



ROYAL COMMISSION ON ENVIRONMENTAL POLLUTION

# The Urban Environment

Summary of the Royal Commission on  
Environmental Pollution's Report



## About the Royal Commission's study on the urban environment

This study examines the environment within urban areas and the wider environmental impacts of towns and cities, and considers the relationship between the urban environment and human health and wellbeing.



During the course of the study around 180 organisations and individuals submitted evidence or provided information on request. The Royal Commission hosted a seminar in Belfast to review the impact of the environment on health in urban areas. Four consultancy studies were commissioned on topics of special interest, namely: the environmental impact of housing; green infrastructure; the role of local government; and legal and planning issues. We also commissioned five short literature reviews.

Members of the Commission and its Secretariat made visits to Ashford, Belfast, Edinburgh, Glasgow, Hull, Manchester, Milton Keynes, Poole, Poundbury, Southwark, Swansea and the Building Research Establishment at Watford. Additional information was gathered on visits to France, Denmark, Brazil and Mexico.

## OVERVIEW

*Urban areas are central to the UK's aspirations for the environment and the achievement of a better quality of life for its citizens*

For the first time in human history, more than half the world's population lives in urban areas. Around the world, mega and super cities with tens of millions of inhabitants are rapidly expanding. In the UK, over 80% of the population already lives in urban areas, and the country is going through a new phase of urban expansion and regeneration that will affect the way we live for decades to come.



At the same time, the world is facing tremendous environmental challenges in terms of climate change, resource use and protection of the natural environment. Urban areas have major environmental impacts that can be felt globally, but they may also experience severe environmental problems

within their own boundaries. Tackling these problems not only benefits the environment, but improves the health and wellbeing of citizens and should be seen as central to economic viability by making towns and cities more attractive places to live and work.

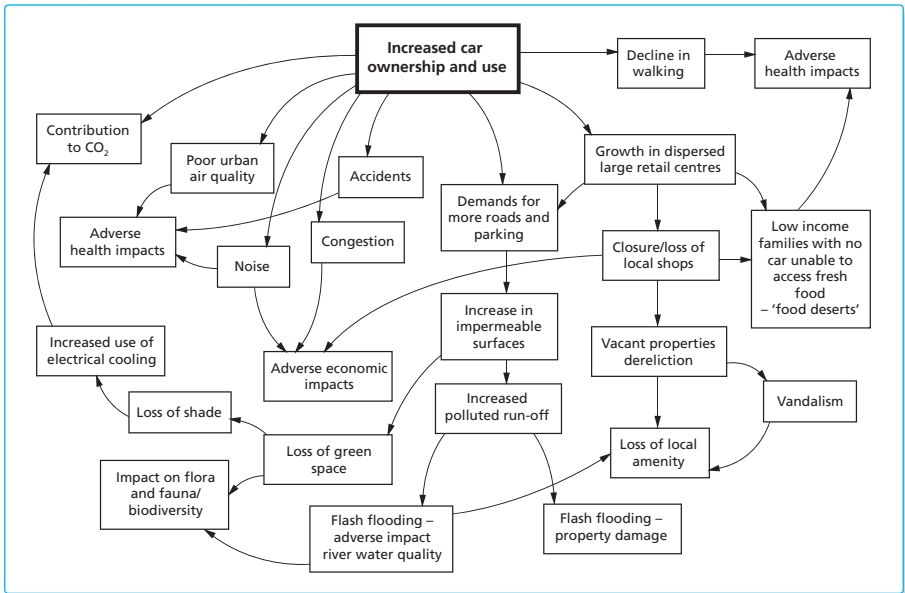
Urban areas can be exciting and fulfilling places to live. Compact urban areas can also offer significant environmental advantages such as encouraging greater use of public transport and more efficient energy systems. We have a rare opportunity to make a real difference through the way we build the new developments planned in the United Kingdom. We need to act quickly or we will squander this opportunity.

# THEMES OF THE REPORT

## Cities are complex systems

Urban environmental issues owe much of their persistence to the complex and interactive nature of towns and cities, which is determined by households, communities, businesses and non-governmental and voluntary organisations, as much as by local and national government. They present a classic case of what has been described as a ‘wicked problem’,<sup>1</sup> as can be seen from the diagram below. However, there are many opportunities to improve towns and cities if the complexity of the forces at work within society is taken into account, and interventions made in the right ways and at the right levels.

### Part of the web of connections between increased car ownership and use and environmental and social outcomes in urban areas<sup>2</sup>



## *Two kinds of environmental issue*

We found it useful to consider the environmental issues impacting urban areas as falling into two broad, but overlapping, categories. The first category, *cumulative issues*, can arise anywhere, but are worse in towns and cities because of the concentration of people and activities there. For example, emissions from traffic are not a problem of urban areas alone, but the highest levels of pollution often occur there. By contrast, *systemic issues* arise from the unique characteristics of urban settlements. An example is the urban heat island effect that can raise the temperatures of towns and cities 1° to 6°C above those in the surrounding countryside.

## *Technology is not enough*

When it comes to improving the urban environment, many techniques are readily available and have been shown to work in demonstration projects, but have not become standard practice. Technology is necessary but it alone is not enough to shift cities onto a more environmentally sustainable trajectory. Instead, complex interactions between forces deriving from institutions, infrastructure, markets, regulations and technologies and people's inclinations represent a 'web of constraints' on efforts to address urban problems.

## *A new approach to governance*

The urban environment presents a challenge to both national and local government. We call for a new environmental contract that engages both, and requires the participation of civil society and business. We also recommend a package of measures that recognises the systemic nature of the web of constraints and re-orientates institutions, infrastructure, incentives, inclinations and information towards delivering environmental sustainability and improved health and wellbeing in urban areas.

## PRINCIPLES AND KEY RECOMMENDATIONS FOR A BETTER URBAN ENVIRONMENT

It should be a fundamental requirement of government policy that towns and cities become more environmentally sustainable and healthy places to live. However, such aspirations will not be met unless:

- urban management is guided by an explicit policy for the urban environment;
- health and wellbeing are recognised as being inextricably linked with environment;
- urban growth and renewal are planned within environmental constraints;
- the environment is placed at the heart of urban design, regeneration and management;
- there is an integrated approach to the urban environment that takes account of social, physical and economic factors;
- there are incentives to reduce negative environmental impacts; and
- knowledge, capacity and skills to reduce environmental impacts and promote health and wellbeing are increased and maintained.

To put these principles into practice we call for:

- a policy for the urban environment and its impact on health;
- an environmental contract between central and local government which also involves the private, voluntary and community sectors;
- a major programme to improve the environmental performance of new and existing buildings;
- promotion of the natural urban environment and green infrastructure through planning policy;
- driving up a range of environmental standards (through the Code for Sustainable Homes, utility pricing and incentives to reduce waste and traffic in urban areas); and
- provision of appropriate skills and information.

## HEALTH AND WELLBEING

Good quality urban areas can be stimulating and offer opportunities not found elsewhere. But the urban environment places stresses and strains on human health and wellbeing that contribute to tens of thousands of deaths each year and a considerable burden of ill health. Major issues include air pollution, climate, obesity and mental health. Most of these problems are not unique to urban areas, but are important because of the high numbers of people living there and the aggravating impact of factors associated with urban areas, such as high levels of vehicle emissions, poor housing and a lack of good quality green space.

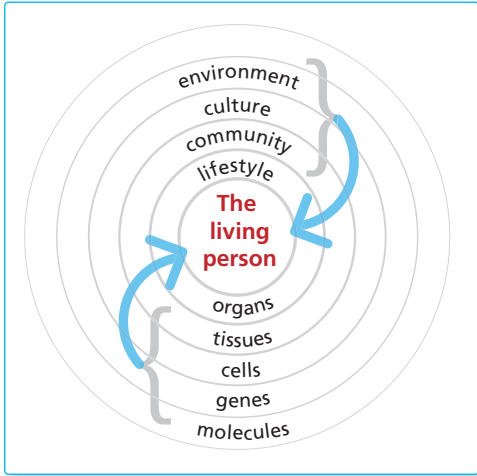
### Aspects of the urban environment that affect health

Air pollution	<b>24,000</b> premature deaths in Great Britain in 1995/96; <sup>3</sup> reduced average life expectancy by around eight months in 2005 <sup>4</sup>
Climate	<i>Winter</i> <b>25,700</b> extra deaths in December to March 2005/06 in the UK (compared with the death rate for other months of the year) <sup>5</sup>
	<i>Summer</i> at least <b>2,000</b> excess deaths in the UK in summer heatwave 2003 <sup>6</sup>
Mental health	association between urban residence and prevalence of psychiatric disorders, which persists after adjusting for confounding factors <sup>7</sup>
Infectious diseases	some disease transmission rates are higher in urban areas; this could also be the case for pandemic influenza or exotic infectious diseases
Obesity	<b>34,000</b> premature deaths and about 16 million attributable days of certified incapacity in England per year <sup>8</sup>
Traffic accidents	<b>3,300</b> deaths and <b>29,000</b> serious injuries in Great Britain in 2005 <sup>9</sup>

Environmental controls can help tackle some problems like air and water pollution. However, health concerns also need to be integrated into the design and management of urban areas so that, for example, urban layouts promote sustainable transport and provide green space to encourage social interaction

and exercise. This more holistic approach recognises that good health is much more than the prevention of illness and embraces life-long physical and mental wellbeing.

### Interacting factors influencing an individual's health<sup>0</sup>



Much more can be done to make health concerns central to the development of new and renewed urban areas and to recognise that the health of individuals and communities is affected by a range of interacting environmental, social and economic factors.

**We therefore recommend that the UK government and devolved administrations develop a statutory framework for including Health Impact Assessments in the planning process.**

One of the most persistent problems in urban areas is poor air quality. While this has improved greatly over the past 50 years, it is still a serious issue leading to thousands of premature deaths each year. Some types of air pollution also appear to be getting worse – a trend that could be exacerbated by rising transboundary pollution and by climate change. The situation is particularly serious in urban areas experiencing high levels of traffic congestion. **We therefore recommend that central, devolved and local government implement further measures to reduce traffic levels in the air pollution hot spots of towns and cities and, in particular, to bear down heavily on the most polluting vehicles. We commend for wider adoption the recent proposal in London for a Low Emission Zone.**

Current knowledge tells us that even small concentrations of some air pollutants, including particulates, have an adverse effect on health. Furthermore, although we do not have clear mechanism-based models for exposures, individual air pollutants are also likely to interact, creating different health outcomes. We therefore need a two-pronged approach, bearing down on the worst hot spots as recommended above, but also driving down overall pollution levels in other areas where it is easier to do so. The latter, an approach known as exposure reduction, requires a holistic approach that reduces total population exposure to all air pollution and maximises public health benefits. **We recommend that the UK government promotes the concept of exposure reduction for reducing the overall health impacts of outdoor air pollutants and actively pursues such measures in domestic, EU and international policy on air quality.**

## THE NATURAL URBAN ENVIRONMENT



Policy and practice have tended to undervalue the natural environment of towns and cities and misunderstand its role. The natural urban environment incorporates not only parks and gardens but also air, soil and water, and a diversity of habitats, including neglected areas like brownfield sites

and land along transport corridors. The natural environment in urban areas often experiences faster and more extreme rates of change than in rural areas. For instance, river flows may be faster and more prone to extreme variations.



communities, providing opportunities for exercise, leisure, education and employment, as well as creating a sense of place.



projects in order to enhance flood control measures and reduce the potential for pollution.



The diverse habitats in urban areas create a variety of ecosystems providing important ecological services for biodiversity, climate, water and flood management. They are also important for individual health and wellbeing and for local

Urban areas face an evolving set of environmental pressures including climate change. At the same time, the existing infrastructure of pipes, drains, sewers and flood defences is ageing and needs replacing. This provides an opportunity to increase the use of flexible green infrastructure in new developments and regeneration

A more strategic approach is needed to increase the amount of green infrastructure, making the most of existing natural features and creating new ones, and tightening up legislation and planning policy to protect particular parts of the urban ecosystem such as the green belt, gardens and trees.

The natural environment in urban areas can be improved by:



*River restoration* which creates more natural rivers and floodplains. This can alleviate flooding, improve water quality and enhance habitats, as well as making the riverside more accessible to people.



*Sustainable drainage systems (SuDS)* such as ponds, ditches and grassed areas, which aim to mimic natural drainage. They can reduce surface water run-off and pollution and provide conservation benefits.



*Green roofs* that can be created by planting vegetation in special membranes. These provide a protective layer of insulation, and can help with drainage. They may also increase wildlife habitat in urban areas.



*Urban woodland and roadside trees* can provide a range of environmental services such as shade to reduce glare and the heat island effect, removal of pollutants, control of erosion and flooding, amenity and landscape, habitats for wildlife and even biomass for local energy generation from prunings.

*Green networks* combine these and other techniques with existing features of the natural environment. Areas in and around towns, and along river corridors, can be networked together to support the functioning of urban ecosystems and to reduce the environmental impacts of the built environment.

Such measures are not as prevalent as they should be because of the low priority given to the natural urban environment, problems with legislation and management, and a lack of encouragement for such measures in urban development. **We recommend the Department for Communities and Local Government and its devolved equivalents amend their planning policy statements and guidance to reflect a broader definition of the natural environment in urban areas and to recognise and protect the role that urban ecosystems can play in improving towns and cities.** Planning policy and guidance should promote green infrastructure and provide options for planners and developers including: green networks; urban river restoration; green and built infrastructure for flood storage and redirection; sustainable drainage systems, including green roofs; and the protection and promotion of urban trees and woodland.

## THE BUILT URBAN ENVIRONMENT

There is a drive to create new urban areas and at the same time a need for a radical rethink on the provision of associated transport, water and energy infrastructure to cope with new demands and to lessen environmental impacts. We also need to deliver the same level of infrastructure improvement in existing areas which, despite new development, will still make up the majority of the built stock in 2050.



In the case of transport, the UK has experienced 50 years of rapid growth in road traffic, and the volume of traffic in urban areas is forecast to grow further by about 40% between 2001 and 2031. This predicted growth will squeeze out other more sustainable forms of transport in urban areas, as well as imposing considerable costs

on the economy, seriously reducing the quality of life and causing high levels of pollution. **We recommend that the government develops and strengthens requirements for Local Transport Plans, such that by the end of 2008 they can include statutory targets for reduction in urban traffic.**

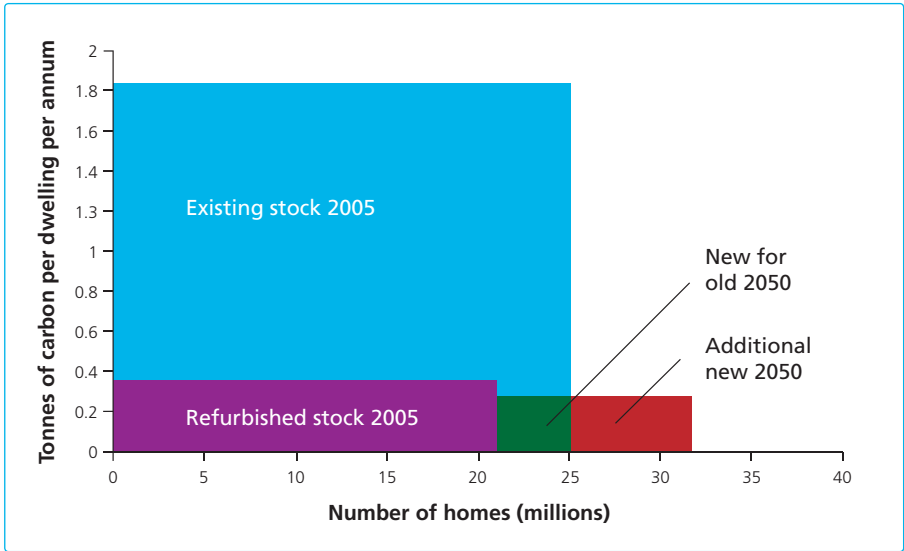
Some of the best opportunities to introduce decentralised energy generation with a lower environmental impact are in urban areas. However, the UK has failed to take advantage of forms of renewable energy and Combined Heat and Power, which are used extensively in other parts of Europe. **We recommend that the new Planning Policy Statements on Climate Change require all new developments beyond a certain size to incorporate a strategic approach to energy planning and provision, that takes all opportunities to optimise the use of low carbon technologies, renewables, microgeneration and Combined Heat and Power.**

For water, we recommend a package of measures to ensure that development does not go ahead unless water supply, drainage, and sewerage can be provided in an environmentally sustainable manner and to encourage better long-term planning in these sectors. We also recommend measures to stimulate water efficiency through water metering, changing customer behaviour and promoting higher building standards.

The construction, occupation and operation of buildings also have a major impact on the environment and are responsible for 45% of total UK carbon dioxide (CO<sub>2</sub>) emissions, with 27% of the total coming from domestic buildings.

Many studies have shown that there is enormous potential to reduce emissions from buildings. Work carried out for this study suggests that in theory CO<sub>2</sub> emissions from the UK's housing stock could be reduced by 75% by 2050 compared with 1996 levels (see graph overleaf). This would involve a demanding package of measures including: refurbishment of existing stock; more energy efficient lights and appliances in all homes; replacement of some old housing with new housing constructed to very high environmental standards; a change in householder attitude to energy saving; and installation of low and zero carbon technologies across the entire stock.

## Scenario for reduced carbon emissions from the UK housing stock in 2050<sup>11</sup>



This graph demonstrates the importance of tackling carbon emissions from the existing stock. However, there is a huge difference between what is technically possible in theory and what has so far been achieved in practice, and some of the measures could have important environmental, historic, aesthetic and social implications. Nevertheless, research shows that a timid policy approach would result in emissions falling by less than 10% by 2050. In the face of the challenge of climate change, and the difficulty of cutting emissions in almost every sector of the economy, we conclude that buildings must play a major part in meeting the UK's 60% CO<sub>2</sub> emissions reduction target by 2050. **We recommend that:**

- **government draws up realistic but demanding timetables to improve the energy efficiency of the building stock and the uptake of low and zero carbon technologies, taking account of the drivers for change and the policy levers appropriate for the various sectors. For example, fiscal incentives, such as rebates on stamp duty land tax or council tax for energy saving measures, should be introduced to provide**

real encouragement to developers and householders to deliver new building and refurbishment to a high environmental standard; and

- existing homes should be improved to the EcoHomes ‘excellent’ standard by 2030, with equivalent standards applied in other sectors, wherever the technologies are available to achieve this consistent with social, cultural, heritage, urban landscape and aesthetic considerations.



Good urban design can also reduce the environmental impact of urban areas by promoting layouts that support sustainable transport, include green infrastructure and are resilient to climate and flood risk. The planning system should encourage such environmentally sustainable design. However, in practice, development proposals miss opportunities to include environmental principles or technologies, and tools like masterplans and design codes do not currently reflect environmental concerns.

We conclude that there needs to be a greater drive for environmentally sustainable development in new and existing urban areas, that builds on the strengths of the planning system and other environmental strategies, but that gives more scope and encouragement for local action, behavioural change and innovation.

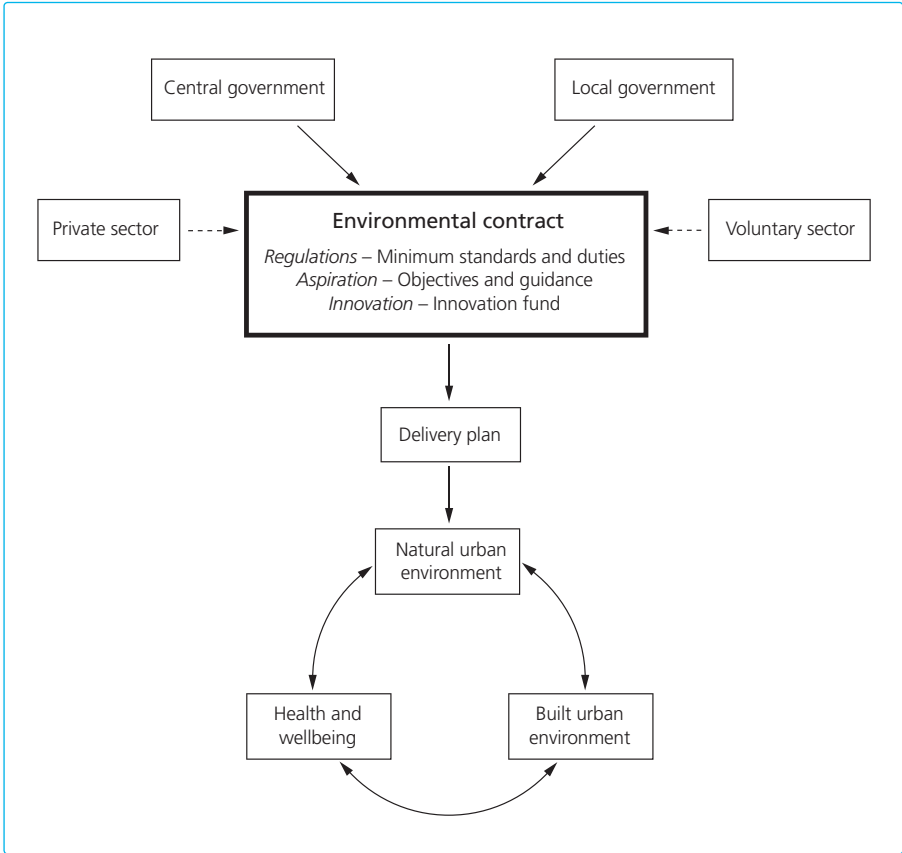
## GETTING THE FRAMEWORK RIGHT

Many approaches are available to create high quality urban areas with a substantially reduced impact on the environment and better health and wellbeing. However, many tried and tested ideas are not yet standard practice. In the main, this is not because the technology is lacking, or because there are simple social barriers to its uptake. Instead, a more subtle web of constraints operates through institutions, infrastructure, incentives, inclinations and access to information. To make progress there needs to be simultaneous action across many fronts and by different actors.

At the institutional level, we believe that government has yet to grasp the importance of the urban environment for environmentally sustainable development and a good quality of life in the UK. **We recommend that the UK government and devolved administrations develop a coherent policy framework containing explicit policies for the urban environment,** with the core objectives of environmental sustainability and improved health and wellbeing in urban areas.

While national policies can do much to improve the urban environment, our analysis of the clustering of issues within towns and cities suggests that the local level is also vitally important. While some local authorities have set up innovative environmental projects, central government has not always supported these in their initial stages and has failed to send a strong signal to local government that the environment should be a core concern of local policies. To remedy this, **we recommend that the UK government and devolved administrations establish an environmental contract between central and local government, beginning with larger urban areas.**

## Environmental contract between central and local government



The environmental contract would be a high level agreement setting out the top priorities that all local authorities would tackle, such as climate change, but it would also encourage a large degree of local discretion in identifying and addressing other environmental issues. The contract would encourage innovation and the spread of good practice within local authorities by identifying:

- **minimum standards to be achieved by all local authorities in different policy areas;**

- **aspirational objectives based on the experience of the best performing local authorities; and**
- **innovative action to find new ways of improving environmental performance, incentivised through a Local Government Environmental Innovation Fund.**

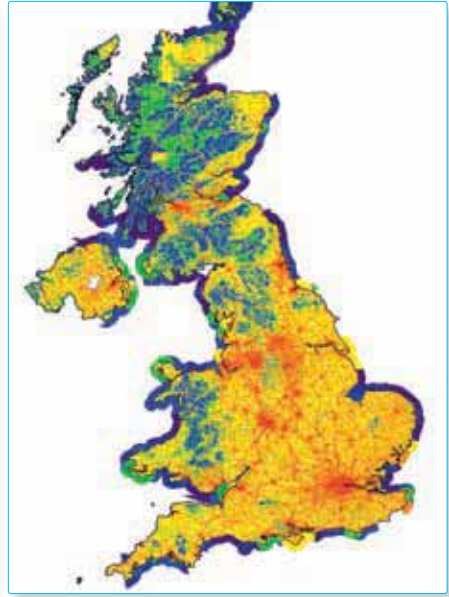
The contract could strengthen the environmental component of existing initiatives such as Sustainable Community Strategies and Local Area Agreements which currently contain few environmental goals. It should also be used to integrate different local plans such as those on transport and air pollution. However, the contract's main aim would be to stimulate much greater ambition in local government activity on the environment, with actions being set out in a local delivery plan. The delivery plan could take various forms, for example an environmental management plan or integrated spatial strategy that brings together environmental and planning decisions from the outset.<sup>12</sup>

In principle, the contract should apply everywhere, but the priority is to introduce it in the larger urban areas and city regions that have the largest impacts. As illustrated for two environmental issues – light pollution and CO<sub>2</sub> emissions – in the maps below, these areas have the most to gain from a strategic approach to environmental issues that brings together action across a conurbation.

Patterns of light pollution (a) and carbon dioxide emission (b)<sup>13</sup>



(a)



(b)

Environmental good practice at local level is often championed by skilled and enthusiastic individuals or small teams, who have created pioneering initiatives such as the Merton planning initiative on renewable energy, Woking’s renewable energy projects and the Nottingham Declaration on Climate Change. We recommend strengthening the work of these environmental entrepreneurs through mechanisms such as a new Local Government Environmental Innovation Fund (page 16), and expanding training available to professionals in the built environment sector (page 22).

Environmental standards also need to be raised systematically across a range of issues, for example, energy and water use, transport and waste generation. The reduction of environmental impacts should be encouraged through appropriate environmental taxes, subsidies and charges. Technologies that reduce environmental impacts will then become increasingly economically viable, especially where this is backed up by public purchasing.

**We recommend that the UK government and utility regulators create packages of measures for water and energy that:**

- **provide customers with frequent billing information showing how much they are using in comparison with past use and average consumption levels. Bills should also provide information on the environmental impact of consumption and ways of reducing use;**
- **include appropriate smart metering; and**
- **encourage utility companies to set tariffs that reward conservation, do not provide discounts for high use and are structured to protect vulnerable groups.**

**We recommend introducing a similar incentives-based package for waste, including equitable charging related to waste generation.**

## **CONCLUSION**

We conclude that urban areas present daunting challenges, but also immense opportunities. It is imperative to reduce substantially human impacts upon local, regional and global environments, and to improve health and wellbeing. These changes will not come about by piecemeal tinkering with existing infrastructures and institutions, nor by pursuing simplistic technological solutions. Appealing to people to change their behaviour or merely providing information is often futile. This is especially the case in the absence of policy interventions that change incentives and infrastructures and provide convenient alternatives to current practices. Urban environments are highly complex, interdependent social, ecological, economic and technical systems. We have learnt that changing them for the better on a sufficient scale, and with sufficient speed, to make a major difference to the environment and human health and wellbeing requires a fundamental reshaping of the ways in which they are governed.

## OTHER SELECTED RECOMMENDATIONS

### *A public policy framework that promotes the environmental component of sustainable development*

We recommend that:

- the UK government upgrades local authorities' current discretionary powers on wellbeing to a statutory duty to protect and enhance the environment.
- the Department for Communities and Local Government (DCLG) takes a share in the Public Service Agreement on climate change and that its devolved equivalents take on similar climate change objectives.
- central and local government ensure that environmental constraints are recognised and respected by the planning system and by policies for urban areas.
- the UK government and devolved administrations apply Strategic Environmental Assessment to all major public sector policies, plans and programmes including those at the national level.

### *Incentives and information to raise environmental standards over time*

We recommend that:

- DCLG extends the Code for Sustainable Homes to cover all buildings, and progressively tightens the Building Regulations and the standards in the Code for both energy and water efficiency, over a pre-announced three-yearly cycle.
- DCLG and the devolved administrations periodically review the level of compliance with Building Regulations, and that local authorities provide adequate resources for the inspection and enforcement of Building Regulations.
- VAT rates be equalised between refurbishment and new build at a level which is fiscally neutral. This means raising the VAT on new build above the minimum level of 5%, and reducing the VAT on refurbishment to match it, such that the revenue gained is equal to the revenue lost.

We recommend that the UK government and devolved administrations:

- introduce a Water Efficiency Commitment on water suppliers, along the same lines as the Energy Efficiency Commitment;
- strengthen the Business Resource Efficiency and Waste programme; and
- establish a Water Saving Trust to provide advice on water efficiency to households.

We recommend that all domestic buildings are metered for water, beginning in the areas shown in assessments of the environment agencies (the Environment Agency and the Scottish Environment Protection Agency) to be in water-scarce zones.

### *New infrastructure should contribute to environmental sustainability*

*Transport* – We recommend that before development plans are approved, the government publishes a clear assessment of the transport infrastructure needs for all proposed housing growth, how they will be funded and the environmental and health impacts of meeting those needs. This should be accompanied by a clear plan for phasing in the necessary supporting infrastructure, such that new transport provision is environmentally sustainable.

*Built environment* – We recommend that government includes high standards of environmental performance in private finance initiative and public private partnership contracts for non-residential buildings and that government puts in place management processes to ensure that 100% of public sector non-residential buildings meet the BREEAM ‘excellent’ standard.

*Water and sewerage* – We recommend that:

- development allocations should not be made until it has been established that water supply and management can be provided in an environmentally sustainable manner, and that the environment agencies (the Environment Agency and the Scottish Environment Protection Agency) are made statutory planning consultees with regard to environmental constraints on water for a given catchment area;

- the government and devolved administrations require water companies to produce and implement long-term strategic plans for sewage and wastewater treatment in consultation with the relevant environment agencies; and
- Ofwat (the Water Services Regulation Authority) sets more stringent leakage targets for water companies supplying urban areas in the south and east of England and that the Scottish Executive sets leakage reduction targets for Scottish Water, particularly for areas of water scarcity.

We recommend that the UK government and devolved administrations promote a strategic and integrated approach to urban drainage that:

- clarifies ownership and responsibility for the long term maintenance of every element of surface water drainage systems, including sustainable drainage systems (SuDS);
- brings forward reforms to ensure that SuDS are the preferred option, and are incorporated wherever feasible in all new urban drainage schemes within five years;
- amends Section 106 of the Water Industries Act 1991 in England and Wales to encourage the use of SuDS; and
- promotes the role of SuDS in planning policy statements and guidance.

### *Promoting the role of the natural environment*

We recommend that the UK government and devolved administrations:

- strengthen their planning policies to direct development away from high flood risk areas, and ensure that planning authorities follow this principle in practice;
- review the environmental impact of brownfield policies across the UK, and consider whether the 60% target will remain appropriate across England after 2008; and
- set minimum standards on size and distance to ensure access to good quality green space particularly in urban areas.

We recommend that the Environment Agency, the Scottish Environment Protection Agency and the relevant body in Northern Ireland, in partnership with other bodies, each produce a strategy on urban river restoration and publish guidance on its costs, environmental, social and economic benefits, potential funding sources, opportunities for community engagement and examples of good practice.

### *Resources and skills for sustainable development*

We recommend that:

- DCLG and the devolved administrations ensure that local authority planning departments are adequately resourced and organised to maximise environmental and associated health benefits from developments; and
- the higher and further education sectors and professional bodies develop training for the built environment sector that includes environmental sustainability as a core part of the curriculum.

## MEMBERS OF THE ROYAL COMMISSION ON ENVIRONMENTAL POLLUTION

Members are drawn from a variety of backgrounds in academia, industry and public life.

### **Professor Sir John Lawton (Chairman)**

President, Council of the British Ecological Society  
Former Chief Executive, Natural Environment Research Council

### **Professor Nicholas Cumpsty**

Head, Department of Mechanical Engineering, Imperial College

### **Professor Michael H. Depledge**

Professor of Environment and Human Health, Peninsula Medical School  
(Universities of Exeter and Plymouth)

### **Professor Paul Ekins**

Head, Environment Group, Policy Studies Institute

### **Dr Ian Graham-Bryce**

Principal Emeritus, University of Dundee

### **Professor Stephen Holgate**

Medical Research Council Clinical Professor of Immunopharmacology,  
University of Southampton

### **Professor Jeffrey Jowell**

Professor of Law, University College London

### **Professor Peter Liss**

Professor of Environmental Sciences, University of East Anglia

### **Professor Susan Owens**

Professor of Environment and Policy, Department of Geography and  
Professorial Fellow, Newnham College, University of Cambridge

**Professor Judith Petts**

Head, School of Geography, Earth and Environmental Sciences, University of Birmingham

**Professor Jane Plant\***

Professor of Geochemistry, Imperial College

**Professor Steve Rayner**

Director, James Martin Institute for Science and Civilization, University of Oxford

**Mr John Speirs**

Director of the Carbon Trust

**Professor Janet Sprent**

Emeritus Professor of Plant Biology, University of Dundee

**Professor Lynda Warren**

Emeritus Professor of Environmental Law, University of Wales Aberystwyth

**Mr Tom Eddy (Secretary)**

\* Served on the Royal Commission until July 2006.

**References**

- <sup>1</sup> Rittel, H. and Webber, M. (1973). Dilemmas in a general theory of planning. *Policy Sciences*, **4**, 155-169.
- <sup>2</sup> Figure courtesy of Professor Judith Petts, University of Birmingham, November 2006.
- <sup>3</sup> Committee on the Medical Effects of Air Pollutants (1998). *The Quantification of the Effects of Air Pollution on Health in the United Kingdom*. The Stationery Office (TSO), London.
- <sup>4</sup> Improved air quality can extend life expectancy. *Department for Environment, Food and Rural Affairs (Defra) News Release*, 5 April 2006.
- <sup>5</sup> National Statistics (2006). *Winter Mortality: Excess winter mortality falls*.
- <sup>6</sup> Back, E. *et al.* (2005). The impact of the 2003 heat wave on mortality and hospital admissions in England. *Health Statistics Quarterly*, **25**, 6-11.
- <sup>7</sup> Lewis, G. and Booth, M. (1994). Are cities bad for your mental health? *Psychological Medicine*, **24**(4), 913-915.

<sup>8</sup> House of Commons Select Committee on Health (2004). *Obesity*. 3<sup>rd</sup> Report, Session 2003-04. TSO, London.

<sup>9</sup> Department for Transport (2006). *Road Casualties in Great Britain in 2005*. Transport Statistics, London.

<sup>10</sup> Figure courtesy of Professor Stephen Holgate.

<sup>11</sup> Palmer, J., Boardman, B., Bottrill, C., Darby, S., Hinnells, M., Killip, G., Layberry, R. and Lovell, H. (2006). *Reducing the Environmental Impact of Housing: Final Report*. Consultancy study in support of the Royal Commission on Environmental Pollution's 26<sup>th</sup> report on the urban environment. Environmental Change Institute, University of Oxford. Available at: <http://www.rcep.org.uk>.

<sup>12</sup> Royal Commission on Environmental Pollution (2002). *Twenty-third Report. Environmental Planning*. TSO, London;  
SEC(2006)16. *Impact Assessment. Annex to the Communication from the Commission on the Thematic Strategy on the Urban Environment*. European Commission, Brussels.

<sup>13</sup> (a) Map by kind permission of Campaign to Protect Rural England, website: [www.cpre.org.uk](http://www.cpre.org.uk);

(b) AEA Technology (2006). *Local and Regional CO<sub>2</sub> Emissions Estimates for 2004 for the UK*. Defra, London. This map is reproduced from Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of HMSO © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Defra, Licence number 100018880, 2004.

## Photograph credits

Inside cover: Brindleyplace, Birmingham, kindly supplied by David Borgan; Page 1: Aerial view of Birmingham ©webbaviation.co.uk; Page 9: River restoration project Birmingham ©Environment Agency, intensive green roof in London kindly supplied by Dusty Gedge ([www.livingroofs.org](http://www.livingroofs.org)). All other photographs are owned by RCEP.

The Royal Commission on Environmental Pollution is an independent body, appointed by the Queen and funded by the Government, which publishes in-depth reports on what it identifies as the crucial environmental issues facing the UK and the world. The Royal Commission's full report on the Urban Environment is available from The Stationery Office (Cm 7009, ISBN 978 0 10 170092 4). Alternatively the full report and this summary are available on the Royal Commission's website (<http://www.rcep.org.uk>).

The Royal Commission on Environmental Pollution  
5-8 The Sanctuary  
Westminster  
London SW1P 3JS

E-mail: [enquiries@rcep.org.uk](mailto:enquiries@rcep.org.uk)

Tel: 020 7799 8970

March 2007