Integrating Different Forms of Knowledge in Local Policy-Making: The Case of Local Air Quality Management in Southampton

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Introduction

This article examines how the English city of Southampton has implemented the 1996 EU Ambient Air Quality Framework Directive (Council of the EU, 1996). The directive requires EU Member States to designate at the appropriate levels the competent authorities and bodies responsible for implementation of the directive, including periodic assessment of ambient air quality and development of action plans. In the UK, local authorities are responsible for periodically reviewing and assessing local air quality and developing action plans to reduce certain pollutants (benzene, 1,3-butadiene, carbon monoxide, lead, nitrogen dioxide, Particulate Matter 10, sulphur dioxide) to acceptable levels when their concentration in outside air has exceeded levels set by the EU and national legislation. In particular, the research aimed at examining how the local governance regime and institutional setting in the case study filtered different types of knowledge throughout the policy process and helped or limited policy learning and sustainability. The case study is part of a larger EU funded project "Governance for Sustainability" (G-FORS) which examines the role of different types of knowledge in local environment policies, in particular comparing how different governance modes (hierarchy, network, market) and institutional settings across Europe filter knowledge in local decision-making and impede the achievement of reflectivity and learning. As we will see, our case study reflected a very hierarchical setting of public policy which has regulated policy processes and outcomes. Air quality management was chosen as an area requiring sophisticated air quality data and modelling to develop local action. In this article, we are particularly interested in the link between the strategy aimed at linking local air quality management (LAQM) to local transport plan in Southampton. Within that context, we will first summarise the theoretical approach, outlining the concepts of governance and knowledge identified. Secondly, we will expose the key characteristics of the case study, describing the main forms of knowledge and governance arrangement identified in LAQM. Finally, we will present some key findings in terms of knowledge, governance and the relationship between the two, in particular its impact on policy sustainability.

Theoretical Approach and Methodology: Knowledge and Governance

Introduction to Theoretical Approach and Methodology

Whilst the overall aim of the project was to compare implementation of the EU Air Quality Framework Directive across several EU countries, this article will focus on research carried out in Southampton, one of the English case studies. One of the project's key hypotheses is that different modes of governance impact differently on the collective action of policy actors and on the knowledge that affects political processes, hence impacting on policy sustainability. The project uses a definition of governance that goes

beyond the narrow concept of non-hierarchical, consensus-based and often decentralized means of guidance (Heritier 2002: 3; Rhodes 1996) and includes public and private, hierarchical, competitive and network forms of action coordination. This broad definition offers a frame of reference through which complex patterns of collective action and changing processes of governing can be understood. As the project's methodology is based mainly on a case study approach to examine the interaction between governance modes and knowledge, G-FORS researchers were conscious that these pure modes of governance are not found in practice, but rather that governance regimes applying to different policy areas offer a mix of two or more of these ideal modes of governance (Lowndes/Skelcher 1998). Governance regimes then, through formal and informal rules will constitute, shape, and constrain the way actors interact and coordinate their collective action for instance by defining policy or action arenas and opening or limiting access to the policy process, by allocating and limiting competencies and resources, and by defining actors' roles. In particular, the project used Ostrom's "Institutional Analysis and Development framework (IAD)" (see Ostrom, 1994) to systematically identify rules of the Southampton LAQM regime that will shape actors' roles. Another key hypothesis of the project is that, in so doing, governance regimes filter knowledge and in the end hinder or facilitate collective learning processes and impact on policy sustainability.
The project used Matthiesen's concept of knowledgescape to distinguish between nine knowledge forms: expert, product knowledge, steering, institutional, economic, local, milieu, everyday life knowledge and reflective knowledge (Matthiesen, 2005). The first 8 can be bundled into 3 knowledge groups, first, Expert/Professional/Scientific/Product group, second Steering/Institutional/Economic group, and third Everyday/Milieu/Local group. Each group mainly represents different groups of knowledge holders or policy actors. In each policy process, heterogeneous knowledge forms will combine themselves to form a case specific knowledgescape. These knowledgescapes and their specific knowledge content then form knowledge holders' policy discourse that will interact with policy-making processes. For Matthiessen, knowledge is also seen as the result of a process that ultimately aims at better effectiveness and efficiency through learning: reflective knowledge is the result of the learning process by different policy actors which make them perceive the world differently by altering their knowledge base. Policy objectives and outcomes are affected by the filtering of knowledge forms: firstly governance modes affect the reflective knowledge gained throughout the policy process; secondly, sustainability of policies is also affected. To measure the level of sustainability, the project used Lafferty's approach to policy integration through comprehensiveness, aggregation and consistency. Comprehensiveness implies that sectoral policies programmes should reflect environmental, economic and social concerns; aggregation refers to the (ex ante) evaluation of the policy from an integrated (i.e. cross-sectoral) perspective reflecting the various substantive concerns; finally, consistency means that the various components of the integrated policies are in accord with each other (for instance consistency between different departments and different levels of governance) (see Lafferty and Hovden, 2003; Lafferty, 2004).

The key elements of the model are outlined in diagram 1.

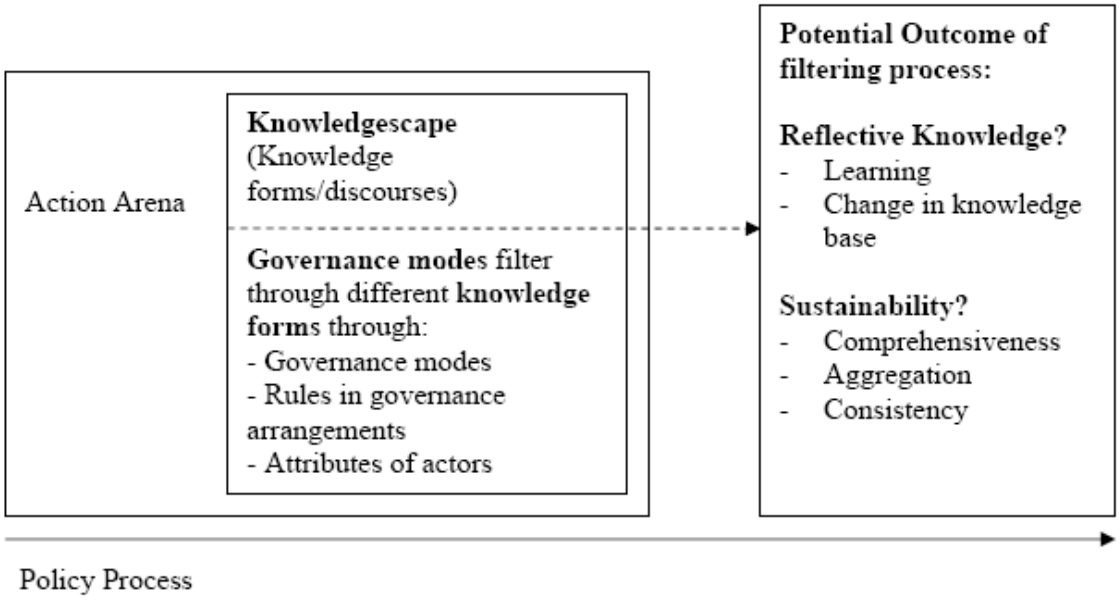

Diagram 1: Filtering Process within the Policy Process

LAQM in the UK and the Southampton Case

An examination of how Southampton City Council has implemented the EU Air Quality Framework Directive 1996 offers the opportunity to understand the synergy between knowledge forms and governance in a topical environmental policy area, i.e. air quality management, which requires a complex knowledge base to both measure various air pollutants and to develop policies aimed at reducing their concentration in ambient air. Southampton is a city of 220000 inhabitants located on the south coast of England with the second largest container terminal in the United Kingdom (UK), handling more than 42 million tones of cargo annually, the first UK cruise terminal and an international airport. Due to the city's coastal location air quality is perceived as good relative to other cities of a similar size. Year to year variations in weather conditions as well as traffic levels contribute to variation in pollutants such as particulate matter (PM_{10}) and nitrogen dioxide (NO_2).

In the UK, the Environmental Act 1995 and the National Air Quality Strategy (reviewed periodically) implement the EU Air Quality Framework Directive that has set up a standard process for local authorities across the EU to tackle key pollutants, and has led to the creation of LAQM procedures. LAQM requires firstly, measurement of NO_2 as well as other pollutants (thresholds set by the EU), secondly, declaration of Air Quality Management Areas (AQMA) if pollutant threshold is exceeded, and thirdly, development of Air Quality Action Plans (AQAP) to reduce such pollutants. EU and national air quality strategies also include key actions at national level both in transport and energy generation. However, a major part of the implementation process resides with local authorities through LAQM, the main tool for tackling local pollution hotspots generally caused by road transport. Local authorities can use a range of other powers in pursuit of

air quality objectives including smoke control, land use regulation, local traffic management, low emission zones. Local authorities are not obliged to prepare a Local Air Quality Strategy, but are encouraged to do so with advice provided by the Department for the Environment, Food and Rural Affairs (DEFRA). Any action they propose must be cost effective and proportionate. Southampton City Council (SCC) is one of over 200 local authorities in the UK that have designated parts or the whole of their administrative territory as an AQMA in view of high levels of NO_2 emissions (the threshold is 200 micrograms per cubic metre, when expressed as an hourly mean, not to be exceeded more than 18 times a year and 40 micrograms per cubic metre or less when expressed as an annual mean, see SCC, 2007), mainly a result of road traffic and have submitted an AQAP (SCC, 2007) to central government for approval.

Dominant Forms of Knowledge Facilitated by the LAQM Process in Southampton

Formal processes of LAQM require the application of different forms of knowledge which approach policy issues from different perspectives and offer different policy solutions. Knowledge holders indeed will have different agenda to promote within the decision-making process. We will expose below some key characteristics of the case study, including the integration of LAQM with the local transport plan (LTP), the predominance of expert, scientific and steering knowledge and some multi-level tensions.

Policy Integration between LAQM and LTP: Importance of Expert Knowledge

In Southampton, air quality is integrated into planning policy vehicles such as housing, transport and spatial planning. Due to the significant contribution that road transport makes to air pollution, the most important interaction remains between air quality management and LTPs. Once the geographical areas where NO_2 limits have been exceeded have been identified, SCC must declare them as AQMAs and develop an AQAP. SCC chose to integrate the AQAP to the LTP2 (LTP 2006-1011) to tackle main source of NO_2 pollution. In the UK, integration of AQAP into LTP is recommended by DEFRA when road traffic emissions are the main source of pollution. The link between LAQM and LTP sets a certain course for problem definition and knowledge used to tackle air pollution that will filter through the local policy process. Institutionally, in order to achieve the target of reducing levels of NO_2 and achieve the EU and national targets, LAQM requires considering the resources that can be allocated to air quality measurement and action plan with possibly cuts in other policy areas. It also requires a commitment to cross-departmental working, i.e. cooperation between internal experts who will apply knowledge in different ways, with possibly different institutional agenda and time-scale and using different policy processes. Strategically, integrating LAQM to transport planning in view of the source of the problem gives local authorities an opportunity for synergy between transport planners and environmental health officers, a budget, transport expertise, and an established planning framework with its own policy tools such as regional and local planning guidance and statements suited to the territory they apply to. However, it also causes challenges in terms of communication between transport planners and environmental health officers, who come from different knowledge bases, understand the problem differently, and have different priorities. In Southampton, the LTP proposes a range of measures that relate to four priorities:

accessibility; congestion; road safety; and air quality. It identifies a number of actions to tackle the growth of road traffic, taking into account the fact that freight plays a vital economic role in the city and that rail connections to the port are vital to reduce road-based freight movement. The LTP also acknowledges that road traffic is a major source of air pollution in built up areas with points of congestion frequently associated with high concentrations of NO_2. However, the air quality priority is very much a fourth priority in the discourse of Southampton's LTP as its key aim is to support the development and success of the transport system in the city. A 2007 survey of 110 transport planners and health environmental officers in local authorities across England into the effectiveness of delivering air quality objectives through the LTP process confirmed that air quality comes last in LTPs' priorities not only in Southampton but across England, after safety, congestion, accessibility and other (non identified) local priorities (Olowoporoku, 2008). The two processes of LAQM and LTP have also different time scales and are accountable to different government departments (the first to DEFRA; the second to the Department of Transport). Their priorities and their areas of intervention and jurisdiction, in particular in terms of road management and relationship with personnel from outside agencies (Highway Agency) can also differ and influence the types of policy tools used and measures taken to address air quality.

Integration of LAQM into LTP altogether means that LAQM is a hierarchical process that promotes expert and professional knowledge both at local and in upper levels of government. Typically the review and assessment phase that leads to AQMA declaration (i.e. measurement of levels of pollutants) is largely undertaken by environmental health officers, with information input from transport planners, the Highways Agency and the Environment Agency. As the process moves on to action planning and implementation through the AQAP, a more inclusive, multi-knowledge approach is required. Linking AQAP with LTP will require for instance working across local authority boundaries given the nature of pollution. In Southampton, cross-boundary networks in planning and transport exist via a sub-regional partnership, and in environmental health, via informal officer networks to discuss common problems. At national level as well expertise is used in the development of the Air Quality Strategy, which draws on the advice of various expert groups and panels, and a wide range of stakeholders. It is important to note that while national air quality standards are based on medical and scientific evidence of the impact of pollution on human health, the objectives which act as the triggers for local action also take account of costs and benefits, practicality and technical feasibility. To that end, local authorities increasingly need to employ environmental consultancies. However, a significant advantage in having in-house expertise and capacity remains, including keeping issues of air quality on the agenda and integrating the consideration of air quality into on-going debate and decision-making in local authorities.

With the focus on expertise, air quality becomes associated with a limited numbers of actions and policy tools, rather than opening up to other broader concerns. Indeed, although linked to the LTP in Southampton and henceforth integrated in a local policy with established funding, LAQM has not been linked to broader policies tackling health and global warming for instance and tends to remain a local if not sub-local issue. The national process further reinforces the focus on expertise as local decisions are checked and endorsed by professionals in the relevant national government department. We will

se below that to some extent, expert from the health sector have also contributed to the strategy, albeit to a lesser extent and at late stage.

The Importance of Institutional and Steering Knowledge and Political Processes

While expert and scientific knowledge are dominant in the case study, they remain very much structured by a political process characterised by the institutional and steering knowledge of higher tiers of government. If we start from the EU itself, the EU directive upsets the resource allocation and sanctions mechanisms of national administrative models as it simply puts the burden on the local level to monitor air quality and to take action and on the national level to ensure implementation of the directive, irrespective of where domestic power lies in the air quality field. Conflicts or joint working can appear as the local authorities have the responsibility to reduce pollution levels caused primarily by traffic pollution on certain motorways and trunk roads that cross their territory but have no power over the maintenance of these roads, which lie for instance within the remit of the Highways Agency in England. Funding for transport infrastructure, which would remove freight from city roads or onto the rail network in Southampton, is therefore dependent on decisions made by the national level. Regulation of emissions from freight vehicles also relies on national level action while implementation and regulation of the shipping sector involves international action. Addressing the real source of the problem will then be very difficult at the local level. Joint working across different levels of government and with various agencies, but also conflicts, can appear between local authorities, regulators and professional sectors. For instance, the Environment Agency, the regulator of industrial processes sets out air quality objectives for Regional Planning Bodies and local authorities, Health Authorities may carry out studies on the impact of pollution, the Vehicle Inspection Agency and the police have powers to stop and check vehicles suspected of violating emission standards. Conflicts can also emerge with regional government agencies such as Government Offices (GO) involved in LAQM who are likely to identify the air pollution problem in different scientific, political and economic terms, and might lead to diverging opinions on which measures will help meet EU targets. In Southampton, GO South East's suggestion for shore-side electricity supply went far beyond the financial reach of the local authority to deliver air quality. Requiring substantial alterations to ships would also alienate the fragile private-public relations developed with port actors.

When it comes to local decision-making over LAQM by the local authority itself, research has shown that local authorities handle the formal process in different ways across England, which suggests a difference in steering knowledge applied, in particular in early stages of the process when a decision over AQMAs has to be made (Beattie et al, 2004). In Southampton, proposals for AQMAs were presented to SCC elected members, and recommendations from officers were accepted. Elected councillors can find the complex science of assessment difficult, but trust officers' recommendations.

Other Forms of Knowledge through Consultation

LAQM legislation provides a list of statutory consultees, including neighbouring authorities and external agencies such as the Highways Agency and Environment Agency and a wider group of stakeholders who may be consulted, including the public at large and local businesses. LAQM process offers the opportunity for local authorities to

collaborate, through consultation with a number of stakeholders and residents, working across public and private sectors, for example, with specific industrial sectors or with transport operators and providers. The government for instance supports the use of Freight Quality Partnerships – agreements between local authorities, the haulage industry and commerce, to improve the quality of distribution in towns and cities. It is possible that in some areas, Non Governmental Organisations such as environmental pressure groups will participate or be consulted at the review and assessment stages or on AQMA designation and action plans. Prior to formal AQMA designation, residents and businesses in the areas affected are also consulted. Despite the dominance of hierarchy and of expert and institutional knowledge, institutional rules at AQAP stage (i.e. after AQMAs have been declared) do allow opportunities for other stakeholders to input other forms of knowledge and take part in the shaping of the policy. In practice, these other knowledge forms have a rather limited impact, either because of the uncertainty of claims being made (on the link between poor air quality, poor heath and social deprivation) or because there is not actually much conflict with local authority's plan. However, there is potential for other knowledge claims to be more influential. The table below gives example of some of the key stakeholders and knowledge holders in the case study, their arguments and the impact that their discourse has had on helping to shape the AQAP.

Stakeholder	**Key arguments and discourse**	**Impact on LAQM**
Port Authority	• Questions the impact of future growth in freight on air quality • Rejects measures reducing competitive edge: shore-side electricity, clean energy	• Helps define economically acceptable local measures
Southampton Primary Care Trust	• Promotes link between poor air quality, poor neighbourhoods and poor health	• Provides evidence strengthening the health impacts of air pollution and outlining the social dimension of the air quality issue. However, it led to little substantive impact the actual plan • Synergy between local authority's action on air quality and health concern of the health authority developed through the Active Travel partnership

Residents	• Use air quality to oppose planning decisions (retail centre and multi-occupancy housing) • Link traffic growth to planning decisions • Promote concerns over property value, social impact of planning and environment	• No direct impact on air quality but impact on the City Council 's spatial planning strategy

In practice, knowledge is highly concentrated within government agencies and very little wider debate between the local authority and the general public about problems of air quality and changes in behaviour that would lead to improvements in air quality. It is not because these forms of knowledge are explicitly excluded, marginalised or suppressed. The reasons could include firstly that the local air quality management process in the city is relatively 'immature'. The first AQMAs were declared in 2005 and the AQAP is very recently approved. Secondly, resources to support wider stakeholder and public engagement were relatively limited and in Southampton the actual methods of wider engagement fulfilled the statutory requirements, but did not go further. Mechanisms used in Southampton for communicating with the public included information provision through e-mails, letters, leaflets and website. Yet, some research has been carried out in England on issues such as public perception of air quality information, and how the public evaluate this data based on local knowledge and personal experience (McDonald et al., 2002). This work demonstrates why non-expert knowledge may be valuable: by providing situated ways of understanding air quality risk; by extending the ownership of problems and hence buy-in to proposed solutions; and by allowing local authorities to benchmark air quality data against 'real life' experience. Thirdly, air quality in the city is perceived as relatively good, and in no sense a high profile political, public or media issue. Fourthly, there is general evidence on the connection of poor air quality and problems of ill health , but no specific local studies that explicitly make this connection in the city. There is no obvious source of dissident knowledge, though interviews with professional officers suggested that the political priority afforded to environmental issues, including air quality, is compromised to some extent by the overriding political commitment to supporting the local economy of the city. This is reinforced by the national and regional policy framework, which identifies the city as a regional growth point and transport hub. This is a source of some frustration for officers most closely associated with air quality management, but seems to be accepted as 'the way things are'.

Conclusions: Relationship between Knowledge and Governance

The case study demonstrated that the technical nature of the policy area and its lack of relevance to local residents meant that action arenas and knowledgescapes were neither open nor inclusive in Southampton. Furthermore, key local actors understood that multi-level action is required as air quality problems cannot be solved by local measures alone. We will briefly review our findings in terms of knowledgescape and governance and analyse the relationship between the two before examining the impact of their synergy on reflective knowledge and sustainability of the policy.

Knowledgescape, Governance and Learning

As far as knowledge is concerned, the case study has demonstrated the dominance of expert, scientific and institutional knowledge. Certain conflicts between expert knowledge can emerge in particular over measurement and causes of air pollution. Politicians as well seem to have left it to expert to both assess air quality and develop a local strategy to tackle exceedences. It could be perceived either as a lack of scientific knowledge on their behalf but also as a convenient way to ignore the problem as they can filter knowledge available to them in such a way as not to offend dominant local economic players such as the port authority in Southampton.

As far as governance is concerned, the institutional setting of LAQM is established in the national legislation (the Environment Act 1995) and central government therefore defines the institutional rules applying to the policy arena through national legislation. Review and assessment of air quality, and the declaration of AQMAs is essentially a hierarchical and bureaucratic process, with rules and procedures, concerning measurement, modelling and objectives, cascading down from the national to the local level. Results and decisions are reviewed and endorsed by DEFRA. There is some discretion locally regarding the spatial extent of air quality management areas – and local knowledge is used here on local transport conditions, traffic projections and the economic impacts of declaring an AQMA. The economic impacts considered are direct, e.g. risk of blighting property values, and indirect, impact on image and perception of environmental quality in the city. However, the design of the regime tends to lead to a focus on pollution hot-spots in specific residential areas within the city. Opportunities for local practice to develop more or less cross-disciplinary collaboration, and more deliberative forms of governance through the consultation that is built into the process exist, but wider engagement is extremely limited despite the fact that the UK Air Quality Strategy makes clear that the process of action planning should explicitly engage different sectoral interests and other stakeholders (DEFRA 2007). The process of developing the AQAP is also hierarchical, with elements of network governance operating in the shadow of hierarchy. The AQAP is developed in the context of the legislation and guidance provided by the UK national government. The guidance to integrate AQAP with LTP is a relatively recent development in terms of national policy. This is generally regarded as a positive development. It brings together plans to deal with poor air quality with the key source of air pollution in urban areas, and embeds proposals to respond to problems of air quality within a plan that includes firm spending commitments. Altogether institutional knowledge and actors select the “relevant” knowledge forms to enter the policy arena that will influence the decision-making.

If institutional actors have influenced the forms of knowledge developed in the process, knowledge acquired throughout the process has also led them to change their strategies and decisions and a process of learning or reflective knowledge has taken place through expert knowledge but also other forms of knowledge entering the area through consultation. As LAQM matures as a policy area, there is further potential for consultation to develop through the local authority adapting its practice to involve other stakeholders more extensively and at an earlier stage in the process. In particular in the area of measurement and modelling of air quality in the city which has become more accurate with the installation of additional monitoring stations and the employment of expert consultants. Since the first round of assessment, significant work has gone into developing the technical guidance at national level making the identification of areas of poor air quality more reliable. AQAP's integration into LTP, on the basis that problems of poor air quality are almost exclusively related to transport sources suggests that the awareness of transport planners of air quality issues has been raised through this process in part, as pollution hot-spots have been identified and publicised, and sources of pollution associated with freight traffic and shipping have been highlighted locally. As local actors are more and more aware of the limited scope for local action, they start to a realise that action to deal with these problems requires national, European and international intervention

Conclusion: Success and failure of LAQM to Address Local air Quality Issues

Although the EU directive is particularly interested in outcomes (i.e. reduction of pollutants), it is difficult in this case to fully assess sustainability of LAQM in terms of efficiency of policy outcomes, as the action plan was adopted by SCC towards the end of 2007, and actions are proposed that will be implemented over the next 5 years. However, some positive air quality benefits have emerged out of the LAQM process. Firstly, the local AQ policy has identified, through monitoring and measurement, areas where air quality falls short of the national objectives. Secondly, links have been established between areas with poor air quality and specific sources, including vehicles of different kinds and shipping. Thirdly, comprehensive package of measures has been identified in the AQAP, as part of the LTP, with the potential to contribute to improved air quality. In many ways the hierarchical process, imposing duties on local government to regularly review and assess air quality, and develop action plans, and the emphasis on evidence in the process is a significant strength. In addition, the explicit integration of the process with LTP is also a very positive feature of the regime. Nevertheless, the effectiveness of the local air quality regime is limited by several factors. Firstly the LAQM regime only applies to agglomerations, i.e. zones with a population concentration in excess of 250000 inhabitants or with high population density per km², secondly, public and political profile of air quality problems in the city is low, thirdly, the economic significance of the port and growing the local economy are of over-riding importance for the local authority, fourthly there is limited scope at local level to implement measures which involve high capital costs or which impose costs on transport operators of various kinds. These constraints potentially limit effectiveness, rather than the exclusion or marginalisation of other forms of knowledge. It does seem, however, that this round of air quality assessment and action planning has highlighted for the professional officers directly involved the necessity of lobbying for action beyond the local arena if solutions to the

problems are to be found. It has also established relationships, for example, with the health sector, which may in the future lead to better evidence on the link between pollution and health, and in turn to a higher political and public profile for the issue.

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