Strategy for a healthy environment

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In *The Health of the Nation* diabetes and heart disease get six pages, prevention of accidents four, and the environment two.¹ This is not so bad. Other important health issues have, as this series has shown, been omitted from the document altogether. But the number of pages devoted to the environment, and its relegation to the back of the book, suggest either that the government does not perceive it to be a major influence on the nation's health or that it is not an area that lends itself to the setting of targets.

For some aspects of the environment these conclusions might be justified. It is, for example, difficult to establish that the failure of our drinking water to conform to European Community standards constitutes a real threat to health.² There are, however, other aspects of the environment—urban air pollution is one—where evidence of real harm does exist,³ where large numbers of people are affected, where there is great potential for the situation to worsen, and where effective targets can be set.

Case for air pollution as a key area

The largely invisible cocktail of pollutants produced by road traffic and industry includes substances known to be harmful to man.⁴ Nitrogen dioxide and sulphur dioxide are respiratory irritants. They are the major constituents of acid rain and exacerbate asthma and chronic lung disease.⁵ Airborne particulates, emitted mainly from diesel vehicles and visible in the air as black smoke, are inhaled into the lungs and carry with them acidic gases and volatile organic compounds like benzene, which is a known carcinogen. There is continuing debate about the role of diesel exhaust and benzene in the aetiology of non-occupational lung cancer.^{6,7} Carbon monoxide reduces the oxygen carrying capacity of blood by forming carboxyhaemoglobin. It exacerbates ischaemic heart disease and can precipitate cardiac arrhythmias.⁸ Ozone, produced by the effect of sunlight on traffic fumes, causes impaired lung function and, with long term exposure, may cause structural damage to the lungs (Sherwin RP, Richyrs V, meeting of the Air and Waste Management Association, Los Angeles, March 1990). There is also some evidence that urban air pollution is responsible for an increase in the prevalence and severity of asthma.⁹

Whether and to what extent these pollutants damage health remains controversial. But the factors responsible for air pollution are increasing. Department of Transport figures predict that the number of cars will double from 23 million to 56 million by 2025, and the growth of the world's population will present ever growing demands on industry and energy production. Unless action is taken air pollution and its effects on health will also increase.

Case against

It could be argued that enormous improvements have already been made in the quality of urban air since the London fog of 1952 in which 4000 people died. And not everyone agrees that modern air pollution is harmful. Laboratory studies on individual pollutants cannot accurately reflect the real situation of a cocktail of pollutants interacting with one another, and

Government's suggested targets for air pollution

Emissions of nitrogen oxides contribute to acid rain and to photochemical oxidants. The principal sources are large combustion plants such as power stations and vehicles. Action is in hand to reduce emissions from both these sources.

Under certain weather conditions the WHO guideline for peak ozone concentration in air is occasionally exceeded in parts of southern England. Solving this problem will require national and international action to reduce emissions of nitrogen oxides and of volatile organic compounds, which are the precursors of ozone.

- On a 1980 baseline, reduce emissions of nitrogen oxides from existing large combustion plants by 30% by 1998
- Reduce concentrations of nitrogen oxides in urban air on a 1990 baseline by at least 50% by 2000
- By 2000 effective national and supranational controls should be in place to ensure that air quality meets the WHO guideline for peak ozone concentration

population studies are bedevilled by the difficulty of finding unaffected control groups. Cleaning up industry and developing cleaner technology is also likely to be costly, at least in the short term. Other cheaper and more certain routes to a healthy population may seem more attractive priorities.

The targets

The government's targets for reducing air pollution are based on European Community directives (box). These are negotiated for each country and Britain has managed, by a process of stalling and special pleading, to commit itself to less stringent reductions than other European countries with comparable economies. Germany, Denmark, Italy, and France, for example, are committed to a 40% reduction in the production of nitrogen oxides from existing large combustion plants by 1998. Britain's target is 30%. Britain also negotiated a smaller reduction in production of sulphur dioxide than other European Community countries on the grounds that its coal contains high levels of sulphur. But Britain now imports much of its coal from abroad. What is achievable by comparable economies in Europe and North America should be achievable in Britain. The government should commit itself to a 40% reduction in production of nitrogen oxides from large combustion plants by 1998 and a 70% reduction in production of sulphur dioxide by 2003.

AIR QUALITY

Such broad percentage reductions bear little relation to the protection of health at a local level. For this the government should turn to the World Health Organisation's guidelines on air quality. Formulated in 1987 at a meeting of 130 experts from Europe and North America, these give the safe maximum one hour, eight hour, daily, or annual concentrations

for various pollutants based on available scientific evidence.¹⁰ They are the best estimates we have of what is necessary to prevent damage to health. WHO guidelines on safe peak concentrations of all the main air pollutants are regularly exceeded in Britain (table).¹¹

World Health Organisation's air quality guidelines and when exceeded in Britain according to Warren Springs Laboratory, the government's monitoring agency

	WHO air quality guideline	When exceeded
Nitrogen dioxide: 1 h mean 24 h mean	400 µg/m ³ 150 µg/m ³	Likely to be exceeded at busy roadsides
Ozone: 1 h mean 8 h mean	150-200 µg/m ³ 100-120 µg/m ³	Exceeded several times during hot summer of 1989; a site in Devon reached 270 µg/m ³
Sulphur dioxide: 10 min mean 1 h mean	500 µg/m ³ 350 µg/m ³	1 h mean regularly exceeded in London and probably throughout Britain
Airborne particulates: 24 h mean (in presence of ≥125 µg/m ³ sulphur dioxide)	125 µg/m ³ black smoke or 120 µg/m ³ total suspended particulates	Exceeded in 34 sites in 1985-6, mainly due to domestic burning of coal
Carbon monoxide: (To prevent carboxyhaemoglobin concentrations >2.5-3.0% in non-smokers) Up to 15 min 30 min	100 µg/m ³ 60 µg/m ³	At 1 site in London exceeded on 24 days during winter of 1988. Highest reading almost double the guideline concentration
Benzene	Because benzene is a known carcinogen WHO is unable to recommend a safe level	

Japan, Switzerland, the Netherlands, and the United States all have mandatory air quality standards which are in some cases more stringent than the WHO guidelines. By contrast, the European Community directives are less stringent and do not include any legislation on peak ozone or carbon monoxide concentration. The government's target of adopting the WHO guidelines on peak ozone concentration by 2000 is a step in the right direction. By the same year it should also adopt the WHO guidelines for nitrogen dioxide, sulphur dioxide, carbon monoxide, and airborne particulates.

The green paper does not mention the main greenhouse gas carbon dioxide. The government is already committed to stabilising emissions at 1990 levels by 2005. This target has been described as "feeble" by the environmental group Friends of the Earth. Targets elsewhere in Europe are more ambitious. Germany, for example, plans to cut emissions of carbon dioxide by up to 30% over the same period. The second world climate conference in Geneva last year concluded that cuts of 20% were both technically feasible and cost effective for industrialised countries. The British government should commit itself to a 20% reduction in emissions of carbon dioxide by 2005.

Achieving the targets

The way in which governments choose to tackle environmental pollution depends greatly on the prevailing political ethos. In America there is new interest in the idea of harnessing economic forces to the environmental bandwagon. There is talk of taxation systems that would direct the social and environmental costs of a product back to the producer and pollution tokens that could be traded like stock dividends. Speaking to commercialists in their own language might quickly bring them to a more healthy respect for their environment.

But wedded as it is to Europe, Britain is more likely

to take as its model Brussels, with its love of legislative limits, than America, with its unrestrained market forces. In this case the government will need a coherent plan of action incorporating both national and local regulation. Industry and transport should be given separate quotas for pollutants, and targets should be challenging but potentially achievable. If, like much of current European Community and British legislation on air pollution, they are based on what can be achieved with current technology rather than on what is considered necessary to prevent damage to health, they will simply encourage complacency. Legislation should be used to force the pace of industry. The government should set the limits and then determine policy, not the other way round.

TARGETS FOR INDUSTRY

Existing power stations should be fitted with pollution control devices to reduce sulphur dioxide emissions. Tough controls are needed to reduce solvent emissions from paint and print manufacturers. This is an expanding industry and is an important source of volatile organic compounds, which interact with nitrogen dioxide to produce ozone. Companies which introduce cleaner and energy efficient technology should receive financial rewards and those that continue to pollute the atmosphere should be penalised. Britain needs an environmental agency with real power to take action. The United States Environmental Protection Agency, for example, can ban all new development in an area that fails to meet the air quality standards, and in the Netherlands companies can be forced to cut production if pollution exceeds acceptable levels.

ROAD TRANSPORT

The area with most scope for reducing air pollution is road transport. It is responsible for the emission of a fifth of carbon dioxide in air, a third of airborne particulates and volatile organic compounds, half of nitrogen oxides, and almost all the carbon monoxide. Catalytic converters will greatly reduce the emission from petrol engines of nitrogen and sulphur dioxides, and filters fitted to diesel engines will reduce particulate and gaseous emissions. Britain has committed itself to existing European Community legislation enforcing the fitting of catalytic converters to all new cars by January 1993 as well as tighter standards on particulate and gaseous emissions for all new trucks and buses by 1996. Similar controls for trucks and buses will be in force two years earlier in the United States, and since European manufacturers are already gearing themselves up for this in order not to lose the American market the European standard could be brought forward to 1994. Friends of the Earth are now campaigning for filters to be fitted to all existing trucks and buses.

Improvements in car design, and the shift from petrol to diesel engines, which emit fewer volatile organic compounds and less carbon monoxide, will reduce air pollution, as will the development of lower sulphur fuels. The amount of benzene and other volatile hydrocarbons escaping into the air will be reduced by the introduction of carbon canisters to absorb fuel vapour at petrol stations.

But technological fixes have their limits. Introducing catalytic converters will result in an initial downturn in emissions of oxides of nitrogen, but the growth in the volume of traffic will soon overcome this. Emissions of exhaust fumes will be on the increase again by the beginning of the next century.¹² For the same reason, carbon dioxide emissions will nearly double by 2020 despite stabilisation of industrial and domestic emissions. Long term reductions in air pollution will be achieved only if traffic is restrained.

The Public Health Alliance has produced a detailed

examination of transport policies that would promote health and reduce the burden of road traffic.¹³ These include improved public transport systems and town planning; a shift away from factors that encourage people to buy and use cars such as out of town shopping and recreation facilities; changes in the tax system, which currently favours car users; and the transfer of freight from road to rail. Such measures would also reduce road accident deaths and noise pollution and create a more humane urban environment.

Problems

There are obvious obstacles and disincentives to achieving these targets. Traffic restraint will be politically unpopular. The private car symbolises personal freedom and social status, and despite evidence that it has a negative influence on the quality of community life it is often used as a measure of standard of living. Powerful lobbies for the motor industry make sure that these images are maintained.

The improvements in terms of individual health are likely to be small and difficult to measure, especially when dealing with such multifactorial conditions as asthma, chronic bronchitis, and ischaemic heart disease. This absence of neatly quantifiable cause and effect could prove an additional disincentive. Progress will have to be monitored in terms of concentrations of the pollutants in the environment.

Whether or not the economic cost is an obstacle depends on the political will of the government and therefore to some extent on the priorities of the electorate. But because reducing air pollution goes hand in hand with efficient use of energy, in the long term there will be benefits for the economy as well as the nation's health.

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Housing

Stella Lowry

Florence Nightingale understood that "the connection between health and the dwellings of the population is one of the most important that exists," and recent reviews have emphasised that poor housing is still a major threat to public health.¹ No attempt to improve the health of the nation should ignore the benefits of tackling some of our housing problems, but the temptations to do so are great. Although the government acknowledges the importance of housing in its green paper, it fails to set any definite targets (box).²

Housing affects health, but in ways that are hard to untangle. The effects of housing may be compounded by those of poverty, age, pre-existing illness, and

personal behaviour. Children living in a damp home may have respiratory problems, but if their parents smoke it is fair to blame the housing conditions for the illness? Living in a high rise block may be unhealthy for a single mother of three but ideal for a young working couple with no dependents. An old person living in cold conditions is at increased risk of illness, but this may be the result of unwillingness to turn on a heater, inability to remember how to do it, insufficient money to pay the fuel bills, or a host of other factors rather than a specific defect in the housing.

Studies of housing and health can rarely show a cause and effect relation. Evidence accumulates slowly and usually applies to populations rather than individuals. It is seldom possible to alter a variable and assess the response. But enough is known about the main associations between housing conditions and health to enable some specific targets to be set. These are best phrased in terms of housing targets rather than health targets, and their effects should be monitored in the same way. Many will not show obvious health effects for years, and if they are introduced on too small a scale their potential benefits for improving the health of the population may be missed.

Temperature and humidity

Some of the strongest evidence for effects of housing conditions on health concerns the effects of cold damp homes.^{3,4} The strength of the evidence has been recognised in court rulings.⁵ Yet no specific standards for temperature or indoor humidity are included in the building regulations.

Ideally all homes should be capable of being heated to 21 °C, the winter room temperature recommended by the British Geriatrics Society. The people who are most vulnerable to the effects of cold and damp often

Green paper focus on housing conditions and homelessness

The overall objective of the government's housing policy is to ensure that decent housing is within reach of all families. Housing policy and programmes continue to give priority to renovation of the housing stock and to securing housing for those who could not otherwise afford decent housing.

Tackling homelessness is a particular priority, not least because of the damage it can cause to people's physical and mental health and wellbeing. Two categories are of particular concern: firstly, single people sleeping rough in the streets (3000-5000), particularly in London, and, secondly, families (11 000) living in bed and breakfast accommodation. Special measures have been introduced to help those sleeping rough in London and to reduce the need for local authorities to use bed and breakfast accommodation; over two years these are expected to provide 16 000 additional family lettings and over 3000 extra places in permanent housing and hostels.