Towards local air quality management in the United Kingdom
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ABSTRACT

This paper reviews the current policy making framework for the management of air quality in the UK. The various drawbacks associated with this is then discussed with a view to how it could be improved through better integration and an enhanced role for actors and agencies at the local scale. It is proposed that local air quality management may provide a more effective mechanism to identify and prioritise problems and to formulate successful policy responses.

INTRODUCTION

Urban air quality has been an important consideration in the lives of British city dwellers for hundreds of years [1]. This has been characterised by the changing influence of different pollutants and their sources in response to particular economic and technical situations. Air quality issues and associated responses can, therefore be viewed as sequential stages of an ongoing problem. The first stage involved smoke and sulphur dioxide from fossil fuel combustion in the late nineteenth and early twentieth centuries [2]. Later concerns were associated with lead pollution from petrol engined vehicles and more contemporary issues focus on NO\textsubscript{x}, VOCs, CO and O\textsubscript{3} derived from transportation and industrial sources. A framework for tackling the issues of air quality has developed in line with these problems and are largely specific to them. This framework operates largely on a national basis through the activities of government departments and their agencies. The contemporary situation requires a new response and due to the diverse nature of modern pollutants and their sources this should be at a local and regional as well as national scale.

Local initiatives to combat air quality problems are not entirely new and it is at this level that air quality problems were first identified. Local attempts at reducing emissions and the creation of ‘smokeless zones’ had been implemented, with mixed success, well before national legislation was introduced [3]. These developments were instrumental in the creation of national legislation and it is important that valuable input at the local scale can be preserved. Effective air quality control should, therefore, include actors at the local scale to deal with the particular problems of a
specific area. Air quality management plans developed at this level can provide a better response to the need for emission quantification and control, monitoring requirements and land use conflicts. National legislation and agencies by their nature, provide a centralised approach to air quality management and policy making tends to be split between government departments. Regional and local policy making would be able to provide an integrated approach which could more effectively address locally identified priorities. A model to follow in this regard may be the State Implementation Plan (SIP) process of the United States [4]. An additional benefit of a local approach could be more effective public information dissemination.

THE CURRENT CONTROL FRAMEWORK AND ITS DRAWBACKS

A variety of national and European legislation exists to control emissions from point, areas and mobile sources. Of the more recent UK legislation, the most significant is the Environmental Protection Act (1990). Legislation is enforced through a framework which involves a wide range of participants at a number of spatial scales, from central through to local government (see Figure 1). In the United Kingdom, central government is the most important actor in air quality management. It discharges its functions through a number of Departments including the Department of the Environment (DoE) and the Department of Transport (DoT). Her Majesty’s Inspectorate of Pollution (HMIP) enforce national control on complex industrial processes whilst less technically complex processes are the responsibility of local authorities, usually through the Environmental Health Department. Air quality monitoring programs are coordinated by the DoE, the results from which may be used to check compliance with policy goals. However, other governmental policies may conflict with air quality goals, particularly in regard to transportation. The inability to resolve these policy dilemmas is, in part, the cause of our contemporary air quality problems.

WHY LOCAL AIR QUALITY MANAGEMENT?

There are various functions of local government which can assist in resolving this national policy dilemma. Local authorities already have certain air pollution control functions and undertake some monitoring programs, not all of which are nationally co-ordinated [5]. Additional input to an air quality management structure at a local level could be provided through Planning, Environmental Health, Engineering and Economic Development Departments. There already exists a number of air quality initiatives at the local scale which could, with better co-ordination and control, provide a local air quality management system analogous to the SIP system [5, 6, 7]. Initiatives such as these have the advantage of being sensitive to local conditions and information requirements in contrast to the priorities of national government. External agencies must be involved within a co-operative framework as the local authority has very few powers at its disposal to enforce change. They may monitor compliance with national air quality standards and discharge some limited emission control functions but direct control of most polluting activities, especially transport, resides with other agencies. Hence, a local approach must be predicated upon recognition of a long time scale for successful implementation and a co-operative approach to goal setting.

The relationship between local scale and national scale initiatives is, however,
Figure 1: Actors and Agencies Involved in Air Quality Management in the UK.
weak at present and there is little opportunity for liaison between the different groups. There is a clear need to provide a better integrated system which can utilise funds and skills at each scale in order to provide a better understanding and documentation of air quality both throughout Britain and in individual areas [8]. This has also been the subject of a DoE Consultation Paper which examines possible initiatives to bring about better co-ordination and the improvement of air quality through planning and management [9]. Some form of liaison and consultation, ideally involving common goal setting and joint working is needed to bring all these actors and agencies into a coherent structure with which to challenge air quality issues.

THE VALUE OF AN INTEGRATED APPROACH TO AIR QUALITY MANAGEMENT

Air Quality Management Plans (AQMP) can be defined as 'the application of a systematic approach to the control of air quality problems' [10] and this represents one mechanism whereby integration could be achieved. The use of AQMPs can provide a workable framework to control air quality. As with any policy plan involving multiple agencies and actors, they require clear goals, a common working format, adequate resources and a shared vision. The plan needs to be flexible to allow modifications for new knowledge about emissions or concentrations yet provide a suitable framework within which all groups can co-exist. Such plans require the involvement of actors at a number of scales including those at the local level. A schematic representation of the functions and processes involved in a theoretical AQMP is shown in Fig. 2. These plans should enable local decision makers to choose the combination of measures appropriate to local circumstances. This would enable a socially desirable level of air quality to be achieved which would be within the requirements of regional, national and international regulations. An AQMP at the local scale would thus ideally be a tier of a regional plan which is in turn part of a national plan.

Air quality management plan can be tailored to the requirements of a local area. Within the framework already suggested (Fig. 2), the following elements can be included; emissions, modelling and monitoring. In addition, an AQMP provides opportunities for setting local air quality standards or guidelines, new possibilities for public information and education and new mechanisms for the integration of a wide range of local authority and national policies. An essential component of an AQMP is the set of procedures for dealing with the occasional occurrence of very poor air quality. The operation of a successful AQMP system requires a set of mutually agreed goals and a shared vision amongst the various actors and agencies involved.

The plan would firstly need to consider the range of sources at the local, regional and national scale which contribute to local air quality. Emission inventories involve providing a descriptive and detailed assessment of industrial, transportation and domestic related sources and the species emitted as the result of these activities. A quantification of emissions can then be made to assess the relative contribution of sources. The use of existing local data sets as well as the development of new ones along with appropriate emission factors can provide a very good indication of the level of emissions and their spatial distribution. A more detailed national emission database could be built from such local scale studies to improve the overall accuracy of estimates. Such an approach would also highlight the inherent differences in emission
The availability of good quality spatially and temporally resolved emissions data is one pre-condition for a series of modelling exercises to predict both current and future air quality. The current levels of air pollutants predicted in a model can then be tested against monitored data. Ensuring the validity of modelled concentrations is crucial before a model can be used to simulate future changes in response to changes in emissions, themselves responding to a combination of direct source control and a range of anticipatory pollution prevention measures. Implementing an air quality model has relatively high capital costs and would require regular updating. Despite this, it is still a valuable tool for air quality management. Monitoring of pollutant concentrations is also an important component of any plan, both in its role for assessing the validity of modelling and for determining trends in air quality. Actors should agree on the range of species to be incorporated, sampling techniques and period, quality assurance and quality control procedures and siting priority. In this way local monitoring networks can be tailored to specific local requirements as well as the requirements of national and regional networks.

Minimum standards would be set by the EU and central government but the local decision-maker may select alternative standards to work towards. The legislative procedure is dynamic and standards are subject to regular re-evaluation in the light of new research both for traditionally recognised pollutant species and also for previously unregulated species. In view of the relatively lengthy timescale over which AQMPs are implemented, local decision-makers would be advised therefore to set standards that are at the leading edge of wider scale policy recommendations for air quality standards and to make provisions for their revision as the plan progresses.

Other important aspects of an air quality plan are concerned with how this information is to be used. Information from emission estimation, modelling and monitoring is not only important in the future development of AQMPs, but also to the public at large. The public is very important as the management activities of the plan can impact upon the public by changing their activities and expectations. Consequently the public must be involved in goal setting and informed in accessible ways of the development of the plan and its success at improving air quality. Information on air quality should be readily available in both a general way and in relation to specific requirements such as during periods of poor air quality. This highlights a number of issues regarding what the information would consist of and how it would be disseminated. In regard to general air quality information it is necessary to assess what the public want and expect and in what form this should take. Information dissemination could be undertaken through various forms of media, information centres, libraries and schools as part of more general educational measures.

The AQMP is primarily concerned with the long-term control and management of air quality. The exception is the set of procedures designed to deal with a short term episodic air pollution incidents. These are dealt with through a series of actions known as an air quality alert. These procedures would be introduced as an incremental response to an air quality problem. The response of the designated air quality manager to an episode of very poor air quality will be to attempt to stop the forecast actualising by modifying emission of air pollutants both within the local area and over a wider
scale through co-operation with other air quality managers. This could be done by modifying traffic flow, for example through co-operation with bus companies to enhance bus service availability or with the railways to timetable extra train services so encouraging the public to reduce private vehicle use. Should this fail then the air quality manager will attempt to minimise the peak concentrations and the duration of averse air quality by progressively more stringent restrictions on behaviour within the area. The range and scope of restrictions available to the manager will have been agreed between the local authority as the planning agent and the participating agencies responsible for the development of the plan. The air quality manager will, if concentrations increase to pre-determined levels, activate a series of health warnings to the public advising sensitive individuals of actions to take to minimise their personal risk.

Ultimately the air quality management plan will result in effective action being taken to control ambient levels of harmful pollutants in urban air. This will be achieved through the integration of emission controls, legislation and planning policy [12]. The local identification of planning needs and the powers to take action to control them is an integral part of successful management. At present the influence of national transport policy could be regarded as having a negative impact on local transport issues as national policy tends to emphasise the use of the car over public transport. The bias toward investment in road transport is also in conflict with the need to reduce transportation sources. Another indication of conflicting transport policy is bus deregulation where power has been taken away from local authorities with little regard for the needs of urban transport networks. Effective local transport provision is required before action to restrain private vehicle use can be successfully introduced as part of an integrated transport policy.

It is essential that national, regional and local planning policy can be integrated if this is to form an effective control measure. The role of local authorities in such planning policy will allow such policies to deal with particular air quality issues prevalent at that level. In urban areas and particularly metropolitan areas, the process of formulating a Unitary Development Plan (UDP) could provide an ideal mechanism for the long-term integration of air quality planning needs. A UDP could incorporate highway, car parking, transport, industrial development and shopping policies within the AQMP framework. Other local measures could include the promotion of energy efficiency within buildings, initially council controlled properties and eventually in a wider context. An expansion of the size and extent of urban green space and tree planting could have a dual effect to act as a filter to pollutants and also as a contribution to the more basic improvement of the urban environment.

There may, however, be a number of problems associated with the further empowerment of local actors. Perhaps one of the most important is the potential abuse of air quality responsibilities in favour of other political issues especially in regard to economic development and the creation of industrial wealth and new employment opportunities. There is a danger that air quality improvement will be sacrificed in favour of attracting industries which have polluting capabilities. If local authorities are given the power to create local laws for environmental protection, they could equally use this to create lax laws, even if underpinned by national standards, which favour development without appropriate environmental control. There are also concerns about
the influence of administrative boundaries and the competition this may foster between neighbouring authorities. This could be somewhat counter-balanced by the advisory role played by regional bodies such as MAPAC to protect and encourage co-operation. This may have the advantage of acting as a central forum for the discussion of different control strategies in the light of the contrasting approaches and subsequent experiences between regions. Despite these other political pressures, it is likely that local government would provide a better response to these air quality issues.

PERFORMANCE INDICATORS FOR AN AQMP

The success of a plan will be judged according to its success in reducing emissions of a range of air pollutants against specified local targets over an agreed timescale. This method of emission control based on performance indications, rightly assumes that the plan can have a less direct influence upon atmospheric concentrations than upon emissions. However, outright change in emissions, for example per year, is relatively crude as it makes no allowance for other changes which may not be occurring as a consequence of the plan itself. Consequently, it is recommended that a variety of local indicators are used with which to express emissions on an annual basis, for example population size, area of the local authority, length of motorway or trunk roads, car registrations, number of dwellings, employment characteristics or area of greenspace.

SUMMARY AND CONCLUSION

It is proposed that effective air quality management will best be achieved through an enhanced role for local decision-makers. There are a number of concerns associated with further empowerment at the local scale principally involving its potential abuse in favour of pursuing other political goals. However, it is suggested that a solution to this may be found through effective minimum regulatory standards being set at the national level. The benefits of enhancing the involvement of local government and other local agencies in air quality control will mitigate these concerns. Such benefits may include better emission estimates concerning those pollutants of most concern in a particular area, better monitoring networks and more effective public information mechanisms. Perhaps more importantly, local actors can provide a better basis for planning successful direct and preventative control measures as the ultimate ambition of air quality management at all scales.

REFERENCES


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**Figure 2: A Schematic Representation of the Functions and Processes Involved in a Theoretical AQMP.**