programme, and to the developing knowledge base from the UK Climate Impacts Programme. Local authorities and regional bodies across their range of corporate functions are in a position to be leaders in raising awareness. Many have signed up to the Nottingham Declaration on Climate Change or are partners in the ICLEI Councils for Climate Protection.

- **Regional climate change studies**

LPAs, RPBs and the devolved administrations should be actively involved in the regional climate studies being coordinated through UKCIP. These studies are particularly relevant to national and regional spatial strategies and RPG.

- **Dealing with uncertainty**

See *Planning for an uncertain future* on page 20.

## **Limits to the role of planning**

It should be recognised that planning is only one way to respond to climate change. In the UK a whole range of policy instruments and programmes are being used including:

- Taxation: Climate Change Levy, fuel taxes, reduced VAT on energy efficiency materials and so on
- Regulation of markets: this includes the New Electricity Trading Arrangements, Renewables Obligation
- Subsidies and programmes: for example energy efficiency grants, the Carbon Trust.

In addition, at the local level, councils are putting in place policies and programmes that address climate change including Community Strategies, Local Agenda 21 Strategies and environmental policies.

Planners are advised to devise planning policies that work in concert with these other policies and instruments.

## Summary of Topics and the Planning Role

The table below shows the reader where they will find more detailed guidance on the issues in the Topics section. Some issues are relevant to reduction of greenhouse gases (indicated by R) or to adaptation (indicated by A), or both (indicated by R,A).

Topic	R/A	MORE INFORMATION	Comments	Planning role
<b>Built Environment</b>				
Building fabric: insulation, thermal mass, solar gain	R,A	BUILT ENVIRONMENT	Big opportunities to reduce emissions. Same measures help keep buildings comfortable in varied weather.	Covered by building regulations. Planners can provide additional advice in design guidance.
Built form, orientation, site layout, shelter, landscaping and consequent microclimate effects	R,A	BUILT ENVIRONMENT LANDSCAPE	Determines potential for passive solar heating, affects comfort in sunny weather and exposure to extreme weather. Can reduce need for building services.	Policies on building design backed up by design guidance.
Building envelope/ built form	R,A	BUILT ENVIRONMENT	Significant reductions in heat requirements possible.	Design guidance.
Design/building services sizing and standards	A	BUILT ENVIRONMENT	Robust construction, well-sized rainwater (etc) capacity, good temperature management. All needed for resilience to more extreme climate and weather.	Policies on building design backed up by design guidance.
Sustainable urban drainage	R,A	FLOODING WATER COASTS	Can improve the availability of water resources.	Policies on water resources, flooding backed up by design guidance.
Vehicle usage	R,A	TRANSPORT	Opportunities to reduce 'lifestyle' emissions provided people use local amenities.	Policies on parking, home zones, local cycle and pedestrian links. Density and mixed use policies. Travel Plans backed up by planning agreements. Local delivery.

Topic	R/A	MORE INFORMATION	Comments	Planning role
<b>Infrastructure</b>				
Renewable energy and CHP	R,A	ENERGY SYSTEMS INFRASTRUCTURE WASTE	Reduces reliance on fossil fuel. Can be incorporated into building design. Can enhance security of supply.	Policies on energy/resources including targets for capacity. Policies on building design.
Transport infrastructure	A	INFRASTRUCTURE TRANSPORT	Need to reduce vulnerability to severe weather events.	Policies on flooding/transport.
Water infrastructure, coastal/flood defences, minerals	A	INFRASTRUCTURE FLOODING WATER COASTS	Need to ensure infrastructure is adequate to cope with increasing risks of drought, flooding, storm surges.	Policies on water resources/flooding. Consideration of disruption to aggregates supplies through flooding.
<b>Location</b>				
Accessibility: nearness to amenities/public transport	R,A	TRANSPORT BUILT ENVIRONMENT ECONOMIC DEVELOPMENT	Big opportunities to reduce 'lifestyle' emissions, provided people use local amenities. Also reduces vulnerability to weather disruption of travel.	Policies on accessibility to retailing, leisure, commercial and educational services. Promotion of local supply networks.
River floodplains/ sea/flood risk areas	A	FLOODING BIODIVERSITY, LAND AND LANDSCAPE INFRASTRUCTURE WATER COASTS	Preventing development in at-risk areas or developing strategies for 'managed realignment' or ensuring development resilient to risk. Avoid areas of water stress.	Policies on reducing flood risk, identification of areas for development. Planning agreements to assign responsibilities for flood protection. Involvement in river catchment, estuary and shoreline management plans.
<b>Rural environment and land</b>				
Land management	R,A	FLOODING BIODIVERSITY, LAND AND LANDSCAPE	Opportunities to integrate land management for water resources, floodplain management, biodiversity and crop diversification. Potential changes in landscape value of countryside in terms of suitability for statutory protection under existing criteria of natural beauty and recreation.	Policies on rural land uses, flood washlands, wildlife corridors, buffering capacity and water storage. Raise awareness of potential change to the landscape and possibility of value of landscape changing with consequent impact on planning policies and decisions.



Local food sourcing	R,A	ECONOMIC DEVELOPMENT TRANSPORT	Opportunities to sustain rural economies, to reduce food miles and reduce vulnerability.	Policies on rural diversification and local food markets and sourcing.
Tourism	A	ECONOMIC DEVELOPMENT	Opportunities for increase in domestic tourism.	Policies on tourism and rural development.
Agriculture and forestry	R,A	ECONOMIC DEVELOPMENT BIODIVERSITY, LAND AND LANDSCAPE	Potential for carbon sinks, new crops. Awareness of climate effects on soil.	Involvement in rural development plans and indicative forestry strategies.
Biodiversity	A	BIODIVERSITY, LAND AND LANDSCAPE COASTS	Opportunities to provide wildlife corridors and buffer zones to allow migration and to consider substitution of habitats/designated sites lost to coastal erosion and flooding.	Policies on biodiversity. Involvement in biodiversity strategies and action plans, estuary and shoreline management plans and coastal habitat management plans.
Development	R,A	BUILT ENVIRONMENT	Opportunities to promote low impact developments to reduce carbon emissions and reduce vulnerability to disruption.	Policies on low impact developments.
Renewable energy	R	ENERGY SYSTEMS INFRASTRUCTURE	Opportunities for renewable energy sources and alternative crops.	Policies on renewable energy sources and processing plants.
Water resources	R,A	WATER BIODIVERSITY, LAND AND LANDSCAPE	Opportunities to rethink water demand, storage and water use techniques, and landscape implications of changes to water resources.	Policies on water efficiency, water storage and integrated landscapes.



# *Topics*



# Infrastructure

*The infrastructure on which we depend can be seriously affected by extreme weather events.*

The UKCIP02 Scenarios show with high confidence that:

- High temperature extremes will increase in frequency.
- Low temperature extremes will decrease in frequency.
- There will be an increase in the number of intense rainfall days in winter.
- Extreme sea levels will occur through a combination of high tides, sea

level rise and changes in winds. These will increase in frequency in many coastal locations.

The general picture is for an increase in wind speed in winter, however a relatively low confidence is attached to these results. The direct and indirect impacts on infrastructure will be expensive. Local authority finances will be affected in terms of calls for rate relief and because of the need to rebuild their own infrastructure.

## National policy

Specific Government guidance on climate change and infrastructure is limited. The following guidance is for development generally.

	England	Scotland	Wales
Flood risk	PPG25 <i>Development and flood risk</i> (information on emergency services) PPG20 <i>Coastal planning</i>	SPP7 <i>Planning and Flooding</i> ; PAN60 <i>Planning and Building Standards Advice on Flooding</i> (2004)	<i>Planning Policy Wales</i> Ch.12 and 13; TAN15 <i>Development and flood risk</i>
Ground instability	PPG14 <i>Development on unstable land</i> (Annex 1 <i>Landslides and Planning</i> ; Annex 2 <i>Subsidence and Planning</i> )	NPPG13 <i>Coastal Planning</i> (re unstable coastal areas)	<i>Planning Policy Wales</i> Ch.13; Draft Technical Advice Note <i>Development on Unstable Land</i>

## Impacts on infrastructure: the basics

Possible future impacts on:	Increased and more intense rainfall, Flooding, Sea level rise, coastal erosion	Stronger winds, storms	Drought/heat/subsidence
Transport	Roads/rail/footpaths/bridleways washed away or made temporarily unusable; increased demand for aggregates etc to rebuild.	Transport accidents, obstructions on roads/rail lines.	Damage to road and rail structures.
Energy	Power stations, substation, transformers in coastal areas or floodplains at risk; buildings that are not flood proof lose power.	Damage to pylon lines and transmission equipment.	Sudden increased demand for air conditioning and cooling causing outages and transformers to overheat.
Water and sewerage Networks	Sewers back up, water becomes contaminated; sewage and water treatment plants in coastal areas or floodplains at risk.		Water shortages. Increased demand for resources etc. Pipes damaged by subsidence.
Telecommunications	Buildings that are not flood proof lose telecommunications.	Damage to masts, towers and equipment.	
Emergency services	Emergency services cannot function; increased need for emergency services.	Increased need for emergency services.	Increased heat-related health problems.



The railway between Teignmouth and Dawlish in Devon has been subject to landslips and cliff falls caused by coastal erosion, severing a main rail route.

## Regional bodies

Much infrastructure – gas pipelines, trunk roads, electricity lines etc – goes beyond local authority boundaries. Siting such infrastructure appropriately will require the collaboration of several local authorities, utility companies and other infrastructure providers. Regional bodies have a role in establishing a framework for such collaboration.

Considerations for regional planning bodies:

- Setting a framework for local authority maps of flood areas and areas of unstable land. See *Flooding*
- Collaborating with the public utilities and providers of transport infrastructure to consider likely future weather conditions, appropriate standards for infrastructure provision (for example it might be necessary to revisit the standards of construction for roads or sewage plants) and appropriate rules for siting of infrastructure developments.
- Ensuring climate change impacts on infrastructure are addressed in the preparation of RPG, RSSs and Regional Sustainable Development Frameworks (RSDFs).

## Illustrations of the increase in extreme weather events in 2080s – UKCIP02 scenarios

	Increase in number of extremely warm days in summer 2080s	Increase in 'intense' rainfall days in winter 2080s	Change in 50 year return period surge heights (metres)
Southeast England	10-30	0.25-1.5	0.2-1.4
Northwest Scotland	0-18	0-0.5	0.1-0.8

Table shows the range of values by reference to the extremes in any 50km square in the given region for the Low Emissions and High Emissions scenarios

### Our Coast – Our Common Asset: Devon County Council's Role, Policy and Action Programme for Coasts (Consultation Draft May 2002) states:

*'It is becoming increasingly important for spatial planning to take account of the pressures that climate change will bring so as to*

*maximise the effectiveness of the coastal defences that we are prepared to pay for and to identify those that we are not. There is a need to look to the future and plan infrastructure in a way that does not compromise the need to have a vibrant coastal economy yet does not require expensive works that will be threatened by climate change.'*

## Local planning authorities

**In England and Wales local planning authorities should consider identifying areas at risk of flooding and unstable land due to erosion, and show them on the local plan, UDP or LDF to guide developers and consultations with the Environment Agency.**

In Scotland planning authorities should use a range of indicators (such as history of flood events) to identify those locations where SEPA will be consulted.

All authorities are advised to adopt a precautionary approach when dealing with proposals in such areas.

The main infrastructure providers are directly involved in assessing the increased risks resulting from climate change impacts. LPAs should work with them to put in place adaptations to increase the resilience of essential infrastructure to climate change impacts.

### **LPAs are advised to work with infrastructure providers:**

- When consulting on or making decisions related to current and planned infrastructure in the light of current information on risks from climate change impacts
- To plan/safeguard new routes/sites to replace those currently in risk areas
- To consider introducing a presumption against built development in areas of flooding and instability.

Specifically, LPAs might address risks to:

- Transport infrastructure by working with rail network companies and

road agencies (such as the Highways Agency in England) to take account of the vulnerability of road and rail lines, power supplies to railways, bridges, footpaths and bridleways. See Transport.

- Energy infrastructure by working with national electricity grid and gas pipeline operators, regional electricity distribution companies, and power station operators to take account of the vulnerability of power stations, pylon lines, transformers, gas pipelines and gas storage facilities to climate change impacts and surges in demand resulting from extremes in the weather. See *Energy Systems*.
- Telecommunications infrastructure by working with relevant companies to take account of the vulnerability of telephone lines, transmission masts and towers to climate change impacts.
- Water and sewerage infrastructure by working with water and sewerage companies to take account of the vulnerability of resources, water and sewage treatment plants, water mains and drainage systems to climate change impacts and surges in demand resulting from extremes in weather. See *Flooding and Water*.
- Sewerage networks: the matter of sewer flooding is being addressed by sewerage undertakers but LPAs should be aware of the problems that climatic change can bring to surface water issues and should consult sewerage undertakers when considering planning applications.
- Sewerage systems posed by new developments or other changes which could have an impact.

**Emergency services**

LPAs might consider whether existing protection and arrangements for access need to be improved. Where possible emergency services should be located away from medium and high risk flooding areas but without affecting response times. Where high-risk areas cannot be avoided facilities need to be designed and constructed to ensure emergency services can be operational in all circumstances.

# Flooding

*Almost two million houses and five million people in the UK are currently at risk of flooding.*

The UKCIP02 Scenarios show that:

- Winter rainfall may increase by up to 15% in the 2050s and by up to 30% in the 2080s for some scenarios and regions
- More precipitation is likely to fall in extreme events in winter.

The rise in sea level will change the frequency of high water levels. For example, the current 1-in-100-year high-water mark on the east coast of England may be expected to be exceeded every 20 years on average by 2050.

Existing and proposed development in flood plains is at risk of being flooded. Development can also increase the risk of flooding elsewhere by reducing the storage capacity of the floodplain, and/or the flow of flood water. Floods, and flood prevention works, can affect wildlife and amenity value.

## National policy

There is comprehensive Government guidance on flooding and land use planning:

- England: PPG25 *Development and Flood Risk*; PPG20 *Coastal Planning*
- Wales: *Planning Policy Wales* Ch. 13; TAN15 *Development and Flood Risk*
- Scotland: SPP7 *Planning and Flooding* with supplementary advice in PAN69 *Planning and Building Standards Advice on Flooding* (2004)

## Planning for flooding: the basics

Flood risk is a material planning consideration. Local planning authorities can guide and control development so as to reduce the country's vulnerability to floods. Avoiding the need to provide further flood defences is desirable. The Environment Agency/SEPA are statutory consultees (or, in Wales, consultees on all UDPs) and hold information identifying most of the areas known to be currently at risk. Planners should take this into account when deciding whether to permit development.

## Floodplain mapping

England and Wales: The Environment Agency provides information on flooding to local authorities under Sec 105(2) of the Water Resources Act 1991. Indicative floodplain maps show the extent of the floodplain that may be vulnerable to flooding from rivers or the sea (see [www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)). It should be noted that these maps do not take account of expected changes in flood risk resulting from climate change impacts. The Agency is preparing updated maps for priority areas. It plans to publish extreme flood outline (EFO) maps showing areas which may be vulnerable to a one in a thousand annual probability flood.



Scotland: SEPA advises Scottish planning authorities on flood-risk matters – see the SEPA Planning Authority Protocol *Development at Risk of Flooding* (2000) ([www.sepa.org.uk/policies/pdf/41.pdf](http://www.sepa.org.uk/policies/pdf/41.pdf)). SEPA has provided paper copies of the Institute of Hydrology's 'indicative' maps of high risk areas to local authorities.



## Regional bodies

**Strategic flood management makes most sense at the regional or sub-regional level, that is, at the river catchment or coastal cell scale. Floodplains can span several authorities and development in one local authority can affect run-off and flooding in other authorities. Although regional authorities generally do not clearly correspond to catchments or coastal cells they have a key role in planning for flood prevention and protection.**

### Regional planning bodies might consider:

- Identifying in RPG or RSS principal areas where flooding issues are likely to be of regional significance, and establish regional policies to discourage inappropriate development in high-risk areas.

RPG 13 for the North West (March 2003) Policy ER8 Development and Flood Risk

*'In preparing development plans and other relevant strategies and considering individual planning proposals, local authorities should apply the precautionary principle.'*

*In accordance with this precautionary principle they will make use of Indicative Flood Plan Maps, Shoreline Management Plans, Estuary Management Plans and Local Environment Agency Plans to develop the information necessary to apply the sequential approach to flood risk set out in PPG25. In particular, they should:*

- *Ensure built development is wholly exceptional and limited to essential transport and utilities infrastructure in areas of functional flood plains.*
- *Apply the precautionary principle, using the sequential approach, to developments in areas at risk of flooding. In the NorthWest areas of greatest risk are the Solway Coast, the Duddon Estuary and Morecambe Bay, the Lower Lune Valley, the Fylde, the Ribble Estuary and Sefton Coast, and the River Mersey network and the Dee and its estuary.*
- *Discourage inappropriate development in areas at risk from flooding.*
- *Avoid development which could lead to flood risk elsewhere either by reducing the ability of flood plains to store flood waters or by creating unacceptable increases in surface water run-off.*
- *Promote the use of Sustainable Urban Drainage Systems (SUDS) in all new developments.*
- *Support the protection, management and development of flood defences.*
- *Take account of the longer-term impacts of climate change.'*



- Promoting local management of run-off in their RPG or RSS policies.
- Promoting a holistic approach to flood management on the wider scale of the catchment or coastal cell and incorporating the concepts of managed retreat of coastal defences and restoration of floodplain function.

#### Per cent increases in winter precipitation UKCIP02 Medium High Scenario for 2080s

	2080s (%)
Eastern England	25-30
Eastern Scotland	20-30
Southeast England	20-25

## Local planning authorities

**Local planning authorities are advised to adopt a joined up approach with other local authority services and liaise closely with Building Control, Highway Engineers, Environmental Health and Emergency Planning.**

Fluvial and urban flooding are of increasing concern. Climate change impacts may be severe because of the discharge relationships of piped systems (the capacity of piped systems does not increase greatly once pipes are full, so performance above design conditions can be poor). It is important to note that drainage problems and associated flood areas are not shown on the indicative flood maps which relate to main river and coastal flooding only.

Planning authorities can aim to reduce flood risk and prevent flood damage through careful siting and design of development.

### Considerations for local planning authorities include:

- **Identifying areas of flood risk and designate flood washlands**

This should be based on information from the Environment Agency/SEPA and more detailed local knowledge of past flooding events, developers' studies etc at a whole catchment level. These should be shown on local plans or LDFs in England. Flood washlands can be multi-purpose land uses which, for instance, promote biodiversity or offer recreational opportunities. *See Biodiversity, Land and Landscape.*

Newport UDP 1996-2011 second proposed changes to the Deposit Plan May 2003 Policy U7:

*'Flood plains have been identified within the valleys of the rivers Usk, Rhymney, Lwyd and Ebbw and their catchment tributaries where development and land raising will not be allowed. Protection is required so that they can fulfil their primary function as effective flood flow conveyance and floodwater storage areas.'*

- **Adopting a risk-based approach to development in, or affecting, flood risk areas**

LPAs are advised to use a risk-based search sequence to identify sites for development in local plans/LDFs and in considering applications for planning permission. Developers should carry out a flood-risk assessment appropriate to the scale and nature of the development and the risks involved. This assessment should cover both the

risks to the development itself and its impact on flooding elsewhere. In all cases the developers are responsible for identifying, implementing and funding the provision and future maintenance of any flood control measures necessary because of the development.

Oxford City Council (June 2002) First Draft Oxford Local Plan 2001-2016  
*'A Flood Risk Assessment must be submitted alongside planning applications for any development within undeveloped flood plain, low lying land, and developments elsewhere which could significantly increase run-off or are at risk from flash floods. The Flood Risk Assessment must assess the risk of flooding to the proposed development, the possible impact which it may have on flooding elsewhere, and propose mitigation measures where appropriate.'*

- **Aiming to prevent/reduce surface water run-off**

Any development, including changes of use, can increase flooding by increasing the area of impermeable ground and thus the amount of run-off. Sustainable Urban Drainage Systems (SUDS) can help to reduce these problems.

Newport UDP 1996-2011 2nd Proposed Changes to the Deposit Plan (2003) Policy U6:

*'Development which could increase the risk of flooding due to additional surface water run-off must include appropriate and environmentally sympathetic mitigation measures.'*

- **Monitoring, and devising rapid reaction strategies in case of problems**

Planning officers should also liaise with emergency planning officers in case policies require revision following a flood. This includes checking the likely risk of flooding of current emergency services' facilities.

- **Devising appropriate planning policies**

Structure plans, strategic plans or sub-regional strategies can set out the strategic approach to reducing flood risk and managing run-off, including requirements for acceptable developments in various risk areas. Local plans or LDFs can show areas of flood risk, consider these when proposing development sites and establish a framework through the use of Section 106 (or Section 75 in Scotland) for developer contributions for flood defence and mitigation works.

West Sussex Draft Deposit Structure Plan 2001-2016 (2002):

*'The risk of flooding is an important issue in West Sussex. The coastline of the county is generally low-lying and naturally sinking. As a result, it is particularly vulnerable to the predicted impacts of climate change. These include more coastal and river (fluvial) flooding resulting from sea level rise, increased storminess, increased winter rainfall, and higher and more intensive waves ... The aim of the policy is to reduce the risks to people, property and the natural environment from flooding. This applies to the coast, rivers and their catchment areas. The policy also*

*seeks to reduce risk from coastal erosion, land instability, wind, waves, sea-spray or wave-borne debris’.*

- **Working with other authorities on flood appraisal**

Local authorities are advised to work closely with others (including Flood liaison and Advice Groups in Scotland), and those involved in specific exercises such as LEAPs, Shoreline Management Plans (SMPs) and Catchment Flood Management Plans (and in future River Basin Management Plans) to ensure the widest possible participation at a scale that is appropriate to flooding (namely catchment /coastal cell). See *Water and Coasts*.

Stirling Local Plan Alteration 1A (2002) ‘Government advice now is that climate change is a major issue. In local terms, over the time-scales appropriate to considering development planning and proposals, this means anticipating an increasing flood risk from higher peak river flows, from greater rainfall run-off, and from rising sea level. The Council therefore proposes to adopt a precautionary planning policy, with criteria based upon the widely advocated insurance industry ‘template’, relating risk levels to developments of differing vulnerability.’

POL, E61

*1. Development will not normally be permitted where a site specific flood risk assessment indicates that:*

*(a) the location is part of a functioning river flood plain, or is otherwise at risk of inundation because of its*

*relationship to contours, flood defences, or tidal waters; or*

*(b) the nature of the proposal is such that increased surface-water run-off may cause or exacerbate flooding elsewhere; or*

*the ecological value of affected wetland and related habitats will be unacceptably reduced.*

*2. Exceptionally, where the flood-risk is shown to be low, development or redevelopment may be permitted contrary to part (a) if:*

*(a) the proposal is sufficiently important to warrant specific flood alleviation or defence measures; or*

*(b) the proposal is of such a nature that people, and the structural integrity of buildings and other features, will not be at risk should flooding occur; and*

*(c) the developer bears all costs of providing and maintaining flood defences and flood warning measures.’*

### **Prepare development advice notes (or similar) on development and flooding**

These would normally include more detailed guidance on flood mitigation measures for different risk areas and development types as well as details on developer contributions. For instance Stirling Council’s four page draft Development Advice Note on flooding explains who is responsible for various aspects of flooding, reviews the council’s planning policies, discusses the location of development and site planning, and gives further contacts.

King's Lynn and West Norfolk Borough Council, Fenland District Council and the Environment Agency have commissioned a Strategic Flood Risk Assessment of both districts to determine the different levels of flood risk in those areas identified on the Agency's Indicative Flood Plain Maps as being at risk of flooding. *'The assessment will differentiate land in both districts with different levels of protection, taking into account existing flood defences and drainage systems, and showing the relative risk under both present day conditions and conditions 50 years hence taking into account the effects of climate change.'*

*The SFRA will help in the consideration of planning applications in at risk areas, and inform the review of local plans (or their replacements), including urban capacity studies and open space strategies. It is envisaged that, based on the results of the SFRA, Supplementary Planning Guidance will be prepared to help in the consideration of applications for development.'*

### **Sustainable Drainage Systems (SUDS)**

SUDS aim to minimise the quantity and improve the quality of water before it is discharged from a development so as to help prevent flooding and pollution. They include: source-control techniques that treat water close to the source and minimise the quantity of water collected at source eg infiltration trenches/basins; porous pavements; permeable systems that store, filter and dispose of some run-off before the water is discharged eg filter/French drains, grass swales; passive treatment systems that use natural processes to remove pollutants eg detention ponds.

CIRIA sells SUDS design manuals for (a) England and Wales and (b) Scotland and Northern Ireland: [www.ciria.org.uk](http://www.ciria.org.uk).

In Scotland Planning Advice Note 61 *Planning and SUDS* gives advice on the role of the planning system in delivering SUDS.

# Coasts

*Coastal areas are particularly exposed to the impacts of climate change through risk of erosion, land instability and sea level rise. The UKCIP02 Scenarios indicate that extreme sea levels – occurring through combinations of high tides, sea level rise and changes in wind – are likely to be experienced more frequently in many coastal locations.*

Climate change will affect natural processes. This will have a direct impact on built development and natural assets on the coastline and wider coastal zones. Planning authorities will need to liaise well with other agencies with coastal responsibilities to plan for such changes, make provision for medium to long-term realignment and ensure new development does not exacerbate the risks.

## **National policy**

Current UK planning policy on coasts is contained in:

- Scotland: NPPG13 *Coastal Planning*; PAN53 *Classifying the Coast for Planning*.
- England: PPG20 *Coastal Planning*; PPG14 *Development on Unstable Land*.
- Wales: *Planning Policy Wales* Ch.13; TAN 14 *Coastal Planning*.

Within the EU the concept of Integrated Coastal Zone Management (ICZM) has been promoted, and in the UK there are many initiatives to coordinate sectoral policies and improve coastal planning across the wider area than the immediate coastal zone. In England and Wales SMPs are prepared, within which coastal defence strategies are produced. In Scotland SMPs are promoted where coastal erosion is a serious issue; Scottish Natural Heritage is promoting Focus on Firths and the Scottish Coastal Forum (SCF) is supported by the Scottish Executive. The network of local coastal fora report to the SCF. A Wales Coastal and Maritime Partnership has been set up to inform policy development in the Welsh coastal and maritime areas. English Nature is also promoting Estuary Management Plans and Coastal Habitat Management Plans.

The UK is committed to implementing the EU Recommendation on ICZM and the national strategies required under this recommendation will be fundamental to the long-term management of the coastline of the UK. The LGA has adopted a coastal strategy called *On the Edge* which promotes integrated and democratically accountable sustainable solutions that recognise the dynamic nature of coasts and the changing economies of coastal settlements. This goes to the heart of ICZM policy.

### Planning for coasts: the basics

Planning bodies at local and regional level are in a position to take the lead in pulling together policies for planning, protecting and improving coastal zones; policies for developments and land uses which require a coastal location; and policies for the wider coastal area. *'LPAs should acknowledge the inter-relationships between the physical, biological and land use characteristics of their coast, and the likely effects of climate change'* (Planning Policy Wales 2002). Marine aquaculture may also be also an issue.

Coastal defence strategies are being prepared for a 50 year time horizon and planning bodies need to have regard to time horizons longer than the statutory plan period.

In carrying out SAs of their development plans, LDFs, RSS or RPG, planning authorities and bodies might assess the impacts of climate change where relevant on coastal areas (for instance on objectives for biodiversity, landscape, infrastructure, economic development or tourism). See *Sustainability Appraisal*.

## Regional bodies

### Considerations for regional bodies include:

- Identifying the range of issues across the wider coastal zone.
- Setting objectives to protect and enhance the region's coastal resources under conditions of climate change.
- Adopting policies to provide for the long-term sustainability of coastal areas.
- Identifying cross-border issues.
- Identifying offshore wind farm potential.

### Range of sea level change 2080s: UKCIP02 scenarios

London	26 to 86 cm
E England	22 to 82 cm
SE England	19 to 79 cm
Wales	11 to 71 cm
NW Scotland	-1 to 59 cm

### Regional studies

Many of the sub-UK regional climate impacts studies highlight concerns over the coastal zone, and regional planning bodies need to be actively involved in these studies.

The North West Region, through its involvement in the REGIS project on regional climate change impacts, is developing greater understanding of climate change issues and ensuring the relevant agencies, stakeholders and the general public in the coastal zone are kept informed. More detailed information and modelling



applicable to specific locales will allow better exploration of coastline management options.

### **Adopt climate-aware objectives and policies**

Regional planning guidance, regional spatial strategies or strategic plans can include objectives and policies which guide development away from risky or sensitive areas and ensure new development does not exacerbate coastal squeeze. They might also indicate areas where decisions on managed realignment may need to be taken.

The North West commissioned research into integrated coastal zone planning in the northwest region. This recommended that RPG should encourage LPAs to take a precautionary approach to issues related to climate change in preparing development plans and in assessing the locational acceptability and detailed design of individual development proposals within the coastal zone.

### **Cross-border issues**

Ideally policies should be adopted for whole ecosystems such as river valleys or coastal zones, which may cross boundaries.

Scottish Natural Heritage's *Focus on Firths* initiative is a Scotland-wide initiative to promote the integrated management of the natural resources of the firths. The project aims to involve all statutory, voluntary and community interests with a stake in the firth to generate and implement a management strategy.

## **Local planning authorities**

### **Planning authorities which include a coastal zone are advised to ensure that they:**

- Liaise with statutory flood defence agencies and maritime, conservation and landscape interests.
- Consider effects over the wider coastal zone.

### **They should also include policies to:**

- Identify appropriate sites for development that must have a coastal location such as wave power.
- Identify opportunities for relocating development or land uses inland.
- Make provision for new habitat.
- Identify opportunities for existing resorts to make the most of warmer summers.
- Address both short-term protection and long-term adaptation.

### **Liaise with other agencies**

Local planning authorities need to be active partners in the range of initiatives affecting the coastal zone and to use and develop their expertise to examine the wider implications of climate change for all coastal activities and land uses. Closer liaison is needed between SMPs and statutory development plans or LDFs.

Minehead, on the Bristol Channel, is subject to very large tidal ranges and has experienced frequent recent flooding. The new sea defences and beach replenishment, constructed to withstand a 1% storm, have been used to improve access to the beach, enhance the seafront, and promote the area as a holiday resort.



### Consider the wider coastal zone

Many issues besides flooding affect areas inland from the coast. These include the risks of saltwater penetration, water supplies, and backing up of sewage systems. LPAs are well-placed to take the widest view of the coastal zone, both inland and in liaison with adjacent authorities. Some structure plans have included policies addressing maritime issues affecting inland waters.

### Identify sites for essential coastal development and land uses

LPAs can take account of climate change in allocating sites, or when consulted on proposals for developments such as water-treatment works, ports and off-shore wind farms or their extensions which may need a coastal location. They can also consider the role of habitat creation in providing soft defences. See *Biodiversity, Land and Landscape*.

In West Sussex a community initiative is being progressed with the statutory agencies to develop a strategy for the Manhood peninsula. It will address issues of coastal management (including managed realignment), water management (including using the landscape to store water), promotion of non-car transport options, green housing, development of new saline tolerant crops, and space for habitat creation and enhancement.

# Water resources

*Climate change is adding significantly to the uncertainties about future supply of and demand for water. The UKCIP02 Scenarios show that seasonal distribution of precipitation will change, with wetter winters and drier summers across the UK. A combination of lengthening thermal growing seasons and a decline in summer soil moisture is likely to lead to increased water demands by agriculture and horticulture.*

Areas that are already experiencing water constraints on development are likely to find problems exacerbated. Planning authorities need to take water resources and quality seriously as a material consideration in their development plan or framework and development control decisions.

## National policy

England: PPG3 Housing (para. 31), PPG25 *Development and Flood Risk* PPG23 *Planning and Pollution Control* (Annex 3 para 17) states that: ‘... the supply of water and sewage disposal are capable of being material considerations in planning applications and appeals and should also be taken into account in drawing up development plans.’

Wales: *Planning Policy Wales* Ch. 13; TAN 15 *Development and Flood Risk*  
Scotland: PAN 61 *Planning and SUDS*

The Environment Agency is responsible for water resources strategy in England and Wales. Its *Water Resources for the Future Strategy* (March 2001) bases forecasts for water demand on socio-

economic scenarios and takes a 25 year horizon, including climate change impacts. The national strategy is complemented by regional strategies.

## Planning for water: the basics

In much of England and Wales, water is a scarce resource. It is crucial, therefore, that planning bodies liaise early with the Environment Agency and water companies so that the provision of water supply and disposal infrastructure can be timed to serve the development it is to support. Planning bodies at local and regional level are advised to adopt the precautionary principle in formulating policies which allow for change and uncertainty in the supply of water, and which promote water-efficient development. The current Water Bill provides a new duty on public bodies to take water conservation into account. This will affect planning bodies where their functions have an impact on water use, as well as public bodies’ own use of water.

Changing water resource patterns are likely to have an impact on many land uses, including manufacturing, commercial development, agriculture and rural land use, and residential development. Ecology and biodiversity are likely to be affected and landscapes may well experience significant change.

In carrying out SAs of their development plans, LDFs, RPG or RSSs, and in requiring EIAs for major developments, planning authorities are advised to consider the impacts of climate change on water resources. See Sustainability Appraisal and EIA.

The EU Water Framework Directive requires comprehensive River Basin Management Plans (RBMPs) to be adopted by the end of 2009. These plans are based on analysis of the pressures arising from human activity and will set out measures to achieve the objectives for water within each river basin district. The land use planning system will need to ensure that development has regard to the needs of the water environment identified in the RBMPs.

## Regional bodies

### Considerations for regional bodies include:

- Engaging in the RBMPs being drawn up under the Water Framework Directive.
- Adopting objectives and policies which allow for uncertainties over future water resources.
- Recognising the constraints of water supply and demand in developing regional spatial strategies.
- Recognising the impacts of development on water quality.
- Identifying and dealing with cross-border issues.

### Change in summer precipitation: UKCIP02 Scenarios

	2020s	2080s
Northwest Scotland	0 to -10%	0 to -50%
Southeast England	-10 to -20%	-20 to over -50%

### Regional and river catchment studies and strategies

Many of the sub-UK regional climate impacts studies highlight concerns over water resources; in England the issues have had a greater profile in the recent rounds of RPG revision. In England and Wales regional planning bodies must take account of the Environment Agency Regional Water Resource Strategies which look ahead 25 years and promote flexible options regarding climate change. RPBs should also engage with the RBMPs being drawn up under the Water Framework Directive. Catchment Abstraction Management Strategies, which are being produced for the first time in a phased programme up to 2007 and revised on a six year cycle, will indicate the local water resources position and the likely availability of water for the public supply.

### Adopt climate-aware objectives and policies

It is important that RPG or RSSs include objectives and policies which ensure that the water resource implications of new developments are assessed. Where development proceeds resources should be sustainably managed. This includes policies for new housing and for other developments such as mineral workings, tourism schemes and energy projects. For example:

- **Water demand**

The Regional Sustainable Development Framework for the South East Objective 17: *'To achieve sustainable water resources management proposes a target of stabilising per capita consumption at current levels.'*

- **Water quality**

RPG for South East Policy INF2 states: *'New development should be located and its implementation planned in such a way as to allow for sustainable provision of water services and enable timely investment in sewage treatment and discharge systems to maintain the appropriate standard of water quality.'*

### Cross-border issues

Regional planning bodies may need to consider climate change in cross-catchment discussions over water resources.

RPG6 for East Anglia Policy 54 states: *'the RPB and the Environment Agency should work with the water industry and the RPB for the South East and the Greater London Authority to formulate a sustainable long-term policy relating to inter-regional water provision.'*

## Local planning authorities

### Considerations for LPAs include:

- Recognising the availability of water resources in formulating development plans and frameworks, and considering development proposals.
- Planning to minimise demand on existing water resources.
- Promoting water-efficient installations in developments.
- Recognising the wider impacts of water provision on landscape and biodiversity.
- Publishing SPD as good practice develops.
- Setting an example in their own local authority developments.

### Address water resources as a material consideration

Local planning authorities will want to take account of regional water resource strategies and catchment abstraction management strategies, promote sustainable provision of water services and adopt good domestic practices.

Hampshire County Council (April 2003) Hampshire Water Strategy  
*'In the case of major development sites, the provision of trunk water mains and sewers requires coordination to avoid piecemeal infrastructure development This can be addressed in development briefs and supported by appropriate planning consents. Such mechanisms also provide an opportunity, particularly in such large developments, to be positive in terms of water efficiency, sustainable drainage, and wetland habitat creation. With organisations working in close partnership, new development can be seen as an opportunity and not just as a threat.'*

### **Recognise uncertainties and consider phasing of development**

LPA's are advised to take a precautionary approach. Where water resources might be a significant problem in the future, LPA's can consider adopting a policy such as that of Wealden District Council:

#### **Policy EN5**

*'New development will only be permitted where adequate water resources are available and where it would not present an unacceptable risk to such resources.'*

Wealden Local Plan, Adopted December 1998

### **Greywater use/rainwater harvesting**

Where maintenance and safety can be assured, there is scope for greywater recycling technology on larger sites such as housing developments and industrial/commercial sites. Its suitability for individual sites can be considered, and provision made through design, for instance for water-collection points and rainwater harvesting.

### **Publish supplementary planning documents**

LPA's can prepare SPD documents stating their encouragement for water-efficient installations, greywater recycling and rainwater harvesting schemes and attenuation of surface water drainage. LPA's can also use informatives to direct developers to the use of water-efficient technology.

# *Biodiversity, land and landscape*

*Biodiversity – the variety of life on earth – includes all species, both commonplace and rare, and the habitats in which they are found. It is vital for our quality of life, but is already threatened through fragmentation and direct loss. Broader landscapes, protected by national or local designations, also contribute much to our quality of life.*

Climate change will cause change in natural processes and will change landscape features. It may make existing fragmented habitats more vulnerable unless space for adaptation is available. The direct effects of climate change, such as flooding or sea level rise, might also reduce the extent of protected areas.

## **The role of the planning system**

The planning system helps to integrate the development necessary to sustain economic and social activity in rural communities with protection of the countryside for the sake of its beauty, the diversity of its landscape and historic character, the wealth of its natural resources and its ecological, agricultural, recreational and archaeological value. It is also the principal means for regulating the rate at which land is transferred from agriculture, forestry and other rural uses. The planning system can therefore play a key role in ensuring uses of land respond appropriately to climate change.

Planning ahead requires long-term vision to maintain and enhance biodiversity, improve connections and provide capacity for future change.

## **National policy**

Biodiversity is a key component of sustainable development. In addition to statutory designations of internationally and nationally important sites, many sites of regional or local value are identified in statutory plans. Planning can help to sustain and enhance biodiversity through the development process. Current planning policy on biodiversity is contained in:

- Scotland: NPPG14 *Natural Heritage*; PAN60 *Planning for Natural Heritage*.
- England: PPG9 *Nature Conservation*.
- Wales: *Planning Policy Wales* Ch.5; TAN 5 *Nature Conservation and Planning*.
- Northern Ireland: *Planning and nature conservation* PPS2.

Knowledge of the impacts of climate change on biodiversity is increasing with a number of studies, such as REGIS and MONARCH, completed or underway. *See Information*. English Nature has published guidance (2000) *Developing Naturally*, and in Wales the CCW's LANDMAP information system methodology can assist in landscape assessment.

### **Planning for biodiversity, land and landscapes: the basics**

Planning bodies at local and regional level can promote biodiversity through the short- and long-term protection and enhancement of existing designated areas and other areas of biodiversity value, and in safeguarding capacity for future change. In consultation with relevant conservation agencies they might assess the needs for safeguarding areas which help to maintain the connectivity of semi-natural habitats to allow species to adapt to climate change through dispersal. In consultation with the countryside agencies and councils they can also consider the possible short- and long-term effects of landscape change, brought about by climate change, on the local and regional economy.

They can consider ecosystem and species dynamics and natural processes in their allocations of land uses. English Nature's Natural Area Profiles, based on landscape, wildlife and natural features, can be used as a basis for policy formulation and implementation in England.

In carrying out Sustainability Appraisals of their development plans, LDFs, RPG or RSSs, planning

authorities should consider the impacts of climate change on trends in biodiversity and landscape protection. *See Sustainability Appraisal*.

## **Regional bodies**

### **Considerations for regional bodies include:**

- Setting objectives to protect and enhance the region's biodiversity, landscapes and earth heritage resources under conditions of climate change.
- Adopting policies to reflect regional character.
- Identifying cross-border issues for natural areas or natural processes.
- Through RSSs, ensuring agriculture can respond appropriately to climate change and that it is protected from the most severe impacts.
- In rural development plans, explicitly taking into account changing patterns of flood risk and water availability.

### **Regional studies**

Regions are an important level to integrate biodiversity into emerging spatial frameworks. RPG and RSSs can make use of the many regional climate impacts studies and the work of Regional Biodiversity Forums, which are coordinating biodiversity action at a regional level.

Draft North West RPG referred to the North West Climate Group study of 1998 on climate change in the north west which identified the wide-ranging implications for the region, including those affecting biodiversity



and landscapes. The North West Regional Assembly has commissioned a study on the spatial implications of climate change and is initiating a partial review of RPG to reflect this.

### Adopt climate-aware objectives and policies

It is important that regional plans and strategies include objectives and policies which promote biodiversity conservation and enhancement under conditions of climate change directly, through the protection of existing sites and promotion of new safeguarded areas, and indirectly through the biodiversity component of the spatial strategy and development chapters. RPG and RSS can guide development away from sensitive areas to avoid the long-term loss of natural habitats and disruption to human settlements, and can promote the identification of areas for habitat creation or managed realignment.

RPG 9 for the South East (2001) states that: *'Climate change in the future may have unpredictable impacts, ranging from coastal inundation to habitat displacement to suit the new climate. It is therefore all the more important to continue to monitor environmental changes'*. RPG East Anglia (6.7) suggests that managed retreat may have environmental benefits in creating new wildlife habitats and replacing those lost. RPG South West includes BAP targets in its monitoring chapter, such as the creation of new woodland.

### Cross-border issues

It is most effective for policies to be adopted for whole ecosystems and

landscapes, such as river valleys or coastal zones, which may cross boundaries.

RPG 13 for the North West Policy ER5 *'The NWRA will actively pursue arrangements for the establishment of effective cooperation with authorities from neighbouring regions on cross-border issues, which require inter-regional coordination, specifically with regard to the Pennines, Solway Firth and such important landscape and biodiversity strategies as the Dee Estuary Management Plan, and more widely in relation to the potential effects of climate change.'*



## Local planning authorities

**In formulating development plans and LDFs, LPAs can make use of local Biodiversity Action Plans (BAPs) and seek to include climate change sensitive policies on biodiversity and landscape, such as:**

- Assist in achieving BAP targets.
- Identify opportunities for new habitats, buffer zones and wildlife corridors.
- Reflect local diversity.
- Identify opportunities for development to enhance climate-adaptable biodiversity.
- Address both short-term protection and long-term adaptation.

### Local authorities can also:

- Prepare supplementary planning guidance.
- Engage with biodiversity forums.

### Considerations for LPAs include:

- **Build local targets into planning**

LPAs could usefully contribute towards meeting biodiversity targets by including them in development plans and LDFs. For instance, Oxfordshire proposes a 5% increase in woodland in 10 years, a target supported by structure plan policy EN7. While these targets do not yet take account of climate change, they can be expressed as *‘to increase the area and quality of semi-natural habitat’*.

- **Identify areas for new habitat**

Plans and frameworks can review the policies for areas at the edges of existing priority habitats and consider safeguarding buffer zones or wildlife corridors to allow adaptation. They can also positively promote the designation or creation of new habitats such as wetlands or woodlands.

The Langholm/Lockerbie Local Forestry Framework indicates where there is potential for certain types of tree planting. The area is divided into catchments and smaller subdivisions, each of which is characterised according to existing land use, the relative significance of sensitivities (such as the objectives of the open moorland habitats or creating buffer strips along rivers) and public opinion.

Plans and frameworks might identify scope to reverse fragmentation and improve the connections between natural habitats, in order to provide stepping stones or corridors for migration or dispersal.

In the East Midlands one of the main impacts of climate change will be the movement of species on the edge of their distribution and the loss of wetland species. Suggested adaptation strategies include the creation of habitat corridors and the maintenance and enhancement of floodplains. The River Soar has been designated as a Strategic River Corridor and Leicester City is proposing Built Environment Policy 20 Floodplain Protection and Enhancement: *‘Within the area of floodplain shown on the proposals map, development which is likely to have an unacceptable impact, both directly and indirectly, on the natural functions of the floodplain or water retention areas will not be permitted.’*

Leicester draft replacement plan identifies Biodiversity Enhancement Sites on the proposals map. Green Environment Policy 3 states *‘Development on a Biodiversity Enhancement Site will be permitted if the strategic nature conservation value is maintained or enhanced. Opportunities will be sought through the planning process to enhance the biodiversity of the sites, adjacent sites or the green network to which it relates.’*

At Freiston Shore, Lincolnshire, 78 hectares of new saltmarsh and a 12ha saline lagoon are being created following the re-alignment of sea defences, through a partnership between the Environment Agency, RSPB, landowners and local authorities. The new habitat and defences improve flood protection for inland settlements and agricultural land, and the scheme is being used to promote green tourism.

Suffolk Coastal Local Plan 1994:

Policy LP80 Sea Defences

In the interests of marine and coastal habitats, particularly along the Heritage Coast, the district council will, where practical, encourage the use of 'soft' sea defences such as higher and wider beach profiles, or the rehabilitation of salt marshes, rather than the installation or raising of sea walls, using material such as concrete.

- **Identifying opportunities for biodiversity enhancement**

Through planning conditions or Section 106 (England) or S75 (Scotland) agreements, LPAs can ensure that the ecological integrity of an area is protected from disturbance, disruption, loss or fragmentation, or enhanced through the creation of new habitat. See Implementation.

- **Landscaping**

LPAs could consider seeking relevant advice on appropriate species and planting regimes for landscaping schemes for major or significant developments, and for urban and rural enhancement schemes. Species will need to be able to establish themselves in current conditions, and be able to adapt to anticipated changes over their lifetime such as drier summers, more extreme episodes of rainfall and higher windspeeds. LPAs should consider the long-term implications under conditions of climate change of requiring tree planting too close to new developments. Until more becomes known about the impacts of climate change on different species there is a strong case for taking a precautionary approach.

- **Coastal habitats**

Many coastal habitats are threatened by sea level rise and yet they can also provide valuable means of moderating the erosive power of tides and waves. LPAs can appreciate and plan for dynamic natural processes, and be more involved in the many initiatives for ICZM such as SMPs, Coastal Habitat Management Plans (CHaMPS) and Estuary Management Plans. Natural systems such as marshes can be promoted for many benefits besides biodiversity, including recreation, productive services, water resources and quality, and flood washlands and flood defence. See *Coasts*.

- **Preparing supplementary planning documents**

SPD can assist in achieving biodiversity and landscape objectives, detailing opportunities and targets for biodiversity, and landscape enhancement.

The report *A Strategic Overview of Biodiversity Issues in Leicester, Leicestershire and Rutland* was prepared by the Local BAP Executive Committee in partnership with planners, and will provide SPD to emerging policies in development plans.

# *Economic development and tourism*

*Climate change will create new economic development opportunities. Many of these are likely to be in rural areas with lengthening of the thermal growing season.*

Climate change impacts will also constrain economic development in some areas as a result of factors such as increased flood risk, coastal erosion and drought.

The warming of the climate and hotter, drier summers, will have some benefits for tourism particularly in the southern regions of the UK. Diminished snow cover in winter will have implications for the skiing industry in Scotland.

## **National policy**

It is national policy that economic development, regeneration and tourism should be undertaken within an overall sustainable development framework. Planning policy guidance on economic development and tourism does not explicitly refer to climate change but there is extensive reference to UK policy on sustainable development. Relevant planning policy includes:

- Scotland: SPP2 *Economic Development*; NPPG8 *Town Centres and Retailing*; NPPG11 *Sport, Physical Recreation and Open Space*; NPPG12 *Skiing Developments*; NPPG13

*Coastal Planning*, NPPG15  
*Rural Development*.

- Wales: *Planning Policy Wales* Ch. 7, 10 and 11; TAN4 *Retailing and Town Centres*; TAN6 *Agricultural and Rural Development*.
- England: PPG4 *Industrial and Commercial Development and Small Firms*; PPG7 *The Countryside – Environmental Quality and Economic and Social Development*; PPG21 *Tourism*.

## **Planning for economic development: the basics**

Local authorities and LPAs can raise the following issues with stakeholders and partners from commerce and industry in the context of climate change:

- Identifying new opportunities created by climate change.
- Identifying areas at risk from climate impacts.
- Putting in place planning and other policy to safeguard the existing local economy/infrastructure and encourage future economic development in line with climate change predictions.

- Locating new development away from at risk areas.
- Assessing new developments and infrastructure for resilience to climate change impacts and minimisation of greenhouse gas emissions.
- Promoting, energy, water and resource efficiency in new and existing development.

#### Change in average length of thermal growing season (days) in 2080s: UKCIP02 Scenarios

Western Scotland	20-60 days
England and Wales	40-100 days

## Regional bodies

#### RPBs working with RDAs and with reference to the Regional Sustainable Development Framework can ensure that:

- Economic development is not undermined by climate change impacts.
- Opportunities to expand tourism are exploited.
- The regional economic strategy and RPG or RSS recognise the opportunities created by climate change for agriculture, forestry and 'environmental industries' such as renewable energy and energy efficiency.

#### Average winter snowfall (mm water equivalent): UKCIP02 Scenarios

	1961-1990	2080s
Berkshire	5.4	0.3
Invernesshire	75.0	25.5

## Safeguarding economic development and exploiting opportunities

The SA of RPG or RSSs can include an assessment of the:

- Impacts of regional economic development, regeneration and tourism policies on greenhouse gas emissions.
- Effects of climate change impacts on general economic development, key elements of the existing economic infrastructure and areas earmarked for new development.

*See Sustainability Appraisal*

RPBs can work with other key stakeholders to devise a planning framework to take up any opportunities resulting from climate change and safeguard the operation of the regional economy including:

- Relocation or adaptation of transport, energy, water and telecommunications infrastructure currently located in areas at long-term risk from climate change impacts. *See Infrastructure, Water and Energy Systems*
- Ensuring that key economic centres in the region are protected from climate change impacts. *See Flooding and Coasts*
- Ensuring new strategic commercial and industrial development in the region is either located away from areas at risk or is resilient to climate change impacts.

## Tourism

The positive impacts on tourism of warmer, drier summers in southern regions are likely to increase demand for outdoor and water-related leisure activities. This will have knock-on



effects on transport infrastructure and water demand. It will be important for regional planning bodies to factor in such considerations and encourage the upgrading of the public transport system serving popular areas and ensure that tourism development is in line with the availability of local water resources. Increased demand for outdoor recreation will put greater pressure on some habitats that may also be under direct stress from climate change impacts. This emphasises the importance of managing the increased tourism opportunities through coastal zone planning and management plans (See *Coasts, and Biodiversity and Landscape*) and by encouraging green tourism.

Some elements of the tourism industry will be very vulnerable to climate impacts, for example wintersports, because of less snowfall and, on the east coast, because of coastal erosion. Regional policies on tourism and economic development should take account of this vulnerability.

## Local planning authorities

### Considerations for LPAs include:

- Location of new development in relationship to areas at risk.
- Managing long-term land use changes and the possible need to withdraw key commercial and industrial facilities from areas likely to be at risk in the future.
- Mitigating greenhouse gases through appropriate siting and good design in new commercial and industrial development.

- Including climate change impacts and risks as part of environmental impact assessments before designating Business Planning Zones.

### Assessing risks and impacts

LPAs can work with the insurance industry and representatives of commercial and industrial interests to identify businesses at risk from climate change impacts, and to form long-term strategies for the relocation or adaptation of those businesses.

See *Flooding*

*Rising to the Challenge – Impacts of Climate Change in the South East in the 21st Century* (1999) cites the example of paper manufacturing, as a major plant at Ashford in Kent is likely to be constrained by loss of access to good quality groundwater. The manufacturer commented that the resultant increase in costs would: ‘... mean loss of business to companies in the north (UK and further northern. Europe) who will have advantages if their resources are not scarce.’

Assessing risk from climate change impacts might become a factor in identifying appropriate sites for major economic developments in development plans and frameworks as part of SAs. See *Sustainability Appraisal*. Nearly all major commercial, industrial and tourism developments are subject to Environmental Impact Assessment (EIA). LPAs should ensure that these include rigorous assessments of the greenhouse gas emissions resulting from new developments. See *EIA*.

## Location

The need to mitigate greenhouse gas emissions reinforces current planning practice which:

- Encourages new development in locations that can be served by more energy efficient and non motorised modes of transport. This is of particular importance in the case of offices, light industrial development and campus style developments, such as science and business parks which are likely to have large numbers of employees
- Aims to enhance the vitality and viability of town centres by maintaining a competitive and innovative retail sector, and through the application of the sequential test for siting of large new retail developments. See Transport.

## Good design

Local authorities can work with developers to identify all opportunities for good sustainable design. This is as important for commercial and industrial developments as for housing and there are frequently opportunities for including energy supply from sustainable sources. See Energy Systems and Built Environment.



# Transport

*Transport accounts for more than one-quarter of all CO<sub>2</sub> emissions in the UK, plus other greenhouse gases such as nitrous oxide, methane and hydrofluoro-carbons. Transport CO<sub>2</sub> emissions have almost doubled in the last 20 years and it is the only major sector that is not reducing these emissions. Transport as a key means of communication also needs to be planned to adapt to climate change sustainably.*

## National policy

National policy for sustainable transport is set out in the Transport White Paper, A New Deal for Transport, and in the 10-year transport plan, Transport 2010. This section of the guidance brings out the way in which the transport plan's aims matter for climate change adaptation as well as for greenhouse gas reduction.

UK planning policy on transport and land use is given in:

- Scotland: NPPG17 Transport.
- England: PPS11 Regional Planning; PPG13 Transport.
- Wales: Planning Policy Wales Ch. 8; TAN18 Transport.

## Transport: the basics

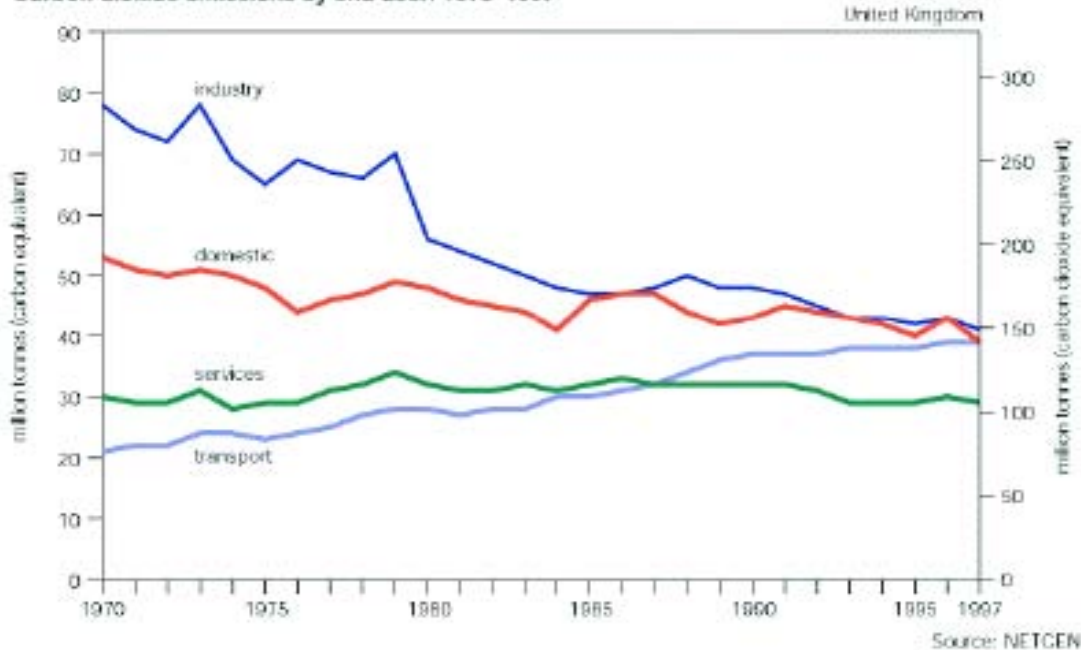
The objectives set out in PPW, PPG13 and NPPG17 are to: 'integrate

planning and transport at the national, regional, strategic and local level to:

- Promote more sustainable transport choices for both people and for moving freight
- Promote accessibility to jobs, shopping, leisure facilities and services by public transport,
- walking and cycling, and
- Reduce the need to travel, especially by car.'

All of these objectives will help to mitigate greenhouse gas emissions. Adaptation aspects also need to be considered, such as the siting of transport infrastructure to be resilient to future climate change (See Infrastructure), and the design of transport interchanges to promote choice of sustainable modes of transport.

Carbon dioxide emissions by end user: 1970–1997



## Regional bodies

Regional planning bodies can use the relative impacts of all types of emissions from different transport modes to inform the content of RPG or RSSs. For instance, mile for mile, air travel is nearly as CO<sub>2</sub> intensive as people driving alone in a car.

New transport infrastructure can be assessed for its impact on greenhouse gas reduction targets and on its ability to adapt to climate change. Integrated transport offers ways to reduce vulnerability to climate change.

### Considerations for regional planning bodies include:

- Promoting the most climate friendly modes of transport. For personal transport this means prioritising walking, cycling and public transport before car and air travel. For freight it means prioritising rail and sea over road and air.
- Considering setting transport reduction targets.
- Helping to coordinate different local authorities' policies on access, transport and parking to avoid inter-authority competition based on provision of parking.
- Identifying and protecting long-distance public transport corridors. This could include safeguarding alternative routes, such as for railways at risk of landslip or flooding.
- Including climate change issues when contributing to and commenting on multi-modal studies.
- Using the SA of the RPG, RSS or RTS to address these issues. See *Sustainability/Environmental Appraisal*
- Preparing a Regional Transport Strategy (RTS) as part of its RPG or RSS, with priorities linked to those of Transport 2010. Whilst preparing the RTS, consideration might be given to the impacts of different development scenarios on greenhouse gas emissions and how the RTS can minimise these emissions.

## Local planning authorities

**The role of the planning system is to set a context in which there is less need to travel, and which encourages access by walking, cycling and public transport in an integrated transport system. The planning system can also support new, more efficient transport technologies.**

*‘Car- free housing developments and car reduced housing developments will be encouraged in locations accessible by public transport and close to local shopping centres. Developers will be required to enter into legal agreement confirming the car free or car reduced status of the development’ (Draft West Edinburgh Local Plan)*

*‘Other than in exceptional circumstances, developments which generate a significant need to travel ... will be expected to locate at points upon the highway network which are best served by public transport.’ (Ynys Mon UDP)*

*‘Development will not be allowed if ... it would substantially add to the dangers to pedestrians and cyclists, and in particular to children walking or cycling to and from school.’ (Leicester Local Plan)*

### Development plans or LDFs

Government planning policy guidance emphasises the importance of key sites in promoting more sustainable transport choices.

Local planning authorities *‘should seek to make maximum use of the most accessible sites, such as those*

*in town centres and others which are, or will be, close to major transport interchanges. These opportunities may be scarce. They should be pro-active in promoting intensive development in these areas and on such sites. They should develop a clear vision for development of these areas, prepare site briefs and, where appropriate, consider using compulsory purchase powers to bring development forward.’* (PPG 13 Transport)

During plan or framework preparation, local authorities might:

- Consider accessibility and transport well into the future. ‘Visioning’ workshops with local residents may suggest approaches to traffic reduction that are amenable to the local community.
- Look at the integration and robustness of strategies in the development plan, LTP, Air Quality Management Plan and other relevant strategies with respect to possible climate change.
- Coordinate with other local and regional authorities when establishing transport targets and parking policies, to prevent inter-authority competition based on, for example, parking provision.
- Require developments that generate many traffic movements to prepare Travel Plans (see DfT 2002).
- Promote the design of any planned transport interchanges to encourage the use of sustainable transport modes, and to be robust to future climate change such as possible heavier daily rainfall.

- In carrying out the Sustainability Appraisal of the plan or framework, consider in particular its long-term effects on the number or length of journeys, accessibility by non-car modes, air pollution effects, and the ability of its transport policies and proposals to adapt to climate change. Involve transport planners in the appraisal process.

### Slateford Green

Slateford Green is the first of seven sites earmarked by Edinburgh Council for car-free housing, with the aim of reducing congestion and pollution in the city. Slateford Green is a car-free development of 120 flats – 26 for sale, 25 for shared ownership, and 69 for social rented housing – built on a 6ha former rail goods yard in Edinburgh. The complex is well served by buses, is adjacent to a proposed commuter rail station and includes a kindergarten so that children can walk there. It also incorporates many energy-saving design features including super-insulation with a material made from recycled newspapers, conservatories for passive solar heat collection, building materials that are low in embodied energy and free heating provided as a by-product of a nearby distillery.

### Support low-car or car-free development and promote walking, cycling and public transport

Local planning authorities can encourage green developments that minimise the use of cars and have other low environmental impacts.

Examples in urban areas are Slateford Green (see box) and Beddington Zero Emissions Development (BedZED) in the London Borough of Sutton (see Box on page 72). Large new developments can be planned to make non-car transport more efficient and direct than car transport.

Development control officers can:

- Require transport assessments that include accessibility studies and/or EIAs for all developments likely to generate significant journeys. Such studies should identify how accessible the development is by different transport modes, and what improvements to access by walking, cycling and public transport are possible. They should provide a basis for determining whether the development is acceptable under TAN18/PPG13/NPPG17.
- For major developments, consider the contribution of the development to meeting greenhouse gas targets. *See greenhouse gas databases in EIA.*
- Use S106 or S75 agreements to improve facilities for walking, cycling and public transport. *See Planning Agreements.*
- Encourage shared car parking (eg office, cinema, church).
- Encourage the setting up of a car club.
- Prepare a development brief for developers on how to reduce transport movements, use alternative fuels, and encourage non-car modes of transport or use informatives to bring these options to the developer's attention.



Slateford Green

# Waste and resources

*The disposal of waste materials represents the loss of energy and resources that have gone into producing those materials. Greenhouse gases are emitted as the result of the production of most materials. Transporting waste also results in greenhouse gas emissions.*

Disposal of biodegradable materials to landfill results in the generation of methane gases. Methane (CH<sub>4</sub>) is a very potent greenhouse gas, having 21 times the impact of carbon dioxide over a 100 year time horizon. Releases from landfill sites accounted for over a quarter of the UK's methane emissions in 2000.

## National policy

Most significantly, the Landfill Directive 99/31 imposes limits on the amount of biodegradable municipal waste that can be disposed to landfill with the target of a 35% reduction on 1995 levels by 2020.

- England and Wales: *Waste Strategy 2000 for England and Wales* sets out national policy on waste including the role of land use planning (see chapter 3); specific planning policy is set out in PPG10 *Planning and Waste Management*.
- The Welsh Assembly has published its own waste strategy *Wise about Waste – The National Waste Strategy* (June 2002) (which replaces *Waste Strategy 2000* in Wales) and planning

policy is set out in *Planning Policy Wales* Ch. 12 and TAN 21 *Waste*.

- Scotland: *National Waste Strategy* (1999), and 11 Area Waste Plans integrated into the National Waste Plan (2003) set a framework for achieving sustainable waste management. Planning policy is set out in NPPG10 *Planning and Waste Management* and advice provided in PAN63 *Waste Management Planning*.

## Waste management: the basics

The key issue for waste planning authorities is to reduce reliance on landfill sites by applying the waste hierarchy (see box below) in combination with Best Practicable Environmental Option (BPEO). All new facilities should be local to sources of waste in conformance with the proximity principle and should demonstrate that they are the BPEO including an assessment of the impact on greenhouse gas emissions. Lifecycle analysis tools such as Wizard can be used to provide quantitative assessments.



The waste hierarchy suggests that:

- The most effective environmental solution may often be to reduce the generation of waste ie **reduction**
- Where further reduction is not practicable, products and materials can sometimes be used again, either for the same or a different purpose ie **reuse**
- Failing that, value should be recovered from waste, through **recycling, composting or energy recovery from waste**
- Only if none of the above offer an appropriate solution should waste be **disposed** of.

This will include encouraging the development of facilities to recycle and reprocess waste materials and particularly to treat biodegradable wastes. In some instances energy from waste plants will be an appropriate means of recovering value from residual waste materials following separation of the element that can be recycled or composted. Planning authorities will need to keep themselves informed of new waste management technology.

The policy context for waste management and planning is changing. The links between waste management and greenhouse gas emissions are likely to become more explicit when new UK and EU legislation comes into force.

#### **European policy on biodegradable waste (biowaste)**

Biowaste is the subject of the Landfill Directive Article 5 targets (which specifically address biodegradable

municipal waste). The Landfill Directive Article 5 targets are designed to reduce the production of methane from landfill sites. The EU is increasingly concentrating on the biowaste fraction and the recent EU Soil Strategy has a commitment to prepare a Biowaste Directive by the end of 2004. The Biowaste Directive is likely to require the separate collection of biodegradable waste from households and other sources, with a possible start date of 2008.

#### **Forthcoming UK legislation – Waste and Emissions Trading Bill**

The first part of the Bill puts in place an allowance scheme which will help the UK to meet, in the most cost effective and efficient way, its obligations under Articles 5(1) and 5(2) of the Landfill Directive 1999/31/EC. The second part places on a statutory footing penalties for companies that miss their emissions targets in the UK Greenhouse Gas Emissions Trading Scheme and amends the Pollution Prevention and Control (PPC) Act to provide for the application of penalties within future emissions trading schemes.

The Environment Agency is starting to assess the implications of climate change on existing and future waste management such as the location and vulnerability of landfill sites.

## **Regional bodies**

**Regional planning bodies should be aiming to minimise greenhouse gas emissions resulting from waste management by:**

- Planning for regional self-sufficiency in treating waste.

- Encouraging an integrated approach to waste management, and putting forward policies to enable the development of facilities to collect, store, segregate, reprocess and utilise recyclable materials.
- Seeking the best technical advice and working with the licensing authority.

### Regional self-sufficiency

Working towards regional self-sufficiency will reduce the need to transport waste and consideration is needed to ensure that there is no over-provision of landfill. Regions should also be identifying actual types, capacities and numbers of facilities required, together with broad areas of search in line with the proximity principle. Consideration should be given to ensuring that there are facilities to treat all types of waste arising within the region. Self-sufficiency will be aided by encouraging economic development of all parts of the chain in utilising recycled materials.

Regional planning bodies have a key role in encouraging the development of larger waste reprocessing facilities and associated markets for products made from reused/recycled materials for the whole region. Of particular importance to mitigating greenhouse gas emissions is the development of markets for composted biodegradable wastes. It is these wastes that will have to be diverted from landfill where they cause CH<sub>4</sub> emissions from sites. Composting these wastes for use as soil conditioners has a role in carbon sequestration (see box). The reprocessing facilities and

markets for the reuse of paper, glass and cans is more significant for the mitigation of CO<sub>2</sub>.

### Technical advice

PPG 10 recommends the setting up of Regional Technical Advisory Bodies to provide specialist advice on waste management in each region. Regional planning authorities can utilise these advisory bodies to ensure that the most effective waste management options and strategies are being adopted to reduce greenhouse gas emissions.

### Waste and carbon sequestration

Vegetation and soils currently absorb around 40% of global CO<sub>2</sub> emissions from human activities. This has raised the possibility that carbon could be sequestered through the creation of carbon sinks. Waste management has two roles through:

- The use of compost to improve the organic matter and thereby soil carbon sequestration
- Recycling paper reducing the pressure on forests.

## Local planning authorities

**Waste Local Plans and Development Plans or LDFs provide an opportunity to set out a planning framework for minimising greenhouse gas emissions resulting from waste management. In particular this might mean restricting the development of new landfill sites and identifying sites for new facilities that provide an alternative from disposal to landfill.**



Environmental appraisal of plans is a means for ensuring that the most effective options to reduce greenhouse gas emissions are being encouraged.

### Recycling

Encouraging the development of new facilities that will result in increased recycling rates and reduction of disposal to landfill is a primary means for reducing greenhouse gas emissions. These could include:

- Building design that includes space for building users to separate and store materials for recycling prior to collection.

*H. Adequate provision is made for the storage and collection of waste and recyclable material and, where appropriate, recycling on site.*

South Gloucestershire Local Plan, Deposit Draft, September 2000

- Identifying sites for local recycling centres for the public to take recyclable materials, including garden wastes, with minimal transport impacts.
- Identifying sites for sorting and bulking depots.
- Identifying sites for, and encouraging the development of, processing facilities for recyclable materials such as in-vessel composting of biodegradable waste.
- Positively encouraging the development of facilities that manufacture products from recycled materials and the use of recycled and secondary materials in construction.

### Energy recovery

Encouraging the controlled extraction of methane from landfill sites, as a fuel-for-energy plant, is an effective way of reducing the overall impact of greenhouse gas emissions from landfill. The net result is the substitution of the very potent methane emissions for the less potent CO<sub>2</sub> emissions.

In some instances energy recovery facilities will be the best practical environmental option for treating residual waste materials but local planning authorities need to be aware that such plant will generate greenhouse gas emissions and can result in transporting waste over some distance. Therefore they might consider whether proposed energy recovery facilities are:

- Treating local waste.
- Not undermining waste minimisation initiatives.
- Appropriately sized to avoid competition with recycling.
- Incorporating Combined Heat and Power (CHP) technology. *See Energy Systems.*

Local planning authorities are advised to keep themselves informed about new technological developments in this area. Large scale mass-burn incineration is not the only option for energy recovery – smaller scale technologies such as anaerobic digestion, gasification and pyrolysis should also be considered (see Box) *‘The future of energy from waste probably lies in emerging cleaner technologies such as pyrolysis,’ National Waste Strategy (SEPA 1999)*

# Energy systems

*Energy supply, and particularly electricity generation, is responsible for a quarter of the UK's greenhouse gas emissions (in 2000). Encouraging the development of sustainable energy supply from renewable sources and CHP are main planks of the UK's strategy to reduce emissions and the Energy White Paper (DTI 2003).*

All parts of energy systems need to be adapted to climate change impacts. This includes distribution and transmission systems. More localised systems and 'embedded generation' may be more resilient to climate change impacts.

## National policy

In the Energy White Paper (DTI 2003) the UK Government has reaffirmed the following targets:

- 10% of the UK's electricity to be supplied from renewable energy by 2010 and an aspiration to double this again by 2020.
- Double the capacity of CHP by 2010 to around 10 GW.

The Scottish Executive has set a target for 17-18% of Scotland's electricity to be supplied from renewable energy by 2010. Planning policy on renewable energy is contained in:

- Scotland: NPPG6 *Renewable Energy Developments*; PAN45 *Renewable Energy Technologies*.

- England: PPG22 *Renewable Energy*, with Annex on *Photovoltaics* (shortly to be replaced by the new Planning Policy Statement 22 *Renewable Energy*).
- Wales: *Planning Policy Wales* Ch. 12; TAN8 *Renewable Energy*.

Planning guidance on waste is relevant to waste-to-energy plants including incinerators, anaerobic digestion plants, pyrolysis /gasification plants and landfill gas. See Waste and Resources.

## Planning for sustainable energy supply: the basics

Regional assessments have been undertaken in all parts of the UK to establish regional and local targets for the development of renewable energy: these are available from the Scottish Executive, government offices in England and the Welsh Assembly. Some of these have included the creation of GIS map-based databases of renewable resources. See Information. It is the intention to

establish sub-regional targets within each of the English regions. These targets and associated assessments should provide the basis for a positive planning regime for renewable energy.

In most circumstances renewable energy developers are required to undertake an EIA, the exception being very small-scale schemes.

Encouraging the development of CHP schemes and district heating/cooling systems in any mixed-use, high density development and in association with energy intensive industrial processing plants will help to reduce greenhouse gas emissions. Where district heating and/or cooling systems are in place, planners should give strong encouragement for new developments to connect to the system.

## Regional bodies

**Regional bodies have a key role in identifying the main renewable resources in the region. In most instances regional targets for electricity generated from renewable sources have been established for the period to 2010.**

Regional bodies might also consider the issue of security of supply, in response to the likely increases in severe weather events.

### Considerations for regional bodies include:

- **Identifying the main renewable energy resources in the region**

Information is available from the regional renewable energy studies that will enable regional bodies to

identify the main resources and to work with LPAs to define broad locations and/or criteria for renewable development.

- **Establishing and promoting energy targets**

*'... work towards a target capacity of 400MW by 2005 from grid-connected renewable installations, in addition to supporting smaller scale local initiatives that promote self sufficiency for a diverse capacity.'*  
East Midlands Draft Regional Planning Guidance, November 1999

While there is a specific requirement to establish regional renewable energy targets it will be important to put these alongside targets for other sustainable energy generation technologies (such as CHP). Targets for generation should also take account of changes in energy demand which might result from factors like large-scale new development in some areas or economic decline in others. In England and Wales the process of disaggregating targets to a sub-regional level can be related to advice on the types of technologies that are appropriate for particular areas.

- **Securing energy supply**

The dispersed and relatively small-scale nature of renewable electricity generation and CHP plants can be used to increase security of supply, particularly at the geographic extremes of the transmission system and where plants are embedded in the local distribution system. *See Infrastructure.*

- **Alternatives to extending gas network**

The use of renewable technologies (eg biomass-fired CHP) can be a zero carbon alternative to extending gas supply to more remote rural settlements or new developments.

- **Establish a criteria based approach to assessing applications for renewable energy developments**

A criteria based approach puts the onus on the developer to select sites that are economically and technically viable while meeting the criteria.

## Local planning authorities

### Development plans or LDFs could include policies on sustainable energy which:

- Support regional renewable energy targets and sub-regional targets (where they have been established).
- Establish a criteria based approach to assessing applications for renewable energy developments.
- Encourage developers to integrate renewable energy technologies into building design.
- Promote CHP by encouraging developers to assess the feasibility of CHP in certain types of development.

### Considerations for LPAs include:

- **Regional and sub-regional renewable energy targets**

Sub-regional renewable energy targets and in some cases CHP targets are contained in regional energy studies eg *Viewpoints on Sustainable Energy in the East Midlands* (March 2001). In other English regions there are processes in train to establish sub-regional targets for renewable energy. Contributing to the establishment of sub-regional targets and supportive planning policies, is one way in which LPAs can contribute to meeting regional and national targets.

Policy 8 Renewable Energy Resources, Cornwall County Council Structure Plan, Deposit Draft 2002  
*'Provision should be made for the development of renewable energy generation weighing up the wider environmental benefits against any local impact.'*

*A range of technologies for renewable energy generation will be encouraged (including the potential for combined heat and power schemes) that will contribute to the South West Region's target of about 11-15% of electricity production from renewable resources by 2010. This should be through development that increases local benefits, particularly diversification of the rural economy and minimises any adverse effects on the natural or built environment.*

*In respect of land-based wind energy, the scale and location of development should respect the landscape character and distinctiveness and reflect, in particular, countywide priorities to avoid adverse effects on the Area of Outstanding Natural Beauty, significant intrusion into coastal landscapes, and unreasonable proliferation of turbines in the landscape.'*

Where the zone of visual influence extends beyond an LPA boundary, LPAs should consider cross-boundary public consultation.

### **Beddington Zero Emissions Development (BedZED)**

BedZED is a mixed development of 82 ultra-low energy dwellings and 2500m<sup>2</sup> of office, retail and community facilities in the London Borough of Sutton. Energy is supplied from:

- A small 130 kW CHP unit fuelled by tree surgery and forestry waste.
  - 777m<sup>2</sup> of high efficiency photovoltaic panels which generate power for electric vehicles used by local residents.
  - Renewable electricity purchased on a 'green tariff' through the national grid.
  - Passive solar gain through large glazed areas on southerly facing aspects.
- **Incorporating sustainable energy technologies into buildings as an element of sustainable design**
- This issue is explored further in the next section on *Built Environment*.
- **Assessing the feasibility of CHP/district heating and cooling in certain types of developments**
- Some types of development are particularly appropriate for CHP/district heating and cooling, such as:
- High density mixed-used developments.
  - Any large building development such as office complexes, hospitals, colleges.
  - Large energy intensive industrial plants.
  - Refurbishment of buildings with centralised heating plant with existing heat distribution mains. LPAs should encourage developers to assess the feasibility of incorporating CHP/district heating and cooling in these types of developments as a means of minimising carbon emissions. This approach is consistent with European Directive 2002/91/EC – Energy Performance in Buildings. See *Environmental Assessment of Buildings*.

London Borough of Sutton – Amended Draft Revised UDP Second Deposit – August 2000

*'The Council will promote the introduction of community heating schemes and encourage development with photovoltaics (solar power) and passive solar heating within the Borough, in partnership with local initiatives.'* (see BedZED example)



Beddington Zero Emissions Development (BedZED)

Specific encouragement might be given to CHP plants that use 'carbon neutral' renewable fuels such as coppice wood, forestry waste, or miscanthus as opposed to more conventional CHP plant using fossil fuels like gas or oil. District heating schemes can also be linked to other renewable technologies such as solar thermal collectors.

- **Prepare supplementary planning documents**

Local authorities can also prepare SPD to provide advice about sustainable energy supply and to set out in detail how criteria will be applied to assess renewable energy applications. LPAs may want to indicate the relative sensitivity of some landscapes to particular types of renewable energy development to guide developer's choice of sites.

Newark and Sherwood DC –  
Supplementary Planning Guidance,  
Wind – July 1999  
*'... countryside designations ...  
may not necessarily be a barrier to  
the development of wind turbines.  
The policy seeks to ensure that the  
intrinsic value of these areas and  
their character is taken fully into  
account when assessing the  
suitability or merits of any scheme.  
It is possible that well researched  
and thought out schemes may  
actually enhance the landscape, if  
certain rules on the relationship of  
the development to land form and its  
context in the landscape are obeyed.  
Therefore in such circumstances  
each case will be assessed on its  
own merits.'*



# Built environment

*Climate change will introduce some new design considerations for planners, building developers and architects in terms of adaptation and resilience to impacts and climate variability.*

Energy use in commercial, public sector and domestic buildings accounted for 42% of the UK's final energy consumption in 1998. Encouraging energy efficient, low carbon developments as part of sustainable design is an important part of the UK strategy to reduce emissions.

An integrated design approach is appropriate to ensure that adaptation measures do not conflict with greenhouse gas mitigation measures. A *Climate-Sensitive Development Checklist* is provided in the Appraisal section.

## National policy

Design issues and energy efficiency are referred to in the following planning guidance

- England: PPG 1 *General Policy and Principles, Annex A – Handling of Design Issues, PPG 3 Housing.*
- Wales: *Planning Policy Wales* Ch. 1, 12 and 13; *TAN12 Design.*
- Scotland: SPP 1 *The Planning System; Designing Places – a Policy Statement for Scotland; PAN 67 Housing Quality.*

- N. Ireland: PPS1 *General Principles, Annex 3 Design.*

Planning guidance on renewable energy is also relevant to the built environment. See *Energy Systems*.

## Climate-sensitive built environment: the basics

In terms of mitigating greenhouse gas emissions the key considerations are familiar and are partly covered through building regulation. They include locating new developments to reduce the need to travel and ensuring that sustainable design principles are applied to minimise energy requirements from fossil fuels. The adaptation responses for planning and the built environment are summarised below. It is possible for some adaptation measures in buildings to increase energy demands (eg greater need for cooling) unless an integrated approach is adopted. Particular attention will be needed where development is associated with the reuse of historic buildings.



Possible climate change impacts	Potential impact on built environment	Planning response
Drier summers with lower soil moisture and wetter winters	Subsidence	Spatial policies – avoiding areas at risk Policies on location Design advice
More extremely hot days and fewer very cold days	Reduced heating demands, increased cooling demands	Policies on sustainable design/passive solar design backed up by design advice
Warmer drier summers	Greater requirement for outdoor environments	Policies on sustainable design and design of open/green spaces backed up by design advice
More extreme weather events	Damage to building fabric	Spatial policies – avoiding areas at risk from flooding Policies on location and sustainable design backed up with design advice
More frequent droughts	Water shortages	Spatial policies on the siting of major new developments Policies on water conservation and sustainable drainage backed up by design advice

## Regional bodies

**Regional planning bodies have a key role in ensuring that climate change is a factor in the assessment of options for how a region can accommodate projected growth.**

Regional planning bodies can provide a lead in encouraging climate change aware policies on sustainable design and sustainable use of resources in the built environment.

### New settlements

*Planning for Sustainable Design – Towards Better Practice* (DETR 1998) states:

*‘To be sustainable, new settlements should be large enough to support a good range of local facilities, jobs, shops and leisure opportunities. They should be well-connected by public transport to several major towns and cities, for example by being in a public transport corridor.’*

Based on this advice, spatial strategies might show that the choice of location for new settlements will:

- Minimise greenhouse gas emissions by reducing the need to travel, demonstrating good links to public transport systems and enabling the increased use of renewable energy sources. *See Transport, Energy Systems.*

- Take account of climate change impacts and in particular ensure that new settlements (and the infrastructure that serves them) are not at risk from current and future flooding, coastal erosion and sea level rise. *See Infrastructure, Flooding, Coasts.*
- Not create an unsustainable demand for water resources taking into account possible changes in seasonal precipitation resulting from climate change. *See Water.*

### Advice on preparation of development plans or LDFs

RPBs should be encouraging LPAs to include a range of policies in development plans or frameworks to meet regional objectives to reduce greenhouse gas emissions and adapt to climate change impacts. These might include policies on sustainable building design supported by design guidance in the form of supplementary planning guidance.

Such policies would also support general policy objectives on sustainable development and regeneration.

## Local planning authorities

### By focusing on producing planning policies on sustainable design LPAs can provide an integrated framework for climate sensitive built developments.

Developers can be encouraged to design new buildings that:

- Contribute to overall greenhouse gas reduction targets.
- Meet high environmental standards as measured by nationally recognised assessment schemes.

- Are resilient to climate change impacts and adaptable to climate variability.

Policies can be reinforced through SPG to give detailed advice on these matters.

### Going beyond the building regulations

The 1991 Building Regulations Part L (as amended 2001) for England and Wales set standards for energy efficiency for new buildings that will minimise their contribution to carbon dioxide emissions in a way that is cost-effective and proportionate.

The Scottish equivalent is the sixth amendment to Part J of the Technical Standards for compliance with the Building Standards (Scotland) Regulations 1990. The Government has stated in the Energy White Paper (DTI 2003) that: ***'We will start work immediately on the next major revision of the building regulations, which we will aim to bring into effect in 2005. Tighter building regulations will also encourage developers to use low carbon solutions such as solar water heating and photovoltaics.'***

Building regulations are a key instrument for mitigating greenhouse gas emissions but they focus on specific issues such as the building fabric and heating systems. LPAs can provide a more integrated framework for climate sensitive built development. This can be achieved within policies on sustainable design that establish clear outcome criteria such as:

- Minimising greenhouse gas emissions
- Ability to achieve healthy internal temperatures throughout the year

- Resilience to damage from current and potential future severe weather events such as flooding (only for areas at risk).

Outcome criteria can be related to the following planning and design issues:

- **Location**

This is dealt with extensively elsewhere. See Flooding, Coasts, Transport. The key aims are to ensure that the locations of new developments, wherever possible:

- Are not in areas at risk from climate change impacts (subsidence and flood risk).
- Do not compromise the management of climate change risks elsewhere.
- Do not result in generation of more journeys by car.
- Do create opportunities for sustainable energy supply (eg CHP/renewable energy).

- **Density, layout, built form**

All these factors can contribute to the mitigation of greenhouse gas emissions. For instance, high density developments (50 dwellings per hectare or more) can improve the viability of public transport and district heating networks linked to renewable energy/CHP plants. Layout is a key factor in encouraging walking and cycling as opposed to the use of cars. Compact built forms (eg terraced housing) are generally more energy efficient, though this should be balanced by the need to maintain good access to natural light. The level of risk from flooding, subsidence and high winds could also influence built form.

### Increasing need for cooling

Useful measures for considering the heating and cooling requirements of new buildings are 'Heating and Cooling Degree Days'.

The number of 'heating degree days' in a year gives an indication of the amount of time, and by how much the temperature is below a given baseline, when heating will be required. Conversely 'cooling degree days' provide an indication of the amount of time, and by how much the temperature is above a given baseline, when cooling will be required.

In the table below, degree day data from the UKCIP02 Scenarios show the likelihood of a significant decline in heating needs and a large growth in cooling requirements by 2080s.

### Changes in degree days by 2080s: UKCIP02 Scenarios

	Heating	Cooling
Scotland	-15 to 35%	+50 to 80%
Southern England	-25 to 40%	+30 to 80%

There are a number of benefits of sustainable design other than mitigating greenhouse gas emissions, such as:

- Providing affordable warmth in housing.
- Contributing towards Home Energy Conservation Act targets.
- Delivering low energy running costs for building users.

- **Passive solar design**

Designing to make effective use of passive solar gains, and particularly passive cooling, is important for achieving healthy and comfortable internal temperatures throughout the year with the minimum use of energy for heating and cooling systems. Layout and orientation of buildings in a new development can be used to exploit opportunities to optimise solar gain.

- **Drainage and resilience to flood damage**

Adoption of SUDS to minimise and slow water run-off from built developments is an appropriate response to preventing flooding. However in some locations buildings may also need to be designed for the possibility of failure of flood defences eg using water-resistant materials on ground floors, siting services above possible flood levels, design of drains to prevent groundwater entering buildings etc. *See Flooding.*

- **Open spaces**

Public open spaces, green spaces, and courtyards are an integral part of climate sensitive development. Overall warming and the likelihood of hotter drier summers in many regions will put a greater emphasis on the design of outdoor spaces. The landscaping, planting and the overall design of open spaces can be used to manage the microclimates within a development (through shading and shelter), impacting on both the energy use in buildings (for cooling and heating) and providing comfortable external environments for a more outdoor lifestyle. Open/green spaces and car parks can be designed to

absorb floodwaters. Public green spaces can be part of wildlife corridors and stepping stones increasing the resilience of local habitats to climate change impacts.

- **Integrating sustainable energy supply and distribution**

Developers can be encouraged to integrate renewable energy technologies (eg photovoltaic panels, active solar water heating, ground source heat pumps and biomass-fired CHP) into new built developments to mitigate greenhouse gas emissions and to make developments more resilient to interruptions to centralised energy supply. This could be linked to local electricity grids and district heating and cooling systems. *See Energy Systems.*

West Edinburgh Local Plan Draft  
Written Statement July 2001 Policy  
DQ3 – Sustainable Development

*'The following principles of sustainability in particular will be applied when relevant to a development proposal:*

*a) Larger developments should include a well integrated mixture of land uses at densities which will promote alternatives to private car use*

*b) Development design and landscaping should combine to create a sheltered microclimate, minimise heat loss and promote solar gain*

*c) Layout and development design should make provision for the on-site treatment and conservation of surface water as far as practical, in line with best practice and guidance for sustainable drainage*

*d) Buildings should be of durable construction, incorporating flexibility and adaptability in their detailed design*

*e) The re-use of existing buildings and the shared use of facilities will be encouraged.'*

Development briefs are a powerful tool for setting out LPA aspirations for the development of important sites. Climate change can be addressed in the form of design principles or a development concept. These can be related to achieving specified standards using accredited assessment methods.

### Development Concept

Newark and Sherwood DC – Sherwood Energy Village, Planning Brief, Jan 2001  
*'The development of the Energy Village will provide an opportunity for high standards of energy efficiency in building design and will benefit from pleasant landscaping. Renewable energy sources will feature prominently in some on-site developments. A biomass power plant is planned for the site, supplying electricity and heat to the site and wider community.'*

#### • Built heritage

Where development is associated with the reuse of historic buildings the opportunity should be taken to consider the scope for measures to preserve them from future climate change impacts.

### Assessment and standards

A number of assessment methods are relevant to climate change and particularly the mitigation of greenhouse gas emissions. The building regulations now require an energy rating calculated by the Standard Assessment Procedure (SAP) to be displayed in all newly created dwellings.

Other broader environmental assessment and accreditation schemes such as BREEAM and EcoHomes provide methods for assessing climate change impacts including energy and water use, embodied energy of materials, and some transport impacts. A requirement to meet a good or excellent rating on a BREEAM assessment would be a way of ensuring that best practice is adopted and would drive innovation in building design. See *Environmental Assessment of Buildings*.

Building developments are now being built to a Zero Emissions Standard (ZED) where for instance any transport greenhouse emissions resulting from a built development might be off-set by exporting surplus renewable energy electricity generated on-site (see the Ashton Green example below).

### Design principles

Leicester City Council set out its design principles for a large development of 3500 dwellings at Ashton Green on the edge of the city. A key objective is to:

*'Achieve best practice in construction methods and environmental design through a 100 per cent renewable energy and sustainable community. This would involve integrating the following features into the Ashton Green development:*

- Higher density development around the settlement centre and close to public transport routes.*
- Connected street networks to provide clear and direct links, particularly for pedestrians and cyclists.*
- A range and mix of shops and community facilities which are easily accessible to the local community by foot and bicycle.*
- High energy efficiency and performance in the new buildings.*
- Maximising recycling opportunities for waste products.*
- Sustainable urban drainage systems that deal with surface water run-off.'*

Leicester has also set a zero carbon dioxide standard for housing as part of the Ashton Green Phase 1 Area – Planning, Design and Development Requirements, January 2001





# *Appraisal*



# Climate-sensitive development checklist

*This checklist covers the considerations that could be used as a filter to assess whether new developments:*

- Are adapted to current and potential future climate impacts.
- Mitigate greenhouse gas emissions.

The risks listed in the first section of the checklist will also be of use when formulating planning policies that deal with adaptation to climate change impacts. See *Planning for an Uncertain Future* page 14.

The checklist could also be used for awareness raising. To be effective, local plan or local development framework (LDF) policies should provide general support for the considerations covered in the checklist.

The considerations covered by this checklist could be incorporated into:

- A sustainability checklist used by development control officers.
- Supplementary planning guidance on sustainable development.
- Internal local authority design guidance for its own property.

## Bristol City Council – Sustainability Profile System

Bristol has introduced a system where developers are asked to complete a sustainability profile in order to demonstrate that they have addressed a range of sustainable design and construction issues, including climate change.

A sustainable design guide has been produced which provides information to help developers compile a profile. The guide refers to relevant policy in the current local plan. The revisions to the local plan will provide more comprehensive policy backing for the system. The guide will have the status of supplementary planning guidance.

Bristol City Council is one of the Councils for Climate Protection pilots and the introduction of this system is one part of their action plan for addressing climate change.

## 1. Assessing risk

**Is the site in an area at risk (see the UKCIP02 Climate Change Scenarios) from current or future climate change impacts and extreme weather events such as:**

- Sea level rise.
- Storm surges, extreme high water levels and tidal flooding.
- Flash floods, slow onset flooding and fluvial flooding.
- Groundwater rise flooding.
- Land erosion/subsidence.
- Wind damage (direct and indirect).
- Water shortage.

**Does the development potentially increase climate-related risks in the locality in terms of:**

- Increased surface water run-off.
- Causing changes to the flood or groundwater regimes elsewhere.
- Increased pressure for new or enhanced flood or coastal defence measures.
- Loss of tree cover that provides wind protection or shade.
- Fragmentation and vulnerability of habitats.
- Increased pressure for water resources.

## 2. Design considerations Adaptation

**Has the development adopted features that increase resilience/ adaptability to climate impacts:**

*Flood risk and heavy rain events eg*

- Incorporating landscape features to absorb floodwater in larger developments.
- Specifying SUDS.
- Ensuring building services are sited above potential flood levels.
- Increasing resistance of building envelopes to penetration by driving rain.

*Drought and extreme heat eg*

- Specifying water recycling and rainwater collection features (only in developments where maintenance and safety issues can be addressed).
- Incorporating passive ventilation and greater thermal mass.
- Incorporating shading into landscaping and design of open public spaces.
- Incorporating features which prevent excessive solar gain eg light shelves.
- Connecting to district cooling systems where available.

*Storms and strong winds eg*

- Design to reduce aerodynamic loads.
- Incorporating landscaping to provide protection/shelter from prevailing winds.

*Emergency planning eg*

- Access for emergency vehicles.



### 3. Design considerations – mitigating greenhouse gas emissions

#### Has the development adopted features that mitigate greenhouse gas emissions in terms of:

##### *Energy efficiency eg*

- Orientating buildings and laying out site to optimise passive solar gain.
- Incorporating passive solar design features.
- Balancing compact built forms with solar access to reduce heat loss.
- Utilising passive ventilation as opposed to mechanical air conditioning.

##### *Minimising waste and choice of materials eg*

- Making provision for the storage and collection of recyclable materials.
- Specifying low embodied energy materials from sustainable sources.
- Specifying materials from local sources and suppliers.

##### *Use of sustainable energy sources eg*

- Incorporating renewable energy technologies or making provision for later incorporation into the building.
- Adopting high density, mixed-use to enable the incorporation of sustainable energy supply such as biomass-fired CHP and district heating/cooling.

##### *Water efficiency eg*

- Specifying water efficient appliances and fittings such as showers, dual flush toilets.

- Promoting rainwater collection for outside uses such as watering gardens and landscaping.
- Promoting the recycling of greywater in larger buildings where maintenance and safety issues can be addressed.
- Incorporating onsite water treatment

##### *Transport emissions eg*

- Ensuring good access for pedestrians and to public transport, cycle paths.
- Provision of cycle storage/parking facilities.
- Travel Plans for new commercial developments.
- Contributions to public transport provision through planning obligations and agreements.

# *Sustainability/environmental appraisal*

## *of development plans, LDFs, RPG or RSSs*

As part of the preparation of a development plan or LDF, RPG or RSS it is a requirement that impacts on sustainability – including on climate change – should be appraised, with the aim of making the plan more sustainable.

To date, SA has normally involved:

- Identifying relevant sustainability criteria: in terms of climate change, these include the energy efficiency of transport and the built environment, renewable energy potential, and the rate of CO<sub>2</sub> 'fixing'.<sup>3</sup>
- Ensuring that the plan conforms with the sustainability requirements of national planning guidance.
- Testing the plan's strategic policies, development options and detailed policies against the sustainability criteria.

It is essential that this process is used to appraise development plans or frameworks for their resilience to climate change and for their contribution to reducing greenhouse gas emissions.

The European Directive on strategic environmental assessment<sup>4</sup>, adds further requirements to this process:

- Identifying the main objectives of the plan, its links with other plans, and environmental protection objectives.
- Describing the environmental baseline and projecting it into the future.

- Describing the environmental characteristics of the areas likely to be affected, and key environmental problems in the area.
- Describing alternatives considered during plan preparation and the reason for the choice of alternative(s).
- Identifying measures to prevent/reduce/offset negative environmental impacts of the plan.
- Describing proposed monitoring measures and any difficulties encountered in compiling the information in the appraisal.

Guidance on Strategic Environmental Assessment (SEA) for regional and local plans in England has been prepared by ODPM. The Directive's obligations are being fully incorporated in the requirements for Sustainability Appraisal of Local Development Documents and Regional Spatial Strategies under the Planning and Compulsory Purchase Act 2004.

Analyses of good practice<sup>5</sup> suggest that the appraisal process should

1. Be iterative, with the objectives defined as the starting point then used to test emerging policy options.
2. Start early, perhaps with a retrospective analysis of the existing plan.
3. Go beyond environmental and towards sustainability appraisal.
4. Be consultative, developing linkages with a wide range of interests.

<sup>3</sup> *Environmental Appraisal of Development Plans* (DOE 1993) suggests that 'indicators of positive impact' for these criteria are: reducing trip length, reducing the number of motorised trips, increasing public transport share, increasing the attraction of walking and cycling, reducing heat loss from buildings, reducing capital energy requirements, increasing CHP potential, safeguarding renewable energy potential, increasing direct solar gain and increasing tree cover. The guidance for the regional level proposes similar but fewer indicators.

<sup>4</sup> Directive 2001/42/EC of the European Parliament and of the Council on the Assessment of the Effects of Certain Plans and Programmes on the Environment ([www.europa.eu.int/comm/environment/eia/full-legal-text/0142\\_en.pdf](http://www.europa.eu.int/comm/environment/eia/full-legal-text/0142_en.pdf))

<sup>5</sup> eg DETR (1998): *Planning for Sustainable Development – Towards Better Practice* ([www.planning.dtlr.gov.uk/sustdev/index.htm](http://www.planning.dtlr.gov.uk/sustdev/index.htm)); Welsh Assembly (2002) *Sustainability Appraisal of Unitary Development Plans in Wales – a Good Practice Guide*, Welsh Assembly ([www.wales.gov.uk/subiplanning/content/devplans/udp-ace-e.pdf](http://www.wales.gov.uk/subiplanning/content/devplans/udp-ace-e.pdf))

### Relevant legislation and guidance

The legislation/guidance on SA is changing rapidly. Do check to make sure that you are using the latest versions. This is the status in mid-2003.

*Directive 2001/42/EC of the European Parliament and of the Council on the Assessment of the Effects of Certain Plans and Programmes on the Environment* ([www.europa.eu.int/comm/environment/eia/full-legal-text/0142\\_en.pdf](http://www.europa.eu.int/comm/environment/eia/full-legal-text/0142_en.pdf)) will, from July 2004, require development plans and RPGs to be appraised in terms of their 'likely significant effects on the environment, including ... climatic factors ...', and including cumulative and long-term effects.

### Development plans

DOE (1993) *Environmental Appraisal of Development Plans: A Good Practice Guide* is the guidance which explains how local authorities should carry out environmental appraisals. A Welsh equivalent has been commissioned but has not yet been published.

DETR (1999) *PPG12: Development Plans* requires environmental appraisal of development plans ([www.planning.dtlr.gov.uk/ppg12/index.htm](http://www.planning.dtlr.gov.uk/ppg12/index.htm)).

### Regional planning

ODPM (2004) *PPSII: Regional Spatial Strategies* requires SA of RSSs. (Website as yet not available as PPSII will be published in August 2004).

DETR (2000) *Good Practice Guide on Sustainability Appraisal of Regional Planning Guidance* explains how regions should carry out sustainability appraisal for their RPGs. The emphasis on objectives-based planning and SA also applies to development plans;

the focus on independent appraisal is less applicable at the local level ([www.planning.dtlr.gov.uk/gpgsarp/index.htm](http://www.planning.dtlr.gov.uk/gpgsarp/index.htm)).

Welsh Assembly (2002) *Sustainability Appraisal of Unitary Development Plans in Wales – A Good Practice Guide*, Welsh Assembly ([www.wales.gov.uk/subiplanning/content/devplans/udp-ace-e.pdf](http://www.wales.gov.uk/subiplanning/content/devplans/udp-ace-e.pdf))

### Local planning authorities might consider:

- The long term when developing their strategy, plan or framework, for instance by using visioning processes to help develop the plan's objectives/strategies.
- A range of future scenarios, for instance the UKCIP Climate Change Scenarios and the latest socio-economic scenarios when projecting baseline trends. *See Information*. This will give an indication of the *impacts of climate change on development*, and the type of adaptation to climate change that might be necessary.
- Including an appropriate range of climate change criteria and indicators when considering the *impacts of the plan or framework on climate change*, and the responses that might be necessary. The criteria from Footnote 1 are a good starting point.
- Paying particular attention to long-term and cumulative impacts when carrying out policy appraisal: consider what the framework or plan's impacts would be in 20, 50 or 100 years.
- Identifying and responding to areas of uncertainty and use the precautionary principle: in case of doubt, plan for the worst-case scenarios.



# *Environmental impact assessment*

## *of projects likely to have a significant environmental impact*

Planning applications for a wide range of projects that are likely to have a significant environmental effect must be accompanied by an Environmental Statement (ES). An ES must contain information on:

- The proposed project.
- Alternatives considered by the developer and the main reasons for the choice of alternative.
- Aspects of the environment likely to be significantly affected by the proposed project, including climatic factors and air quality.
- Likely significant effects of the proposed project on the environment, including indirect, secondary, cumulative, medium and long-term effects.
- Measures envisaged to mitigate any negative effects of the project.
- Difficulties encountered in compiling the required information.

Environmental statements are required, *inter alia*, for most energy-related developments (power stations, pipelines, power lines etc), transport infrastructure (roads, railways, airports), and developments likely to cause many vehicle movements such as large housing and industrial developments.

### **Relevant legislation**

EC Directive 85/337 required EIA to be carried out in all Member States. Directive 97/11 imposed more stringent requirements and broadened the list of projects requiring EIA. In the UK the Directives are implemented through many different regulations depending on whether the project is in England, Wales or Scotland, whether it falls in the remit of the planning system or not etc. Details of EIA requirements can be found at:

England and Wales  
([www.planning.dtlr.gov.uk/eia/guide/index.htm](http://www.planning.dtlr.gov.uk/eia/guide/index.htm))

Scotland  
([www.scotland.gov.uk/library/pan/pan58-02.htm](http://www.scotland.gov.uk/library/pan/pan58-02.htm))

EIA tends to be most effective if it:

- Is treated as an integral part of project planning and starts early in the process so that any project changes that it suggests can easily be incorporated.
- Is based on close collaboration between the developer and LPA, and probably an expert environmental consultancy.



- Considers alternative approaches to achieving the project objectives, rather than being a post-hoc ‘snapshot’ of the project’s impacts.

#### **Local planning authorities and regional bodies could:**

- Identify projects (or categories of projects such as developments of over 100 houses) that are likely to cause significant emissions of greenhouse gases or need particular climate change adaptation measures.
- Specify in plans, strategies or frameworks that EIA will be required for such developments, and that these will be expected to include consideration of impacts on climate, cumulative impacts, and long-term impacts.
- Consider how impacts on, and by, climate change could be mitigated (eg through planning obligations/agreements) and convey this to developers carrying out EIAs, perhaps through an EIA guide such as that published by Essex County Council.

#### **Development control officers could:**

- Consider whether an ES should include consideration of climate change impacts. Where necessary the regulations give local authorities the power to require:
- A robust discussion of the baseline environment in terms of existing greenhouse gas emissions (possibly using an emissions model).
- A discussion of alternative forms of development – and, when appropriate, locations – that have

fewer impacts on climate change, or are less vulnerable to the impacts of climate change, and an explanation of why the proposed development option was chosen. This will be particularly relevant for developments that generate many traffic movements. For large transport projects a multi-modal study ([www.dtlr.gov.uk/itwp/mms](http://www.dtlr.gov.uk/itwp/mms)) may be required.

- Quantitative predictions of a development’s likely impacts on climate change with assumptions clearly stated and areas of uncertainty highlighted.
- Mitigation measures to address thoroughly the climate change impacts of the development.

#### **Climate change emission models and databases**

Several models allow local authorities to compile greenhouse gas emissions inventories and model future scenarios:

ICLEI-sponsored model developed for the Councils for Climate Protection Programme by Torrie Smith Associates ([www.torriesmith.com](http://www.torriesmith.com)). Widely-used but not UK-specific, nor compatible with other energy databases such as Stock Profiler or Eagle. Some input data hard to collect.

Energy and Environmental Prediction (EEP) model designed by Cardiff University ([www.cf.ac.uk/archi/research/cost8/case/uk.html](http://www.cf.ac.uk/archi/research/cost8/case/uk.html)). Focused to UK local authorities and compatible with other databases, but barely past development stage and hardly used beyond South Wales.

Sustainable City Model developed by Rutherford Appleton Laboratories ([www.global-vision.org/city/footprint.html](http://www.global-vision.org/city/footprint.html)). Powerful GIS-based model, but confined to experienced users.

Total Emission Model for Integrated Systems (TEMIS) devised by the German \_ko-Institut ([www.oeko.de/service/temis](http://www.oeko.de/service/temis)). Powerful and free, but complex and not UK oriented.

Dynamic Regional Energy Analysis Model (DREAM) developed by the Open University (<http://technology.open.ac.uk/eeu/main/rindex.html>). Powerful GIS-based model confined to experienced users.<sup>6</sup>

Twenty-four local authorities are piloting the models in a DEFRA-funded project ([www.idea.gov.uk/climate](http://www.idea.gov.uk/climate)).

<sup>6</sup> Derived from Centre for Sustainable Energy (2001) Review of Council for Climate Protection and Other Climate Change Modelling Software.

# *Environmental assessment of buildings*

## **SAP ratings**

The Standard Assessment Procedure or SAP provides a simple but reliable means of estimating the energy use for space and water heating in new and existing dwellings. SAP is based on the Building Research Establishment Domestic Energy Model (BREDEM).

SAP is the Government's recommended system for energy rating of dwellings. SAP consists of the:

- SAP rating, on a scale from 1 to 120, based on the annual energy costs for space and water heating.
- Carbon Index, on a scale from 0.0 to 10.0, based on the annual CO<sub>2</sub> emissions associated with space and water heating.

The SAP rating is used to fulfil requirements in the Building Regulations Part L to notify and display an energy rating in new dwellings. The Carbon Index can be used to demonstrate compliance with Building Regulations Part L.

SAP was introduced by the Fourth Amendment to the Technical Standards in Scotland in 1997.

It is also required by the Housing Corporation in their Scheme Development Standards for Housing Associations new-build and refurbishment schemes.

The latest edition is SAP 2001, published in December 2001. It has been operational in Scotland from 4 March 2002, and in England and Wales from 1 April 2002.

## **BREEAM**

The Building Research Establishment Environmental Assessment Model (BREEAM) awards an environmental label after assessing buildings against a range of environmental issues.

BREEAM assesses the performance of buildings in the following areas:

- Management: overall management policy, commissioning site management and procedural issues.
- Energy use: operational energy and carbon dioxide (CO<sub>2</sub>) issues.
- Health and wellbeing: indoor and external issues affecting health and wellbeing.
- Pollution: air and water pollution issues.

- Transport: transport-related CO<sub>2</sub> and location-related factors.
- Land use: greenfield and brownfield sites.
- Ecology: ecological value, conservation and enhancement of the site.
- Materials: environmental implication of building materials, including lifecycle impacts.
- Water: consumption and water efficiency.

Developers and designers are encouraged to consider these issues at the earliest opportunity to maximise their chances of achieving a high BREEAM rating.

Credits are awarded in each area according to performance. A set of environmental weightings then enables the credits to be added together to produce a single overall score. The building is rated on a scale of Pass, Good, Very Good or Excellent, and a certificate awarded that can be used for promotional purposes.

For further information contact:  
BREEAM Office, Centre for  
Sustainable Construction, Watford,  
WD2 7JR. Tel: 01923 664462 Fax:  
01923 664103 Email  
BREEAM@BRE.CO.UK

## EcoHomes

EcoHomes is a straightforward and independently verified environmental assessment method for housing, with environmental performance expressed on a scale of Pass to Excellent,

depicted by sunflowers.  
EcoHomes is based on BREEAM.

EcoHomes is integrated into the Scheme Development Standards for the Housing Corporation in England and is incorporated in the Housing Quality Indicators.

It can be used to demonstrate sustainability in design of housing developments to planning authorities addressing issues such as:

- Reduced running costs through greater energy.
- Water efficiency, and reduced maintenance.
- Healthy, comfortable and flexible internal environments.
- Access to local amenities.
- Less dependence on the car.

EcoHomes assessments can be carried out at the design stage in a similar way to a SAP rating. Every house type on a site is considered but the award is given for the whole development.

EcoHomes considers the broad environmental concerns of climate change, resource use and impact on wildlife, and balances these against the need for a high quality of life and a safe and healthy internal environment.

For further information contact BRE:

Tel: 01923 664462

Fax: 01923 664103

Email: [ecohomes@bre.co.uk](mailto:ecohomes@bre.co.uk)

Web: [www.bre.co.uk/ecohomes](http://www.bre.co.uk/ecohomes)

## **Directive 2002/91/EC – Energy Performance in Buildings**

This European Directive requires member states to put in place measures to ensure that minimum energy performance requirements for buildings are set, based on a common framework. In summary, the Directive also includes requirements for member states to:

- For new buildings with a total floor area over 1000 square metres, ensure that the technical, environmental and economic feasibility of alternatives systems such as decentralised energy supply systems based on renewable energy, CHP / district heating and heat pumps, are taken into account before construction starts.

- Ensure that, when buildings are constructed, sold or rented out, an energy performance certificate is made available.
- Put in place measures for the inspection of boilers with regard to minimising energy consumption and carbon dioxide emissions.
- Put in place measures for the inspection of air-conditioning systems with regard to minimising energy consumption and carbon dioxide emissions. Appropriate advice is also to be provided on possible improvements or alternative solutions.

The Directive has to be brought into force by member states by January 4<sup>th</sup> 2006.

For the full text of the Directive go to:

[http://www.eurima.org/downloads/buildings\\_directive\\_jo\\_english.pdf](http://www.eurima.org/downloads/buildings_directive_jo_english.pdf)

# *Implementation*

# Implementation and further mechanisms

*A number of strategies and mechanisms for implementing this advice are mentioned in the Topics sections. This section draws them together, focusing on LPA and RPB roles in influencing decisions, and in alerting and informing the public and developers about the need to respond to climate change.*

## **Partnership and joint working**

Planning is well placed to engage in a constructive and dynamic way with other agencies at regional and local level to share knowledge and expertise and to maximise the most appropriate responses to climate change.

## **Utilities and developers**

Utilities or other developers may not always have expressly considered the impacts of climate change in risk assessments for all their proposals, and planning authorities can help to raise awareness of the issues.

## **Environment Agency and SEPA**

UKCIP and the Environment Agency have prepared a decision analysis framework with supporting guidance for climate risk assessments (Willows and Connell 2003). A simplified summary of how this could be applied to land use planning policy making is provided earlier in this advice. See

Planning for an Uncertain Future. For specialist advice on the interpretation of the UKCIP Scenarios and their use in climate-risk assessments, planning bodies should ensure close working with SEPA or the Environment Agency.

## **Flood Liaison and Advice Groups**

On the particular issues raised by flood risk, authorities in England and Wales can consider establishing Flood Appraisal Groups or Flood Advisory Groups similar to those in Scotland, where adjoining local authorities, representatives of different local stakeholders, SEPA and the Water Authority are represented.

## **Local partnerships**

The local and regional government agencies are already involved in many partnerships or corporate ventures where climate change is addressed across a range of statutory functions (such as Councils for Climate Protection), which will assist in better



implementation of climate-aware planning policies. Community Strategies, LA21 Strategies and, at regional level, RSDFs will also address responses to climate change.

### **Plan, monitor and manage**

The uncertainties involved in our knowledge of climate change, and hence in climate-robust decisions, makes it imperative that plans and planning decisions are reviewed and monitored. Plans can include a number of appropriate indicators, such as flood-resistant development and other indicators of changes in external conditions such as sea level, and include policies expressly to provide for a review if circumstances change.

### **Supplementary planning documents**

Despite the uncertainties associated with climate change practice in response to climate change is developing rapidly, and SPD can perform a useful role in enabling LPAs to provide additional current guidance and advice to developers.

### **Informatives**

Where it is inappropriate for LPAs to impose conditions or negotiate planning obligations/agreements, but where in the LPA's view the developer should be made aware of certain matters, it is possible for the LPA to attach an informative to any consent.

### **Training**

As climate change is a new consideration for the UK planning function it is important that planning authorities and regional bodies assist

officers and members to keep up-to-date with developing knowledge and good practice through training events, conferences, short courses and in-house training.

### **Planning obligations and agreements**

Section 106 planning obligations and Section 75 agreements in Scotland are an appropriate planning tool to secure many of the measures necessary for the long-term management of climate change issues. For example PPG 25 makes clear that planning obligations can be used for flood risk reduction and protection measures.

Currently, to be enforceable in the long term, Section 106 planning obligations must meet the tests in Circular 1/97 *Planning Obligations*:

- 1** Be necessary for the development to go ahead.
- 2** Contribute to the cost of necessary works by the LPA or other public body.
- 3** Be so directly related to the development that the development ought not to be permitted without it.
- 4** Be designed to secure the implementation of related local plan policies.
- 5** Provide mitigation measures for a development or offsets the loss of or impact on any amenity or resource.

The tests for Section 75 agreements in Scotland are contained in Scottish Executive Circular 12/1996 Planning Agreements.

### **Slateford Green ‘car-free’ development – Edinburgh**

This development of 120 flats, which adopts a built form based on the traditional Edinburgh tenement block, was designed to be car-free. The development has good access to public transport. A Section 75 agreement was used by the planning authority to make the ‘car-free’ status legally binding on the developer and through them on the occupiers. The agreement stipulates that no more than one parking space will be provided for every ten dwellings: this is to provide parking for visitors. It also requires that tenancy agreements or titles of ownership state that occupiers cannot park within the development.

The planning obligation/agreements that may be necessary for dealing with climate change issues will be those that attempt to achieve the following (subject to the tests mentioned above):

- Significantly reduce or remove the risk of flooding on and off site.
- Provide a financial contribution to LPA or EA flood alleviation or management schemes or Internal Drainage Boards.
- Secure the long-term management of areas of a site so that they can provide flood protection/storage and/or mitigation in the long term.
- Secure alternative flood-wash/ storage areas away from the site.
- Secure the long-term maintenance of SUDS.
- Provide and secure the long-term maintenance of planting and landscaping schemes, or of buffer zones that protect development from physical dangers resulting from climate change such as wind damage to trees etc.
- Secure temporary consents and site reinstatement agreements for development that may not be sustainable in the long term (coastal caravan parks etc).
- Secure funding for and provide for the long-term implementation and maintenance of green transport plans.
- Secure land restructuring agreements so that land with development rights in areas at risk because of climate change can be exchanged for development rights at alternative sites.
- Where a development has been specifically laid out and designed on climate change principles, secure the long-term maintenance of those features of the development that, if lost, would risk the undermining of the design principles of the development as a whole.

# *Information*

A blue-tinted photograph of a residential street. In the foreground, a dark-colored car is parked on the right side of the road. Behind it, a row of houses with gabled roofs and multiple windows is visible. Large trees are situated behind the houses, and the overall scene is captured in a monochromatic blue color scheme.

# Context

## General

### Further Reading

DETR (1998)

*Planning for Sustainable Development: Towards Better Practice*, DETR, London

DETR (2000)

*Climate Change: the UK Programme* Cm4913, Stationery Office, London

ERM (2000)

*Potential UK Adaptation Strategies for Climate Change*, DETR, London

Kerr, A. and McLeod, A. (2001)

*Potential Adaptation Strategies for Climate Change in Scotland*, Scottish Executive, Edinburgh

National Assembly for Wales (2001)

*Climate Change Wales: Learning to Live Differently (the Welsh Climate Change Programme)*, NAW, Cardiff

Town and Country Planning

Association (2003) *Policy Statement: Climate Change*, TCPA, London

### Contacts

Planning Policy Guidance and Statements

England:

[www.planning.odpm.gov.uk/ppg/](http://www.planning.odpm.gov.uk/ppg/)

Scotland:

[www.scotland.gov.uk/library/nppg/](http://www.scotland.gov.uk/library/nppg/)

Wales:

[www.wales.gov.uk/subiplanning/contents/](http://www.wales.gov.uk/subiplanning/contents/)

Northern Ireland: [www.doeni.gov.uk](http://www.doeni.gov.uk)

Environment Agency:

[www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)

SEPA: [www.sepa.org.uk](http://www.sepa.org.uk)

UKCIP: [www.ukcip.org.uk](http://www.ukcip.org.uk)

Hadley Centre for Climate Protection and Research: [www.met-office.gov.uk/research/hadleycentre/](http://www.met-office.gov.uk/research/hadleycentre/)

## Research guidance and tools (available from UKCIP)

UK Climate Impacts Programme, DEFRA, Tyndall Centre for Climate Change Research, Hadley Centre (2002)

*Climate Change Scenarios for the United Kingdom: The UKCIP02 Briefing Report*, Tyndall Centre for Climate Change Research, UEA, Norwich

UK Climate Impacts Programme, DEFRA, Tyndall Centre for Climate Change Research, Hadley Centre

(2002)  
*Climate Change Scenarios for the United Kingdom – The UKCIP02 Scientific Report*, Tyndall Centre for Climate Change Research, UEA, Norwich

Willows, R.I. and Connell, R. (eds.) (2003)  
*Climate Adaptation: Risk, Uncertainty and Decision-making (Technical Report)*, UKCIP, Oxford

UK Climate Impacts Programme, (2001)  
*Socio-Economic Scenarios for Climate Change Impact Assessment: A Guide to Their Use in the UK*, UKCIP, Oxford

UK Climate Impacts Programme (2001)  
*Thinking Ahead: Socio-Economic Scenarios for Climate Change Impact Assessment*, UKCIP, Oxford

Metroeconomica Ltd (2001)  
*A Methodology for Costing the Impacts of Climate Change in the UK (Technical Report)*, UKCIP, Oxford

### **Regional studies (available from UKCIP)**

Department of Environment (2002)  
*Implications of Climate Change for Northern Ireland: Informing Strategy Development*, DOE Northern Ireland, Belfast

Kersey, J., Wilby, R., Fleming, P. and Shackley, S. (2000)  
*The Potential Impacts of Climate Change in the East Midlands: Technical Report*, Environment Agency, Solihull

East Midlands Sustainable Development Round Table (2000)  
*The Potential Impacts of Climate*

*Change in the East Midlands: Summary Report*, Environment Agency, Solihull

National Assembly for Wales (2000)  
*Wales: Changing Climate, Challenging Choices: The Impacts of Climate Change in Wales From 2000 to 2080 – Summary Report and Technical Report*, The National Assembly for Wales, Cardiff  
[www.bangor.ac.uk/ies/scoping.html](http://www.bangor.ac.uk/ies/scoping.html)

South West Climate Change Impacts Partnership (2003) *Warming to the Idea: Meeting the Challenge of Climate Change in the South West (Summary Report)*, South West Climate Change Impacts Partnership, Exeter  
[www.oursouthwest.com/climate](http://www.oursouthwest.com/climate)

Kerr, A., Shackley, S., Milne, R., and Allen, S. (1999)  
*Climate Change: Scottish Implications Scoping Study*, Scottish Executive Central Research Unit, Edinburgh  
[www.scotland.gov.uk/cru/kd01/ccsi-00.htm](http://www.scotland.gov.uk/cru/kd01/ccsi-00.htm)

Wade, S., Hossell, J., Hough, M., and Fenn, C., (eds.), (1999)  
*The Impacts of Climate Change in the South East: Technical Report*, WS Atkins, Epsom

WS Atkins, ADAS and the Met. Office, (1999)  
*Rising to the Challenge: Impacts of Climate Change in the South East in the 21st Century: Summary Report*, WS Atkins, Epsom

Shackley, S., Wood, R., Hornung, M., Hulme, M., Handley, J., Darier, E., and Walsh, M. (1998)

*Changing by Degrees – The Impacts of Climate Change in the North West of England: Technical Overview*, University of Manchester, Manchester  
[www.snw.org.uk/enwwweb/climate/](http://www.snw.org.uk/enwwweb/climate/)

Sustainability North West, (1998) *Everybody Has An Impact – Climate Change Impacts in the North West of England: Summary Report*, Sustainability North West, Manchester  
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Countryside Council for Wales:

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New and Renewable Energy Enquiries Bureau at the Energy Technology Support Unit: 01235 432450/433601, [NRE-enquiries@aeat.co.uk](mailto:NRE-enquiries@aeat.co.uk)

For regional renewable energy studies and targets go to the Government offices for the regions contacts on the Regional Coordination Unit website: [www.rcu.gov.uk/](http://www.rcu.gov.uk/)

Combined Heat and Power Association: [www.chpa.co.uk](http://www.chpa.co.uk)

BedZED:  
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Energy Efficiency Best Practice

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This document provides planning professionals with an overview of current thinking and state of knowledge on the planning response to climate change. It is hoped that the advice will stimulate planners to look for new strategies to respond to the changing climate in partnership with developers and the wider community.

The advice will also be of assistance to local authorities implementing strategies to address climate change.

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