

A FRAMEWORK FOR CHANGE

Cleaner air for everyone

JULY 2001



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A FRAMEWORK FOR CHANGE

Cleaner air for everyone

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“Delivering cleaner air and a healthy environment more quickly are things worth working for”

MICHAEL MEACHER, 19 JANUARY 2000

1. Why a Framework for Change?

The Environment Agency's vision

In June 2000 the Agency consulted widely on its long-term objectives and goals. After taking into account the responses that we received, in January 2001 we published *An Environmental Vision: The Environment Agency's Contribution to Sustainable Development* (the *Vision*)¹.

This sets out our long term, aspirational objectives for the environment, grouped under nine environmental themes. In preparing it, we were very conscious that it would be the process by which those objectives are met - the route by which the Agency plans, in partnership with others, to make progress towards the long term destination - that would be of particular interest. This was reinforced by the comments we received during the consultation on the *Vision*.

Frameworks for Change

To show the route we propose to take, we have prepared a series of *Frameworks for Change*, one for each of the *Vision's* nine environmental themes. This document is one of these thematic *Frameworks* which are intended mainly for internal planning purposes though they are publicly available. They set out our proposals for the medium term to make progress towards the long-term objectives described in the *Vision*. These *Frameworks* - and the associated dialogue and business development that will flow from them - are not only intended to make progress towards the environmental outcomes in the *Vision*, but also to improve the Agency's service delivery to Government², industry, and the public. They are also intended to improve our own internal efficiency and effectiveness. Overall, we regard them as being beneficial to both our stakeholders, and society in general. They are frameworks with a menu of possible actions, rather than final plans, because we still have to agree the final proposals. We have to balance the competing priorities within them, take into account their specific implications for others, and match them to the resources we have available. This balancing and prioritisation has to be agreed with Government, and will be done through our corporate planning process, with our firmed-up work programmes appearing in our formal Corporate Plans. The Government's current revision of its statutory guidance in respect of our sustainable development remit will also help us clarify the routes and options available to us.

¹ The Environmental Vision, and Frameworks for Change is available on the Agency's website <http://www.environment-agency.gov.uk>

² References to Government include the UK Government and, where appropriate, the National Assembly for Wales.

We will be discussing these proposals with our stakeholders. The main vehicle for this external dialogue and discussion will be a separate series of sector based *Frameworks* starting late in 2001. These will draw from the nine themes the issues and outcomes relevant to the sector concerned.

Working with partners

We recognise that we cannot on our own deliver the outcomes and goals we have set out. We already work in close partnership with a wide range of organisations and groups, and we are keen to explore how we can strengthen existing partnerships and develop new ones. This does not just involve seeking partners for Agency led projects, but also supporting the work of others. We will need to work with a wide range of bodies with an interest in land issues, including those we regulate. Below we list areas where we will want to work in partnership with others, but have not sought fully to specify who these others might be.

2. Cleaner air for everyone

Air pollution has been a major problem, particularly in urban areas of the UK, for many centuries; "pea-souper" fogs were a frequent winter occurrence in many cities from about the middle of the 19th century. The Clean Air Acts of 1956 and 1968 largely eradicated the high levels of smoke and sulphur dioxide from domestic coal burning, and have led to a substantial improvement in air quality. In central London, levels of sulphur dioxide have reduced to less than 5 per cent of their concentrations in the mid-1930s. However, at the same time there has been an increase in other types of air pollution.

Health effects

There is now a growing understanding of the effects of air pollution, which indicate that health may be damaged at lower levels than previously thought. Air pollution episodes may lead to increases in hospital admissions for cardiovascular and respiratory disorders, while high levels of some other pollutants may cause cancer. Evidence is beginning to emerge that long-term exposure to air pollution could have more significant health effects than those associated with short-term effects.

Urban air pollution

Urban air pollution, primarily as a result of local emissions, presently exceed air quality standards set by the Expert Panel on Air Quality Standards (EPAQS) from time to time in some urban centres. The implementation of the Government's air quality strategy should ensure that national objectives for a range of pollutants are met within 5–10 years. However, continued progress is needed to deliver and sustain the anticipated improvements.

Environmental effects

Acidification as a result of sulphur and nitrogen deposition and eutrophication by nitrogen deposition are important issues and have been addressed by a series of EU Directives and successive Protocols under the 1972 UN Convention on Long Range Transboundary Air Pollution. Critical loads, which have been developed according to international guidelines, are currently exceeded in parts of England and Wales, particularly the Pennines, northern England, southern and mid Wales. Sulphur and nitrogen deposition from UK and European sources is expected to continue to decline over the next 10 years and some freshwater ecosystems are showing chemical and biological signs of recovery. However, for soils there is no unequivocal evidence

of recovery from acidification in the UK and ecosystems may need to be actively managed to promote recovery. Recovery may take many years, possibly decades, and even then ecosystems may not return to their past status.

Ground-level ozone pollution is a Europe-wide problem which affects human health and vegetation. In the UK the highest concentrations occur in rural areas and over high ground, lower concentrations are generally found in urban areas where ozone undergoes chemical reactions with oxides of nitrogen to form nitrogen dioxide. Peak levels have fallen substantially since the 1970's and emissions controls which have so far been agreed within the EU are expected to deliver further improvements over the next decade. However, there are still likely to be substantial areas where impacts on vegetation arising from ozone may occur.

Aesthetic air pollution, such as odour, noise or light pollution has not been well quantified but is detrimental to the quality of life of many people and may affect wildlife. For example, light pollution may disrupt migration and roosting behaviour in birds. Odour is a key issue affecting local communities in the vicinity of operational processes, such as landfill sites, sewage treatment works, agricultural units and industrial plant.

All these issues require further understanding of the links between emissions and effects in relation to the health of humans and the ecosystem. Other pollutants, such as heavy metals and persistent organic substances, are not known to have significant effects at current levels but require further evaluation. Although air pollution is not restricted by physical boundaries, environmental pressures do vary from region to region as well as within regions, as shown in Table 1 (page 14). In March 2000 the Agency published a report on the State of the Atmosphere and its findings are summarised in Table 2 (page 15).

3. The Environment Agency's role

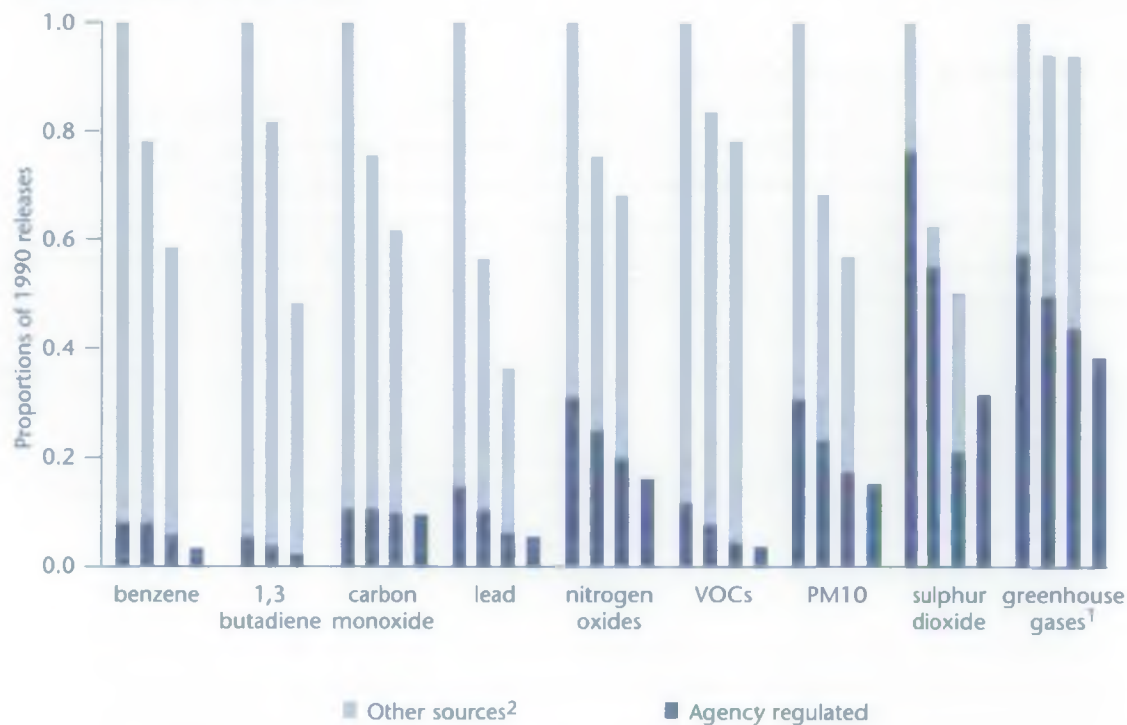
The Agency regulates releases of pollutants to air in England and Wales from over 2,000 of the larger or more complex industrial processes through Integrated Pollution Control (IPC) under the 1990 Environmental Protection Act. Also under the 1990 Act, local authorities regulate over 20,000 smaller processes. During 2000 this legislation will be superseded by the Pollution Prevention and Control Regulations which implement the EU Directive on Integrated Pollution Prevention and Control (IPPC). The Directive is similar to IPC but covers a wider range of activities and industrial processes, including landfill sites and larger sewage treatment works. IPPC will be progressively applied to existing processes, with full implementation by 31 October 2007.

Processes regulated by the Environment Agency

The contribution of Agency-regulated processes to national emissions of key pollutants is shown in Figure 1 overleaf.

It can be seen that releases from IPC processes controlled by the Agency make a significant contribution to the national emissions inventory for sulphur dioxide and greenhouse gases and, to a lesser extent, for nitrogen oxides and particulates (PM10). However, releases of all substances may be important locally in the vicinity of particular processes. Our understanding of pollutant releases has improved significantly in recent years, and the development of the Pollution Inventory has made this information readily available. However, the level of understanding of releases to air from non-IPC processes is relatively poor.

Figure 1 Contribution of Agency-regulated processes to national emissions of key pollutants in 1990, 1995, 1998 and 1999



¹Emissions expressed as carbon equivalents

²Not available for 1999

Information needs

Information on the impacts of pollutants needs to be improved. There are relatively few environmental quality standards available for releases to air and, where they do exist, the majority relate to human health. Nationally or internationally agreed criteria for impacts on ecosystems are limited to sulphur dioxide, nitrogen oxides, ozone and ammonia, which is a major constraint in assessing the risks posed by air pollution. In order to deal with this issue the Agency is working to develop a suite of environmental assessment levels for use in assessing the impact from IPPC processes.

Policy drivers

Among the key national and international drivers that will influence our actions over the period of this *Framework* are:

- **International drivers:** UNECE Protocol to abate acidification, eutrophication and ground level ozone; UNECE Persistent Organic Pollutant and Heavy Metal Protocols; the Montreal Protocol and subsequent agreements on ozone depleting substances.
- **European drivers:** European Directives on: Integrated Pollution Prevention and Control; Habitats; Birds; Sulphur content of Liquid Fuels; Solvents; Daughter Directives on air quality limit values for nitrogen dioxide, sulphur dioxide, particulate matter, lead, benzene, carbon monoxide, PAHs, arsenic, cadmium, mercury, nickel; Ozone; large combustion plant; national emissions ceilings; and waste incineration. The proposed 6th Environmental Action Programme.

- **National and Regional drivers:** Air Quality Strategy for England, Scotland, Wales and Northern Ireland.

4. Working in partnership

The Agency works closely on policy development with the Department for Environment, Food & Rural Affairs (DEFRA), the Department of Trade and Industry (DTI), the National Assembly for Wales (NAW). Our activities are framed by, and help to implement, a range of Government policies and commitments, including its Sustainable Development Strategy (and the supporting strategies and schemes of the DTI and NAW), its Urban and Rural White papers, and Modernising Government and Better Regulation policies.

The Environment Agency works with a wide variety of partners on air quality issues and to deliver improvements in air pollution:

- EU and other international organisations (for example OECD) – mainly by contributing experts to working groups.
- Central Government – by liaison on policy development and advice and guidance on regulatory issues.
- Local authorities – by working with them to identify and quantify key sources of air pollution and assist with local air quality management. The Agency is involved in over 40 regional groups related to air quality issues.
- Industry – by working with trade associations and operators to improve their environmental performance and to ensure that regulation is undertaken in a consistent, transparent and cost effective-manner. The Agency was a founder member of the Environmental Analysis Co-operative, a group made up of industry, regulators, academics, consultants and central Government which provides a forum for discussion and a collaborative approach to solving regulatory issues.
- Non-governmental organisations – the Agency works with a number of such groups, (eg the National Society for Clean Air and the Environmental Analysis Cooperative).
- Environmental organisations – the Agency collaborates with English Nature and the Countryside Council for Wales in monitoring and assessing the environmental impacts of air pollution, and works with the Forestry Commission on monitoring the impacts of air pollution on tree health.

Over the period covered by the *Framework* it is anticipated that links with local authorities and industry will be strengthened and new partnerships developed with organisations such as the Highways Agency. This will assist the Agency to take more account of the contributions and changes to air quality due, for example, to diffuse sources, industry and traffic, and to work with other organisations to address them.

5. The Environment Agency's objectives

In *An Environmental Vision, The Environment Agency's Contribution to Sustainable Development* our overall long-term objective with respect to air is that:

We will have cleaner and healthier air. The emission of chemical pollutants into the atmosphere will decline greatly and will be below the level at which they can do significant harm.

This *Framework* has strong links with the others in the series. *A greener business world* and *Wiser, sustainable use of natural resources* provide many of the mechanisms by which air quality can be improved. Air pollution can also impact on both soil and water quality issues, which are addressed in *Restored, protected land with healthier soils* and *Improved and protected inland and coastal waters*.

The Vision and long-term objectives will help achieve these outcomes:

- Clean air will be valued and demanded by society.
- Air quality standards will have been set, and met, for all significant pollutants.
- Air quality will no longer be a significant cause of adverse human health effects and damage to the urban and rural environment.
- Air pollution will no longer have a detrimental effect on plants, animals or their habitats.
- Adverse effects on the natural processes of the global atmosphere will have been greatly reduced.
- All national and international aspects of air pollution will be recognised.
- All controllable emissions to the air will be regulated on the basis of their environmental impact.

We will seek to achieve these outcomes in the most efficient and effective manner, taking into account the costs and benefits of the options available to do so.

6. Goals and actions

For each outcome we have identified below a number of goals we intend to achieve in the short to medium term in order to move towards the vision for the environment. We have also outlined the activities that will help achieve these goals, together with the tests to assess progress in their delivery. In practice, activities may contribute to the achievement of more than one goal and outcome.

Tests for progress

The Government's set of sustainable development indicators³ help show, at a high level, whether we are on a sustainable track. The Agency has also developed its own set of environmental indicators⁴ that will be used to show progress towards the Vision. In addition to these, we have included some key tests for progress for each outcome.

Role of the Environment Agency

To clarify the role of the Agency in achieving each of these goals, we have allocated the activities to one of three categories:

Environment Agency's role is central
Environment Agency as a substantial partner
Environment Agency's involvement to build understanding

³ DETR (1999) *Quality of life counts. Indicators for a strategy for sustainable development for the UK: a baseline assessment.*

⁴ Environment Agency (July 2000) *Environmental Indicators*. A set of Environmental Indicators for Agency use (also available on the Agency's website <http://www.environment-agency.gov.uk>)

The value of clean air

Outcome 1 – Clean air will be valued and demanded by society.

Tests for progress:

- The value the public and other stakeholders place on air quality.

GOAL	ACTIVITY
<p>Goal 1.1 Pressures and impacts on air quality at local and national level are better understood and communicated.</p>	<p>Short to medium term:</p> <ul style="list-style-type: none"> • Shift the balance from Agency to operator check-monitoring to facilitate more focused Agency auditing and monitoring. • Work with Government to encourage the use of an air quality index on the weather forecast. • Improve the provision of national and regional information to the public on air quality issues associated with Agency regulated processes through paper and electronic media, placing them into the context of all sources, making full use of the DEFRA/NETCEN maps and the National Air Emissions Inventory. • Work with Government to identify and develop environmental indicators for priority issues. <p>Medium term:</p> <ul style="list-style-type: none"> • Pilot making publicly available real time monitoring of emissions via means such as the internet and displays in public places. • Model the impact of all Agency regulated releases using an appropriate air quality model.
<p>Goal 1.2 Improved public understanding of the factors affecting air quality.</p>	<p>Short to medium term:</p> <ul style="list-style-type: none"> • Require operators to provide impact assessments of releases to air as part of IPPC applications. • Develop a consistent framework for inclusion of air quality information within Local Environment Agency Plans (LEAPs).
<p>Goal 1.3 A reduction in emissions to air as a result of the Agency's own activities.</p>	<p>Short to medium term:</p> <ul style="list-style-type: none"> • Develop a strategy for reduction in air pollutant emissions as part of Agency wide EMS scheme. • Including BREEAM assessments in the Agency's building acquisition policy.

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Air quality standards

Outcome 2 – Air Quality Standards will have been set and met for all relevant pollutants. Air Quality will no longer be a significant cause of adverse human health effects and damage to the urban and rural environment.

Air Quality will no longer have a detrimental effect on plants, animals or their habitats.

Tests for progress:

- Compliance with Air Quality Objectives.
- Additional health and environmental standards established.
- Urban Air Quality – measured air pollutants in urban areas in relation to standards and targets.
- DEFRA Air Quality Index.
- Area of country subject to acidification and eutrophication.
- Area of country over which critical levels for the protection of vegetation are exceeded.
- Biological monitoring of sensitive habitats.

GOAL	ACTIVITY
<p>Goal 2.1 Local air quality strategies in place covering all sources.</p>	<p>Short to medium term:</p> <ul style="list-style-type: none"> • Develop greater collaboration with central Government and devolved administrations in policy development and technical issues. • Develop links with local planners and Highways Agency to develop integrated air quality strategies. • Develop closer links with local authorities as part of next Air Quality Strategy Review. • To support Agency work on the Habitats Directive develop a biological monitoring strategy for the terrestrial environment, impacted by industrial sources. <p>Medium term:</p> <ul style="list-style-type: none"> • Through Agency authorisations reduce industry emissions in identified air quality management areas to meet National Air Quality Strategy objectives consistent with regulatory powers.
<p>Goal 2.2 Air quality standards and objectives to protect human health and the natural environment developed to cover a wider range of pollutants.</p>	<p>Short to medium term:</p> <ul style="list-style-type: none"> • In collaboration with industry, Government and other regulators develop interim environmental criteria where these do not otherwise exist. <p>Medium term:</p> <ul style="list-style-type: none"> • In collaboration with Government, develop risk-based objectives for impacts from Agency regulated processes to human health and the environment.

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Natural atmospheric processes

<p>Outcome 3 – Adverse effects on the natural processes of the global atmosphere will have been greatly reduced.</p> <p>All national and international aspects of air pollution will be recognised.</p> <p>Tests for progress:</p> <ul style="list-style-type: none"> • Emissions to air from Agency regulated processes. 	
GOAL	ACTIVITY
<p>Goal 3.1 The impact of pollutants on global atmospheric processes better understood.</p>	<p>Short to medium term:</p> <ul style="list-style-type: none"> • Work with DEFRA on their existing programme and seek greater collaboration with academic and research community to tackle outstanding issues.
<p>Goal 3.2 The importance of transboundary pollution will be recognised globally.</p>	<p>Short to medium term:</p> <ul style="list-style-type: none"> • Work with central Government on their existing programme and international organisations to identify the relative importance of transboundary contributions as emissions in western Europe decline and, potential mechanisms for future collaboration.

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Regulation of emissions

Outcome 4 – All controllable emissions to air will be regulated on the basis of their environmental impact.

Tests for progress:

- Availability of league tables at site, company and sector level.
- Introduction of benchmarking of site performance on basis of environmental impact.
- Number of odour complaints.

GOAL	ACTIVITY
<p>Goal 4.1 Controllable emissions regulated on the basis of their environmental impact and the cost of reductions.</p>	<p>Short to medium term:</p> <ul style="list-style-type: none"> • Where consistent with IPPC and other regulatory regimes, develop and consult upon pilot sectoral plans for reductions in emissions based on environmental objectives set against the cost of reductions. • Prioritise pollutants and sources for regulatory action on basis of environmental damage and costs of reduction. • Develop database of release characteristics for all Agency regulated processes. • Incorporate into licences plans for reductions in emissions based on the costs and benefits of meeting environmental objectives. <p>Medium/longer term:</p> <ul style="list-style-type: none"> • Work with Government to provide a GIS based system for Agency staff to access information on releases and ambient concentrations.
<p>Goal 4.2 League tables on emissions to air from Agency regulated processes widely available.</p>	<p>Short to medium term:</p> <ul style="list-style-type: none"> • Publication of league tables. • Review and develop emission factors for releases to air from existing and closed landfill. • Place emissions from Agency regulated processes and relevant trends into context with other sources, including traffic, working with DEFRA, and using information from the National Atmospheric Emissions inventory and other sources.
<p>Goal 4.3 Odour complaints relating to Agency regulated processes are minimised.</p>	<p>Short to medium term:</p> <ul style="list-style-type: none"> • Develop guidance on the assessment and control of odours from IPPC processes, including landfills and also from sewage treatment works and progressively incorporate conditions on the control of odours for processes under IPPC. • Require sites to record the number and nature of accurate complaints made to them by the local public.

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7. Research and development

New research and development will be required to support the delivery of the *Framework*, which will be undertaken in conjunction with others including the DEFRA and DoH. The main areas for further work are outlined below:

- Development of risk based health and environmental objectives where they do not otherwise exist.
- Development of interim environmental criteria.
- Development of biological monitoring techniques and strategy.
- Development of environmental indicators for priority issues.
- Development of landfill emission factors.
- Strategic review of air quality R&D requirements.

8. Implications for the Environment Agency

The Agency's ability to deliver these goals varies. Some are entirely within our power, while others depend on influencing the Government in its introduction of legislative changes or working with or influencing others. Successful delivery will require:

Expertise and Awareness

- Increased awareness in the Agency of the potential and implications of air quality impacts.
- Developing, with Government, greater expertise in assessing the impacts of pollutants on human health and the natural environment.
- Using the National Atmospheric Emissions Inventory for the assessment, with Government and local authorities, of source attribution at a regional and national scale, leading to:
 - Increasing awareness of the importance of releases and impacts from Agency controlled processes in relation to those from other sources.

Policies and strategies

- Development of policies on targeting regulation based on environmental objectives, set against costs to business.
- Develop and adopt integrated policy appraisal techniques, covering environmental, social and economic costs and benefits, to inform our consultative decision making processes.

Monitoring and reporting

- Reporting on releases to air from Agency controlled processes in relation to releases from other sources through the National Atmospheric Emissions Inventory.
- Increased environmental monitoring by operators.
- Working with Government in its development of:
 - a terrestrial monitoring programme.
 - improved indicators of air quality.
 - an air quality communications strategy.

Knowledge

- Inputting to Government's development of objectives and criteria for air quality impacts to human health and the environment.
- Working with Government to agree a process whereby interim health and environmental criteria can be established for a wider range of air pollutants than currently available.

- Improved Agency understanding of atmospheric processes on local and national scale, based on and consistent with DEFRA models.
- Contribution of information on Agency controlled sources to the development of databases, such as the NAEI on emissions and impacts from all sources of air pollution.
- Better information systems.

Influencing and education

- Working with Government to raise public awareness of air quality issues.
- Working with other regulators such as local authorities, and organisations such as the Highways Agency, to achieve cost effective reductions in all sources of air pollution.
- Helping to improve public awareness of the impact of Agency controlled processes in relation to releases from other sources.

New and Revised Regulations

- Working with Government to develop measures to reduce air pollution.
- Working with other international and European institutions to develop air pollution control measures.

The Planning System

- Working with Government on revised planning guidance.
- Working with strategic and local planning authorities to achieve sustainable local air quality.

TABLE 1: Regional variation in pressures and the state of the atmosphere¹

Environmental quality measure	Anglian East	Midland West	North	North West	Southern	South	Thames	Wales
Urban air pollution*	L	M	M	M	L	L	H	H
Air quality (nitrogen oxides)	M	M	M	H	M	L	H	L
Regional air quality (sulphur dioxide)	L	M	M	H	M	L	H	M
Emissions from transport	M	H	M	M	L	L	H	L
Emissions of CO ₂ from Part A processes	M	H	H	M	M	L	L	M
Nitrogen deposition (critical load exceedance for natural vegetation)	M	L	M	M	M	H	L	H
Soils (exceedance of acidity critical loads)	M	L	M	H	L	M	L	H
Ground-level ozone	M	M	L	L	H	H	M	M
Aesthetic quality	M	M	M	M	H	L	H	L

KEY

This has been based on selecting the two Regions with the greatest breaches of standards, poorest quality or highest loadings and ranking these as H – highly impacted; the two Regions with the best quality or lowest loadings are ranked as L – least impacted. The other Regions are ranked M – moderate (where the impacts are about equal, more than two Regions may be designated H or L).

* Applicable to specific urban areas.

Source: Environment Agency (2000) *Environment 2000 and Beyond*.

TABLE 2: Summary of the state of the atmosphere and key impacts

Viewpoint	State and trends
<p>Compliance with standards, targets and classification schemes</p>	<p>Urban air quality: In 1999 the main causes of short-term urban air pollution, which occurred on one day in 12 on average, were particles (PM10) and ozone. About half the urban sites also exceeded the annual objective for nitrogen dioxide. There have been declines in concentrations of sulphur dioxide since the 1960s, of carbon monoxide since 1990, particles since 1993 and nitrogen dioxide since 1995, but no clear trend in ozone. Improvements are projected to continue but particles and ozone may still exceed health standards in some areas in 2010.</p> <p>Rural air quality: In rural areas ozone exceeded the health standard on an average of about one day in 8 in 1999, and critical levels of ozone for crops and natural vegetation are widely exceeded. Exceedances of critical levels for sulphur dioxide and nitrogen oxides should be eliminated in the next few years.</p> <p>Persistent organic pollutants: Levels of dioxins and PCBs in air and deposition have fallen since the early 1970s and human intake in food is generally within present recommended limits. PAH concentrations in air have also fallen but concentrations in urban areas in 1997 were two or three times the health-based standard, although values were generally below the standard at rural sites. The soil burden of persistent organic pollutants will decline only gradually and their health effects are not well understood.</p> <p>Metals: Deposition of heavy metals is greater near industrial and urban areas and in regions of high rainfall. The effects on crops, ecosystems and humans are poorly understood.</p> <p>Airborne radioactivity: Concentrations in air and deposition are very low. The average human dose from artificial sources, excluding medical procedures, is less than one per cent of the total, and human exposure near nuclear sites is well within recommended limits. Restrictions on sheep contaminated by the 1986 Chernobyl accident were still in place on 389 farm holdings in 1998. Levels of natural radon are above the advice threshold in some 110,000 homes in England and Wales.</p> <p>Sulphur and nitrogen deposition: Sulphur and nitrogen deposition exceeds critical loads of acidity over a significant area of the UK. International agreements are likely to lead to significant reductions in emissions of sulphur and nitrogen by 2010, however, critical loads in parts of Wales, Cumbria and the Pennines will still be exceeded. Nutrient nitrogen exceeds critical loads in many regions. The input of nitrogen into the atmosphere may be significant for remote marine areas, increasing the risk of eutrophication.</p>
<p>Human and environmental health</p>	<p>Human health: Air pollution can lead to serious short and long-term effects, particularly for sensitive groups. Particles, sulphur dioxide and ozone may bring forward 12,000 to 24,000 deaths and 15,000 to 24,000 hospital admissions annually. Personal exposure and the effects of pollution relative to other factors are not well quantified.</p> <p>Health of the environment: The effects of air pollution are difficult to separate from those of other pressures. For example, the UK forest survey of changes in crown condition shows variations related to the effects of insects, fungi, storms, frost and drought, while air pollution is thought to have a comparatively minor influence. For other species and habitats, land management is another major influence on ecosystems that interacts with air pollution.</p>

TABLE 2: Summary of the state of the atmosphere and key impacts *continued*

Aesthetic quality	<p>Odours: Industrial odours gave rise to over 15,000 complaints to local authorities in England and Wales in 1996/97, an improvement on previous years.</p> <p>Soiling: Particles from stack emissions, site activity, mineral workings and traffic soil local property, although they are being reduced.</p> <p>Visible air pollution: Visible stack plumes often lead to complaints. Long-range visibility has improved since the 1960s as fine particles and sulphate aerosols have been reduced.</p> <p>Light pollution: Intrusive light from roads and buildings spoils the night sky and potentially affects moths, birds and other species.</p> <p>Noise pollution: In 1991 road traffic was heard inside the home by 47 per cent of those surveyed in England and Wales, of whom almost 70 per cent objected to it. Only 56 per cent of England is now classed as tranquil, compared with 71 per cent in the 1960s.</p>
Land use and resources	<p>Stratospheric ozone: Total halogen loading peaked in the 1990s and should decline steadily. The ozone column has declined slightly across the UK over the past 20 years although there is no clear trend in UVB. There are potential risks but little evidence of increased human skin cancers, ecological effects and changes to atmospheric chemistry. The ozone layer is projected to recover substantially by 2050 although uncertainties remain.</p> <p>The effects of air pollution on materials: Ground-level ozone damage to rubber products costs £35 million–£189 million/year in the UK.</p> <p>Acidic air pollutants erode limestone and sandstone building materials; the damage from sulphur dioxide, excluding historic buildings, is around £800 million/year, projected to decline to £450 million/year over the next five years, although the rate of erosion is declining more slowly than pollutant concentrations.</p> <p>Particle pollution from coal and diesel soils buildings, although this has reduced over the past 30 years.</p>
Key biological populations	<p>Toxic effects of air quality: There are few examples of population responses to poor air quality. Sulphur dioxide eradicated sensitive lichens in much of England from the mid-19th century onwards, although some species have started to recolonise.</p> <p>Acidification and nitrogen deposition impacts: Acidification led to declines of mosses, liverworts and lichens and also freshwater species including salmon, trout, invertebrates and dippers. High nitrogen deposition causes eutrophication, which has probably damaged mosses in the southern Pennines and may lead to the replacement of heather by grassland. As deposition reduces, affected ecosystems may recover only slowly and may not return to their former state.</p>

Source: Environment Agency 2000, *The State of the Environment of England and Wales: The Atmosphere*.



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Fax: 01903 821 832

MIDLANDS

Sapphire East
550 Streetsbrook Road
Solihull B91 1QT
Tel: 0121 711 2324
Fax: 0121 711 5824

SOUTH WEST

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Kestrel Way
Exeter EX2 7LQ
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NORTH EAST

Rivers House
21 Park Square South
Leeds LS1 2QG
Tel: 0113 244 0191
Fax: 0113 246 1889

THAMES

Kings Meadow House
Kings Meadow Road
Reading RG1 8DQ
Tel: 0118 953 5000
Fax: 0118 950 0388

NORTH WEST

Richard Fairclough House
Knutsford Road
Warrington WA4 1HG
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WALES

Rivers House/Plas-yr-Afon
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ENVIRONMENT AGENCY
GENERAL ENQUIRY LINE

0845 933 3111

ENVIRONMENT AGENCY
FLOODLINE

0845 988 1188

ENVIRONMENT AGENCY
EMERGENCY HOTLINE

0800 80 70 60



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