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Air Quality

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The Environmental Audit Committee

The Environmental Audit Committee is appointed by the House of Commons to consider to what extent the policies and programmes of government departments and non-departmental public bodies contribute to environmental protection and sustainable development; to audit their performance against such targets as may be set for them by Her Majesty's Ministers; and to report thereon to the House.

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A list of Reports of the Committee from the current Parliament is at the back of this volume.

Committee staff

The current staff of the Committee are: Gordon Clarke (Clerk), Simon Fiander (Second Clerk), Tim Bryant (Committee Specialist), Edward White (Committee Specialist), James Bowman (Senior Committee Assistant), Susan Ramsay (Committee Assistant) and Steven Everett (Sandwich Student)

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Witnesses

Tuesday 5 January 2010 *Page*

Tuesday 9 February 2010

Tuesday 23 February 2010

List of written evidence

List of Reports from the Committee during the current Parliament

The reference number of the Government's response to each Report is printed in brackets after the HC printing number.

Session 2009–10

First Report	The work of the Committee in 2008–09	HC 58
Second Report	Green Jobs and Skills	HC 159-I and -II (HC 435)
Third Report	Carbon budgets	HC 228-I and -II
Fourth Report	The role of carbon markets in preventing dangerous climate change	HC 290

Session 2008–09

First Report	Work of the Committee in 2007–08	HC 108
Second Report	Environmental Labelling	HC 243 (HC 861)
Third Report	Pre-Budget Report 2008: Green fiscal policy in a recession	HC 202 (HC 563)
Fourth Report	Reducing CO_2 and other emissions from shipping	HC 528 (HC 1015)
Fifth Report	Reducing greenhouse gas emissions from deforestation: No hope without forests	HC 30 (HC 1063)
Sixth Report	Greening Government	HC 503 (HC 1014)

Session 2007–08

First Report	Are biofuels sustainable?	HC 76-I & -II (HC 528)
Second Report	Reducing Carbon Emissions from UK Business: The Role of the Climate Change Levy and Agreements	HC 354 (HC 590)
Third Report	The 2007 Pre-Budget Report and Comprehensive Spending Review: An environmental analysis	HC 149-I & -II (HC 591)
Fourth Report	Are Biofuels Sustainable? The Government Response	HC 528 (HC 644)
Fifth Report	Personal Carbon Trading	HC 565 (HC 1125)
Sixth Report	Reaching an international agreement on climate change	HC 355 (HC 1055)
Seventh Report	Making Government operations more sustainable: A progress report	HC 529 (HC 1126)
Eighth Report	Climate change and local, regional and devolved government	HC 225 (HC 1189)
Ninth Report	Carbon capture and storage	HC 654 (Cm 7605)
Tenth Report	Vehicle Excise Duty as an environmental tax	HC 907 (HC 72)
Eleventh Report	The Exports Credit Guarantee Department and Sustainable Development	HC 929 (HC 283)
Twelfth Report	Greener homes for the future? An environmental analysis of the Government's house-building plans	HC 566 (Cm 7615)

Thirteenth Report	Halting biodiversity loss	HC 743 (HC 239)

Session 2006–07

First Report	The UN Millennium Ecosystem Assessment	HC 77 (HC 848)
Second Report	The EU Emissions Trading Scheme: Lessons for the Future	HC 70 (HC 1072)
Third Report	Regulatory Impact Assessments and Policy Appraisal	HC 353 (HC 849)
Fourth Report	Pre-Budget 2006 and the Stern Review	HC 227 (HC 739)
Fifth Report	Trade, Development and Environment: The Role of FCO	HC 289 (HC 1046)
Sixth Report	The Voluntary Carbon Offset Market	HC 331 (HC 418)
Seventh Report	Beyond Stern: From the Climate Change Programme Review to the Draft Climate Change Bill	HC 460 (HC 1110)
Eighth Report	Emissions Trading: Government Response to the Committee's Second Report of Session 2006–07 on the EU ETS	HC 1072
Ninth Report	The Structure of Government and the challenge of climate change	HC 740 (HC 276)

Session 2005–06

First Report	Greening Government: the 2004 Sustainable Development in Government Report	HC 698
Second Report	Sustainable Timber	HC 607 (HC 1078)
Third Report	Sustainable Procurement: the Way Forward	HC 740
Fourth Report	Pre-Budget 2005: Tax, economic analysis, and climate change	HC 882 (HC 195)
Fifth Report	Sustainable Housing: A follow-up report	HC 779
Sixth Report	Keeping the lights on: Nuclear, Renewables, and Climate Change	HC 584 (HC 196)
Seventh Report	Sustainable Development Reporting by Government Departments	HC 1322 (HC 1681)
Eighth Report	Proposals for a draft Marine Bill	HC 1323 (HC 1682)
Ninth Report	Reducing Carbon Emissions from Transport	HC 981
Tenth Report	Trade, Development and Environment: The Role of DFID	HC 1014 (HC 197)
Eleventh Report	Outflanked: The World Trade Organisation, International Trade and Sustainable Development	HC 1455 (HC 354)
Twelfth Report	Transport Emissions: Government Response to the Committee's Ninth Report of Session 2005–06 on Reducing Carbon Emissions from Transport	HC 1718

Oral evidence

Taken before the Environmental Audit Committee

on Tuesday 5 January 2010

Members present:

Mr Tim Yeo, in the Chair

Mark Lazarowicz
Jo Swinson
Dr Desmond Turner

Memorandum submitted by the Mayor of London (AQ03)

SUMMARY

The Mayor of London believes that progress is being made at all levels of government to reduce emissions, yet more needs to be done if limit values are to be met and the negative health impacts of poor air quality are to be minimised in London. The Mayor therefore makes the following recommendations:

- The Government needs to take a clear strategic lead, setting out its vision, a delivery framework, national measures that will be taken and advise on regional and local measures.
- The Government should use the time extension notification process for the NO_2 limit values to set a framework for local and regional authorities to take action over the next few years.
- Government departments need to work more closely together to develop strategies to improve air quality.
- Funding for air quality measures should be available from health budgets as well as environment budgets.
- The Government should publish an annual report setting out air quality data and updating the Government's approach and priorities.
- Legislative processes and requirements should be streamlined in London so that the delivery chain is clearer.
- Research is needed to explain the disparity between air quality modelling and monitored air quality.
- The Government should publish clear information on the health impacts of poor air quality to inform decision makers.
- A common methodology for assessing the benefits of potential measures at national, regional and local level should be developed.
- Government-led research should focus on the needs of policy makers.

INTRODUCTION

1. The Mayor of London welcomes the opportunity to provide a written submission to the Environmental Audit Committee. The Mayor, along with his Adviser on the Environment, Isabel Dedring, is committed to improving air quality in London to protect the health of its citizens.

2. The Mayor is required under the Greater London Act 1999 to prepare an Air Quality Strategy. This must contain the Mayor's policies and proposals for the implementation in Greater London of the Government's Air Quality Strategy for England, Scotland, Wales and Northern Ireland, as well as for achieving air quality standards and objectives prescribed in regulations under the Environment Act 1995.

3. Consultation recently ended with the London Assembly and functional bodies on a draft of a revised Mayor's Air Quality Strategy. The Mayor and GLA officials are now considering comments made during the consultation period and are discussing resource allocation and national measures with the Government. The Mayor will publish a further draft of the Strategy for consultation with the public early in 2010, and it is currently planned that the Strategy will be published by autumn 2010.

4. The Mayor also has a role in the Local Air Quality Management (LAQM) process in London. London boroughs are required to consult the Mayor when undertaking their LAQM functions. The Mayor must review air quality review and assessment methodologies, reports and action plans to ensure consistency with mayoral strategies. The Mayor also has reserve powers to require boroughs to conduct air quality reviews and assessments.

5. The Mayor can direct boroughs to take specified steps, for example where it appears that objectives are not likely to be achieved or when technical or material developments cause a borough's actions to be inappropriate. The Mayor can direct boroughs to declare (or modify) air quality management areas, to

prepare action plans and to implement any measures in action plans. The Mayor is required to consult with boroughs before using his powers of direction and must take into account national guidance when using them. The Mayor is also able to carry out investigations and research on matters concerning air quality in London and to provide advice and information to the boroughs.

6. The Mayor is also responsible for strategic planning in the capital, carried out through:

— the formulation a spatial development strategy for London (the London Plan); and

— his role in decisions on major planning applications (applications of potential strategic importance).

7. The Mayor uses his powers in the planning process to promote sustainable development and improve air quality.

Modelling and Monitoring Systems

8. The Mayor appreciates the work of Defra in managing the Automatic Urban and Rural Network (AURN) for monitoring air quality in England. Eight of the 121 sites in the AURN are also part of the London Air Quality Network (LAQN) which is sponsored by the Mayor and the Environment Agency. The UK Air Quality Archive, which is funded by Defra and the devolved administrations is also a useful and well presented source of air quality information. However, the Mayor believes that an annual report produced by Defra on air quality trends would be a useful way to raise awareness of air quality issues.

9. The Mayor also recognises the important role of the National Atmospheric Emissions Inventory (NAEI) in modelling air quality in the UK. Although London has its own inventory, the London Atmospheric Emissions Inventory (LAEI), some of the supporting data in the NAEI is useful in the LAEI's development. Although the LAEI and the NAEI are developed using slightly different methodologies, largely due to the difference in geographic scale between the two inventories, GLA and Defra officials have worked to ensure consistency between them as far as possible, and the Mayor hopes that such co-operation will continue.

10. It is widely acknowledged, however, that in recent years, monitored emissions have not fallen to the extent that models predicted that they would. It is important to policy makers that the causes of this disparity are established, as modelling contributes greatly to the air quality policy development process. Officials from the GLA group would be willing to use their experience in London and the data that is available to them to work with Defra officials to investigate this issue further. However, the Mayor feels that in order to investigate this issue further, it is important that the AURN network is maintained, if not expanded, including the monitoring sites in London.

Health and Environment Risks

Health information

11. Over recent years, there has been emerging evidence about the health impacts of poor air quality. The Government's advisory body, the Committee on the Medical Effects of Air Pollutants (COMEAP) has been at the forefront of research into this issue, which has contributed greatly to policy development in London.

12. However, the Mayor feels that the Government could make better use of this research. It is extremely important that clear health information and messages are communicated to key audiences. Air quality issues are sometimes neglected by decision makers at all levels of Government, largely through a lack of knowledge and because the causes and impacts of other environmental challenges, especially climate change, are easier to understand. Clear guidance on the health impacts of poor air quality would enable officials at all levels of government to raise awareness and understanding of air quality issues among senior managers and thus improve the decision-making process. Such information, if effectively communicated, could also persuade individuals to make the small changes in behaviour that collectively are important in improving air quality in urban areas.

13. It is sometimes argued that the failure to communicate clearly the health impacts of poor air quality has resulted in air quality proposals being rejected by policy makers. It is striking that the Government's Air Quality Strategy for England, Scotland, Wales and Northern Ireland concluded in 2007 that few national measures had positive net benefits. Further analysis making use of the recently updated COMEAP guidance, which significantly increases the assessment of the negative health impacts of poor air quality, would be informative.

14. There is a need for advice from the Government on a methodology for assessing the net benefits of potential measures which could be applied at both national and regional level, and which takes into account wider costs and benefits—such as CO_2 emissions—rather than focussing narrowly on air quality impacts. GLA officials have experience of implementing assessment techniques for air quality measures, such as the London Low Emission Zone and Taxi Emissions Strategy, and would be willing to work with the Government to develop a practical methodology.

Technical information

15. The Mayor also recognises the high-quality work carried out in recent years by the Air Quality Expert Group (AQEG). However, AQEG-led studies tend to be complex and take a long time to complete. This research is valuable but given the urgent need to take action to meet European Union limit values, policy makers need quick answers to technical issues that arise—for example, the relationship between NO_x and NO_2, the impacts of new technology and fuels and analysis of tyre and brake wear emissions. It would be helpful if AQEG could also undertake short, focussed pieces of research responding to the needs of those implementing policies on the ground.

16. For these reasons, the Mayor generally supports the conclusions of the Defra-commissioned review of AQEG that was carried out by Enviros and published in December 2008. In particular, the GLA believes that AQEG could be made more effective by:

— being more flexible to undertake more short-term research projects;

— focussing its efforts on research that will have direct relevance to policy implementation; and

— increasing interaction with policy implementers both at project inception stage and during the research phase.

Delivery Chain

17. The Mayor appreciates the efforts that have been made by Defra to engage on policy development in London. Improving air quality in London is a shared responsibility between the Mayor and the Secretary of State, and the development of policies that complement each other and the adequate resourcing of measures will be vital if limit values are to be achieved.

18. However, despite this engagement on particular measures in London, there is a lack of clarity as to the Government's policy priorities or overall strategy. The Mayor considers that the Government needs to set out a strategy that:

— describes a clear vision for air quality in the UK;

— sets the framework for delivering air quality improvements across the country;

— explains broad actions that the Government will take to meet limit values; and

— proposes policy areas that local and regional authorities should focus on.

19. The Government published its Air Quality Strategy for England, Scotland, Wales and Northern Ireland in 2007. It could be argued that this document describes a vision for air quality in the UK, in the form of compliance with EU limit values and national objectives, though perhaps the vision should focus more on the health impacts of poor air quality. Even here, however, the picture is confused. In some cases, the EU limit values and national objectives are subtly different, which means that local and regional authorities are unsure exactly what targets take priority.

20. There is a case for making the EU limit values the only legal objectives, though a narrow focus on limit values and targets alone could be detrimental to achieving the deeper cuts in emissions that are so important for health reasons. Even in areas that are already meeting PM_{10} limit values, it is desirable to reduce concentrations further. Without a strong lead from the Government, there is little reason why local authorities should take any action to reduce these concentrations once legal compliance has been achieved. This underlines the need for the Government to state unequivocally the health case for improving air quality.

21. To an extent, the Government's Air Quality Strategy sets a framework for delivering air quality improvements, largely through the Local Air Quality Management (LAQM) process. The GLA has contributed to the current review of the LAQM process which is being undertaken by the Government, and awaits its outcomes with interest. Overall, the Mayor supports the current LAQM system, which provides an impetus to local authorities to take action to improve air quality and which ensures that the monitoring information which is integral to evidence-based policy development is properly collated. Nevertheless, the bureaucratic process could be greatly streamlined and there is also a need for the chain of responsibility in London in particular to be clarified (see below).

22. Perhaps the main problem with the Government's Strategy is that it fails to set out the broad policy areas that it will focus on at a national level. The only three new measures that the Government committed itself to considering further in the Strategy were:

— incentivising the early uptake of new tighter European vehicle emissions standards;

— increased uptake of low-emission vehicles; and

— reducing emissions from ships.

23. The Mayor considers that there are other measures that could be more cost-effective if implemented nationally rather than piecemeal by individual authorities and which merit further consideration by the Government. These include:

— tax incentives for cleaner vehicles;

— a national framework for low-emission zones;

— a certification scheme for NOx abatement equipment;

— extended and targeted vehicle-scrappage schemes;

— grants schemes for retrofitting vehicles;

— development and promotion of new technologies;

— restructure of energy-efficiency schemes; and

— awareness campaigns.

24. As mentioned above, a number of national measures were rejected by the Government because they did not result in positive net benefits in the analysis process. However, if local authorities had confidence that the Government would implement certain national measures, they might be more willing to put in place complementary local measures, which would improve the effectiveness of both the national and the local measures. However, without such a clear steer from the Government, anecdotal evidence suggests that local authorities are unwilling to take the plunge by developing innovative new policies.

25. Similarly, the Government has failed to provide enough guidance about the types of measures that it believes should be implemented at a local level. While local authorities are best placed to respond to local needs, high-level advice and guidance from the Government would reduce the effort that local authorities would have to put into the initial policy scoping process. Government endorsement of policies would also be likely to persuade decision-makers at local level to support particular actions, especially if this was backed up by an indication of funding support from government for these actions.

26. The Mayor considers that there is sometimes a lack of consistency between different government departments. It makes sense for one department—Defra—to take the lead on improving air quality. However, Defra does not always seem to be able to persuade the Department for Transport of the merit of transport policies that will improve air quality, or the Department of Health of the benefits to public health that would result from air quality improvement policies. In addition, the removal of climate change policies from Defra that occurred after the creation of the Department of Energy and Climate Change (DECC) makes it more difficult to maximise the air quality benefits of measures to reduce carbon dioxide emissions or to minimise any negative impacts.

27. There is an urgent need for departments to work more closely on packages of policies and to ensure that messages given to stakeholders—including local authorities—are consistent. Given the health benefits that would result from better air quality, it could also be argued that funding for air quality measures should be made available from government health budgets, as well as environment budgets.

Steps Needed to Change

28. Given the need for action in the short term to meet EU limit values, the Mayor does not consider that a full revision of the Government's Air Quality Strategy for England, Scotland, Wales and Northern Ireland would be an effective use of time and resources. Nevertheless, there is a need for the Government to articulate what action it will take to improve air quality and to indicate what policy areas it advises local authorities to address.

29. An early opportunity to do this would be through the NO_2 Action Plan that the Government will be developing in 2010 as part of its time extension notification to the European Commission for the NO_2 limit values. This Action Plan needs to cover actions at national, regional and local level, so the Government should work closely with local and regional authorities in its development. The NO_2 time extension application process should not just be about persuading the European Commission that action is being taken. It provides the Government with an opportunity to set out a framework for delivery and to help regional and local authorities implement measures that will be effective in improving air quality (not just NO_2) over the next few years.

30. The Government needs to put in place procedures to ensure that the Action Plan is implemented. The LAQM process is effective in allowing the Government (and in London, the Mayor) to provide direct advice to local authorities on particular issues. There is still, though, a need for the Government to communicate on an ongoing basis its priorities and policy direction. The Government should therefore consider how this could be best achieved and how to include all relevant government departments within this process. One option would be for the Government to produce an annual National Air Quality Review. This could include up-to-date data about air quality and related health impacts in the UK, summarise how the Government intends to address any emerging challenges and provide advice and best practice for local authorities.

31. The Mayor hopes that the current co-operation between the GLA and the Government will lead to the joint action that is needed to improve air quality in London. Nevertheless, the legislative framework which sets the delivery framework in London could be improved. Under the GLA Act, the Mayor is required to produce an Air Quality Strategy that contains "policies and proposals—for the achievement in Greater London of the air quality standards and objectives prescribed in regulations made under [the Environment Act]." The Mayor considers that it is right that there should be requirements on him to take action to improve air quality and that legal objectives (ideally EU limit values) should be a prime consideration.

32. However, emissions from outside London account for around 40% of PM_{10} concentrations in central London and 25% of NO_2 concentrations across London. In addition, the Mayor has limited scope to influence the vehicle fleet using London's roads. The Mayor, on his own, cannot take action that will ensure compliance with the limit values. There is thus a clear role for central government to improve air quality in London.

33. The Mayor believes that consideration should be given to expressing the Mayor's legal air quality obligations in terms of emissions reductions objectives rather than concentrations objectives. This would allow the Mayor to focus on measures which are fully within his control. The Mayor accepts that there would be practical difficulties in agreeing suitable emissions objectives and in determining methodologies and metrics for monitoring progress. Consideration would also have to be given to funding issues, to ensure that the Mayor has the resources to implement the necessary measures. In addition, it would be important that measures to reduce exposure (and consequently reduce the health impacts of poor air quality) are not neglected in favour of emissions-reduction measures.

34. Consideration should also be given to similar legal emission reduction objectives for local authorities, including boroughs. At the moment, local authorities are required only to work towards meeting air quality objectives. A requirement to achieve emissions reduction targets would provide a focus for local authorities and ensure that air quality is taken seriously at all levels of management within authorities.

35. As described above, the Mayor is a statutory consultee for LAQM documents produced by London boroughs. This is an important means by which the GLA can monitor action taken by boroughs, ensure borough measures are consistent with the Mayor's Air Quality Strategy and spread best practice. However, the Secretary of State is also a statutory consultee for boroughs' LAQM documents. While the GLA and Defra liaise to ensure that responses to their LAQM documents are consistent, there is always the possibility that mixed messages could be received by boroughs.

36. The Mayor therefore feels that he alone should be responsible for appraising boroughs' LAQM documents, and that he alone should have power of direction over the boroughs, while acknowledging the need for the Secretary of State to have power of direction over the Mayor and for him to have legal objectives (as discussed above). This would simplify the delivery chain in London.

11 December 2009

Witnesses: **Ms Isabel Dedring,** Mayoral Adviser on the Environment, and **Mr Simon Cousins,** Environment Programme Officer, Greater London Authority, gave evidence.

Q1 Chairman: I should just draw attention to my entry in the Register of Interests. I chair a company which distributes and services London taxis, which may be relevant to the problem of air quality in London. Could I ask, to start off with, what do you think has led to the situation where we are over the limits for particulates and nitrogen dioxide and ozone in quite a number of locations in London?

Ms Dedring: I just wanted to explain that I have sent round an A3 piece of paper,[1] and apologies for sort of dumping that on you and I know that it looks possibly uninteresting or complex or both, but this is quite a technical issue and I just wanted to explain what it is because it may help inform the discussion, or feel free to ignore it. I am looking at the side of the page where it says "PM_{10}" and it basically shows where the PM_{10} violations are in London to give a sense with particulate matter, and apologies to those of you who know all of this, but for those of you who do not, it is more like dust, it is little bits of things like rubber, dirt, and it can come from exhausts and it can also come from things like tyre and brake wear or from non-transport emissions. Underneath the graph it shows the expected reductions in PM_{10} that we are modelling as a result of the Mayor's draft Policy Strategy,[2] which we can come on to later, and then the thing on the right shows the actual source of this, so where does PM_{10} come from in the first place. It may just be helpful because, when you then compare that to NO_2 which is the other big pollutant of concern in London, the distribution of it is entirely different, it is much more widespread, and the sources of it, which is that thing again on the right, that bar, again it is quite different, so some of the key distinctions are with NO_2 that a lot more of it comes from buildings and gas consumption in buildings rather than more purely from the transport side of things. The last thing that is just worth noting is that what this does not include is emissions from outside London, so on PM_{10} 40% of emissions in London come from outside London, which just further makes the problem intractable, and that is not shown on this graph, and for NO_2 it is about 20%. It is just maybe useful as a reference in the course of the discussions. Going back to your question, I think the first issue is that, if you look, for example, at the European limit values, which were announced quite a while ago now, at no level of government was an effort undertaken to say, "Here's where we are now, that's where we need to be and here's a set of measures that we are all going to take, local, regional and national government, in order to actually get us from point A to point B", so there has been the one good movement in the right direction. Certainly in London we have seen major improvement certainly since the 1950s and even since ten years ago due to a range of things the Government have done and the London Government have done, but there just has not been

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that kind of, "Actually, here's the gap and, therefore, here's what we need to do to fill that". Now, coming into it quite late in the day ourselves, it is quite difficult to take action in a way that looks quite unfair and imposes a very significant financial burden, so those are some of the trade-offs that we need to make, but obviously it is something that we need to tackle because of the health implications primarily. The only other thing to say on that, I think, is that the easiest way to resolve these issues is through improvements in Euro standards basically at the European level, and certainly we would say that those standards need to be coming in faster and they need to be more stringent, and there is a lot of lobbying that goes on by manufacturers. For example, right now we are trying to set Euro standards on LGVs and the manufacturers are trying to get the deadline pushed out as far as possible and they are trying to get the standard not set so tight. Given that the replacement of the fleet is going to be the single most effective way to tackle this problem, then making sure that the newer vehicles are higher-standard vehicles as quickly as possible, the easiest way to do that is at the European level, but obviously, in the absence of that, we need to take action in addition, and that is something we would want to do anyway, so I think that is the kind of unfortunate situation that we are in at the moment.

Q2 Chairman: Just one thing that comes straight out of PM_{10}, and it is a very interesting chart, is that the list on the right-hand side which shows the contributors, most of which are vehicles of one sort or another, in almost every category the contribution of the exhaust is much bigger than the tyre and brake wear, including HGVs, LGVs, buses, et cetera, et cetera, taxis and motorcycles. The one exception to that pattern is cars where the contribution of tyre and brake wear is much higher than the exhaust. Is that because the engine standards for cars are much more stringent than they are for any other category?
Ms Dedring: Yes. Basically, on the smaller vehicles the Euro standards come in first and then over time the bigger vehicles get the Euro V or Euro VI standard, so one issue obviously is to accelerate that as quickly as possible, but yes, that is the primary reason for it. It is just that the average standard of the car fleet is higher basically.

Q3 Chairman: Given that you have identified the Euro standards as one of the key ways in which progress can be made, does that mean the scope for decisions by the GLA directly to reduce air pollution by various measures, is that scope fairly limited in fact?
Ms Dedring: Our view on PM_{10}, just as a starting point, is that this problem exists in London, therefore, we are going to tackle it. NO_2 is the same thing, but NO_2 is much more widespread, so, if you look over the coming years, already there are hundreds of cities in the UK that would have unacceptable levels of NO_2 and that is going to improve over time, but there will still be dozens of cities over the next decade that we are now in which will still have NO_2 problems, so, forgetting political will or anything like that, it is not really efficient for London to tackle the problem and Birmingham and Manchester and each to do it individually. Imagine you are an individual vehicle owner or you are a fleet operator, you are driving from city to city, the standards change everywhere, and imagine hundreds of little LEZs[3] all over the country, it is just not logic, but obviously, if action is not taken at a national level, then that is the kind of thing that we would be needing to look at ourselves. We just do not think that that is really where we want to end up because it just does not make any sense. Having said that, in the Mayor's Strategy, we have put in a number of measures on NO_2 which we think are quite significant and we are sort of arguing that that might be something that the Government could roll out to other cities. For example, the low-emission zone does not tackle NO_2, it is specifically focused on particulate matter, so we are proposing an extension of the low-emission zone to cover NO_2 as well, but again we are simultaneously saying to Government, "It doesn't make sense for us to do this on our own, given that you have got the problem in other cities as well", so we would be very keen to get some assurance that at a national level the approach taken will be X and then we would do something which would be in conformity with that. Things like the low-emission zone, in effect, accelerate the Euro standards. They do not do something that is different from the Euro standard, it is just churning the fleet over faster than it would otherwise have turned over, so action can be taken at any level, but it would be easier to do it in the first place when the things roll off the line because there are obviously significant compliance costs associated with that and people buying vehicles which, subsequently they discover, they should not have bought or they should have bought a newer version, and that is one of the unfortunate consequences of trying to accelerate some of the standards.

Q4 Mark Lazarowicz: Just on a factual point, you mentioned that 20% of PM_{10} comes from outside London?
Ms Dedring: Forty per cent. It changes over time, having said that.

Q5 Mark Lazarowicz: Where are they coming from in broad terms?
Ms Dedring: It can be anywhere. It can be as far as Saharan dust, it can be northern Europe sort of agricultural activity, it can be industrial activity in southern England and northern Europe, so it is very much subject to meteorological conditions. That is one of the difficulties with tackling PM_{10} because, unlike NO_2, it is much spikier, so it has these sorts of episodes where suddenly it sky-rockets which you will typically see when you have got your hot, still days, so, given that it is small bits of dust basically, when there is not that much wind, it builds up and

[3] Low-emission zones

particularly will build up in urban environments where we have these sorts of street canyons and traffic going through those accumulate it.

Q6 Mark Lazarowicz: Presumably, just as PM_{10}s are coming into London, also they are being exported out of London as well at certain places.
Ms Dedring: Yes, it is a very poorly understood area and it is one of the issues. Even just understanding the breakdown of these things and where they are coming from in the first place, it is a sort of whole discipline unto itself with a lot of uncertainty around it, and that is one of the issues around this. An interesting aspect of that lack of understanding is that, given the measures that have been put in place in London over, say, the last ten years, and I do not just mean by London Government, but generally, you would expect to see a much bigger reduction in NO_2 and PM_{10} than you have seen, and again that is something people do not really understand. Here are these new Euro standards coming in and there are various things which have been implemented, but NO_2 is not reducing at the rate that it should be reducing. There has been some discussion recently about the performance of Euro standards in reality versus the way that they perform on a test track. All of these things are actually just ammunition to say, "Oh, we shouldn't do anything", which is exactly what needs to not happen, and that is one of the challenges with this agenda.

Q7 Mark Lazarowicz: But, nevertheless, there must be danger in adopting prescriptions which actually are not soundly based on the science?
Ms Dedring: Yes, we need to base it on everything that we know at the time and it is just that it is well-recognised now that, for some reason, we are not seeing the reductions that we need to see and there is a lot of speculation about why that is, but there is not a 100% understanding of it. Our own view is that we need to carry on tackling the problem and hope to resolve those issues in parallel because we cannot say, "Oh, right, let's just stop doing anything, bottom out what is going on and then we'll start again" because nobody wants to be in that situation of just losing three years, especially given the speed at which public sector organisations work.

Q8 Dr Turner: I am just curious, given the abundance of buses in London traffic, your breakdown of the contributions to PM_{10} and to NO_x which are attributable to bus and coach exhausts is relatively small. I can remember, two or three years ago we visited Stockholm where the entire city bus fleet had been converted to alcohol with dramatic effects in reducing both particulates and NO_x levels in the city, so it rather looked as if buses were a very key element in both these pollutants, yet they do not seem to figure very much in your breakdown. I find this confusing and perhaps you could explain that.
Ms Dedring: One reason is that the buses have to meet the low-emission zone standards, so they all have traps on them now, so on the PM side you would see a much higher number if you had looked ten years ago or five years ago, so on the PM side, because they have these particulate traps retrofitted to them, you would be seeing a much lower level of PM than you might otherwise see. The other thing is that it is a relatively new fleet because there has been so much investment in the bus fleet, so now you are seeing that about half of them, I think, are Euro III and about a third are Euro IV, but what we have said in the Strategy is that we would be looking to convert all the buses to Euro IV by 2015 because having the traps helps on PM, but it does not do anything for NO_2 particularly, so that is one thing we are doing. Also, we are converting the whole bus fleet to hybrid which has about 30/40% lower emissions across the board, CO_2, NO_2 and PM, compared to a standard diesel vehicle, so that will be above and beyond the Euro IV performance, so it will be a Euro IV+ hybrid, and the new bus for London, the new Routemaster will be hybrid as well. All of that is actually going to help improve the situation, but on NO_2 it is still quite significant, and that is in the baseline, which is why we have suggested that all buses need to be Euro IV because, when you actually look at its contribution on the NO_2 side, it is bigger than it should be relative to the volume of traffic that it represents.
Mr Cousins: Also, it is especially bad in central and inner London where there are so many vehicles.

Q9 Dr Turner: Sorry?
Mr Cousins: It is especially bad in central and inner London for NO_x emissions from buses, so that is why we—

Q10 Dr Turner: You only have to stand next to one!
Ms Dedring: It is just worth saying that we are doing a review of the bus network and looking at some of those classic examples that people always give, like Oxford Street, and do we really need all those buses going down Oxford Street.

Q11 Dr Turner: What do you think are the key measures that you can take to improve London air quality to achieve the targets that you are looking for?
Ms Dedring: We have structured a lot of the Strategy so that, as a bare minimum starting point, we have got to get compliant with European limit values because those are set off of health standards and, if we are not compliant in certain locations, that means that we are exposing Londoners to health risks in those locations, and that is not okay, so we need to tackle the problem more broadly and see improvements across the board, but first the priority has got to be those areas where people are exposed to unnecessary and unacceptable levels of risk. The reason I am mentioning that is that on the PM side those limit values, the time has passed already for tackling them, so we have focused on measures that are short-term in terms of things that can be delivered quickly basically and that includes things like focusing on hot spots particularly, so it includes things like routing the cleaner buses down the hot spots, changing the road layout at hot spots, smoothing traffic flow in those locations, potentially looking at traffic diversions around those locations

and restricting access to some of the roads potentially, so that would be things like reducing the entry and exit points from the road to actually reduce traffic flow on the road in those particular locations. I think, broadly speaking, getting away from the specifics of PM_{10} over the next couple of years, first of all, we have to look at our own fleet, and that is things like buses, and the fleets that we indirectly affect, but more directly, say, than cars, so that would be things like cabs. There are more than 20,000 black cabs and more than 40,000 minicabs and the minicabs are actually relatively very clean, but you could create further incentives for them to be greener. Then we can use things like the Congestion Charge and other measures on cars specifically, and then we are also looking at extensions to the low-emission zone, as I said earlier, on the bigger vehicles, but at the same time at the national level there are measures which are actually cutting against some of these things. For example, for CO_2 reasons, there is an incentive to buy diesel vehicles which has been quite effective and about 30% of new cars sold now are diesel versus 8% a few years ago, but diesel vehicles tend to be the worst from an air pollution standpoint, so it was all put in for the right reasons from a climate change perspective, but from an air pollution perspective not a good outcome, so there are some of those perversities that need to be resolved.

Q12 Dr Turner: Talking of perversities, there seem to be two things which the GLA is doing which do not seem to be helpful. One is to delay the implementation of Phase 3 of the low-emission zone, and the other is to remove the western Congestion Charging Zone. You have just prayed in aid the effect of the Congestion Charge. How do you explain those apparently contradictory moves?

Ms Dedring: On WEZ,[4] it was an election commitment of the Mayor to consult on it and that consultation is still ongoing, so we will see what happens, but one of the things that we are considering as part of the consultation is exactly what the air quality impacts are going to be, and that is part of that exercise, so the details of that are not available yet. It is worth saying that obviously on a London-wide level, WEZ, the western extension, has an undetectable impact, but obviously on certain roads it has more of an impact when you just look at the local areas. The traffic impact of the western extension was never as significant as it was for the central zone and it was always much more of a revenue-raising device than really a traffic management measure and certainly than an air quality measure, so a combination of those things means that the impact, in our view, is quite small even if you look at those areas. Again, that is something that we are looking at in the course of the consultation and obviously one wants to be clear about what the specific impacts are. On the low-emission zone, interestingly, Phase 3 of the low-emission zone which tackles LGVs, the sort of 'white van man', it is very different from the first two phases which were about basically large lorries, fleet operators, so the ability of them to adapt and prepare for the requirements that the low-emission zone placed on them was quite different from a sole trader with a van, and at the time that it was meant to be coming in was in the depths of the recession and, literally, the cost of retrofitting those vehicles or buying new vehicles would have bankrupted a lot of these people, so at the time we felt it was appropriate to suspend it, but obviously, as you say, we are still introducing it in 2012 and we are consulting on that at the moment. We would expect to see substantial pre-compliance based on the previous low-emission zone phases where we have seen pre-compliance of 50 to 75% quite substantially before the introduction of the low-emission zone and, apart from anything else, having suspended it, there is just a certain lead time associated with getting all the infrastructure in place, so putting it in for 2010 is not really an option anymore.

Q13 Dr Turner: What is going to stop London achieving its future air quality targets?

Ms Dedring: I think three things: one, execution on our side, and hopefully that will not be a problem; two, there are certainly policy measures which we have suggested in the Strategy from a national perspective which, we think, are essential to delivering these targets, so what we have said in the Strategy is not just what we think is needed to be done by the GLA, but also what we need the boroughs to do and what we need national government to do, and simply nobody foresaw this. Although, for example, if you look at the European limit values, those came in ten years ago, but there was not any, "Ok, right, we're going to allocate this amount of budget in order to tackle this problem", so we are now in a position where nobody at any level of government has foreseen the couple of hundred million pounds that ideally would be needed to tackle this problem. It is very easy to get into a finger-pointing, "No, you pay for it", "No, you pay for it", especially at this time in the public spending situation, but we are trying to just take a collaborative approach to say, "Look, this is the way to tackle this problem", and we need to have a conversation about how we actually fund some of these measures because saying that we are not going to do anything about it is not acceptable. I just think that, if you look at the health costs associated with a lot of these things, there is absolutely no link between the funding that is available and the avoided health costs if you were to invest in it, that is just not there at all, and on the delivery side we have tried to work with the NHS on this. It is not as if they are opposed to the concept, but there is no real joined-up thinking on the subject at all in terms of from a preventative standpoint and it might well be a much better investment to invest in some of these things from a health perspective, so a lot of that connection simply is not happening, but there is a pretty stark funding issue on this, on both PM_{10} and on the NO_2 side. On PM_{10} we are trying to kind of cobble it together out of two bits of TfL funding, and the more you keep pushing, the more you are able to

[4] Western Extension Zone

put something together, but it is just not where we need to be, and actually the fact that the European Union have talked about up to a £300 million fine is fantastic because it is a great force for us to say, "Right, well, we should all be prepared to pay up to £299 million to address this issue".

Q14 Dr Turner: I was just going to ask quickly whether you were fearful of European penalties, and you clearly are.
Ms Dedring: I embrace them!

Q15 Dr Turner: How likely do you think they are?
Ms Dedring: On PM_{10}, as I say, the work that we have done so far has been identifying the policy measures and its rough modelling, but we are quite confident that we can deliver the European standards and, therefore, avoid the fine, but we are just doing the detailed modelling because the nature of air quality is quite complex, so hopefully that will show that we are right and we can actually get there, but then it is about making sure that the things that we have said need to happen to deliver that actually do happen. This issue is still not at the level that it needs to be. You were saying earlier about adaptation and is this really in people's minds, in the forefront of people's minds. It is if you are Defra, but actually it needs to be if you are DfT because they are making all the decisions on transport emissions that actually affect air quality and it needs to be a frontline issue for the Department of Health, so Defra can care about it all it wants, but fundamentally it has got to be a mainstream issue for the other relevant departments, Treasury as well. At the London level, there is the same issue, that it is TfL that really needs to get this, not the environment team at City Hall.

Q16 Jo Swinson: You are just touching on what I was about to ask and you might want to expand slightly. What is your assessment of how well different government departments are co-ordinating their work on dealing with air quality issues? Is it working?
Ms Dedring: We have got a very good working relationship with Defra which is great. I just think that these issues are not front and centre for somebody like DfT, and again I think that is changing, so that is fantastic, and I think some of the European limit value stuff has really focused people's minds. It is unfortunate that it has had to come to that, but, in a way, it is a good thing, so we are pushing quite hard on different parts of Government, but it is quite difficult because we kind of go and see the DfT and we talk to Defra and we will talk to the Treasury and we will talk to whoever, and it just feels like that is quite hard work and obviously, when you think about the NO_2 issue where you have got many cities that are going to be confronting the same problem, it just feels, with the potential for endless discussions without any kind of focus, that co-ordination is going to be quite difficult. I am not sure, but Defra has got the responsibility to deal with this issue, but they do not have all the levers. Most of the levers sit somewhere else and the funding sits somewhere else, so I do not know what the right solution to that problem is.

Q17 Jo Swinson: Is it just that it is not high enough up the other government departments' agendas or is it ultimately that there are actually conflicts between the different departments on this issue?
Ms Dedring: I think it is more conflicts between air quality and other issues and how do you sort of balance those things. It is a difficult issue on transport, and again why you would want to deal with it with a lot of advance notice is that the turnover in the fleet in London, for example, is about 7% a year, so it is not as if half the vehicles are turning round every year, so you want to have a lot of advance notice of new standards coming in and you just want people to only be able to buy clean vehicles, and that is the perfect scenario. If you do not have that, then you are basically talking about imposing an unexpected cost on individuals or businesses and that cost is either going to be borne by them or it is going to be borne by us because we are going to pay them to upgrade their vehicle, but indirectly it will be borne by them through the tax regime or through some other form of charging, so you just do not want to end up there in the first place. I think it is more that there are certain tensions between, for example, the carbon agenda and the air quality agenda and sometimes they push in the same direction and sometimes they do not and there is not enough tied-up thinking on that. Even in the GLA, it is hard to constantly remember to balance those two things. Combined heat and power is an interesting example where you would want to have biomass fuel CHP plants, but in certain cases actually they can contribute to poor air quality, so we have to be quite careful about how we balance those two things. I think some of that is more accident than design, I guess, in terms of some of the tensions.

Q18 Jo Swinson: Just looking at your NO_x graphic of London and the sort of hotspots, as you can expect, the central London bit is quite yellow with little red bits on the main routes, but there is then this rather large yellow blob to the south-west which, I imagine, is Heathrow.[5]
Ms Dedring: Yes.

Q19 Jo Swinson: Looking at the estimated reduction of course from 2006 to 2015, you have got most of the forms of transport reducing NO_x emissions, but the airport just staying steady at the same block. Do you think that is a conflict in terms of the GLA's point of view for the London plan for air quality, and how much of the Heathrow expansion, because presumably, if it does expand depending on the timescale that we are talking about, it might be beyond that graph, but that is just going to have a negative effect?
Ms Dedring: That is one of the big reasons we have opposed the expansion of Heathrow and the construction of the third runway because it is a

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combination of aircraft as well as road traffic going in and out of Heathrow. There are things that you can do at the margins to reduce that, but we were just starting with "Let's not increase it" as a starting point, but yes, it is definitely an issue. That is one of the arguments for, whenever you might think about it, moving the airport, for example, to the Thames Estuary and moving more activity to other airports where there is less population density, not just for over-flying and noise reasons, but also because of the exposure to air quality. It is one of those things that is quite difficult to explain to people because, if you say, "I'm going to shift the air pollution from here to somewhere else", that does not seem any better, but obviously it is about exposing human beings to it, so it is not something that you would want to have co-located with a densely developed urban area; it just does not make any sense.

Q20 Jo Swinson: What do you think are the key things the Government should be doing that they are not currently on air quality?

Ms Dedring: There is a long list!

Mr Cousins: Overall, there are measures particularly to do with NO_x which, we think, could be taken. We talked earlier about how NO_x is a problem across the country, not just in London, so we would like to see low-emission zones promoted across the country, so we think a national framework for low-emission zones would be very helpful. We also think that, if we are going to have a NO_x standard in low-emission zones, then you need some sort of certification scheme for vehicle retrofit. There is a similar scheme for particulate matter traps, but nothing yet for NO_x traps and NO_x abatement equipment, so we would like to see a certification scheme put in place and that could help not just for low-emission zones, but also for tax incentive schemes and other such incentives. We think that targeted scrappage schemes would help because we have seen the success of the scheme for private cars. If it were targeted at certain sectors, like taxis, for example, then that would have significant benefits for urban areas, and also we would like to see funding for vehicle retrofit because that is one relatively cheap way in which operators can really make a difference and reduce their impact on air quality. We would like to see further incentives. I know that the Government is doing a lot of work on electric vehicles and cleaner fuels and technologies, but we would like to see further work done in that area and again tax incentives or other schemes to actually encourage the construction of these vehicles. One area we have not really talked about so far is that about 20% of NO_x emissions in London are caused by domestic heating systems, so we think that there is an open goal here really. We could have schemes which address fuel efficiency and heating efficiency which benefit not only carbon dioxide emissions, but also reduce emissions of NO_x, so you would have fuel efficiency and energy efficiency schemes which had two benefits there as well as saving money for users. I think also that there are knowledge gaps. We have already talked about the fact that we do not really understand why emissions seem to be going down, the concentrations, but the actual air quality is not improving as fast. I think we need to know more about that so that local authorities can put in place measures and policies which are actually going to address the real causes. I think also another area that we touched on is tyre and brake wear and, even though it seems relatively small, whilst Euro standards are addressing exhaust emissions, there is no similar regulation for tyre and brake wear, so, whether it is done at the national level or, more likely really, the European level, we think there needs to be some sort of regulation for tyres and brake systems to similarly reduce their emissions.

Ms Dedring: One other thing where doing it at the national level just makes more sense is communication around the health impacts of air pollution and to consumers as decision-makers. When you buy your dishwasher now, pretty much people know that they should look for an A or B-rated thing and it is quite a simple graphic, but there is no equivalent thing for your car that says, "This one is bad for your kids when they stand behind it and this one isn't". Again, that is quite a low-cost thing to do and an easy way to get the message across to consumers, and the very same people who probably complain about their children being exposed to pollution from trucks will then go out and buy quite a polluting vehicle themselves, so those kinds of things. Then, also the communication around the impacts of air pollution and how to avoid it for vulnerable groups, again that is something that really would be a lot easier to do systematically through the health networks. It is good in some places, but it is quite patchy a lot of the time. Obviously, we all want to live in a scenario where there are no emissions anywhere in London and everybody does not have to worry about it, but in the interim we do need to improve how we communicate where the problems are and when they arise.

Q21 Mark Lazarowicz: On this issue of the health implications of poor air quality, we have had some written evidence that suggests that some of the Government's estimates are on the low side for the actual consequences of poor air quality. Have you carried out any quantification yourself of the effects of poor air quality?

Ms Dedring: The one sentence for you is that we would tend to agree with that and we are doing a piece of work in the next chapter of the Air Quality Strategy, looking at exactly that question, which is London-specific, but obviously it is not really London-specific and it is seeking to quantify that. In the first draft, we have just said, "There are significant health implications and impacts, thousands of deaths a year, and, therefore, you would want to do something about it, whether it is a thousand, 8,000 or 16,000 people".

Q22 Mark Lazarowicz: You are still doing the research for it?

Ms Dedring: Yes, it is something that we are doing at the moment. I do not know whether you want to say anything more about that, Simon.

Mr Cousins: I think there are two reasons why we are doing this. We are going to be looking at quantifying the impacts in health terms, firstly, because I think it is important that we sell the message that air quality is not just an environmental issue, but also a health issue, and we can do that if we can actually illustrate what the impacts are. That is also going to persuade decision-makers, local politicians and local officials, that air quality is an important issue. There is always an element of air quality being the Cinderella issue compared to climate change, so we need to make clear that it really is something that is affecting local residents' lives. The second reason is that, when we come to implement the Strategy, we need to know where the health impacts are worse so that we can actually target our measures to where they are going to have the maximum impact on human health, so that is why it is important that we look at it, not just in the whole and come up with a figure, but that we also target and look at where the actual geographical areas are most affected.

Q23 Mark Lazarowicz: So the picture we get certainly is that the overall understanding of the effects of poor air quality is pretty patchy amongst both Government and local authorities. Is that fair or is that too much of a generalisation?
Mr Cousins: I think that probably is fair to a certain extent. The government advisory body, COMEAP,[6] has recently carried out some further research on the impact of particulate matter and I think really it is just a question of all of us, Government and local authorities, carrying out further investigations in our own areas to see what the actual impacts are.
Ms Dedring: But also coming up with a shared view. There is not a single view where you could say that every unit of air pollution equals that many years of life and then again going back to some of these really boring points about business cases and things like that, but then every time a funding decision gets taken, you can put a number in, but at the moment nobody agrees what the number is, so it is just a generic, "Does this tackle air pollution?" "Maybe", so that would enable it to become a much more hard-nosed issue in the way that it is tackled, and we can form a view ourselves, but that will not necessarily solve the problem at the national level; it will not.

Q24 Chairman: I think we have covered most of the ground. Are there any other burning issues you wanted to mention in relation to this?
Ms Dedring: On air quality particularly?

Q25 Chairman: Yes.
Ms Dedring: Not really. It is quite a frustrating issue because I think it is something where, if you talk to Londoners, they really care about it and it is something that people would consistently rate at the top of their environmental concerns, and I am sure you find that nationally, but we have not had the level of activity on this. There has been a lot of good stuff that has happened and low-emission zones are good, they are useful, the Congestion Charge is good and useful and the things that we are trying to do on black cabs. We have put in the Air Quality Strategy that one of the big sources of PM in central London is all the black cabs that are 15 or 20 years old still running around on the road, and the particulate traps that we put into those kinds of vehicles do not really work the way they need to work. Then there is some of the stuff that we are doing round buses. It is all to the good, but there just simply is not the level of focus and attention and it is quite like pulling teeth, I think, to get people to say, "Right, what are we going to do to actually get there and try and shift the boat around again quickly enough, given that we've sort of not paid attention to this issue at the level that we needed to in the past?" Funnily enough, people love electric vehicles, for example, because it feels like, "I don't have to compromise anything about my lifestyle, but I'm going to get an environmental good out of it" which is a zero-emission vehicle, so it is changing and I think the situation is improving quite a lot, but we are just not seeing that scale of activity, I think, that we need to see and the sense of pace which, I think, is needed.

Q26 Chairman: Well, thank you very much for coming in; it has been a very useful and interesting session.
Ms Dedring: Thanks for having us.

[6] Committee on the Medical Effects of Air Pollutants

Supplementary memorandum submitted by the Greater London Authority (AQ 32)

This letter responds to the request from the Committee for further information relating to the London Low Emission Zone (LEZ) and the study that has been commissioned by the GLA into the health impacts of poor air quality in London.

In summary, the GLA recommends that the Government should take the following actions:

- Establish a national oxides of nitrogen (NO_x) standard for Low Emission Zones across the country.
- Carry out trials of NO_x abatement equipment on a range of vehicle types.
- Introduce a testing and certification scheme for NO_x abatement equipment.
- Include a nitrogen dioxide (NO_2) limit as part of the standards for NO_x abatement equipment.
- Introduce a NO_x retrofit incentive programme to encourage widespread uptake of NO_x abatement equipment and to mitigate the costs to operators of possible LEZ extensions to NO_x.

London Low Emission Zone

The LEZ currently has standards for particulate matter (PM) for HGVs, buses and coaches. There are a number of ways in which operators with older vehicles that do not meet these standards can become compliant, including vehicle replacement and the retrofitting of PM abatement equipment. The retrofitting option is especially important as for many operators, particularly smaller organisations, it is more cost effective than vehicle replacement. To allow retrofitted vehicles to be classified as compliant with the LEZ standards, a thorough testing and certification scheme for abatement equipment is required. This provides reassurance to both operators and scheme administrators alike that a particular piece of equipment genuinely makes the emission reductions required.

The LEZ has been effective at reducing emissions of PM_{10} across London from the heaviest, most individually polluting diesel vehicles. Given that the problem of NO_2 pollution in London is even more severe than that of PM_{10}, and that concentrations of NO_2 are high at a number of locations across the capital, ideally the LEZ would also include a NO_x standard. However, without a national certification scheme for NO_x abatement equipment, as there is for PM abatement equipment, it is not practical to introduce such a standard, as this would prevent vehicle retrofit from being a compliance option. The Mayor has proposed in his draft Air Quality Strategy to introduce a Euro IV NO_x standard for HGVs, buses and coaches as part of the LEZ from 2015. This would be dependent on the Government delivering a national NO_x standard for Low Emission Zones, with an associated NO_x abatement equipment testing and certification regime for vehicle retrofit.

Central Government Support

A large number of towns and cities in the UK are exceeding the EU limit values for NO_2. It is therefore in the Government's interest to address this problem at a national level with a solution that will effect change across the whole country. A UK-wide approach would make it easier for local or regional authorities to implement control or incentive schemes in areas with high concentrations. It would also ensure that schemes are consistent with each other, minimising compliance costs for operators.

The Mayor cannot take effective action to address NO_x emissions in London through the LEZ unless the Government establishes a national NO_x standard with an associated testing and certification regime for abatement equipment. Such a regime would be necessary in order to be sure that retrofitted vehicles meet the standard. The GLA Group does not have the resources to develop such a certification scheme, which the Government is best placed to deliver, especially as it could then be applied to other potential future Low Emission Zone schemes in the country. Were the Government to do this, a grant scheme or incentive for vehicle retrofit would mitigate to some extent the compliance costs for vehicle operators as well as encouraging the widespread uptake of abatement equipment across the country. So far the Government has provided no indication that it endorses this approach. This may be due to concerns about the effectiveness of NO_x abatement equipment, which the GLA does not share.

Timescales

Based on TfL's experience of developing standards and certification schemes for equipment and vehicles for the LEZ and the current development of NO_x abatement technology, it is our judgement that developing a NO_x standard would require a minimum of three years to complete. Therefore the earliest a NO_x standard could be in place would be 2013.

In addition, the Mayor must consider the potential compliance costs for vehicle operators and the impacts these could have on the wider London economy. The Mayor has set out his desire to announce proposed alterations to the LEZ as early as possible to maximise compliance time. The Mayor feels that five years (from the launch of the Air Quality Strategy in 2010 to the possible introduction of a NO_x standard to the LEZ in 2015) would be an appropriate compliance period for operators.

Developing a NO_x Standard and Potential Barriers

TfL has identified distinct phases that would need to be undertaken to develop a NO_x standard:

1. *Research of NO_x abatement solutions that could potentially bring HGVs, buses and coaches up to the Euro IV standard for NO_x.*

A 30% reduction in NO_x emissions would be required to bring a Euro III vehicle to the Euro IV standard and a 60% reduction would be needed for a Euro I vehicle to meet the Euro IV standard. Abatement equipment would therefore need to be highly efficient to achieve these reductions consistently.

The Euro standards enforce a NO_x cap with no reference to the split in emissions between NO and NO_2. Vehicle manufacturers therefore seek to limit total NO_x emissions irrespective of the ratio of NO_2 to NO from a vehicle. Concerns have been expressed that the fitting of NO_x abatement equipment sometimes increases emissions of NO_2 as a proportion of NO_x from a vehicle. NO_2 adversely affects health and this is therefore a concern to air quality professionals, especially since national objectives and EU limit values are for NO_2 rather than NO, which poses much less of a threat to human health.

However, the data giving rise to these concerns has been based on 'drive by' emission tests. These are remote measurements taken as a vehicle drives by, so they are recorded at only one speed and load condition. This means that they are not representative of all conditions and cannot be compared to legislated emissions (ie. Euro standards). It is true that some exhaust emission abatement technologies that contain platinum group metals can increase NO_2 emissions. However, it cannot be stated that PM or NO_x abatement equipment increase NO_2 per se. The GLA would recommend that any national NO_x standard should also include limits for NO_2.

Abatement devices can deliver a large NO_x reduction such that even where a higher percentage of total NO_x emitted at the tailpipe is NO_2, there is still a substantial reduction in overall NO_2 emitted from that vehicle. It may be necessary to accept that to develop a commercially viable device, some increase in the NO_2 ratio may be necessary within an envelope which nevertheless reduces the overall mass of NO_2 emitted.

As well as establishing a retrofit standard, consideration would need to be given to in-use (ongoing) compliance of abatement equipment. For example, Selective Catalytic Reduction (SCR) systems need to be replenished with a reductant (typically urea solution) in order to reduce NO_x emissions. In new vehicles, when the urea tank is empty, the engine's power is reduced to indicate that the SCR system is not working. Retrofitting the engines of older vehicles in such a way is not likely to be feasible as a monitoring solution. Some other means of monitoring in-service performance, either via the technical standard developed or via the certification system, would need to be developed.

2. *Pilot trials of technologies*

Retrofit technologies such as SCR have been trialled by TfL in its bus fleet and have demonstrated a 65% NO_x reduction over a "real-world" London drive cycle. A further pilot of NO_x abatement on the TfL bus fleet is to be undertaken towards the end of 2010. Data from this trial could contribute to developing a technical standard for national NO_x abatement equipment. The GLA recommends that the Government should undertake further trials on a range of vehicle types.

3. *Establishment of a national standard*

Meeting the NO_2 EU limit values is a problem across the UK which requires action at national level. The vehicles addressed by the LEZ (HGVs, buses and coaches) tend to be long-range vehicles that travel between cities. A single national LEZ standard would make compliance more straightforward for operators: vehicles compliant in one area would be compliant across the country. In addition, regional markets would not become distorted by different, local emission standards.

It is strongly recommended that detailed consultation with the abatement equipment industry should form a core part of the development of any standard to ensure that it can deliver commercially viable abatement devices that meet the standard. The abatement equipment industry would be required to invest significant amounts of money in advance of a NO_x standard being implemented to develop market-ready solutions and put these forward for approval within the national framework. The Government should make its intentions clear so that the UK is seen as a potential market for abatement devices. This would provide confidence to the industry and would ultimately keep prices for vehicle operators competitive.

Establishment of a national approval mechanism for abatement devices would be critical. Devices would need to be tested against a rigorous approval system to ensure that they operated as required under the standard, thus providing assurance to authorities administering control schemes. The approval procedure would also need to provide operators with confidence that the systems fitted would be safe, effective and not damage their vehicles.

4. *Establishment of a national certification system for abatement equipment*

A control system such as the LEZ cannot operate without effective certification to ensure that standards are adhered to and to prevent fraud. There are three components to the current LEZ certification scheme for abatement equipment:

— company (or supplier) approval;

— technology approval; and

— vehicle certification.

The Vehicle Certification Agency (VCA) is involved in the company approval and technology approval, which requires the supplier to pay a one-off cost (currently between £3,000 and £5,000) followed by annual reassessment costs of around £1,000. the Vehicle and Operator Services Agency (VOSA) carries out the vehicle certification process, which can be combined with the vehicle's annual test. VOSA charges a small fee to the operator for the certification process (£32), which is reduced to £19 if it is combined with the annual test.

NO_x abatement for light duty vehicles

Unlike heavy duty vehicles, NO_x exhaust after-treatment abatement technology (such as SCR) is not common in light duty vehicles. The different duty cycles and lower exhaust temperature of light duty vehicles mean that the technology is not as effective on these vehicles. In addition, the physical size of some systems means they may be difficult to retrofit to light duty vehicles. Economically, such NO_x abatement systems are likely to cost more than the vehicle is worth in many cases.

Light duty vehicles generally employ exhaust gas recirculation (EGR) to control NO_x, which is integrated into the engine's control system and less suited for retrofit. EGR systems alone would not provide the NO_x reduction required to bring early Euro standard vehicles up to a Euro 4 level for NO_x.

Given that viable and affordable retrofit options are not currently available for light duty vehicles, it would be extremely difficult to introduce a NO_x element to the LEZ for these vehicles in the short-term. This is because the compliance costs would be extremely high for non-compliant operators as they would have to replace their vehicle (rather than retrofit) to meet the NO_x standard. Longer-term this could change if more viable and affordable retrofit options become available.

Health Study into the Impacts of Poor Air Quality in London

The GLA has commissioned a study into the health impacts of poor air quality in London. This will provide estimates of the number of deaths per annum attributable to poor air quality in London and the total loss of life years implied by these numbers. The research will use the coefficients recommended by the Government's advisory committee, the Committee on the Medical Effects of Air Pollutants (COMEAP) in its recently published report on mortality and long-term exposure to air pollution, as well as "uncertainty bounds" to take into account the possible unknown factors that could also have an impact on health. We believe that this is the first piece of research into the health effects of poor air quality on London's population as a whole for several years, and certainly the first since COMEAP published its new coefficients. The high-level results of the study will be included in the next draft of the Mayor's Air Quality Strategy, which is due to be published for public consultation in the spring. The final report of the study will also be published on the GLA website.

The Strategy will include policies to raise awareness of air quality in London. For example, the GLA will develop a website that will provide information and advice about air quality in London and will seek to work with central government, boroughs and health professionals on awareness campaigns. We hope that the clear data on health impacts that the study will provide will help persuade Londoners to make changes to behaviour to reduce emissions. The data should also encourage policy makers in London to appreciate the urgent need for measures to reduce concentrations in the capital. We believe that policies could be more effective if developed and implemented jointly by air quality practitioners and the health sector. Unfortunately, in London, the public health sector is quite disparate and it is not always easy to take coordinated action. If the Government were to take a lead by involving the Department of Health more in air quality policy development, it is likely that this would encourage coordination at a local level as well.

The results of the study will be broken down to ward level. This will help the GLA and London boroughs apply particular measures where they will have most impact. TfL is currently developing packages of measures that will improve air quality at the small number of locations in central London that are at risk of exceeding EU limit values for PM10. The experiences gained in implementing these packages could allow a similar approach to be taken at other locations where concentrations may not be quite so high but where population exposure is a problem. The GLA will share information with the boroughs to identify such locations and will help them to develop packages of measures to improve local air quality.

22 February 2010

Tuesday 9 February 2010

Members present:

Mr Tim Yeo, in the Chair

Mr Martin Caton
Martin Horwood
Mark Lazarowicz
Dr Desmond Turner
Joan Walley

Memorandum submitted by TRL (AQ 22)

TRL is a leading research and consultancy organisation, with wide-ranging experience in the environmental impacts of transport. TRL has worked in the field of air quality for more than 40 years. We have over 50 staff in our Centre for Sustainability, of which some 13 staff are professional researchers in the fields of emissions and air quality. We have a comprehensive understanding of the relationships between transport policies and emissions, and have been pivotal to the development of a number of modelling tools for different transport modes. TRL was responsible for the recent revision to the UK road transport emission factors, as published by the DfT. In addition TRL developed and has operated since the early 1990s, the Highways Agency roadside air pollution monitoring network. Therefore one of TRL's key research themes is the relationship between transport emissions and air quality. Typically, TRL operates a network of approximately 30 continuous air pollution monitoring stations, for a range of local authorities, engineering consultancies and central government clients.

TRL is therefore well placed to provide a view on the various questions raised in this consultation. Our responses to each of the key questions, is provided in the following sections. TRL would be happy to expand on any of these points, if they are of interest to the Committee.

Question 1: *Monitoring and modelling systems used by the Government and whether these provide an adequate measure of air quality.*

There are two main reasons to monitor and model air quality. One is for compliance with EU limit values (and AQS objectives) and the second is to understand the exposure of individuals and environments to air pollutants. The existing UK monitoring facilities are well established to monitoring against air quality standards, but are poorly designed to measure local conditions and human exposure.

The monitoring and modelling undertaken within the UK is widely acknowledged as being exemplary. However the monitoring network is based on high precision monitoring techniques which are relatively high maintenance. The additional emphasis on an extensive QA/QC also adds considerable costs to the operation of this network. Whilst those sites used in reporting air quality limit value compliance to the EU must meet specific minimum standards, it is arguable if this high cost approach is really required for all monitoring situations.

The choice of TEOMs for use in the measurement of particulate matter indicated that Defra failed to appreciate the composition of ambient particulate matter, and the impact of this composition on this measurement technique. This was surprising. The results from the early equivalence trials were not widely disseminated to the air pollution community, and this reluctance to be transparent is to the detriment of Defra. In addition the development of the "correction tool" for TEOM data (VCM) was undertaken with limited consultation and third party scrutiny. Given the importance of confirming an appropriate measurement technique for PM, it would have been appropriate to consult on the use of the VCM model and the adoption of the FDM-TEOM measurement system.

Defra must be praised for the wide dissemination of the monitoring data from its networks. This enables additional data scrutiny and analysis by third parties. However, whilst funding is made available for monitoring (equipment and calibration), insufficient time and resources are made available for the analysis of data. The emphasis on measurement rather than data analysis should be addressed. This lack of data analysis limits the value of these data.

To better understand air pollution data, it would be better to integrate these measurements with the measurement of local traffic (flows, speeds and composition) and meteorological conditions.

In many cases monitoring data are extracted as the "source increment". This process requires the identification of suitable background sites. However, the Defra network was not established to allow this type of paired-site analysis.

It is not surprising that the TEOM method has now failed its equivalence testing against the European reference method. The robustness of the VCM correction method is questioned.

The modelling of air quality is widely undertaken in the UK, and forms a key component of the local air quality management system. The modelling is undertaken at two levels–the derivation of background concentrations, and the modelling of superimposed sources using models such as ADMS. Crucial to the estimation of pollution concentrations is the appropriate estimation of background concentrations. Within

the UK, this area is dominated by the mechanistic model developed by AEA. These types of models are good for existing and historic situations, but are less reliable for the prediction of future conditions. This remains a weakness in the UK air pollution modelling.

The link between the control of local air pollutants and CO_2 remains poor.

The existing monitoring and modelling fails to identify local level air pollution hotspots.

Question 2: *The extent to which the Government fully understands and has identified the health and environmental risks caused by poor air quality.*

During the 1950s, the UK were at the forefront of research into the relationship between air pollution and health. However no one government department takes responsibility for this issue, and this results in unnecessary confusion. However the work of COMEAP must be praised as a body that brings together knowledge in this sector. However, the chair of COMEAP has once again stated that there is no justification for health effects associated with NO_2, at ambient concentrations encountered in the UK. Given that the reduction in NO_2 concentrations has been central to the Government's local air quality management process, it does call into question if these activities have offered the best value for money. A strategy that focuses on PM concentration reduction would have had a more beneficial impact on health protection.

The Government claims to be seeking ways of reducing the public exposure to air pollutants, but it is unclear if they understand what this means. Large scale dosimeter measurements are not undertaken. The measurement of ambient air quality provides little information on human exposure.

Question 3: *The extent to which the delivery chain for air quality is coherent, integrated, coordinated and effective and whether the bodies with responsibility for managing air quality have appropriate incentives, understand their role and responsibilities, and are adequately resourced.*

Air quality management in the UK is cascaded to the local authority sector. Whilst guidance and funding is available from Defra to support this process, the cascade of this responsibility is not the most efficient way to establish consistency in the derivation of compliance with standards/objectives and air quality trends.

In many cases local authorities have limited knowledge and skill sets, and more importantly involve pollutants and processes over which they have little control. This is particularly the case for O3, and the background concentrations of PM and NO_X. The provision of technical help desks appears to be a good approach, but is restricted by the limited number of experts an organisations involved in the provision of advice. The involvement of professional organisations such as IAQM should be encouraged, rather than the current reliance on single Defra consultants.

The local air quality management process focuses on procedures, rather than understanding.

Local authorities are responsible for the development of air quality action plans. However, these action plans are often poorly funded, and lack monitoring to ascertain their real benefits to local air quality.

Coordination of air pollution responsibilities between government departments, Defra, HPA, DfT and agencies such as the Highways Agency and the Environment Agency appears poor and lacks an integrated approach.

The greater participation from the regional authorities is recommended. The role of AQEG has been influential in the consensus on air pollution monitoring and modelling. However, whilst the regional authorities are party to groups such as AQEG, they failed to actively participate.

Question 4: The steps that need to be taken to ensure that air quality targets will be met in the future.

We would like to propose the following:

- More work on source apportionment.
- A wider appreciation on non-exhaust PM emissions.
- An improved integration of the research agenda with the Research Councils.
- More active engagement with the wider research community. Advice to Defra is dominated by a few suppliers which can limit the wider consideration of views.
- The further use of instantaneous emission modelling is recommended.
- To limit the turnover of staff in the air quality division of Defra. The majority of staff are relatively new to the discipline. In the event that the long term and stable lead by Martin Williams changes, then the skills of the department must be questioned.
- A greater role for the Environment Agency in the monitoring of UK air quality.
- An investigation of the decoupling of the downward trends in estimated emissions and the response in roadside air pollution concentrations.
- An assessment of the performance and successes of the roll out of air quality action plans.

14 December 2009

Witness: **Dr Ian S McCrae,** Senior Technical Manager, Energy, Emissions and Air Pollution Group, Transport Research Laboratory, gave evidence.

Q27 Chairman: Good morning Dr McCrae; welcome to the Committee. Thank you for coming in and also for being here a few minutes earlier as we despatched our private business very quickly today. Can I start off with a general question? The UK is not meeting either its own targets or the EU targets for air quality; how far do you think that the level of air pollution here is caused by transport?
Dr McCrae: Transport is a significant source of air pollution in the UK and across Europe. In very general terms for something like oxides of nitrogen it is something like 40% from transport; for particulate matter again it is something like maybe 25%. It is those sorts of figures and they are biased, of course, by the different vehicle types, diesel vehicles being quite dominant in the generation of particles. We can go into more details about some of these data; they are available and quite well reported in the National Atmospheric Emissions Inventory.

Q28 Chairman: Are those two that you have just mentioned the main sources of pollution from transport?
Dr McCrae: They are the most important ones in my mind in terms of our ability not to meet the European limit values. Of those, in terms of the health impact, I would probably bias towards the particulate matter as being the most important in terms of the health impacts inasmuch as particulate matters have no safe level of health protection and, therefore, it is a matter of balancing risk and cost and things.

Q29 Chairman: In the briefing that we had from the National Audit Office in preparation for this inquiry, I was quite startled by the extent to which life expectancy is reduced by poor air quality; it is quite a substantial cause of people dying a significant amount sooner than they otherwise might. It is not an issue that gets as much attention as I would have thought it deserved given that circumstance. Do you think we understand well enough how vehicle emissions actually contribute to poor air quality?
Dr McCrae: I think we understand that road transport and other forms of transport are mobile sources. There are very high proportions of traffic and movement in urban areas where people live and, therefore, there is a link between emissions from transport sources and exposure of populations to particular pollutants. My own feeling is that some of the messages on the health impacts are confused and particularly confused in terms of the public. If we want to have people making changes in their behaviour—which is what we need to improve our emissions from the transport sector—we need to have that message very much more clearly defined. As to your statement on the number of deaths associated with air pollution, I find those figures very confusing and I do not really know whether it is to do with the reduction of an average person's life by a few months which does not seem so important or individuals who are very susceptible or who have existing diseases whose life expectancy is reduced by many years, and that is quite a different parameter. I think the whole issue of exposure is something that we poorly understand and is poorly researched and poorly financed. The monitoring networks in the United Kingdom are pretty impressive, there are a large number of monitoring stations in a large number of environments, but we use that data collected from the monitoring stations to characterise exposure and then we seem to miss the fact that most of us spend most of our lives indoors and, therefore, what we measure in a street or an urban background situation does not reflect the exposure or the dose that we experience as we go through our normal lives.

Q30 Mark Lazarowicz: To what extent do you think the effects of poor air quality are understood across government?
Dr McCrae: The Department of Health and the Health Protection Agency have a very important group through the work with COMEAP[1] and they have been generating over the last 20 years a whole series of reports that really go into quite a lot of detail on the processes of emissions and health impact. They are widely read and widely responded to by government departments. The issue I always have with government departments, of course, is that they could always be more joined-up and that goes almost without saying. However, I think that is a weakness in government departments; often the health part is in one part, transport is in another part and the environment is in another part. Really to look at improving the environment, particularly air pollution, we do need this multi-disciplinary approach to any particular solution.

Q31 Mark Lazarowicz: Are there any areas where there are policy drivers which are tending to worsen air pollution and air quality which are, as it were, working against a joined-up approach and working against those departments which are trying to reduce air pollution?
Dr McCrae: I think there is always a tension in the two agendas, one being the climate change agenda—which is predominantly looking at the reduction in carbon emissions—and the agenda for improving local air quality. There is a tension there and there is a compromise between the two disciplines. I think there are many cases where we seek to improve local air quality. In my own experience, the early introduction of the three-way catalyst, for example in motor vehicles, in the early development of its technology had something like a fuel consumption increase of a few per cent and that goes against the agenda that we have for climate change where we want to see that moving in the opposite direction.

Q32 Mark Lazarowicz: Are there policies which are moving towards action which is actually detrimental to air quality? One thinks about certain areas, about road development, for example, or indeed looking at

[1] Committee on the Medical Effects of Air Pollutants

other departments' planning policies, for example; are they taking air quality issues into sufficient account?

Dr McCrae: A lot of my work is looking at the impacts from particular road developments and we can see there the work of the Highways Agency—they look after the high-speed road network as an asset for the UK—and what they attempt to do is to design roads to carry high traffic flows. What you have at that point is that is acceptable if you pull traffic away from other parts of the network which are less well designed to carry those flows, so with the development of a high-speed road network you can have a disbenefit along that particular high-speed corridor but benefits further afield as you move traffic away from smaller roads onto the high-speed network.

Q33 Mark Lazarowicz: Are there any ways in which information and resources can be shared more effectively between Defra, local authorities, universities and other government departments, for example?

Dr McCrae: I am sure there are and, stepping slightly aside from that, one of the key things we want to see an improvement in, in local air quality, is communication, and I feel it is communication with the public. What that has to be is messages which are clearly understood and allow the public to act in small ways that could contribute to the improvement in air quality. That message has to be brought forward from integrated policies across government departments.

Q34 Mark Lazarowicz: It is the UK, of course, which is obliged to meet EU standards but most of the departmental work here is only dealing with the situation in England. Are you aware of what measures or steps have been taken to ensure that the devolved administrations also comply with the EU policies? Obviously it is the UK that would be responsible for any breaches on the part of those devolved administrations.

Dr McCrae: The UK has developed and has a very comprehensive air quality strategy and that does apply to England and the devolved authorities. It is actively serviced in terms of the support of that policy with the development of tools and assessment criteria. I am quite confident that it is done fairly uniformly across the UK.

Q35 Dr Turner: Emission standards keep tightening, particularly European standards. How effective do you think this has been in improving roadside air quality?

Dr McCrae: A few years ago it was often thought that the introduction of technology on motor vehicles and all forms of transport would be the solution to air quality issues; they would see a continuing reduction in allowable limits for motor vehicles and that would result in an improvement in air quality. That reliance on technology has probably been shown to be not particularly robust and what we see now is that many forms of technology operate quite differently in different environments. A technology on a heavy goods vehicle that may well be effective on a high-speed road network may not perform as well in an urban environment. That is quite important because that is where most of the population are and that is where the exposure can be a real issue.

Q36 Dr Turner: Do you think these technology failings, in a sense, are part of the explanation of why we have not seen greater improvements?

Dr McCrae: I think it goes a long way to explaining some of the trends that we have seen recently in our estimated downward trends that we still see in transport emissions; emissions of NO_x, emissions of particulate matter we estimate downward trends into the future. What we have since about 2000 is a levelling off of the air quality in response to those emissions improvements. We do not see the same sort of gradients in terms of the improvements in air quality. My feeling is that is probably a weakness in the emission factors that we use in our models and that is a weakness of the understanding of the technologies and how they perform in real service.

Q37 Dr Turner: To what extent are we attributing failure to technologies which are perhaps not intrinsic in the technologies themselves but down to the standards of maintenance and enforcement?

Dr McCrae: On relatively old vehicles maintenance is very important. Since the introduction of the three-way catalyst in the early 1990s modern motor vehicles are essentially computer controlled in terms of their engine management systems and they are very much more stable in terms of emissions signatures; they either work well in terms of emissions or they work very poorly. There is an increasing amount of legislation coming in to allow us to identify when vehicles are operating poorly so either they are good or they are bad. Previously, in older generations of vehicles, there was much more of a distribution of emission signatures from vehicles and now I believe they are either good or bad and, therefore, the answer is to identify those vehicles that are failing. We do have in-service testing—the MOT system for light duty vehicles and the plating system for heavy goods vehicles—and in general that test has the ability to pick up most of those failures.

Q38 Dr Turner: What ways do you see for the future of further reducing vehicle emissions?

Dr McCrae: I believe that if you want to do this then technology has a role in introducing new technologies and we see, for example, the introduction of SCR[2] (which is another form of catalyst treatment on vehicles) will have an improvement on NO_x emission if we optimise the vehicles and the duty that those vehicles are operating under, but only if they are optimised for those particular conditions. We could make all these technological changes and we could do other issues such as the softer measures in terms of smarter driving, smoother driving characteristics, eco-driving type initiatives. Fundamentally though, if we

[2] Selective catalytic reduction

really want to have a reduction in emissions, we do need to have a change in our desire for mobility and this is traffic reduction; we do need to have a reduction in the amount of fuel burnt and, therefore, a change in our mobility patterns, a modal change moving away from the private car into other forms of transport which is very achievable in a city like London.

Q39 Dr Turner: It is achievable but every time you stand next to the exhaust of a bus you doubt it. If we tighten the emissions standards further and extend them to more pollutants, how expensive is this going to be?
Dr McCrae: I do not have figures for the actual cost in terms of the technologies that would be required to add to the basic cost of a model; I do not have those to hand, but we can try to find those out for you.[3] There are some clear costs per lump of technology that one could introduce.

Q40 Dr Turner: What about the contribution of brake and tyre wear towards air quality, particularly PMs?
Dr McCrae: Brake and tyre wear is very important and it is one of the areas which has received very little work over many years. All the products of abrasion—so this is brake, tyre and road surface abrasion—are very significant in terms of the generation of PM_{10} concentrations to the roadside location. For me, the weakness in those is that we have some data on brake and tyre wear but it is relatively weak in relation to what we might consider more robust data for the conventional pollutants coming from motor vehicles where we have a fair amount of data. It is an area which has an immense paucity of information. One of the key areas where there is virtually no information is on the abrasion of the road surface which can be very important. Added to those three abrasion products of tyre, brake and wear, one of the key parameters that we need to think about is the re-suspension of particulate matter. This is particulate matter which is lying on the surface of the road which is entrained in the vehicle's wake and causes a cloud behind the vehicle, and that can contribute to roadside concentration of between a very small figure—a single percentage figure—up to almost 60 or 70% of roadside concentration. That is a great uncertainty; it could be a very small component or it could be a major component of a roadside concentration.

Q41 Dr Turner: Is that what you would describe as secondary particulate matter? Do you think transport actually contributes to that?
Dr McCrae: Secondary particulate matter is normally something formed in the atmosphere, so it is some of the compounds like ammonium sulphate and those sorts of particulate compounds. It is a secondary source of particles in that it is not directly emitted from the exhaust pipe in terms of brake and tyre wear, so it could be classified as a secondary source of particles. It is not legislated anywhere in terms of seeking reductions in emissions of that sector. Whereas exhaust emissions are regulated, emissions from tyres, breaks and road surface are not regulated.

Q42 Dr Turner: I take it that your laboratory has a research programme on vehicle pollution, particularly particulates. Can you tell us a little about it?
Dr McCrae: We are a project-based organisation so we compete in the market for research projects. Over the last few years our main ones have been looking at generating new emission factors for road transport. That is a fairly major programme, pulling in information from across Europe in terms of maximising the sample sizes and from those generating emission factors for road transport for all different types of vehicle classes. We have also done fundamental work on brake and tyre wear, working largely in relationship with funding from the European Community in terms of these multi-partner projects which you do need to generate the sorts of sample sizes that you want within the experimental domain.

Q43 Dr Turner: Has that offered any options for reducing brake and tyre wear?
Dr McCrae: We are not actually at that stage. What we have been trying to do is to categorise the contribution of those sectors—brake, tyre and road surface wear—to total particulate emissions and, therefore, trying to use that data to inform the inventory developments which can then be used to put weight on targeting the policies for reducing particular sectors which are the most important.

Q44 Martin Horwood: In the context of climate change mitigation we are also talking about the shift towards electric vehicles and hydrogen-powered vehicles and so on. Clearly these will still have brakes and tyres, so that kind of matter will still be an emission, but would you expect that to have a very dramatic impact on emissions from vehicles generally? Have you done any work on this?
Dr McCrae: At the point of use emission there will be significant improvements from moving towards electric vehicles. If you look at something like a hybrid vehicle we are looking at something like a 30% reduction in emissions from tailpipe pollutants and, indeed, a 30% improvement in fuel consumption. As you move towards fully electric vehicles obviously at point of use the emissions are moving down towards zero, other than those sources which are not coming from the tailpipe which are things like the abrasion products.

Q45 Martin Horwood: Although the shift is happening largely for other reasons it could have an extremely dramatic impact on air quality.
Dr McCrae: I think it could. There is obviously always a caveat on these issues and the big caveat is that the electricity or the power has to be generated somewhere and, therefore, we would want to

[3]

combine with those sorts of policies, if we want air quality improvements, a move towards that sort of de-carbonisation of the power generation industry.

Q46 Mr Caton: Moving on to the role of local authorities in tackling air quality, how successful has local air quality management been?
Dr McCrae: The local air quality management process, I guess, was triggered by the Environment Act some years ago and what Defra did within that process was to cascade much of the responsibility for the measurement—in this case it was referred to as review and assessment of air quality—to local authorities. That has been fairly successful. If you want to look at local air quality you need to engage with local authorities who understand the local area and the local sources and, indeed, in much of the work done by local authorities you do not have to have complex models and so forth to identify hotspots because most local authority practitioners would actually know where the major areas of concern are across their networks. I think it has been quite a successful process. As you might expect I have a small caveat on that, and that is to do with the fact that local air quality management is about reviewing, assessing and measuring something which is no help in terms of improving air quality. What you need to do for that is to generate actions that will improve air quality and the review and assessment process has to develop an action plan, but what I see as one of the weaknesses in that is not the development of the action plan per se but the funding of the initiatives within an action plan are often relatively weak so the money available to actually implement those changes which seem sensible often do not see themselves in the network because of lack of resources, and that is both staff time in local authorities but also finances.

Q47 Mr Caton: So is that a failure to give proper priority to the issue that is stopping councils developing air quality management strategies or setting up low-emission zones in your opinion?
Dr McCrae: My feeling is that local authorities and central government spend a long time developing the strategies. As a researcher, one of the things I see as a weakness is the lack of assessment of those strategies in terms of their effectiveness and that is not some instant thing, it needs some research to go on to actually look at assessing what are the most efficient measures to improve air quality, but then also, once we have identified a few of those measures, to actually have them implemented in the network does require financing. I think that is one of the weaknesses in the whole process. At the end of a review and assessment process the weakness is a lack of resources to implement action plans.

Q48 Mr Caton: Do councils have access to adequate information to monitor and improve their policies in air quality?
Dr McCrae: I think my own feeling is that local authorities have too much information. There is an immense amount of literature and information on the mechanisms of review and assessment; it is a very process-orientated system of measuring, assessing, modelling and reporting. Combined with that there are then all the various help desks which are available to local authorities to try and respond to particular questions that they may have on moving things forward with implementation. Then there are a whole range of technical reports from a range of bodies, including the reports from the air quality expert group that went some way to try to inform local authorities about some of the important issues in relation to particular pollutants.

Q49 Mr Caton: So as well as resourcing that we have already mentioned, how could air quality management best be improved at local level?
Dr McCrae: One of the complaints we often hear from local authorities is the lack of integrated work across government departments, so the difficulty engaging with the various government departments that are essentially stakeholders in that question, and they may be Defra, the Department for Transport, the Highways Agency, the Environment Agency. All these agencies need to be very joined-up providing very consistent advice to local authorities. I think it is often difficult for local authorities to seek that consensus from those bodies.

Q50 Joan Walley: You are talking very much from the technical aspects in terms of TRL and looking at the vehicle controls and pollution and so on. In terms of what you have just said about local authorities, I am interested in the planning aspect of this. You have said very clearly that you think local authorities have got all this superb detailed expert knowledge; I do not see much evidence from where I sit of what they do with that because I do not see the transport officers influencing planning decisions which tend to put the most polluting operations in the most inappropriate places in residential areas. Do you have any comments at all on the planning process?
Dr McCrae: It was not my intention to imply that local authorities had all this knowledge; they have the knowledge available to them. One of the problems with local authorities is that the air quality staff within local authorities often have to have several different hats so that air quality may be something they are doing on a Monday and the rest of the week they are looking after other disciplines within the environmental health agenda, so air quality cannot be their only focus. That is a problem in terms of the dilution of their resources. In terms of the impact of planning legislation on air quality, it is a key topic and it is one that needs more work to evolve over the next couple of years to really have some teeth within that. There have been some successful applications within the planning system to aid air quality. To give an example, the London Borough of Greenwich in the use of their section 106 agreements to try to allocate money from developments to air quality issues has been very successful and it is being rolled out across the country in terms of how to do it and how to do it most effectively.

Q51 Joan Walley: Could you just elaborate on what kind of benefits might come from section 106 in terms of improving air quality?
Dr McCrae: Section 106 is an agreement between a developer and a local authority to try to ring-fence some money from the developer to support particular initiatives that will improve local air quality in that particular case. It may be as simple as re-designing a junction as part of the entry to a new housing development or the local road network; it may be other physical things like the support of air pollution modelling activities. So you could use that money for various aspects to support your air quality department within a local authority.

Q52 Joan Walley: Would you expect every local authority to have an air quality monitoring department?
Dr McCrae: I would not. I would expect them all to have an environmental health department and a highways and transportation department and those two departments need to talk to each other.

Q53 Joan Walley: You would expect them to talk to each other, would you?
Dr McCrae: Yes. We do see that quite successfully in many local authorities; there are some very active negotiations between those two departments that many years ago would not have spoken to each other.

Q54 Joan Walley: Could you perhaps give us an example of local authorities where that kind of joint working works well?
Dr McCrae: I think you see it in departments in Leeds. Leeds City Council has very integrated highways and environmental health teams.

Q55 Chairman: Increasingly, things like emissions from engines are subject to regulation with some success in reducing various kinds of polluting emissions. Do you think it is possible to apply the same sort of regulatory approach to particulate matter that is generated by tyres and brakes and so on?
Dr McCrae: I am sure it is. In terms of particulate matter generated by brakes, there could be a way of enclosing the brake mechanism to limit the release of particles at that point of generation. In terms of tyres, it seems sensible to integrate within the whole idea of recycling of tyres to improve their longevity in service which would help with the recycling issue of tyres. Having said that, if you do make them harder or stiffer then you can affect the running resistance associated with tyres which is an important component of fuel consumption of a vehicle. One needs to be careful in terms of generating legislation on tyres for reduced particulate wear if it diminishes the rolling resistance and, therefore, the grip of the tyre and if you influence that in any way which could be associated with accidents.

Q56 Chairman: Thank you very much. We have some more witnesses so we will have to move on to, but thank you very much for your time this morning.
Dr McCrae: My pleasure.

Supplementary memorandum submitted by TRL (AQ 33)

In reference to some of the costs for the technologies discussed in relation to Q39:

1. It is envisaged that the two technologies concerned Selective Catalytic Reduction (SCR) and Diesel Particulate Filters (DPF), will essentially be required on all new vehicles to meet the new Euro VI standard. This will come into effect for Heavy Duty Engines in 2013 and for Light passenger and commercial vehicles in 2014. Hence, for these vehicles it is likely the costs will be incorporated within the manufacturer's price of the vehicle/engine.

2. These specific emission-control technologies can be retrofitted. The costs will vary depending on the type of vehicle, the baseline Euro standard and the target Euro standard. For heavy duty vehicles, figures ranging from £5,000–10,000 for SCR (Energy Saving Trust, 2003) and around £5,000 for DPFs (based on Case studies on the Transport for London website) seem typical. In addition there are running and maintenance costs. Furthermore, DPFs and SCR can be fitted in combination which is likely to reduce the costs. Costs for light-duty vehicles are lower.

3 March 2010

Memorandum submitted by the Environmental Research Group, King's College London (AQ 16)

SUMMARY

— We have concerns about the current UK monitoring systems with respect to their ability to support effective policy interventions in order to meet EU Limit Values.

— The current UK monitoring system is designed to provide trends in regulated pollutant concentrations and is limited in its ability to explain the mechanisms behind such trends.

— A lack of understanding of air pollution sources and their linkages to ambient concentrations has been underlined in recent years by a divergence of predicted emissions reductions and measured concentrations.

— We therefore recommend that the UK monitoring system be expanded to include targeted long-term monitoring in urban centres across the UK specifically designed to further understanding of the sources and behaviour of regulated pollutants, particularly the components of particulate matter (PM) and NO_2.

— Such monitoring will also be essential in order to assess the effectiveness of air quality management policies.

About us

1. The Environmental Research Group at King's College London is one of the UK's leading institutes in urban air quality assessment. Focusing mainly in London and the south east we run air quality monitoring networks on behalf of local authorities and Defra including the London Air Quality Network (see www.londonair.org.uk). We undertake air quality modelling to support air quality policy and interventions on behalf of the Greater London Authority/Transport for London and local authorities. We are also active in research into the sources of urban air pollution and their health effects. The National Audit Office interviewed our Director, Professor Frank Kelly, on 2 October 2009 regarding the understanding of air pollution health effects. Our comments here will therefore not address this area but focus instead on UK monitoring systems.

UK Monitoring Systems used by Government

2. We have concerns about the current UK monitoring systems with respect to their ability to support effective policy interventions in order to meet EU Limit Values. By submitting modelled air pollution concentrations to the EU the UK Government is only obliged to have half the standard number of monitoring sites required by the EU Air Quality Directive (EC, 2008). Whilst the use of modelling information in this way enables better spatial coverage of air pollution in the UK, the reduced number of monitoring sites may leave the UK's national monitoring networks vulnerable with respect to their ability to:

— Represent urban background and roadside concentrations in many areas of the UK.

— Provide sufficient understanding of pollution sources to direct policy and to enable changes in these pollution sources to be tracked over time.

— Determine the efficacy of air quality management interventions.

3. In London and the south east of the UK the coordination of local authority and national measurements by King's has led to a cohesive network of densely distributed monitoring sites, representing the range of pollutant exposures in the region with sites in kerbside, roadside, industrial, urban background, suburban and rural locations. Such cohesive networks are generally absent from other cities in the UK and many large urban areas do not have representative coverage of background and near road monitoring sites, for instance the UK Automatic Urban and Rural Network has only one roadside monitoring site in Greater Manchester (Bury).

4. By necessity the current design of the AURN has to ensure compliance with directive requirements. We would not advocate simply doubling the air quality monitoring sites used by Government, instead national monitoring programmes need to be targeted towards understanding sources in order to inform and track the progress of air quality management policies. More comprehensive analysis of measurement data is then required to ensure that the full value of such targeted measurement networks is realised.

5. A lack of understanding of air pollution sources and their linkages to ambient concentrations has been underlined in recent years by a divergence of predicted emissions reductions and measured concentrations. For instance, it is unclear why current polices to decrease PM10 concentrations are not yielding the desired results across Europe (Harrison *et al*, 2008) and, despite European and London specific measures, primary PM10 from within London increased between 1998 and 2003 (Fuller and Green, 2006). Further, progress towards reducing roadside concentrations of NO2 have been confounded by changes in the emissions of primary NO_2 (Carslaw, 2005; AQEG, 2007) that were not anticipated in emissions models. These changes in emissions of primary PM10 and primary NO_2 were first detected in London using the dense measurement network uniquely available in the capital. Outside London deficiencies in monitoring networks make it difficult to detect and quantify these new source trends. The UK's approach with respect to the number of monitoring sites for Directive compliance may therefore leave us vulnerable to detecting and understanding emission trends.

6. A simple network design to enable separation and quantification of pollution sources was proposed by Lenschow *et al*, (2001) for the understanding of PM_{10} sources; however this network design has applicability for other pollutants. The so-called Lenschow approach identifies monitoring sites to represent exposure at the different location types and sources can be separated by difference. For example, "roadside minus background" concentration gives the contribution from a road or "background minus rural" gives information about sources across an urban area and so-forth. Establishing and maintaining such site

pairings allows sources to be tracked over time and augmenting the UK monitoring networks in this way may increase the source information that they are able to provide. Such separation of pollution concentrations by source is especially important for the understanding of airborne particulate matter (PM) where different pollution sources give rise to particles with different chemical and physical properties which are in turn likely to have different human health effects.

7. Only limited UK measurements are available on the composition of PM. Although Defra's networks measure particle composition in rural areas this does not have high time resolution necessary to inform Limit Value compliance, emission inventories and modelling. The UKs' measurement of urban PM composition is focused on London and is one of the few examples of the application of a Lenschow design. However the measurement of PM composition in the UK does not include sufficient chemical species to allow the mass concentration of PM to be fully accounted for using "mass-closure" approaches. We are seeking to control a pollutant without sufficient information on its composition and sources. For instance, are increases in primary PM_{10} in London due to tailpipe emissions or tyre and brake wear? Issues around our control of PM_{10} concentrations have been bought to the fore with the recent EU Commission decision on the UK's time limit extension but there have been few systematic measurements of the complete mass of urban PM_{10} composition since those carried out in London and Birmingham between 2000 and 2002 (Harrison et al., 2004). Additionally, there is no national programme to measure urban $PM_{2.5}$ composition despite the new EU exposure reduction obligation. Without measurements of $PM_{2.5}$ composition now, in the reference years, it will be difficult to direct policy and determine changes over the ten year exposure reduction period. This approach contrasts with our near neighbours where a systematic €1 million programme to measure $PM_{2.5}$ and PM_{10} composition has just begun in Paris to expressly inform air pollution management strategies (see http://www.londonair.org.uk/london/reports/AirParif_PM2%205_Study.pdf)

8. Targeted monitoring and analysis of measurement data is also required to provide a level of accountability in air quality management policy, ie, did a specific policy lead to identifiable improvements in air quality (and also in adverse health impacts) and was this improvement cost effective? If not, why not and how could it be improved to make it more cost effective (HEI, 2003)? Carrying out such accountability studies is a complex task given the wide range of influences on air quality independent of the effects of the policy, and requires targeted monitoring strategies. A recent example where monitoring networks were deficient was the London Congestion Charging Scheme (CCS). An accountability study to assess the effects of the CCS on air quality was very limited in success as existing monitoring was insufficient to isolate the effects of a decrease in traffic numbers and congestion from underlying trends and meteorology (Atkinson *et al*, 2009). In contrast, a bespoke targeted measurement programme has been funded by Transport for London to determine pollution changes arising from the London Low Emission Zone.

9. Many air quality management policies such as fleet renewal have gradual effects. Therefore, it is essential that targeted monitoring programmes or those monitoring of non-regulated pollutants (such as PM composition or O3 precursors) be carried out over the long-term. Long-term monitoring is also required to ensure that improvements are sustained over time and not eroded by unexpected changes. These targeted monitoring strategies will be essential if the UK is to meet EU Limit Values for NO_2 and PM_{10} given the increasingly fragile reliance on vehicle emissions reductions. The cost of measurement programmes may be small compared to the cost of interventions to improve air pollution. Without a fuller understanding of the behaviour and nature of pollutants, such as NO_X and PM_{10}, effective and efficient policy decisions will be far more difficult to formulate.

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14 December 2009

Witnesses: **Professor Frank Kelly** and **Dr Gary Fuller,** Environmental Research Group, King's College London, gave evidence.

Q57 Chairman: Good morning and welcome to the Committee. Thank you very much for coming in. Would you like just to introduce yourselves so we know exactly what you do. You have your titles there, but perhaps you could just summarise briefly the work that you are engaged in.
Professor Kelly: I am Frank Kelly, Professor of Environmental Health at King's College London. I lead a group called the Environmental Research Group which is probably unique, certainly in the UK if not in Europe, in the respect that it has expertise in the monitoring of air quality, expertise in the modelling of air quality into the future, expertise in the health effects of air quality and more recently, from January this year, we have established a science policy unit to try to bring forward the area we are discussing this morning.
Dr Fuller: I am Gary Fuller; I work in Frank's group. The area that I head is mainly responsible for the measurement of air pollution and also in trying to interpret what is happening, so going beyond actual measurement of numbers to interpret these in terms of sources and trends.

Q58 Chairman: Could you start by explaining how clear the link between poor air quality and mortality and morbidity actually is?
Professor Kelly: The link was established in the mid-1990s initially from American studies. Since that time the effects of air quality on health have been confirmed and strengthened across the world so in every continent where the issue has been examined then similar effects and similar magnitudes of effects have been seen. At this point in time the link is extremely strong.

Q59 Chairman: Is there a deprivation factor at work here as well?
Professor Kelly: In respect of social class?

Q60 Chairman: Yes.
Professor Kelly: If I was asked to point a finger at the most important source of pollutants we would look at major urban environments and within those environments it is traffic-related emissions which appear to be the most dangerous. Unfortunately, in many instances the housing stock which is along those busy routes is often the most amenable to the individuals with less income.

Q61 Chairman: I was quite startled by the fact that if you take out the averaging in terms of shortening people's lives and look at people who are actually vulnerable, you are talking about as much as almost ten years off someone's life. That is pretty dramatic. If that could be substantially influenced by the choice of where they happen to live, that seems to me something which people ought to be made more aware of.
Professor Kelly: Yes. As you are aware, the average figure for Europe of time lost in lifespan is seven to eight months, but at the extremes that may be a few days and up to ten years. However, I must stress there will clearly only be a few individuals in the UK who would fall into that extreme. I believe the issue about awareness is extremely important. I think the public are aware that air quality is an issue. I think they find it an irritation in that it sometimes makes their eyes water or their skin is irritable. Clearly you appreciate it when you have been in a busy urban environment from what comes out when you blow your nose et cetera. I think where we are not really up to speed with the current understanding is this tremendous impact that it is now acknowledged to have on not only their lifespan but, more importantly, the development of all the serious chronic diseases which we take for granted but do not associate with air pollution, such as heart disease and chronic respiratory conditions.

Q62 Martin Horwood: Could I just ask a quick statistical question? The seven to eight months of life lost, is that averaged across the whole of the population including those who are not actually losing any life at all?
Professor Kelly: Yes, that is across the whole population in the UK.

Q63 Martin Horwood: So amongst individuals affected it is going to be much more, is it not?
Professor Kelly: Yes. If you want me to try to put that in context I would say that if you took the population of London, because the air quality issue is more severe in London, then those statistics would likely change upwards.

Q64 Martin Horwood: I will come back to London, if I may. Is it sensible to use the often quoted numbers of premature deaths as a metric? It is obviously one which excites a lot of interest.
Professor Kelly: It is one that has certainly been hotly debated. It is not the current favoured metric which is used by the expert committee which informs the UK Government, COMEAP, but it is used by other countries. I think the issue about the number of premature deaths is that it is very easy to understand for the public so it is a good communication tool, but it is actually probably slightly less reliable from a statistical point of view than talking about months or years of life lost.

Q65 Martin Horwood: In terms of the impact on the public and politicians surely it is quite a sensible one for the UK Government to use if they are not using it at the moment.
Professor Kelly: From a communications viewpoint then it certainly would be. This is under debate at the moment as to how best to express the public health impact.

Q66 Martin Horwood: It has been suggested to us that the often quoted figure of 24,000 premature deaths a year is now pretty old and does not take into account some pollutants such as ozone and sulphur dioxide. Is that right?
Professor Kelly: That is not quite correct. The 24,000 figure came from a 1998 report based on the short-term health effects of air pollution which was basically the ones that we understood best at that point in time. It is now acknowledged that if you calculate the long-term health impact of air pollution—which is across a lifespan and involves the development of the chronic diseases I mentioned earlier—then the numbers of individuals impacted will be higher. The latest figures are being worked on at the moment, but the basis for those figures has been published and if one does a back-of-the-envelope calculation on those new risk coefficients the sorts of numbers we are talking about now could be around 35,000. Calculations done in Europe on behalf of the UK and every other country suggest that the figure could be as high as 50,000.

Q67 Martin Horwood: That is 50,000 for the UK on average. You are not talking about a peak of 50,000; you are talking about an average in a year.
Professor Kelly: Yes, but you must admit that there is a higher degree of uncertainty associated with those figures because this is an extremely difficult calculation to do when you are looking across a lifespan of an individual.

Q68 Martin Horwood: You mentioned that London in particular was likely to suffer more than the rest of the country. The Campaign for Clean Air in London has quoted me a figure of 3,460 premature deaths for 2005 and suggested that there is some evidence that suggests that that number could be as high as 7,900. Do you know of any evidence that supports numbers that high?
Professor Kelly: The new risk coefficients which were released last year by COMEAP would support a figure of around 3,500 early deaths in London. If one took the extreme of those risk coefficients which are being produced from studies across the world then the figures could be much higher, maybe up to 8,000 deaths.

Q69 Martin Horwood: Do you think the Government's assessment of the health impacts of poor air quality is really adequate?
Professor Kelly: I think they could be criticised from the viewpoint that they have not come forward quickly enough with data. It seems to be a relatively slow process compared to some other countries. I know the activity is ongoing at the moment and we will hear probably this year those official figures. However, the process has been slow and, more importantly, it really begs to address the issue of communication because if these figures are correct then air quality impact on public health really does come into play and can stand alongside other issues which the Government does give great time to, such as the impacts of obesity, alcoholism, passive cigarette smoking, et cetera; it really would put it up amongst those major risks.

Q70 Mark Lazarowicz: How far has the Government so far been able to quantify the costs of poor air quality in a financial sense?
Professor Kelly: A cost-benefit analysis has been done and it was reported I believe in 2008 by Defra to be of the order of between £8 billion and £20 billion in health costs per year and that range would reflect the low and the high risk coefficients which I described earlier.

Q71 Mark Lazarowicz: Do you think that is a fair assessment from your knowledge?
Professor Kelly: Based on the information that we have now, yes, that would be a fair assessment.

Q72 Mark Lazarowicz: Are these costs adequately included in impact assessments and policy appraisals, for example, by local and central government? Are they given full weight in such analysis?
Professor Kelly: My belief at the moment is that those new figures probably have not been used in that respect but will be in due course when we also have the loss in life year figures coming out.

Q73 Mark Lazarowicz: What should be done to ensure that happens?
Professor Kelly: I would hope there would be a strong message coming from committees like this to government that this is an issue which needs to be taken more seriously than perhaps it has been in the past. I would like to see that the Government provides adequate resources to the offices within Defra and the Health Protection Agency which examine air quality and its effects to resource them correctly to be able to move forward these agendas much more rapidly. I think it will be very important to have a public awareness campaign because it is the public who will ultimately play a major role in helping us to improve air quality.

Q74 Mark Lazarowicz: How substantially do you think we could reduce those costs with the right policy?
Professor Kelly: If we manage to bring air quality to at least the EU objective levels and hopefully even beyond that to the WHO guidelines (which are even stricter for some of the pollutants) then the health benefits will be considerable and, therefore, there should be a considerable saving associated with it. However, in the short term the cost to mitigate air pollution will be substantial so I suspect it is going to be a major investment in the short term for a very large gain across the long term.

Dr Fuller: There was an assessment done as part of the Clean Air for Europe process and they tested a number of scenarios of impacting different technologies and different measures, and they ranged these in severity to a maximum technically feasible one. I do not know whether it was to their surprise, but from the cost-benefit analysis they found that their maximum technically feasible approach actually yielded positive benefits. So if you have chucked everything at it to the maximum extent of technical feasibility it would still yield a positive cost-benefit outcome.

Q75 Mark Lazarowicz: What kind of investment is required to achieve that in terms of actually tackling the problem? How much would need to be spent for how much benefit?
Professor Kelly: We are moving slightly out of my area of expertise, but Defra has reported in the same report where they estimated the health costs that mitigation would be of the order of £6 billion to £8 billion, so less than the perceived health benefits, but I am not sure what they were costing within that.

Q76 Mr Caton: Aside from health, where you have given us figures, are the other environmental impacts of air quality being quantified? I am thinking of things like biodiversity, climate change itself, crop yields and that sort of thing.
Professor Kelly: I know that the biodiversity/ecological benefits of improving air quality have not been costed, so the figures I gave were only for public health benefits. That is something that remains to be done and I would imagine those benefits would be sizeable. In respect of climate change, as indicated by the first witness today, this is a difficult issue because often decisions made to mitigate climate change may have detrimental effects on air quality. A very simple example here is 'dieselisation' where it was observed that there was benefit of moving a lot of the fleet and some of the private car traffic to diesel because they are more efficient and produce less CO_2 but we get an air qualify disbenefit associated with that. Those calculations could be numerous and it really depends what policy options are taken.

Q77 Mr Caton: Are you aware of any work being done on these aspects?
Professor Kelly: Yes. Defra have published a report which has looked at both issues and there is a lot of useful work in there. The Health Protection Agency have also looked at the health impacts of climate change and within that they acknowledge that there need to be decisions taken which benefit both air quality and climate change.

Q78 Dr Turner: Can I ask perhaps a naïve question? We have discussed the public health impact in terms of shortened lives, but how do you actually measure this? It implies that you have, as a standard of comparison, a population which is not exposed to pollution and by definition I cannot think of one.
Professor Kelly: It is not a naïve question at all and it is a very difficult area, but I will try and briefly explain what has happened. It was not easy but it was easier back in the late 1990s when the short-term health effects of air quality were quantified. What I mean there is that if there is an air pollution episode then you quantify the number of extra people who have died during that episode or shortly thereafter, or the number of people who have arrived in hospital, and those figures are easily obtainable. There are studies across the world that show that whenever you have an air pollution episode you do see increases in both those metrics. The much more important but more difficult measure to make is where you are comparing people who live in different communities that are exposed to different air quality and different concentrations of air pollutants across their lifespan, and that is the long-term health disbenefits. Those types of studies are done, as I said, in every continent across the world and instead of finding somewhere where there is no air pollution, because clearly that does not exist, what they are comparing is an area which has got very low air pollution to an area which has a high air pollution and then you quantify the effects based on the difference between the air quality. When that is done, and it is standardised to a ten microgram per metre cubed difference in particle concentration then you can produce a figure which gives you the risk coefficient which can be applied.

Q79 Dr Turner: In Europe we have produced a number of air quality standards to promote air quality: EU Limit Values, EU Target Values, national objectives under the Environment Act and Pollution Days. How effective a contribution do these standards make to improving public health?
Professor Kelly: I think if they are adhered to they can be very effective. I will give you an example of a recent study which has come out of the United States where it was first recognised that there was an association between the particulate concentration in the air you breathe and life expectancy. What they have now been able to do is examine the data for the last 20 years in a number of regions across the United States and what they have shown is that in those regions where there has been an air quality improvement due to standards and legislation, there has been an increase in life expectancy which they cannot explain by any other factor other than the improvement in air quality. That is how important these air quality standards can be. They will improve an individual's health.

Q80 Dr Turner: That is very interesting. Which of the air quality standards and policy instruments that are available do you think has been most important in delivering improved air quality and reducing exposure?
Professor Kelly: From a health viewpoint the air quality standard which has most importance as far as we understand it at this point in time is the particulate standard because the particulate standard gives the biggest health risk coefficient, i.e. it has the biggest impact on our health. All air pollutants impact on our health but the particulate one is particularly important to get right and, of course, that is one which, hearing about again this

morning, is a particularly difficult one and there is a lot we still do not understand about particulates and their sources and the direct health effects. In any study that has been done there has always been a very positive and strong link between particulate exposure and health outcome.

Q81 Dr Turner: We have a fairly complicated regime of regulations governing air quality. Does this complication lead to resources being spread too thinly and not targeted on the things which most matter?
Professor Kelly: I think I have already stated that I do not think there is enough resource given to the issue in the United Kingdom, so already I think we are starting from too low a baseline to address this issue. Are the meagre resources that are given to air quality regulation spread too thinly? I think the honest answer is that we need more intelligence, we need more understanding about the particular types of, for example, particle which is having the biggest health effect to be able to use those resources appropriately. You have already had discussions about tailpipe emissions, brake and tyre wear emissions, re-suspension and secondary particulates. From a health viewpoint all of these are considered in the same way because we simply regulate them altogether by mass, but clearly some of these particles are a lot more toxic than others and, in fact, the most recent research that has come out of King's College looking at the impact of the congestion charging scheme in London really points to the fact that the particles that are coming off roadways, ie from transport, are a lot more toxic than particles that you get in urban background settings which are a mixture of what has come from roadways and what has come into London from elsewhere. However, in particular when we look at exhaust emissions, brake emissions and tyre wear emissions then we cannot replicate all the problems just by what we are seeing coming out of the exhaust. In fact, we think that a lot of the health-related problems may be coming from non-exhaust sources from vehicles, which really does take us back to the issue of brakes and tyres, what they are emitting and what happens if that is really important and we are not regulating them.

Q82 Dr Turner: Is there anything that can be done to raise the public awareness of the effects of poor air quality?
Professor Kelly: I think there is a lot that can be done. I do not think the public appreciate the seriousness of the risk of poor air quality in urban areas. I think that if questioned they would acknowledge that there is an issue and maybe they have heard that it will reduce their life expectancy by seven or eight months, but I do not think they would understand that there is a big impact on pregnancy outcomes in respect of pre-term births; low gestational aged children; I do not think they are aware that there is strong evidence coming out of California which suggests that children who live in highly polluted areas lose the ability for their lungs to develop to their full potential and if this is the case and it is not resolved by the time they reach 20 then they will never gain that lost lung function again, that will always be with them for the rest of their lives; I do not think the public would appreciate that particulates appear to play a major role in the development of heart disease or chronic obstructive pulmonary disease (by 2020 there will be more people suffering from that than there will be of heart disease). I do not think the public has that general awareness that air quality, some of which they are influencing by the choice of vehicle they buy, by the fuel that vehicle has, by lifestyle issues about whether they are using their car for short trips when they could walk or cycle, or where they perhaps sit with their car idling for five minutes at a junction when they do not need to. If they had that information about these issues they probably would help to change the major problem we have before us.

Q83 Dr Turner: That is very interesting. So if the public were aware of these very serious consequences, many of which are down to their own actions and amenable to amelioration by their own actions, this would make a significant difference. Do you think it would also be useful to have increased public pressure on regulatory authorities to help improve air quality?
Professor Kelly: I do. If the official figures, when they are released, are of the order which I have suggested this morning, and which the European reports have suggested, then clearly this issue is much larger than fatalities associated with road accidents or even serious injury from road accidents in the UK, yet there is considerably more resource and drive given to try to improve that public health issue than there is this one.

Q84 Chairman: So you really think if there were a greater public awareness it would lead to significant behaviour change.
Professor Kelly: I suspect it would do, yes.
Dr Fuller: With all of these things it is very difficult territory to entirely put the problem on members of the public because in many cases they are the people who are the innocent victims, be it the person who lives close to the road and so forth. There is a need also for government to enable people to make the right choices. It is no use saying that people should be using public transport if the public transport is not available. I think that is quite obvious really.

Q85 Joan Walley: Can I return to the question I raised previously about planning controls? Certainly in my constituency, people are very much aware that certain developments could bring about greater risk of reduced air quality and they are just totally frustrated because there does not seem to be the ability between the transport engineers who are consulted about planning decisions and the environmental health officers, who may or may not be there consulting too, to actually look at the kind of conditions in terms of planning applications which appear not to be linked to the overall guidance and appear not to be linked to the regional spatial strategies as well. I feel very strongly that there

should be some way in which planning guidance at local and regional level could result in development, be it residential development or operations which particularly bring worse air quality to an area, and should be the focus of controls at a local level. I do not see where the ability is for that to happen. I would like your comments on that.
Dr Fuller: I think you illustrate a very good point. As Ian McCrae alluded to earlier about the need for joined-up thinking, we have a lot of examples of this across government. In local government, for example, it is the responsibility of the environmental health departments to actually assess the problem, but they are not generally the people who are responsible for the solutions, be it their transport department or their planners as well. You can say perhaps the same within central government, that the responsibility lies within Defra, the responsibility for roads lies with the Department for Transport.

Q86 Joan Walley: It is between so many different departments, so how do you get that coordination?
Dr Fuller: Indeed, and I think that is challenging. I suppose it is a matter of making those people that are responsible for the decisions to actually have the obligation to achieve the limit value or the target or the ambient concentration. At the same time there are some examples of excellence in the planning areas as well, the low-emission strategies for instance, which are really interesting ideas being put forward on a planning front. I would probably agree with you that it does need to be joined-up a lot better.

Q87 Joan Walley: At the moment the Government is consulting about the planning guidance which should go into the regional spatial strategies now that the responsibility for planning has gone into the Regional Development Agencies and there is a requirement to look at ways in which that planning guidance will have sustainable development objectives relating to it. Do you know of any research, either your own or anyone else's, that is being done that could assist the application of that new planning guidance to somehow or another pass an evaluation of the different costs of air quality improvements so that you could get a formula to be able to assist local planning decisions to locate the more polluting operations further away from where people live?
Professor Kelly: There is guidance that no new development should seriously impact on air quality to make it breach the air quality standards. That is a starting point.

Q88 Joan Walley: You have existing planning use which cannot necessarily be changed.
Professor Kelly: Sure, but I am saying that is a starting point and then thereafter you should do a health impact assessment on that additional burden to that community and if that health impact assessment shows that there are going to be considerably negative health effects—be it on the children or the resources or health facilities available locally—then all those issues should be brought in together. That is why all these departments that Gary just mentioned need to be involved in these decisions.

Q89 Joan Walley: That does not happen though, does it?
Professor Kelly: It does not probably happen enough but, again, this is moving outside my own area of expertise. Certainly in some very large developments all these things are requirements but maybe they are not always requirements on smaller developments.

Q90 Martin Horwood: If those health impact assessments at local level are being done using existing government methodology, your answers to the earlier questions suggested they could be underestimating premature deaths by as much as 100% a year.
Professor Kelly: Correct.

Q91 Martin Horwood: One hesitates to use the words "cover-up", and I am sure you would not do either.
Professor Kelly: I would never use that word at all. There has been a slow pace in the production of the new figures simply because I do not think that resources are put into the departments which are working on these issues. It is not acknowledged to be a major public health problem. I think the new figures, when they come out, will change that perspective.

Q92 Chairman: Does that raise the question of how good the relationship between people like you and the Government is in terms of providing information which might then affect policy?
Professor Kelly: The system which is operating in this country is that people like myself are asked to sit on expert committees. We provide advice through those expert committees to Defra and to the Department of Health, et cetera. Clearly reports arise from those committees and thereafter people like myself really do not have any influence as to what happens and if that information is taken onboard and used in policy setting.

Q93 Chairman: Does the actual monitoring take place in a way that maximises the utility value to the policy makers in local and central government?
Professor Kelly: It has not been until relatively recently and that is not because of any poor decision-making on behalf of those responsible, it is really the more recent appreciation that we need more information about particular types of particles, for example the smaller $PM_{2.5}$ particles, or the components of those particles. There is now a very good monitoring network in the UK and especially in London which will, over the next five years, provide a lot of information which will be directly applicable to these questions.
Dr Fuller: As Ian alluded to earlier, there is excellent monitoring in the UK, but whether the actual monitoring networks are orientated towards telling us about sources of air pollution is really an open

question. They may be very good at telling us whether we comply with the EU Limit Value in a certain location but whether they actually can then say that a change in concentration that is measured at a certain location is due to transport or due to some other factor I think that is more doubtful. We do not have a pollutant like ozone or carbon monoxide which is a defined chemical species; particulates consist of particles in the atmosphere that fall within a certain size range and have a wide composition, some of which will vary in toxicity and also come from a wide range of sources. We are not really doing enough to actually determine what the PM that is in our urban areas is composed of. There is some excellent work going on with rural concentrations but maybe not so much with urban PM.

Chairman: Thank you very much. That has been a useful session from out point of view. I am grateful to you for coming in.

Witnesses: **Mr Graham Pendlebury,** Director, Environment and International Directorate, **Mr Iain Forbes,** Head of Air Quality Branch, and **Mr Chris Parkin,** Head of Engineering Standards Branch, Department for Transport, gave evidence.

Q94 Chairman: Good morning and welcome; we are grateful to you for coming in to talk to us. Could you tell us what the Department for Transport is actually doing to reduce air pollution from road vehicles?

Mr Pendlebury: We have a number of policy instruments. The biggest single area where we focus our attention and where we get the biggest wins is through vehicle technology standards. Of course these emerge from the European processes, the so-called Euro standards, which I am sure you have heard of, although the Department plays a very major role in negotiating those standards and leading the discussions around what might be the appropriate standards. We have done a lot of that over the past 15 or 20 years or so. It is through the introduction of Euro standards that we get the biggest single reduction in vehicle emissions, but obviously there is a whole range of other policies as well, whether they be small-scale fiscal tweaking, such as the Reduce Pollution Certificates to encourage the earlier uptake of forthcoming Euro standards. Then, of course, there is the whole basket of environmental policies that we have that also support vehicle emission reductions. For example, our rather ambitious goals for effectively de-carbonising road transport through the use of electric plug-in hybrid vehicles and so forth will have significant air quality benefits as well; congestion reduction policies, the work that we do with sustainable travel initiatives and so forth. The whole package helps, we hope, bring down air quality problems and eventually over time eliminate them.

Q95 Chairman: Can the Department point to having urged within the EU the faster introduction of more demanding vehicle emissions standards?

Mr Pendlebury: I might ask Mr Parkin who has more direct experience of this to comment in a minute. Since 1992 we are moving towards Euro V and Euro VI standards, so in the course of about 15 to 18 years we have gone through about five different standards, so the rate of churn, if you like, and change in development of Euro standards is pretty fast as it is. We have to bear in mind what are the technological feasibilities of what we can actually do with particular emission control technologies, so insofar as whether things can be done faster—it is always ideal if things are done faster—I think there has been quite a fair pace already. Chris, is there any particular instance where we have been pushing for faster introduction?

Mr Parkin: I think the most obvious recent example is on the passenger car and light goods vehicle Euro 5 and Euro 6 standards where the Commission's original proposal was actually just for a single stage Euro 5 standard without any significant reductions in diesel NO_x limits. The Department pushed very hard for the addition of a more demanding Euro 6 standard that reduced diesel NO_x limits by around 70%. That was something where we pushed very strongly for an additional significant measure beyond what the Commission requested. There is also the addition of extra measures to control particle emissions in the Euro 5 standard. When that was first proposed the Commission proposed a relatively simple 80% reduction in particulate mass limits. The Department has been very active in UNECE[4] fora developing new techniques to better control particle emissions and better measure particle emissions, particularly to ensure we control emissions of the ultra-fine particles which are believed to have the greatest health impacts. We pushed the Commission there to include these new measurement techniques and set very stringent limits using those techniques as part of the Euro 5 standard and that has resulted in a limit which will effectively reduce diesel particle emissions by 99% compared to current vehicles.

Q96 Chairman: How much of a priority within the Department is air quality?

Mr Pendlebury: As I am sure you are aware we have five overarching departmental strategic objectives, one of which relates to safety, security and health of the British people and that is where we locate, if you like, our air quality efforts as essentially a public health issue. Therefore, because it aligns very well with one of these five strategic objectives, it is something that we give quite a lot of priority to. Obviously we are always trying to balance or hit as many goals as we can so one can never say that any particular policy area is given priority over others. I was just reflecting on this earlier this morning, that one of the areas that is often talked about where we

[4] United Nations Economic Commission for Europe

are having to balance different priorities is around reduction in climate change impacts of transport and air quality impacts. One of the things we do know and agonise over is that some of the technologies that are used to deliver Euro standards have some penalty in CO_2. We have gone for the air quality impacts yet often people say we prioritise climate change perhaps rather more than we do air quality. It is a bit difficult to answer your question directly but it is certainly something that we attach a lot of attention to and obviously we have ministers who are very engaged in it and ministers who work jointly with Defra ministers in particular on this subject.

Q97 Chairman: Some of the evidence we have heard suggests that if we are trying to reduce deaths then more attention paid to air quality might have a bigger impact than trying to refine still further some road safety measures. What do you think about that?
Mr Pendlebury: That is an interesting one. The problem with the 3,000 deaths and 30,000 serious injuries on the road is that those are very immediate, visible, directly attributable impacts and we can devise policy solutions that meet them, whereas with the air quality area it tends to be contributing to a worsenment of someone's existing condition. It is a rather apples and pears comparison really. I think it is certainly the case that more attention as the evidence builds up has been given to air quality impacts and one of the things that you will be aware of was the recent Prime Minister's strategy unit report on urban transport which identified air quality problems as perhaps being a bigger part of the story than had hitherto been suggested, so obviously that is an area we would always want to continue to look at. I think it would be difficult to say, "Okay, let's prioritise this a bit more than road safety and take our eye off the road safety ball", because of the very visible and immediate impacts that road safety measures tend to have.

Q98 Chairman: If we were to ask you how you would demonstrate that air quality is a priority within the Department, what would be the two or three things you could point to to show that?
Mr Pendlebury: I would point to the fact that over the past 15 to 20 years emissions from road vehicle transport have come down dramatically despite a very significant increase in traffic volumes. That has not come about by accident, that has come about by measures led in the large part by the UK in conjunction with our European partners. The fact that we have had people over the years who have put a lot of effort into that and given demonstrable resource would be the single biggest area. I think it is worth bearing in mind that air quality is one of those things that is rather embedded out in the Department, so the Highways Agency, our colleagues in the Aviation Directorate and different bits of the Department have air quality built into their objectives; it is not just about the relatively small air quality strategy team within my area or the kind of technical and engineering standards that Chris represents. It is not a question of just adding up the bodies and saying, "That represents your effort". It is spread around the Department quite effectively.

Q99 Joan Walley: Given that light-touch regulation is very fashionable, I am just wondering where your priorities fit in terms of regulation and in respect of particularly public transport and buses, what resources go into control and regulation of emissions from buses? How many prosecutions have there been, what kind of budget do you have and what you would feel your success is in terms of making sure that buses are not over-polluting?
Mr Pendlebury: If we are doing prosecutions, then we have clearly failed as a policy; I would hate to think we judge it in terms of the number of prosecutions. I have a small confession to make: as well as being the Environment and International Director, I am also the Better Regulation Director for the Department so in line with prevailing government policy I am keen that we do not just lay on more and more regulations, we have to try to find a balance and regulatory instruments are not necessarily always the best option to follow. Obviously the Euro standards apply in the bus sector as much as they do in other sectors. You have a problem with buses which is that the turnover of the fleet is relatively low compared to, say, traffic. We know that the average age of buses is over eight years and within that average there will be some that are quite a lot older than that. Equally, it is very important. Something like two-thirds of all public transport journeys are undertaken by bus and the more we can layer regulations onto the bus sector the more we are potentially affecting the availability and affordability of bus services. In terms of your specific question about how many prosecutions have there been for failing to meet minimum standards, I would not know the answer to that question honestly. I do not know if my colleagues do.
Mr Forbes: Every year, all vehicles undergo an emissions test as part of their vehicle test and we do know that less than 1% of vehicles fail that emissions test which has led to us assuming that the vehicle standards have been well engineered.

Q100 Joan Walley: A further question from that is, given the discussions that are taking place about future public transport, what input have you had into the general trend of policy so that, for example, you could put in controls or basic standards of the age of bus vehicles when looking at bus contracts?
Mr Pendlebury: That would be something we could do.

Q101 Joan Walley: Do you?
Mr Pendlebury: We do not determine them; these are largely locally-derived quality bus partnerships and so forth.

Q102 Joan Walley: So neither the Department for Transport nor the local authorities have actually got any control over the most up-to-date standards? An

area could not say, for example, that they wanted to have only the highest standards in terms of air quality control.

Mr Forbes: To give one example of a local authority that has done that, Oxford has established a low-emissions zone where they came to an arrangement with the bus operators in their area, which stated that the buses that operate in Oxford have to meet certain emissions standards. The Local Transport Act 2008 also makes it easier for local authorities to form quality partnerships and other arrangements with operators to set in place those sorts of arrangements.

Q103 Joan Walley: Would that actually facilitate those higher standards?

Mr Forbes: Yes, it would mean that a certain proportion of the bus operator's fleet would have to meet the higher and cleaner Euro standards.

Q104 Joan Walley: Do you monitor how many local authorities have actually introduced that?

Mr Forbes: We engage with local authorities to see what is working, what the good practice is and seek to share that where possible.

Q105 Joan Walley: Which local authorities would you say have the best example in terms of what is working?

Mr Forbes: In terms of negotiation with bus operators, I think you can point to Norwich and Oxford as two local authorities which have taken a lead on this.

Q106 Chairman: Given that the importance of trying to improve the fleet, and with more demanding Euro standards obviously new vehicles in all categories are getting cleaner but, as you have identified, the real problem is the existing stock and the fact that there are a large number of vehicles on the road which pre-date some of these standards, is there any incentive for local authorities to do as Norwich and Oxford? Is there any reward they get for doing this or do the councils just feel rather better about themselves?

Mr Pendlebury: Where the local authorities know there is an air quality problem and they have declared an air quality management area and we are saying in their local transport plans that they should be integrating transport policies within their area to deliver both their public transport objectives and also their air quality objectives, they have that incentive themselves. I am not sure that a top-down command and control edict from Whitehall when you are getting into quite locally specific service provision is necessarily the right way to go. We can obviously keep that thing under review, but it is again trying to strike the right balance between making sure there is good service level of buses and the like within local authorities matched against air quality objectives.

Q107 Chairman: It was not really a top-down command and control I was thinking of, I was just wondering if there might be some incentive. Another factor which is quite material is modal shift, of course. If we can get more people to go by buses there can also be quite a bit benefit. Are there steps that the Department is able to take to try to encourage that modal shift?

Mr Pendlebury: Modal shift across the piece—whether it is from cars into buses or freight from road to rail and so forth—is something that we are keen to do and we have a number of different measures to try and bring that around whether it is freight facilities grants or very large amounts of public money that go into funding bus services through bus service operator grants and measures such as that, so we are keen wherever feasible to try to encourage a modal shift. Although we never tend to get into the business of trying to tell people how they should travel around, we want to make services as attractive as possible even if it is something as fundamental as the concessionary fares policy that we have had with respect to senior citizens. There are a lot of measures around there. You are talking really about much broader DfT policy initiatives than ones that are specifically aimed at air quality because air quality will be one part of that but it will be to do with congestion reduction and climate change benefits and so forth as well.

Q108 Martin Horwood: Given the health impact of this alone and given the first evidence we heard today that said that shifting towards low-carbon vehicles like electric vehicles would make a dramatic impact on all this, is DfT, or the UK generally, trying to pressure for a much faster timetable for the introduction of zero-carbon vehicles at EU level?

Mr Pendlebury: There are two answers to that. The first is in terms of the regulatory measures which is where you have things like the new car CO_2 standards which again we have been heavily involved in negotiating, so there are standards which apply in 2015 and again in 2020 which introduce pretty radical cuts in the standards that will apply to new vehicles. Quite apart from that, we established a few months ago now something called the Office for Low Emission Vehicles within the departments. It is located within DfT but it actually comprises officials from three government departments whose remit is to accelerate the pace of change and it has a budget in total—all the money that it is managing and disposing of—of about £400 million which, in current circumstances, is a very substantial amount.

Q109 Martin Horwood: In practice the European car market is going to respond to European regulations over the whole car market.

Mr Pendlebury: Yes.

Q110 Martin Horwood: Should we not be bringing forward the target for all new cars to be zero carbon to something like 2040 or even earlier?

Mr Pendlebury: There is a 2020 target which is 95 grams of CO_2 per kilometre which is substantially below the Prius model which has just been phased out so that is pretty radical technology. You can just about deliver that with conventional technologies without switching into hybrid or plug-in electric, but our whole incentive mechanisms that we will be

introducing to get ultra-low-carbon vehicles in and which will take effect very shortly (I am not able to give you a precise date at the moment) and we will be trying to bring these things forward as fast as we reasonably can, but obviously in a sense we can go as fast as the manufacturers are able to deliver the models.

Q111 Martin Horwood: My question was not really about these local incentives, it was about whether we are pressing the rest of Europe to move much faster towards what you are calling ultra-low-carbon vehicles.
Mr Pendlebury: We are pressing for 95 grams by 2020.

Q112 Martin Horwood: I am sorry to cut across this, but I am talking about a complete shift towards zero-carbon or very-very-low-carbon vehicles which needs to be on a timescale that allows the car market and R&D to respond and so on were you to invest in charging points around the country or something like that. Are we trying to achieve that kind of shift on a faster timescale than is presently envisaged?
Mr Pendlebury: We would like to see that shift moving as fast as it is reasonably feasible to do, bearing in mind that you have to de-carbonise the road transport sector and you have to think about the energy generation sector. If you move to all electric plug-in hybrid, you need to think very much about what is the future shape of our electricity generation and so forth. I would be pretty confident, certainly on the timescales you are providing, that we will be getting towards that complete de-carbonisation but obviously we can only go as fast as the technology will take us, as far as the availability of rare earth metal or whatever it is; we have to work within the bounds of technology.

Q113 Martin Horwood: The technology responds to the signals that government and particularly the European Union gives it, does it not?
Mr Pendlebury: It will do to some extent, yes.

Q114 Mr Caton: Moving on to the costings issue, how are the costs of poor air quality included in your Department's policy appraisals?
Mr Pendlebury: That is quite a complicated question. There are three sorts of areas where we do this. There are policy measures or programmes of policies which are targeted specifically at air quality improvements where we have a particular set of methodologies that we would use. There is then, if you like, a general policy appraisal where we are looking at policies that are not primarily aimed at air quality but may have air quality impacts—for better or for worse—and then there are the individual scheme appraisals for particular infrastructure projects. So we have slightly different approaches on each of those circumstances based on the evidence that is available. I was looking earlier today, and one of the things that we published as a major policy initiative for the Department was a low-carbon transport strategy published last July. As we have already referred to, that can have some sort of impact on air quality, for good and for bad, and so we did a very detailed impact assessment, a vast tome, which actually sets out the methodology we have applied, what cost values, how we have monetised air quality impacts; we have done separate health impact assessments as well as sustainability assessments just so they get some sort of handle on whether our direction of travel on low-carbon transport is one that carries with it air quality benefits on an acceptable level of cost that we can try and mitigate against.

Q115 Martin Horwood: We heard today and in written submissions how the health costs of poor air quality are arrived at, but the environmental costs in the sense of eco-systems, biodiversity, climate change and the impact on crops does not seem to be costed. Are you doing any work on that?
Mr Pendlebury: It is true to say that if you look at eco-systems impacts there is not, as far as I am aware, a properly agreed methodology for quantifying and monetising those benefits, so what we will tend to do, therefore, is describe, if you like, in narrative terms what we think the likely impacts will be, try to quantify those and, if possible, monetise them where we can but it is not as easy as it is for some other issues. It is certainly the case that we do take these things into account but the methodology that is used is perhaps slightly different from ones that we would use for human health impacts and so forth.
Mr Forbes: As more evidence comes to light, we are able to know more details about the impacts and that will all feed into the work we do. We are always keen to make sure that we are working with colleagues in Defra and the Health Protection Agency to know the current state of the art in terms of monetising the impacts of air quality.

Q116 Mr Caton: How are the costs of actions to address air quality calculated and then balanced against the cost associated with poor air quality?
Mr Pendlebury: There is a set of methodologies that are developed by an inter-departmental group on costs and benefits which has an air quality sub-group. These are essentially economists and analysts around Whitehall who develop methodologies for looking at different cost-benefit analyses including, in this particular case, air quality. They have developed a series of methodologies for looking at the impacts based on health evidence that comes from people like COMEAP, medical and toxicological evidence, and then you try to convert that into some sort of numbers, develop baselines, develop scenarios and then put some kind of range of numbers of them. It is never a perfect science, I would hasten to add, but it is the best effort that we can make, and then obviously you look at those numbers in the context of other benefits around journey time savings, climate change benefits or whatever.

Q117 Mr Caton: Are the penalties of failing to meet European Limit Values factored into those cost-benefit analyses?

Mr Forbes: Any potential fines are not factored into the impacts of air quality.

Q118 Mr Caton: Is there a reason for that?
Mr Forbes: I would have to rely on the experts in the inter-departmental group to let me know the exact reasons, but I would imagine it is because those costs are not as easy to calculate as the other costs that are factored in.
Mr Pendlebury: I would think it would be difficult to include in a cost-benefit analysis a cost of breaking the law.

Q119 Martin Horwood: Given these legions of analysts who are producing methodologies for you across Whitehall, are you not a little ashamed of the evidence from Professor Kelly which suggested that you are so out of line with best practice in terms of, for instance, bringing into the health assessment long-term health conditions and so on, that you could be underestimating the number of premature deaths by as much as 100%?
Mr Pendlebury: I did not hear Professor Kelly's evidence; I only caught the tail end of it. I think "ashamed" is quite a strong word. We publish a lot of research; we take our evidence from COMEAP, the independent bodies of health experts who are appointed by the Department of Health, the Health Protection Agency and so forth and indeed I must emphasise that that is where DfT will take its evidence from, so there is a wealth of evidence published out there. There is expert advice, there may be different views from different experts from different parts of the academia, but I think we would generally say that we take it pretty seriously.

Q120 Martin Horwood: He strongly suggested that you were lagging behind best practice in other countries, if I am not misquoting him, that potentially 24,000 or so premature deaths currently assumed could be as high—on a worst-case scenario admittedly and with some variabilities and doubts in there—as 50,000.
Mr Forbes: As Mr Pendlebury said, we do take our evidence from the independent groups of experts who recommend on these issues and if the Health Protection Agency and COMEAP were telling us something different, we would use different figures.
Mr Parkin: It might be relevant to add that on policies such as the Euro standards the health impact assessments that we currently have, and the monetisation values, have actually supported the most stringent, technically demanding standards for particle control so I do not think there has been a practical problem there in terms of the impact on policy.

Q121 Martin Horwood: His point in evidence was that you do need to communicate the really dramatic impact of air quality much better and clearly these kinds of numbers would help if we were using best practice and taking long-term health effects as well as others are doing.
Mr Pendlebury: So the suggestion is about communication to the public of health impacts.
Martin Horwood: It is both; it is just that it is rather convenient for government—and he rightly hesitated to use the phrase "cover-up", as I would too—that we seem to be going so slowly on adopting best practice in terms of taking in the full health impacts that we have ended up with numbers that significantly underestimate the number of premature deaths and other health impacts which does not help to highlight the problem.

Q122 Dr Turner: What assessment has the Department for Transport made of the most cost effective ways to reduce pollution from vehicles? To put this into context, recent research shows that vehicle brakes and tyres produce as much particulate matter as actual tailpipe emissions. They are unregulated and tailpipe emissions are regulated.
Mr Pendlebury: I am going to ask Mr Parkin to talk about this in a minute. This is an interesting question because you are quite right in the sense that that exhaust emissions have decreased dramatically over the past 20 years or so, largely as a result of the Euro standards and so forth, but actually emissions from tyre and brake wear have increased by 24% since 1990. That is actually broadly consistent with the increase in traffic because the frictional forces when one is using brakes and so forth are not affected by standards. You are right in that sense, that it is unregulated. I know that in discussing this in the Department it is one of those areas where designing some sort of mechanism to reduce this kind of wear and tear is a classic area where we cannot compromise the safety aspects of tyres and brakes, that is a fundamental issue; it is more difficult to identify what are the solutions. Chris was telling me the other day that perhaps a little bit more evidence is starting to emerge that one of the issues around particulates from tyre and brake wear is to do—this perhaps relates to what some of the previous witnesses were saying—is to do with the chemical composition, what is actually the nature of the particulates rather than just the size and quantum of them. If there is an issue around chemical composition, then we are perhaps in a better position to do something about that; that is within the bounds of possibility that we can devise ways of solving that. Devising ways of reducing the friction from brakes is a little more difficult but I am straying slightly into areas of technology that I do not know about. Chris, do you want to say anything more about tyres and brakes?
Mr Parkin: Yes. I think I would just note that particulate from mechanical wear processes like tyre and brake wear, and clutch wear as well, tend to be a much larger size of particle and expert opinion has tended to be that such particles are not as effective at penetrating into the human respiratory system and for that reason do not tend to have such significant health impacts. As I understand it from discussing with colleagues in Defra, the quantification of the health impacts that we currently have for exposure to particles are based on the fine fraction of particles and not based on the coarse fraction that would be contributed by brake and tyre wear. As Mr Pendlebury mentioned, it is rather difficult to control

brake and tyre wear because wear is a fundamental factor of frictional processes, but if this emerging evidence that Mr Pendlebury mentioned does highlight particular chemical species within particulates as being of concern, then potentially there would be scope to perhaps regulate there, so we will need to keep an eye on this evidence as it emerges and review that with a view to forming future policy.

Q123 Dr Turner: There must be some scope there. I seem to remember that once upon a time asbestos figured very largely in brake pads and now I take it it is principally carbon fibre based, so there has been a shift in the chemical nature of the particulate emissions already. Do you have a handle on that?
Mr Parkin: I do not have any detail on that but that is absolutely correct, that asbestos is no longer used in brake lining because its use is controlled by regulation.
Mr Pendlebury: Thinking about brake and tyre wear, we have seen that the quantum of emissions from those processes has increased and it has actually increased slightly faster than the rate of traffic growth. That is in part, I think, to do with congestion, stop-start traffic conditions and so forth. If we actually get some local congestion reduction measures to smooth traffic flow, that should have a beneficial impact, a side benefit if you will.

Q124 Dr Turner: How do you set about identifying problem categories of vehicles and pollution hot-spots that need to be identified and targeted?
Mr Pendlebury: It is interesting that you use that phrase "pollution hot-spots" because this is one the problems and dilemmas that we face now, which is that when the latest generation of Euro standards is in place—whether it is for cars or heavy duty vehicles—we would probably have gone about as far as you can go with technology so we are then into how do you deal with these very highly localised hot-spots which may just be individual junctions, individual stretches of road and so forth. Then ultimately solutions rest with local authorities to devise solutions, but part of that will most definitely be identifying what is the nature of the traffic that is causing the problem. In a sense, when you look London and the prevalence of buses, taxis, goods vehicles and the concentration of diesel powered heavy vehicles, it is going to cause you a problem. In terms of prioritising between them, it is a question of identifying what is the quantum of the emissions that comes from particular types of vehicles. The fact is that there are far more cars than there are any other types of vehicles, so by and large, if you are looking at a national process that is where you would look, but in an individual local areas it might be a certain type of vehicle that you target. Iain, for example, referred to Norwich which is an example where the policy that the council introduced there was specifically aimed at buses in a particular part of the city, so that is based on their assessment that that is probably the biggest single contributor in that area. It will differ from one place to another. If you were looking at the entrance portals to the Dartford Tunnel, then it is a different kind of composition of vehicles.

Q125 Dr Turner: Could you comment on the effect of the vehicle scrappage system on air pollution. It was introduced because of economic problems but I do not seem to remember it having any environmental factors in it. Did you give any thought to using it as an opportunity to improve air quality?
Mr Pendlebury: The scrappage scheme itself is coming to the end of its life, I believe. It is operated by the Department of Business, Innovation and Skills and you are absolutely right, the scrappage scheme was about supporting the automotive sector rather than delivering any specific environmental objectives. It is a good example of a policy that has environmental spin-offs and that simply comes from the fact that the older vehicles that you trade in will be ones that will be meeting only the very earliest or maybe no Euro standards at all, whereas the new vehicles you buy will be meeting the highest Euro standards and will also be having much greater fuel efficiency and so forth as well, we hope. There is absolutely a benefit in air quality terms in getting the older cars off the road and newer cars on the road and I am sure that that is something that could be quantified. One of the things about the scrappage scheme is that it was designed to be as simple as possible and trying to build in criteria that went beyond the age of the vehicle was going to make it exponentially more complicated so in the end the decision by the Business Department was to go for simplicity and I accept that, but there would certainly have been spin-off benefits in air quality terms from having more new vehicles in the fleet than there would otherwise have been.

Q126 Dr Turner: Could we turn to PSA28, for which you are jointly responsible. I was slightly puzzled by your evidence that the Department for Transport had been agitating for the most rigorous air quality standards possible in new Euro standards, yet the UK government is applying for a time extension on PM_{10} aspects and NO_2 on the new directive. Does there not seem to be something inconsistent there?
Mr Pendlebury: It is the collective position of the Government that we think that a time extension is needed or helpful to enable us to get the measures in place to deliver compliance with the directive and of course one of the things one should always bear in mind is that this is a pan-European problem. I think Ireland is about the only country that has not sought some form of time extension. We are all struggling with this; I will not make any bones about that. None of us wants to be in the position that we are applying for time extensions and we are doing the utmost that we reasonably can to try to comply and obviously we have had a push-back from the Commission on the PM extension. We are considering applying for a NO_x extension and we have a little while to make a decision on that and we will be going back very shortly to the Commission with some further information around PM_{10}.

Obviously Defra is the lead department on this but I hate saying that one department leads and another does not because that creates the impression that we are all playing to different agendas and I would not say that is the case at all; we all work very closely with each other but clearly we have put in these time extensions.

Q127 Dr Turner: Defra may be the lead department on this agenda, but your Department is in the best position to deliver the actual results. What incentive is there for the Department for Transport to set, for instance, domestic policy targets on air quality as part of its shared responsibility for delivering PSA28?
Mr Pendlebury: It is a slightly circular argument. We are co-owners of PSA28 in respect of air quality in particular and therefore that is the incentive that we have. The incentive that we have is because there are real health issues and environmental issues around air quality and in a sense it is not because there is some European legislation that we have to meet that we want to solve this problem. Even if there was no European legislation I think we would be very much incentivised to want to solve this problem; that just provides us with an added stick, if you like, to beat us with. Our duties as public servants and the government overall would lead us to want to do these things as we have done for many years, even before. The legislation around air quality predates European legislation so we have been in this game for quite some time. I am not sure I feel I need some additional incentive to want to work on it.

Q128 Dr Turner: How great a priority do you give to it? PSA28 cannot be delivered without fairly enthusiastic activity from the Department for Transport. Where do you rate the effort? Are you prepared to put as much effort into delivering PSA28 as into, for instance, trying to reduce road casualties?
Mr Pendlebury: We talked about this a few minutes ago. I would like to think we put as much effort into delivering air quality benefits as we do to road safety. Historically we have had a large road safety effort and of course the road safety benefits that have flowed from that have been very, very considerable. The reduction in emissions from road vehicles is comparable, if not better, than the reduction in road casualties from our road safety efforts and, as I mentioned before, one of the things that we agonise over is how you optimise air quality benefits versus other benefits. We take very seriously climate change issues in the Department and the fact that we have a set of measures that have a climate change penalty has illustrated that in that case we prioritise that area. We do put a lot of effort into this. On a philosophical level one looks at the Department for Transport to resolve these issues, but it is everybody in this room who has a responsibility for this. It is the cars that we drive, it is the goods that we expect to be available in our supermarkets, it is the public transport that we take and so forth. Those are the ultimate causes of this problem and there are measures that the Department can take to encourage people to bring about technology shifts and so forth but there are wider societal issues as well, including the priority which society places on this issue.

Q129 Dr Turner: You are absolutely right, but you cannot be held responsible for the whole problem and society as a whole can. What efforts do you make to try to make the public more aware of the problems and the contribution that the public, by their own behaviour and use of vehicles et cetera can make?
Mr Pendlebury: That is a good and fair question because we put a lot of effort into road safety public information and we have increasingly done so in conjunction with our partners in other government departments around climate change through Act on CO_2. There is some information as part of the Act on CO_2 campaign about emissions performance and I think the Vehicle Certification Agency's database is providing information that the public can access about the emissions standards in particular cars. What we have not had is a public information campaign akin to the road safety THINK campaign and that is something that one might give thought to. Obviously local authorities, where they have declared air quality management areas because they have local air quality problems will provide information on their website, through newsletters and so forth and we would very much encourage best practice in that kind of area. When one talks to local authorities and local authority officers in particular it is an issue that does not get much traction with both local politicians and with the public generally. It only tends to be when there is some media story running—poisonous fumes in your high street—that this ever gets much attention. That is a problem with this area I think.

Q130 Mr Caton: How should local authorities take the health effects of poor air quality into account when they are producing their local transport plans?
Mr Pendlebury: There are a number of things they can do. Obviously first of all they need to understand the nature of the air quality problem in their area insofar as there is one. Then there are a number of things they can do. They need to first of all get into a good dialogue with other bodies who are responsible such as the Highways Agency because we sometimes find, for example, the Highways Agency road is one of the principal sources in a particular area so it is important for both the Highways Agency and local authorities to look at what they can do jointly on those areas. There are policy instruments that local authorities should be considering, some of those will be ones that have multiple benefits so the whole drive towards more sustainable travel options, whether it be around cycling or greater encouragement to walk and so forth. Those are the sorts of policies that will have air quality benefits. Ultimately, there are other sorts of policy instruments that are potentially available to local authorities, of which low-emission zones, of which we have one in London, will be one area. That is quite a complicated and potentially quite onerous thing to do, but if you have a really significant problem that might be one issue you

might want to think about developing and introducing. There is a range of things people can do. We already heard mention from Mrs Walley about things like entering into bus quality partnerships and so forth, getting bus operators to change their operating practices so they are not sitting with the engine idling in the bus depot. It is the simple little operational things that cumulatively can try to track the problem. One final thing that I do think is important is around local traffic management measures because we do know that very often the hot-spots will be very, very location specific—a particular junction—and it can be something as simple as re-phasing traffic lights, moving the people a little bit back from the road by planting schemes and small-scale local measures that can make a significant difference.

Q131 Mr Caton: You do provide guidance I know; are these sorts of things covered in that guidance?
Mr Forbes: It is important to note that the recent guidance that the Department put out on local transport plans strongly encouraged local authorities to integrate air quality action plans with the local transport planning process, and actually the new round should simplify that by allowing the timescales to be aligned, and also gave quite clear direction to Defra guidance on local air quality management which describes some of the measures that Graham Pendlebury went through.

Q132 Mr Caton: Do you advise local authorities on how to measure the costs of both health impacts and environmental impacts?
Mr Forbes: Defra provide extensive guidance on local air quality management including how best to monitor air quality in their area and appropriate measures they might want to take to develop action plans to help address air quality problems.

Q133 Chairman: Given the range of policy options available to local authorities, why do you think more are not using them?
Mr Pendlebury: That is a question you might want to put to them and no doubt you will be doing. I think obviously all of these measures, even some of these quite low-cost ones, do have costs associated with them. There are both compliance costs for transport operators who are affected if you are introducing things like low-emission zones; there are issues around what is locally publicly acceptable. They will tend to find that the things people are complaining about are the fact that there is not enough parking provision or they are worried about potholes and things like that, very legitimate things. So even though there are responsibilities on local authorities under the existing statutory regime, it is just not always a locally high-priority issue. This may come back to some extent to the question about the extent of public knowledge and awareness. I do not want to blame local authorities; I appreciate they have very difficult competing objectives.

Q134 Chairman: In the light of that would it be helpful if we had a national framework for low-emission zones, for example in the way that I believe the Netherlands and Germany do?
Mr Pendlebury: I think the national framework for low emissions, certainly the Germans have gone down that route. That primarily relates to particulates rather than to NO_x. The problem we really have, apart from London, is NO_x and whether or not you get the same kinds of benefits from the operation of low-emissions zones is something that we need to think about further. It is something we are thinking about with a view to bringing forward some ideas around this. We want to understand much better the way in which the London low-emission zone has worked or not worked in terms of the actual benefit it has delivered. We can see how it works operationally, although it is quite a technology heavy process, but does it actually deliver real air quality benefits? Similarly we have commissioned a piece of work, which I think we are due to get very shortly, looking at the European experience of low-emission zones. They sound great but do they actually deliver the air quality benefits that one hopes from them? The jury is a little bit out on that so before we go down that route, which potentially is quite an expensive route to follow, we need to be absolutely sure that we have got the evidence, but it is certainly something that we are thinking quite carefully about and we have had some discussions with ministers about that possibility.
Mr Forbes: I think to underline the points you are making, we are actively looking at the experience in Europe and seeing what low-emission zones there deliver and assessing whether it would help us with our air quality objectives.
Mr Pendlebury: I was over in Germany last summer looking at this particular issue amongst other things and it is an area where the Germans, probably for historical reasons, have prioritised this quite considerably. They have far more officials working on this area, they put a lot more financial resource into it than we have done hitherto. I cannot conjure up a pot of money or an army of civil servants to do this, but it is noticeable that in Germany there is a lot of effort going into this area.

Q135 Chairman: Are you saying that the main barrier preventing Britain going further down this road is a lack of resource?
Mr Pendlebury: I walked into that! Just throwing money at the problem is not necessarily the solution. Clearly there are resource implications from setting up something like LEZs both in the local authorities themselves, in terms of our agencies who actually have to provide data and so forth, and depending on what kind of system you apply—the Germans have gone for quite a simple coloured disc approach whereas, in London, TfL have gone for the technology-heavy congestion charge—all of the systems have got significant resource implications. Ultimately is always a question of how you prioritise.

Mr Forbes: If low-emission zones were to take in buses we would want to be very clear on what impact that might have on bus patronage. We talked earlier about the pressures that local authorities are under with regard to their relationship with bus operators.

Q136 Martin Horwood: In terms of retrofitting—it has been said to us again and again that the existing stock of vehicles is part of the problem—has DfT considered any incentives to retrofit things like particulate traps and other measures like that?
Mr Pendlebury: Retrofitting is another of those areas we are often asked about. We used to have a scheme known as the Clean Up programme which ran from 2000 to 2005 which was offering grants for retrofitting commercial vehicles with emissions controlled technologies and in the end that programme was scrapped in 2006 because the assessment of it suggested it was not delivering a value-for-money outcome. We have had it in the past.

Q137 Martin Horwood: I had no idea about that scheme, despite the fact that I drive a car.
Mr Pendlebury: It was actually aimed at commercial vehicles rather than the individual consumer. Chris, is there anything more about Clean Up?
Mr Parkin: It was a programme offering grants for retrofitting heavy goods vehicles and buses with particulate reduction technology or particulate plus NO_x reduction technology.

Q138 Martin Horwood: What was the take-up of that scheme?
Mr Parkin: I do not have any data on that, I am afraid.
Mr Pendlebury: It was administered by the Energy Savings Trust on behalf of the Department so I am sure we could get some data about the take-up. Retrofitting generally—again I am conscious that there is a programme that has just started in Germany—is an interesting area because it is one of those areas where there is a carbon trade-off. Retrofitting technologies give you a carbon penalty as well, so we are having to balance that and it is not a simple thing to set up on a nationwide basis but I am conscious that there are some people calling for nationwide certification and verification processes for retrofitting, so that would be something we would look at but we would have to look at it in the terms of the past experience.

Q139 Martin Horwood: Without having to work out a complicated system, could you just incentivise it by looking at VED?
Mr Pendlebury: You would expect me to say that VED is a matter for the Treasury rather than for the Department. VED at the moment, if you are looking at cars, is obviously calibrated according to CO_2 rather than NO_x or PM_{10} and if you tried to build in some sort of incentive there you are starting to complicate the system very significantly. I think it is not something that has really been considered. Ultimately I would have to say that my friends in the Treasury would probably be in the lead on that but it is not something we would particularly push for. VED for us is good at getting low-CO_2 incentives in place but clearly it has wider purposes as well.
Mr Parkin: There is perhaps a distinction here between VED for passenger cars and VED for commercial vehicles. The Department and Treasury have previously, through the Reduced Pollution Certificate scheme, offered lower levels of vehicle excise duty for commercial vehicles if they comply early with future Euro standards. Indeed the Treasury announced in 2009 that they planned to incentivise the early uptake of Euro VI heavy duty vehicles through that same mechanism.

Q140 Martin Horwood: You told me in an earlier answer that you had a unit which is promoting the uptake of very-low-carbon technology.
Mr Pendlebury: That is right, the Office for Low Emission Vehicles, OLEV as it is known.

Q141 Martin Horwood: Have there been any significant successes so far?
Mr Pendlebury: The significant success from our point of view that we obtained from the Treasury £260 million to add to our existing package of funding.

Q142 Martin Horwood: Congratulations, but I was rather thinking about actual outcomes.
Mr Pendlebury: The mission of OLEV is to stimulate the uptake of ultra-low-carbon vehicles, new technology vehicles, not existing technologies but actually transformational technologies. We have been working with manufacturers and a variety of other stakeholders to design a consumer incentive scheme which will come into effect sooner rather than later. I am not in a position to make an announcement about that, but I think there will be a forthcoming announcement very shortly about when this scheme will start. Obviously at the moment we are not looking at conventional types like the Prius, we are looking at new types of vehicle altogether which are not sort of milk float vehicles but real cars that you and I might drive. We want to get those into the market place. We will be designing a consumer incentive. We have said that we will be giving between £2,000 and £5,000 per vehicle as a grant to the ordinary driver to take up these vehicles. There is also, as part of this, something we are calling "Plugged-In Places" which is getting some infrastructure in place in certain locations and again we will be making some announcements about that fairly soon as well. It is quite early days, but what is really good about this organisation is that it is a genuinely inter-department body as officials from DECC, BIS and DfT are all working on it together. We are very, very keen to make a success of it and, if it works, it really does set us on this complete de-carbonisation path which I know you are very keen

to see us promote. I have to say, all that is about carbon, it is not about air quality as such, but the air quality benefits from de-carbonising are clearly very, very significant.

Q143 Chairman: Thank you very much for that; it has been a very helpful session from our point of view. We are grateful to you for coming in.

Mr Pendlebury: Thank you.

Tuesday 23 February 2010

Members present:

Mr Tim Yeo, in the Chair

Martin Horwood
Mr Ian Liddell-Grainger
Jo Swinson
Dr Desmond Turner
Joan Walley

Memorandum submitted by the Department for Environment Food and Rural Affairs (Defra) (AQ 24)

This evidence has been provided in consultation with Department for Transport (DfT), Department of Health (DoH) and the Health Protection Agency (HPA).

Short Bulleted Summary of Submission

- Air quality in the UK has improved significantly over recent decades, but improvements are now levelling off for key pollutants and are increasingly costly to achieve.
- Notwithstanding these improvements, air quality remains a significant health issue, particularly in urban areas, and reduces the life expectancy of the UK population by an average of seven to eight months, with social costs estimated at £9-21 billion per year. This excludes additional health costs that cannot currently be quantified. Air pollution also affects ecosystems and can lead to loss of biodiversity.
- In common with many other Member States, the UK is not yet meeting in full European obligations or UK Air Quality objectives for particulate matter (PM_{10}) and nitrogen dioxide (NO_2)
- Road transport and large combustion plant (power stations, refineries) are the key UK-based sources of overall pollution emissions but urban exposure are dominated by transport emissions. London generally has the highest levels of air pollution, but levels exceed European Limit Values for NO_2, in particular along main roads in other major urban areas as well.
- EU legislation; the Air Quality Strategy for England, Scotland, Wales and Northern Ireland and Local Air Quality Management provide the framework for delivery of improvements in air quality. The UK has submitted an application for additional time to meet EU limit value deadlines for PM_{10} and work is in hand on measures to help the UK meet EU obligations on NO_2 by 2015.
- The National Air Quality strategy provides the framework for regular review of air quality in the UK including health impacts and possible action for continued improvements in air quality. Looking to the future, links with climate change will be increasingly important to ensure that any measures taken will maximise the benefits to both areas.

Overview

1. Air quality has improved in the UK over recent decades. Levels of most pollutants are declining significantly, driven primarily by domestic and international legislation; legal limits are met across 99% of the country. The Environment Act 1995 requires the Government to set out a strategy for improving air quality in the UK. The first Air Quality Strategy for England, Scotland and Wales (later versions included Northern Ireland) was published in 2000 and was most recently revised in 2007. This set objectives for a number of different pollutants that have impacts on human health and or ecosystems. The key pollutants in the strategy are sulphur dioxide (SO_2), particulate matter (PM_{10} and $PM_{2.5}$), ozone (O_3) polycyclic aromatic hydrocarbons (PAHs), benzene, 1,3 butadiene, carbon monoxide (CO) lead, ammonia, and oxides of nitrogen (NO_X) including nitrogen dioxide (NO_2). Many of these objectives are now reflected in EU legislation.

2. The UK is not meeting air quality strategy objectives for NO_2 and PM_{10}. Breaches of EU obligations for other pollutants such as SO_2, PAHs or benzene are uncommon and usually associated with activities in a particular location. Excessive deposition of nitrogen as a result of ammonia and NO_X emissions remains a threat to ecosystems.

3. Levels of particulate matter (from road transport, stationary fuel combustion, tyre and brake wear and construction and quarrying) remain above legal limits in a very small number of (mainly urban) areas in London. However health evidence suggests that there is no "safe" level for fine particulate matter, and so health benefits (in terms of reduced mortality and morbidity) can be achieved through reductions in population exposure below current legal limits. Concentrations of NO_2 remain above the EU limit value (and UK objectives) at about a third of major roadside sites in urban areas. The recent decline in concentrations of NO_2 is now levelling off and further research is needed to understand why this is the case. Where improvements are most needed (notably urban areas near busy roads) these are increasingly challenging and expensive to achieve.

4. Peak ozone episodes (summer smogs) have decreased due to pollution control in the UK and Europe, but background ground-level ozone levels are rising. In addition to causing health effects, ozone damages both crops and natural ecosystems, and is a powerful greenhouse gas.

Health and Environmental Impacts of Poor Air Quality

5. Defra works with the Health Protection Agency, Department of Health and other Government Departments to maintain and develop methodologies for assessing air quality impacts on health and the environment.

6. The quantified health impacts of air pollution in the UK are valued in accordance with Treasury guidelines and follow the approach set out by the Interdepartmental Group on Costs and Benefits (IGCB) in Volume 3 of the Air Quality Strategy (2007). A monetary cost benefit analysis (CBA) forms a major part of the overall assessment of measures to improve air quality including those set out in the Air Quality Strategy 2007. The monetary assessment of benefits is based on an impact-pathway approach that follows a logical progression from emissions through dispersion, concentration and exposure to quantification of impacts and their valuation. The benefits are then compared on a consistent basis with the estimated costs associated with the implementation of each policy measure under consideration.

Overview of Health Impacts from Air Pollution

7. Advice to Government on the health impacts of air pollutants is provided by the Committee on Medical Effects of Air Pollutants (COMEAP). Several members of COMEAP have contributed to the development of the air quality guidelines published by the World Health Organization (WHO) over the years (WHO, 1987; 2000; 2005). The WHO air quality guidelines form the basis for the European limit values set out in the UK's Air Quality Strategy.

8. Extensive research considered by COMEAP has shown that both short-term and long-term exposure to air pollution can have effects on health. Of the nine air pollutants covered in the UK's Air Quality Strategy (2007) the effects of particulate pollution have dominated the overall impact of air pollution on health. The available evidence shows that day to day variations in concentrations of airborne particles are associated with day to day variations in a range of health effects. These include deaths, admissions to hospital for the treatment of both respiratory and cardiovascular diseases and asthmatic symptoms. In addition to these effects there is evidence that long-term exposure to particulate air pollution is associated with a decrease in life expectancy. These associations are believed to be causal.

9. The available health evidence suggests that there is no "safe" level for fine particulate matter (measured as $PM_{2.5}$). Therefore there are further benefits to health that can be achieved through reductions in population exposure below current legal limits. The Air Quality Strategy 2007 sets out an "exposure reduction" approach for $PM_{2.5}$. This seeks further reductions in the health effects of air pollution by providing a driver to improve air quality everywhere in the UK rather than just in a small number of localised hotspot areas, where the costs of reducing concentrations are likely to be exceedingly high. This approach will act to make policy measures more cost-effective and is more likely to maximise public health improvements across the general population. This approach was adopted for $PM_{2.5}$ by the EU in Directive 2008/50/EC on ambient air quality.

10. Air pollution is currently estimated to reduce life expectancy by an average of seven to eight months across the UK population with estimated equivalent costs of between £9 billion and £20 billion. However there are important uncertainties associated with the quantification and valuation of health impacts. These uncertainties are set out in full in Volume 3 of the Air Quality Strategy 2007.

11. Significantly of all the common air pollutants covered in the Strategy (2007), the evidence on the health effects associated with both short-term and long-term exposure to NO_2 has been inconsistent. Whilst the health effects of particulate pollution are well understood, those resulting from NO_2 are less clear. The available evidence suggests that the reported effects of NO_2 might be due to exposure to particulate pollution owing to the close correlations between their concentrations and similarity of sources.

12. Previous attempts by COMEAP to quantify the possible effects of exposure to NO_2 have not been successful as COMEAP did not regard the available evidence sufficient enough for quantification (DH, 1998); and the available studies have also had difficulties in disentangling the effects of NO_2 from those of particles and other pollutants/factors (COMEAP, 2009). As a result, Defra (and DH) has been unable to assess the direct health benefits for measures to control NO_2 and no direct health benefits have been included in the main cost-benefit analyses for measures assessed in the Air Quality Strategy (2007). Only a sensitivity analysis is presented for the effects of NO_2 on respiratory hospital admissions. The 1998 report by COMEAP suggested a concentration-response function that could be used in sensitivity analyses to illustrate the possible size of the effect of short-term exposure to NO_2 on respiratory hospital admissions. It should be noted that NO_2 can be converted to nitrate which is a component of particle aerosols; the indirect effect of NO_2 via nitrates (secondary particle) on mortality, as part of this fine particle mixture (measured as $PM_{2.5}$), is currently quantified.

13. COMEAP acknowledge that further work is required in order to understand the health effects associated with exposure to NO_2 and is currently in discussion with the Health Protection Agency in developing a programme of work in this area.

14. There is currently an underestimation of the full range of possible health benefits that could be attained from policy measures to improve air quality, because it has not been possible to quantify all health outcomes. Work to review the evidence is ongoing and it is expected that this would lead to an increase in the number of health outcomes identified. Inclusion of other health effects in the central analysis would increase the monetised health benefits that could result from measures targeted at reducing concentrations of air pollutants in the UK.

15. There is some evidence from limited UK studies to suggest that air pollution exposure is higher amongst some communities who rate poorly on social deprivation indices (Defra, 2007). Although this work was limited in scope (it covered only five urban areas in the UK), it illustrates possible health inequalities.

Overview of the Impact of Air Pollution on Ecosystems

16. There is a large body of literature demonstrating that air pollutants can affect aquatic and terrestrial ecosystems. Concern began in the 1970s with the identification of problems caused by acid rain and continues today with the issues of eutrophication and ground-level ozone.

17. An indication of the potential for effects of pollutants on the environment to occur is provided via the critical load concept. A critical load is an estimate of the exposure to one or more air pollutants, above which there is risk of damage to certain sensitive elements of the environment. If the amount of deposition is greater than the critical load for that habitat, an exceedance is reported. Exceeding critical loads does not necessarily indicate that damage has occurred, but it indicates the potential for damage to occur.

Acidification

18. Acidification of soils and waters can be caused by deposition of sulphur, nitrogen (from emissions of NO_X and ammonia) or hydrochloric acid (or a combination of these pollutants). Emission controls have reduced sulphur dioxide emissions by over 90% from their peak value in the 1950s, resulting in reduced concentrations of sulphur and levels of acidity in the atmosphere, soils and freshwater.

19. There has been a reduction in the area of terrestrial broad habitats exceeding critical Loads for acidity from 71% of ecosystem area using 1996–98 acid deposition, to 58% using deposition data for 2004–06; this is predicted to reduce to 40% in 2020. Current critical load exceedences for acidity are mainly due to the deposition of nitrogen rather than sulphur. Typically, most of the deposited nitrogen is accumulating in soils and vegetation, and relatively little is currently contributing directly to acidification, but significant leaching to surface waters is occurring in higher deposition areas, and in particularly in catchments with sparse soils.

20. Since the problem was identified in the 1970s, UK and International policy action has achieved considerable success in managing acid deposition. Acid deposition has been greatly reduced and the acidity of soils and acidified surface waters has declined. Ecological recovery of these habitats is underway but soils and freshwaters in some regions remain acidified and the legacy of previous emissions, land use and climate change may limit the extent of the recovery. Further reductions in the emissions of sulphur may be required to aid ecological improvement.

Eutrophication

21. Eutrophication from atmospheric deposition in the UK is caused by the emissions of nitrogen oxides and ammonia. Emissions of nitrogen oxides have decreased by 50% since 1970, with a corresponding 50% reduction in air concentrations of nitrogen oxides. Emissions of ammonia are only reliable from 1990 onwards, since when they have decreased by 24%, although there is large annual variability, masking any overall trend. Concentrations of ammonia have changed little over the last decade.

22. Despite the large reduction in emissions, total deposition of nitrogen has changed little. This is due to changes in the chemistry and removal of nitrogen compounds accelerating the removal from the atmosphere over 20 years of monitoring. Thus a larger proportion of nitrogen emissions are deposited in the UK than occurred 20 years ago. At sites in the UK where nitrogen deposition exceeds the capacity of the vegetation and soil to sequester inputs, nitrate is leaching into surface waters and has the potential to stimulate algal growth and affect species composition. In the terrestrial environment, changes in species composition have been observed close to sources of ammonia, and in the national surveys (such as the Countryside Survey which while showing significant impacts up to 2000, suggest no worsening of conditions thereafter). Controlled experiments also show reductions in species composition with nitrogen addition, especially for ammonia treatments. Currently, 60% of all sensitive habitat areas sensitive to eutrophication from nitrogen deposition exceed the critical load for nutrient nitrogen. This figure is predicted to decrease to 49% by 2020.

23. Eutrophication problems are being addressed, and while there has been a reduction in emissions and concentrations of nitrogen oxides, it is recognised that further policy action is required to reduce nitrogen emissions, and especially ammonia to prevent further damage and allow recovery of some plant communities to begin.

Ground-level ozone

24. Biological indicators of ground-level ozone show that concentrations continue to exceed thresholds for effects on sensitive species. Current ozone exposures exceed critical thresholds for effects on crops, forests and semi-natural vegetation over substantial areas of the UK. Background concentrations of ozone in the northern hemisphere have now increased to a level where exposure to ozone may cause adverse effects on vegetation. These effects are most likely to occur in crops grown in the southern areas of the UK during spring and summer. It has been estimated that ozone reduces the yield of wheat grown in southern Britain by 5% to 15%, equivalent to a reduction in national yield in 2000 of approximately two million tonnes. Ground-level ozone also contributes to global warming indirectly by reducing carbon take up by vegitation as well as being a greenhouse gas in its own right.

25. Policy action to reduce European emissions of the precursor gases which form ozone have successfully reduced peak ozone concentrations in the UK. However, emissions throughout the Northern Hemisphere are causing increasing background levels; control of emissions of ozone precursors at the hemispheric scale is therefore required.

Assessment of air quality

26. UK monitoring of air quality is undertaken for a number of reasons but the pollutants monitored, the methods used and the location and number of monitoring sites mainly follow requirements of EU legislation. "Directive compliance" monitoring makes up the vast majority of the revenue spend on monitoring activities, and takes up over 50% of the total evidence and research budget for air quality in Defra. Monitoring is also undertaken for other reasons, such as the maintenance of long term and policy relevant datasets (eg the black smoke network where some data go back to the 1920s). By applying the principle of "measure once, use many times" all data from our monitoring networks support a range of activities even though the design of the networks is, by and large, prescribed in legislation.

27. All air quality monitoring data, current and historic, gathered by Defra is made publicly available through the national air quality archive—www.airquality.co.uk—which is updated hourly from our automatic systems. All of our monitoring activities are outsourced through fully competitive tendering processes to ensure high value for money.

28. Local authorities also undertake air quality monitoring for their own purposes and to inform the process of local air quality management. The location of monitors, the methods used and the quality control systems used may not be of the standard required by the European Directives and so these data are not generally reported to the Commission. However, where the requirement of the Directive coincide with local authority monitoring, these sites can be "affiliated" into the national network: the local authority retains ownership of the site and the equipment and Defra takes on the maintenance and quality control. In this way we are able to obtain data in a more cost effective manner; some 53% of the Automatic Urban and Rural Network (AURN) is made up of affiliated sites. The extent to which local data can be used in the centre to assist in delivery of air quality improvements is under review and consideration is being given to the best use of this data at the centre.

29. The Ambient Air Quality Directive also offers Member States the option of reducing the prescribed number of monitoring stations if supplementary assessment methods, are also reported. The UK makes full use of this option as the national model provides far greater spatial coverage than monitoring alone as well as saving around £2.5 million annually. The model is tested against monitoring data and comes well within the required data quality objectives laid down in the Directive.

30. Monitoring data are critical to future policy development, as is predictive modelling, but they are both complex and have many inherent uncertainties. For example, there is evidence from the monitoring network to suggest that roadside concentrations of air pollution are not falling in line with emissions projections (this is being seen in other Member States as well). Defra is conducting research to understand the causes of this and to improve reliability of modelling. Research is conducted to improve our evidence base on air quality and to inform how best to secure future improvements.

Policies to improve air quality and meet EU obligations

31. The new ambient air quality directive (2008/50/EC) must be transposed into national legislation by June 2010 and the UK is on track to achieve this. This Directive consolidates and simplifies most of the existing EU legislation on ambient air quality, setting legally binding limits for key pollutants to protect public health and ecosystems; and introduces a new control framework for fine particulate matter based on exposure reduction. It also provides for additional time to meet the limit values for PM_{10} and NO_2, subject to Commission approval of detailed plans setting out how this would be achieved. This is in recognition of the difficulties nearly all Member States have had in meeting the original deadlines.

32. Since 2005 the UK has reported exceedences of the PM_{10} limit value in eight UK zones (including London) and in April 2009 the UK submitted an application to seek exemption from the obligation to comply with this until 2011 as provided under article 22 of Directive 2008/50/EC. National projections based on a 2005 baseline year suggested that on the basis of current measures compliance would be achieved across all zones by 2011. This reflects the fact that air quality in the UK is generally good and PM_{10} limits have

been met across 99% of the UK. Since this submission, the national 2008 assessment reported compliance in all zones except London and updated national projections show that we should achieve compliance with the limit value across the whole UK by 2010.

33. The Commission published its decision on the notification on 11 December, as it has also done for several other Member States. Whilst this was disappointing in relation to London, Government is confident that it can respond to the questions raised by the Commission and will resubmit its application with further information as necessary, working closely with the GLA. The Mayor of London published his draft air quality strategy in October 2009; and this increases our confidence in our ability to meet particulate matter limits across London by 2011.

34. Meeting EU limits for NO_2 in the remaining areas of exceedences presents, a much more significant challenge, requiring additional action in particular to limit emissions from the transport sector in urban areas. The limits for NO_2 come into force in January 2010 and the UK faces infraction if they are not met or we are unable to demonstrate how they will be met by 2015. This is a risk shared with nearly all other major Member States. Latest estimates for this pollutant suggest that on the basis of current measures alone the UK would not meet EU limit values for this pollutant by either 2010 or 2015. For example Defra projections suggest that without additional measures some 500km of roads mainly in London but also in other major urban areas in the UK, would breach the NO_2 annual mean limit value in 2015). Defra is working with DfT and other stakeholders to identify measures to reduce NO_2 pollution and prepare an application for time extension to meet the EU limit value for this pollutant by 2015.

35. The most significant levels of exceedence for NO_2 are in London and the London Mayor's draft air quality strategy provides some useful measures but their impacts need to be fully quantified and understood and this is not possible without further analysis from the GLA. Separately from this, work is in progress to deliver the Government commitment made in January 2009 that a regulatory mechanism would be put in place to ensure air quality limits are met around an expanded Heathrow airport. No additional capacity would be released until the limits are met.

Vehicle Emission Standards

36. Emissions standards (called EURO standards) for new vehicles and the regulation of fuel quality to reduce air pollution from vehicle emissions are a particularly important means of improving ambient air quality. These have led to significant reductions in particulates especially since the early 2000s. Further reductions should be achieved thanks to later Euro Standards (Euro 5 and especially Euro 6) which impact in particular on emissions of NO_X including NO_2 but these will not have a significant impact until 2015 and beyond when Euro 6 becomes mandatory. Therefore other measures are needed in the short term to reduce pollution and to meet EU obligations. Measures under consideration by Government include exploring the feasibility of low emission zones outside London, retrofitment of pollution abatement technology to the most polluting vehicles (HGV and buses especially); incentivising the early introduction of euro standards, in particular Euro 6 when this becomes available. Other measures under review include measures to reduce road traffic through modal shift for example and to encourage the purchase of low and very low emission vehicles.

37. Many of these measures have significant cost implications which need to be carefully considered against the benefits. The 2007 UK Air Quality Strategy reviewed a number of possible measures and concluded that the most cost beneficial measures were to incentivise Euro standards; to promote low emission vehicles and to reduce emissions from shipping. Action on shipping will be implemented through international maritime legislation; implementation of the other measures is still under consideration as part of the work to apply for further time to meet the NO_2 EU limit value.

Local Air Quality Management in England

38. The Environment Act 1995 sets out requirements for local authorities to monitor and assess local air quality and to work towards the attainment of air quality strategy objectives where these are not met or at risk. The UK Government and the devolved administrations in Scotland, Wales and Northern Ireland are responsible for policy and legislative issues affecting air quality. Defra oversee local air quality management in England. Local Authorities have monitored air quality at district and borough level since the beginning of 2000 and have identified many locations where UK objectives have not been met. These are mainly in large urban areas such as London and major conurbations in the West Midlands the North West and Yorkshire but also in many smaller urban areas and market towns where narrow streets have restricted the dispersion of pollutants. In 2009 over 240 Authorities in the UK had declared an Air Quality Management Area for one or more of the UK objectives. For each of these areas the local authority concerned must prepare and implement an action plan to improve local air quality.

39. Guidance on preparing Action Plans and on measures to improve air quality is provided by Defra and the devolved administrations. Delivery of local air quality improvements is often reliant on district and county authorities and neighbouring authorities working together to identify the main sources of pollution and introducing complementary measures to improve air quality. Transport sources are commonly the most significant source of pollution locally. In 2009, the Department for Transport issued the latest round of Local Transport Planning Guidance, which strongly encourages local authorities to integrate their air quality

action plan with their local transport plan. Similar approaches are recommended for minimising the negative impacts of land use development on air quality and climate change measures. Local air quality management arrangements are currently being reviewed to ensure they remain fit for purpose and capable of delivering local improvements to support the national objectives.

National Emissions Ceilings

40. Health and ecosystem impacts are also caused by air pollutants transported in large quantities across national boundaries. The EU national emissions ceilings directive (NECD) and protocols under the UNECE Convention on Long-Range Trans-boundary Air Pollution aim to address this by setting national emission ceilings for key air pollutants. The UK is currently on course to meet its NECD 2010 emission ceilings for SO_2, VOCs and NH3. However, like many other European countries, the UK is currently projected to exceed its 2010 NO_X ceiling by a small percentage with compliance expected by 2012. The situation is being closely monitored with a view to meeting the ceiling as soon as possible. The Gothenburg protocol, which like the NECD sets ceilings for key pollutants but also sets limit values for key emission sources, is currently being reviewed with a view to setting new ceilings to be achieved by 2020. The European Commission is also expected to publish some time in 2010 a proposal for revision of the NECD so as to set new, tighter ceilings for 2020.

Industrial emissions

41. UK legislative controls on emissions to air from industrial installations have been vital to improving air quality locally, nationally and internationally. In recent years, the larger industrial installations (now some 4,500 in the UK) have been subject to integrated pollution prevention and control (IPPC) under the eponymous European Directive[1] which requires emission limit values (ELVs) to be set for all likely significant emissions to any of the three environmental media. The regulator has to set ELVs on the basis of the use of best available techniques (BAT) which in turn are determined and regularly reviewed on the basis of technical and economic viability in the industry sector concerned. The BAT approach is also used in the regulation[2] under national legislation of air emissions from some 20,000 smaller industrial installations.

42. Other EU legislation dealing with waste incineration, large combustion plants and activities using solvents are met in the UK through the IPPC framework. EU legislation on petrol vapour recovery, paints formulation and the sulphur content of liquid fuels also provide controls upon industry (including the transport industry) relevant to air quality.

Future drivers

43. Growing population and increasing travel in some urban areas, linked with continuing pressures on development, make it difficult to reduce overall air pollution levels in the short term, particularly in major urban areas and along key infrastructure routes. On the basis of current impact assessment methodologies, the costs of measures specifically aimed at bringing forward expected air quality improvements can outweigh the health benefits.

44. Projected increases in summer heatwaves, such as that in 2003, as a result of climate change are expected to increase the frequency and severity of "summer smogs"'. In the UK, it was estimated that there were between 225 and 593 additional deaths brought forward due to increased ozone in the first two weeks of August 2003, compared to the same period in 2002. Similarly, for PM_{10} concentrations, it was estimated that there were 207 additional deaths. For England and Wales, the deaths due to air pollution accounted for 21–38% of the total reported excess deaths during the 2003 heatwave. Other potential climatic changes (higher rainfall, stronger and more prevalent south westerly winds in winter) may benefit local UK air quality. Any increase in burning of coal in the UK in existing combustion plants in the UK will impact negatively on air pollution despite existing and planned abatement measures. The Department for Energy and Climate Change announced in November 2009 that new coal-fired plants would need to incorporate carbon capture and storage which would bring air quality benefits in addition to meeting the primary aim of reducing CO_2 emissions.

45. Globally, greater use of fossil fuels resulting from increased population and energy demand will impact on transboundary air pollution affecting the UK so continued efforts in international fora to drive down national emissions will be needed.

46. Given the many common emission sources, links with the climate change mitigation agenda will be increasingly important in maintaining and improving air quality so that local as well as global benefits are accrued. Influencing future UNECE and European Commission proposals as well as ensuring good co-ordination within Government including at regional and local level will be critical. In the short to medium term (to 2020–30) one challenge will be to manage the risks of deterioration from increased biomass burning (which can lead to local increases in levels of particulates) as well as optimising synergies from energy

[1] Now 2008/1/EC. A proposed "recast" of this and related legislation was politically agreed in the Environment Council in June 2009 and stands to be finalised in mid 2010 after further consideration by the European Parliament.

[2] By local authorities in England and Wales and by the Scottish Environment Protection Agency and the Northern Ireland Environment Agency in their respective areas.

efficiency measures, low carbon vehicles and increased use of non combustion renewable energy. Looking further, right out to 2050, the scale of carbon reductions that the UK has committed to means there should be significant co-benefits achievable for both air quality and climate change. The recent Pre Budget Report announcements on promoting low carbon transport will provide helpful incentives to support the growth in electric vehicles which will bring benefits for air quality on top of those for climate change mitigation.

15 December 2009

Witnesses: **Jim Fitzpatrick MP,** Minister for Food, Farming and Environment, **Mr Daniel Instone,** Deputy Director, Air, Noise and Local Environmental Quality, **Mr Robert Vaughan,** Head of National and Local Air Quality, Atmosphere and Local Environment, and **Mr Tim Williamson,** Head of Science and Evidence, Atmosphere and Local Environment, Department for Environment, Food and Rural Affairs, gave evidence.

Q144 Chairman: A warm welcome and thank you for coming in a few minutes early as well; it is much appreciated. We have got quite a lot of interest in this inquiry. It is an issue which I think many of us had not really thought about in tremendous detail before we started and we have been quite struck by the evidence we have had so far. Could I ask you just generally to start off with: why do you think the Defra Air Quality Strategy has failed to stop Britain from being in the position where it faces EU fines?
Jim Fitzpatrick: Chairman, would it be helpful if I made a very brief opening statement and introduced my colleagues from the Department here?

Q145 Chairman: Of course.
Jim Fitzpatrick: I have Daniel Instone, who is the Deputy Director for Air, Noise and Local Environmental Quality, Mr Robert Vaughan, who has responsibility for the national and local Air Quality Strategy management, and Mr Tim Williamson, Head of Science and Evidence for the Atmosphere and Local Environment Programme for Defra. We welcome the opportunity, Chairman, to come before the Committee today because we recognise that this is an important issue and we are very pleased to be here. Responsibility, as obviously colleagues will know, is shared between Defra and the Departments of Health and Transport whom, I know, you have engaged with. There is significant progress which has been made since the mid-1990s, and I will not quote the figures, but we can go into them later should you choose. For PM_{10}, we are now only exceeding the European limit value at a very few localised hotspots in Central London. For all other pollutants, with the exception of nitrogen dioxide, we are meeting European limit values. There is clearly a tie-up with climate change and the impact of air quality, and again we are quite happy to go into those areas should you choose, and we are engaged with the devolved administrations to publish shortly a document setting out how effective the integration of these policies will be, and we would be very happy to supply that to the Committee in due course, Chairman.

Q146 Chairman: That is helpful, thank you very much. I think it leads me back to the same point: would you like to say why you think the strategy followed so far by Defra, although obviously it has achieved a number of the goals, still leaves Britain in the position where it faces EU penalties?
Jim Fitzpatrick: Well, we are working very hard obviously to be within the limits which are set down by the Commission in the Directive. We have certainly, as I have outlined, met a number of those and we are seeking additional time, as many other Member States are, to make sure that we are able to get within others and, in that instance, we do not think that we will be outwith the requirements set by Europe. We do not think, for example, that the risk of infraction is high, we think it is very low because of the progress we have made because of our direction of travel, so we know we have to do more and we fully recognise that and we do hope to be able to demonstrate to the Commission that we are complying and will be able to meet the targets that are laid down in the Directive.

Q147 Chairman: What are the particular problems, do you think, that need to be solved now?
Jim Fitzpatrick: If you will allow me, Chairman, I have obviously invited my colleagues to contribute where their expertise is far more competent than mine. One of the areas in the briefings and discussions that we have had which has been disappointing is that in the testing regime, for example, for diesel engines which indicated that they would actually be cleaner because of the catalytic technology which was available, in reality, now we are up to 40% of vehicles driven by diesel, the results have been disappointing and they have not actually reflected those initial tests. We clearly have hotspots, as I outlined in my initial statement, in Central London and that is due to volumes of traffic, the lack of the latest technology; the Euro VI standard will obviously improve that and bus engine technology will obviously improve that, and in terms of congestion reducing the number of vehicles and going for modal shift will assist as well, so there are a whole number of factors which are impacting in terms of what we are still seeing in terms of NO_x and PM_{10} and it is very much a matter of looking at the whole raft of measures and initiatives that we might be able to introduce to drive the emission levels down even further.

Q148 Chairman: Well, we will come back to the transport issues later on. We, I think, felt that there was perhaps insufficient urgency in the approach of the Department for Transport to some of these problems. Basically, what you are saying is that you are going to try and buy a bit more time. When do

you think we might actually face the start of proceedings by the EU if they do not agree to what you have asked for?

Mr Instone: We have two separate timescales on this, one in relation to PM_{10} where we have already submitted an application for a time extension, and that is where we are having further discussions with the Commission. The gap is pretty small at the moment between what we have offered and where we need to get to and we think there is a pretty good chance of actually achieving that, so the issue about fines will not arise. Now, clearly there is a significantly bigger challenge when it comes to nitrogen oxide where what we are looking for, along with, I should emphasise very strongly, a range of other Member States, is to achieve a time extension to 2015, so that is the date we are looking for. The Commission have asked that Member States who are looking for a time extension, all of them, put in their applications by next year, so the Commission will then obviously take some time to look at all of that, so it is impossible to say at this stage exactly what time because then we are in the hands of the Commission about the timescale, but that gives you a rough idea.

Q149 Chairman: What sort of fines might we be liable to?

Mr Instone: That again varies considerably. As the Committee probably knows, there is quite a lot of discretion for the European Court of Justice in the way that they actually determine levels of fines. In principle, it could be a mixture of a lump sum and a per-day rate, but whatever exactly it would be, clearly fines are likely to be substantial and are meant to be, and the Commission's main objective is to avoid having to fine, but to ensure that Member States deliver what is needed without it, so we cannot give a precise figure on it.

Jim Fitzpatrick: But we ought not to incur them in the first instance anyway.

Q150 Chairman: If there is a fine, given the present state of public finances, how does it get paid for?

Jim Fitzpatrick: Well, if there is a fine, then obviously the Government will be responsible for paying that. I have had informed discussions with a number of local authorities and we had an informal session in the Department last year with some local authorities who were performing very well in respect of local air quality and we had an Air Quality Summit later last year when we brought in a whole range of local authorities to share best practice and to try to ensure that everybody was aware of the good work that was being done in different parts of the country. One of the questions which came up was that, if the Government were fined and it was as a result of London's inability to get within the values and levels that it ought to, why should the Exchequer pay London's fine and the rest of local government across the country suffer as a result, which, I must confess, had not occurred to me at that time. The follow-on question of course was: could we then transfer any fines on UK plc to whoever happened to be Mayor of London? This is not an attack on Mayor Johnson, and I do not know if there is a legal technical answer to that, but it is interesting that it was in the minds of local authorities that they were thinking that the public sector borrowing requirement, because the Treasury would have to pay the fine, could very well impact on the level of rate settlement that they would get and, in that instance, that may be unfair, particularly for authorities which are doing very well, but ultimately it would be down to the Government to meet the cost as it stands at the moment and we do not see any way out of that other than, as Daniel has tried to explain, Chairman, making sure that we do not fall foul of the Directive and that we actually manage to get inside the limits which are required of us.

Mr Wlliamson: It is probably worth pointing out that for nitrogen dioxide, the European Commission is expecting virtually all Member States to have to apply for a time extension. This is not a UK-only problem, but this is one which is being faced by the majority of the European Member States.

Chairman: From the point of view of people suffering the health effects of course, the fact that other countries are equally bad is not a great consolation.

Q151 Joan Walley: You mentioned just now, Minister, that Defra, along with the Departments of Health and Transport, are looking at a shared responsibility for how to deal with air quality controls, and I just wonder, as there are other government departments and you just mentioned local authorities and I am thinking particularly of DCLG, what are you doing to make other parts of government aware of the costs of poor air quality?

Jim Fitzpatrick: Well, there is research which is commissioned by, and coming out from, the Department of Health which is sponsored by the Department of Health principally, but obviously DfT are the lead in respect of transport and we are the ministry responsible for air quality, so there is a shared responsibility. When it comes, Ms Walley, as you describe, to making sure that we can share that with colleagues in local government, then we have undertaken directly to liaise with them through other government departments very much as a matter of making sure that we disseminate as much information as possible to make people aware of the issue, were they not to be, and my impression is that most people are aware of the issue, and some of the challenges, some of the solutions and some of the research which has been undertaken by various government departments.

Mr Instone: If I might just add to that, we have established the whole area of air quality combined with noise and local environmental quality as a formal programme within Defra and we have a programme board which we have recently revamped and we chair that, but that includes representations from all the key departments, including the Department of Health, the Department for Transport and, as you mentioned, the Department of Communities and Local Government as well, plus some others, so we have established a pretty close working link, and we spend a lot of time in any case

between meetings having a lot of discussions, whether bilateral or multilateral, with those departments; it is incredibly inter-departmental in its focus.

Mr Vaughan: Also, if I might just add as well, I regularly meet with colleagues in DCLG and ensure that air quality is taken into account in policies. I also attend meetings with local transport planning body officials in DfT to ensure that they take account of air quality in the development of their guidance and the advice they give to local authorities.

Q152 Joan Walley: The question which follows on for me to ask is: in terms of the Cabinet Office Strategy Unit and the way in which all these different policies are co-ordinated across government departments and also with DCLG and local authorities, what recognition will there be of this air quality issue in the new planning guidance which is about to be issued any time this month in respect of the new spatial planning? For me, when we are planning either roads or whether or not we are planning, for example, waste transfer stations or anywhere where there is likely to be extra pollution, I would like to know how this is being reflected in this joined-up approach that the Government is telling us that it has.

Mr Vaughan: Well, the new planning guidance must take account of all environmental impacts in the development of plans, and one of those impacts would be air quality where air quality is integral to the preparation of plans.

Q153 Joan Walley: So that is going to be specified in the new planning guidance about to be issued, is it?

Mr Vaughan: It will need to take account of environmental impacts in the round, as it is described in the guidance, and air quality is one of those impacts.

Jim Fitzpatrick: And there is a public service agreement, PSA28, in which air quality is one of the five key indicators and that we do liaise directly on the PSA Board with DECC and DBIS and DCLG because air quality is one of the issues, but also land management, water quality, biodiversity and marine, so there is that tie-up under the PSA target as well.

Q154 Joan Walley: Just following up on the PSA28 target, are you putting incentives in there for the Department for Transport and Defra to contribute to that target? Are you just expecting them to do it or are you putting incentives in?

Jim Fitzpatrick: I am sorry, I do not understand what you mean by "incentives", Ms Walley.

Q155 Joan Walley: Well, are you just leaving it to chance that those targets are going to be achieved, or how are you actually incentivising the people who sign up to those targets to actually deliver them?

Jim Fitzpatrick: Well, in terms of any PSA, if the Government does not meet its target, then it stands in the dock accused by public opinion of setting itself indicators which it then clearly may not have met. We do not think, having identified that these are issues which need to be addressed, that we would fail, and in terms of air quality the Directive sets down the parameters within which we ought to be operating and that clearly is where the Government has got to demonstrate that it is performing as required and, as Daniel outlined a moment ago, we think that we will be able to demonstrate that we will be within the Directive.

Q156 Joan Walley: So you are confident that other departments are accountable for the way that they are contributing to that PSA target?

Jim Fitzpatrick: I would be extremely surprised if any government department was not accountable, not least through your good selves as well as through their own select committees as well as through public opinion. This is very much a matter of public record and public policy and, in that instance, the Government is fully accountable.

Mr Vaughan: Just to add, the DfT is specifically accountable as a joint partner for the air quality indicator within PSA28, and that is laid down in the Treasury guidance on the PSA itself, specifically that the DfT is the joint partner to deliver that work. As a whole, PSA28 is a government-wide target and Defra reports regularly to the Cabinet Committee on the progress with all the indicators within PSA28.

Q157 Joan Walley: Can I just widen it out a little bit and ask in which areas the Government is really having to make trade-offs between action on air quality and action on other policy objectives? Have you come across a situation where you have really had to make a trade-off in terms of how you evaluate whether or not the air quality goes first or another aspect of policy takes precedence?

Jim Fitzpatrick: I am not aware of a trade-off. Obviously, colleagues here are dealing with it every single day. My understanding and expectation is that they are doing everything within their power to make sure that we accomplish the requirements of the Directive and the targets laid down by PSA28 and the rest, and we are not making trade-offs. They have got their work programme cut out, as they have been starting to explain, and, unless there is something in particular where you may think we are in some way, shape or form negotiating, compromising or trading off, I am not aware of any trade-offs.

Mr Instone: I think the main issue around trade-offs is more just looking at the relative cost-effectiveness of different policies as a means, in particular, of achieving our EU targets. When we published our Air Quality Strategy in 2007, we did, as you probably know, include some quite detailed impact assessments of the different policies and their relative costs and effectiveness, so, in a way, that gives us a guide to how we write policies, so it is more about the costs and effectiveness than it is about trading off between policy objectives.

Mr Vaughan: If I may just add, there may be, in some particular policy areas, particular trade-offs to consider. For example, on air quality and climate change, there are considerations in achieving more

biomass burning and a trade-off there needs to be considered, and what we do there is we work with the departments to assess the costs and benefits and to ensure that the costs and benefits of air quality impacts are taken into account in those trade-offs. The reverse of that is also true for air quality where in all the Euro standards, for example, for vehicle emissions, there are trade-offs there to the benefit of air quality in some of the higher Euro standards because they involve slightly more fuel consumption, and again those trade-offs are taken into account in the assessment of the costs and benefits of those policy areas, so certainly they exist, but we do take them into account in how we appraise costs and benefits.

Mr Wlliamson: Plus, as the Minister mentioned in his opening remarks, we are publishing a document which will set out actually how air quality and climate change policies going forward can maximise the synergies and can maximise the co-benefits that can be attained from aligning both climate change and air quality policies, and we think they are considerable going into the future.

Q158 Joan Walley: I think we are just picking up on concerns which were given to us in written evidence from the Institute of Air Quality Management, but just finally on this group of questions: are you confident that you can actually link in, given the separation that there now is between Defra and DECC, so that there is a way of actually resolving the climate change issues along with environmental issues?

Jim Fitzpatrick: Yes.

Q159 Joan Walley: Have you got a mechanism for doing that?

Jim Fitzpatrick: As Daniel was describing earlier on, the various committee structures that are in position give us a clear opportunity to be able to make those connections and we have got no concerns about the lack of good, strong communication links between departments to make sure that we can work together effectively.

Q160 Dr Turner: Jim, you are obviously aware of the effects on public health attributed to air quality. Of course, the Department of Transport is fingered as the biggest culprit. Are you satisfied with one of the metrics which is commonly used, which is the reduction in life expectancy which, on average, is just a few months, to measure the health effects, bearing in mind that that statistical average hides an awful lot of much more unpleasant statistics for several thousand people?

Jim Fitzpatrick: Well, I have naturally discussed this with my colleagues, the officials in the Department, about the different ways that statistics have been presented because clearly, whereas our perspective is that the impact of poor air quality, on average, is reducing life expectancy by between seven to eight months across the country, compared to some of the reports of the Committee's inquiry in the media recently saying that there is a range of between 12–35,000 deaths per annum, they are clearly completely different ways of presenting the evidence. As it was explained to me, and colleagues will be able to offer more technical explanation of life expectancy, if we were able to eliminate poor air quality tomorrow, we would not have 12–35,000 fewer deaths next year because air quality is a contributory factor and taken alongside everything from smoking, obesity, poor diet, lack of exercise, which contribute to the life expectancy reduction that we have analysed in our data and then given a value to in order to try and impact on public awareness as well as government policy how serious an issue this is, but, were we to be able to wave a magic wand and have clean air tomorrow, we would not be saving 12-35,000 lives next year. In that instance, we are comfortable and confident about the way that we are presenting the evidence, that it is a more rational, a more accurate way to portray it and it does not diminish the seriousness of the issue, but we think it better reflects the actual challenge that is out there for us because we are intent on improving air quality, as it has been improving over the years, and with that improvement we would certainly expect to see a reduction in the life expectancy lost, which is averaged out on our data, of between seven to eight months across the UK.

Mr Wlliamson: One of the key points here is that, coming out of the Committee on the Medical Effects of Air Pollution, there was a lot of expertise within that committee and we relied quite heavily on their expert advice and they have estimated that the long-term impacts of particulate pollution are about ten times higher than the short-term impacts, which is why we calculated that long-term impact. We calculated it taking the whole population over a period of 100 years, so you see how that exposure to particulates plays out on the life expectancy of the whole population rather than just taking one-year snapshots; we believe it is a much more robust way of actually, as the Minister said, presenting the evidence.

Q161 Dr Turner: Well, there are some very debatable issues in what you have both just said, but, having said that, does it give you comfort that at the same time, as you have just told us, you are pretty close to meeting the European recommended standards for air quality, yet we still have this level of public health impact which makes one question (a) whether the European standards are themselves adequate, and (b) whether there should not be more urgency in making sure that we do at least meet those standards?

Mr Wlliamson: We have made it clear in the Air Quality Strategy that the health evidence shows that there is no, effectively, safe level for particulate pollution. It is one of the reasons why the UK, along with other Member States, pushed for the concept of exposure reduction which is currently in the Air Quality Directive. That means that we have to reduce the exposure of the whole population to particulate pollution, not just those living in the hotspots. In that way, we maximise the health benefit from the policies that we have put in place to achieve those exposure reductions. It is also why we need to

maximise the synergies or the connections between air quality and climate change policy because we believe that the benefits for particulate, in particular, of doing that are potentially very large.

Q162 Dr Turner: What assessment have you made of the economic impacts, given that a lot of premature deaths average just under ten years' estimated shorter reasonable life expectancy, numbers anything up to 50,000, and this has a great cost, added to that all those people who suffer from chronic conditions which take them effectively out of the workforce and so on? What is your estimate of the cost of the public health impact?
Mr Wlliamson: Using a number of different economic tools, the cost has been estimated at between £7-20 billion a year and that is a social cost, that is not money in terms of what the NHS spends, but it is based on a willingness to pay estimate. Now, that cost takes into account the impact of $PM_{2.5}$, very fine particulate matter, on mortality, so deaths, deaths from all causes. What we do not have is a good, robust way at the moment of calculating the impact on illness and on morbidity, and the Committee on the Medical Effects of Air Pollution is working on a study to define that at the moment.

Q163 Dr Turner: So we are talking then about a level of cost which is much higher than that attributed to lack of exercise and, frankly, the Government makes much more noise about trying to educate the public about the benefits of exercise and healthy living than it does about the impact of air quality. Government is in a position through policy, and particularly transport policy, to do something about it, whether we are blaming PM_{10}, NO_x or whatever. If we change and we decarbonise transport and if we more urgently drive, for instance, an electric/hydrogen fuel economy for transport, we can make a much bigger impact on air quality, can we not?
Jim Fitzpatrick: I do not disagree with the premise, going back to your first question which was about whether we are taking this seriously enough and then your subsequent questions about the monetised impacts on the UK economy. As Mr Williamson has said, working out the exact calculation is being examined at the moment and there again are a range of values which are attributed to the impact on an individual from €12,000 to £30,000, depending on what statistical base you arrive at, but, notwithstanding your original point, is this a serious question?[1] Answer: clearly it is. Are we satisfied and comfortable with just trying to get within European limits? No, probably we should not be and, as Tim has outlined, there is a greater effort being made for a continuing reduction so as not just to get within the limits set by the Directive. I think that, as there is greater awareness of this, there will be more media attention paid to it, more government attention paid to it because it is a contributory factor, going back to my point earlier on, in that it is difficult just to say that, if we had clean air, all these deaths would go because it is not just transport, but it is also housing emissions, it is also industrial emissions, there are a whole range of factors which impact, and what we have to do is try to make sure that we have a framework in place to address air quality because that is our responsibility and then make sure that that is observed and applied by other government departments whichever area is their responsibility.

Q164 Dr Turner: The point I wanted to get to still stands of course. You are right, there are other factors, but in this case addressing the air quality impacts of transport and the climate change impacts of transport go hand in hand, so, given the huge costs in public health terms of poor air quality, is it not worth investing more in driving a technology change in transport faster which will address both of these issues at the same time?
Jim Fitzpatrick: Well, there is a work programme laid down in terms of Euro VI in respect of HGVs. We have low-emission zones, which are used perhaps more in Europe than they are here, which are under consideration. There are a whole number of other transport-related initiatives which could be taken in terms of transport management, congestion charging and the like, so a whole range of transport initiatives which could be used to help drive down emission levels and all are either under active consideration or are being applied and may be applied more intensively in due course as the whole question of air quality moves up the political agenda. In that instance, then perhaps, and I am sure, we ought to be giving more attention to it. I think as we described earlier on, the discussions that we are having at the moment with the devolved administrations will lead us to produce a document later on this year which will address air quality and climate change in a holistic approach which we will be sending to the Committee in due course because that will be an important piece of work.
Mr Vaughan: DfT already are committing funds to the promotion of electric vehicles, in particular, and the establishment of electric charging points through the newly created Office of Low-Emission Vehicles within DfT, and that is also pushing forward funding for green bus purchase by transport operators, and it just distributed £30 million last November to a number of different transport providers across the country specifically for green bus fleets.

Q165 Dr Turner: That is fine, but, now that a hydrogen-based transport fleet is looking to be technically feasible, should we not be putting in more effort to incentivise the development of that because that would eliminate the particulates, apart from in braking systems, it would eliminate NO_x emissions and sulphur emissions and it would eliminate CO_2 emissions? Since that is now looking technically possible, why do we not put more resource into that?
Mr Instone: That is something, as my colleague has indicated, that the Office of Low-Emission Vehicles will be looking at because of course you get both air quality and CO_2 benefits from that, so that is something which is very much under active

[1] *Note from witness:* The range of values attributed to the impact on an individual is from £30,000 to €120,000, depending on the statistical base used.

consideration. What is clear is that we need a range of measures here because of course getting the air quality improvements requires not simply introducing new vehicles into the fleet, new kinds of vehicles, although obviously that is part of it, but also trying to remove as many as possible of the most polluting vehicles, so it is particularly important that we address that issue of what are we doing about the large number of vehicles that are going to be in the fleet, particularly in the short to medium term, so that is why some of the measures, for example, the tax measures that the Chancellor announced in previous budgets for encouraging reduced pollution from heavy vehicles, are very relevant, so we have to think, therefore, about quite clearly a range of measures at both ends, both for the new vehicles where promoting them is absolutely essential and also doing what we can as quickly as possible to clean up the vehicles that are already on the roads.

Q166 Chairman: Just developing this a bit, in terms of making the public more aware of the effects of air quality on health, do you have a strategy to try and raise awareness and to improve understanding about this?

Mr Instone: We have done a variety of work on this area. For example, simply in documents we have published in the past, that is meant to be raising awareness. We have also introduced various campaigns, or the Government has, in relation to CO_2, and we have talked about campaigns like Act on CO_2 and the work to encourage people to use public transport, so we have done a lot, particularly bearing in mind, as has already been indicated, the very strong synergies between action to reduce CO_2 from vehicles and action to remove local air quality pollutants. There is always scope for doing more here, but there has been quite a lot of activity, particularly in the transport area, encouraging modal shift and encouraging the reduced use of cars.

Mr Vaughan: Just to add on the public awareness and the information provision, we do help operators with a website where we do provide a very great deal of information to the public about air quality in their local area, what their local authorities are doing to improve air quality in their local area and what they themselves can do to protect themselves if they need to if they are a vulnerable group, for example. We also provide, and have provided in the past, funding to services, such as air texts and air alerts, which alert vulnerable groups through messaging text services if pollution is going to be particularly high on particular days. Also, many local authorities at the local level do an awful lot of work to promote air quality through teaching packs, business partnerships and travel planning and so on and so forth, as my colleague Daniel has said, linking with climate change wherever they can because the opportunities are there to achieve the same benefits.

Q167 Chairman: In practice, how do you think the improved public awareness of these issues might actually lead to behaviour change? Do you think that, in reality, that actually happens or that people just go on doing what they would have done anyway?

Jim Fitzpatrick: What was quite apparent when I met the local authorities who are doing well and then subsequently at the Air Quality Summit was how effective local communities were once they had recognised they had an issue. There was one particular community group from Sheffield, and we can send the Committee the study, Chairman, who identified that they were having a big problem and then basically took it on themselves to address it and enlisted the support of Sheffield City Council and then started managing their own air quality with a whole number of initiatives in respect of traffic management, in respect of greening their area, in respect of encouraging modal shift, et cetera, and they were able to show that they had an impact, as was described a minute ago by Robert, and the monitoring of the air quality in their area improved and it was down to the local community taking responsibility for itself, so in that one example it was quite clear that public awareness did actually work in alerting people in a residential area, a relatively ordinary residential area, if I may describe it as that and not in any way, shape or form being disparaging, to take control of their own lives and impress upon the City Council that they wanted to see action, and they got action and it resulted in better air quality for themselves and their families, much to their credit.

Q168 Dr Turner: Have you made any assessment of the impacts and costs of air pollution on ecosystems?

Mr Wlliamson: We have certainly made estimates of the impacts on ecosystems, but valuing the impacts on ecosystems has proved extremely difficult and we are not able to do that at the moment. What we do have though, what Defra has certainly developed, is the ecosystems services approach which looks at actually what services a healthy ecosystem provides, and that includes well-being, clean air, clean water and so on. There is a methodology that we can use there to start valuing ecosystem impacts, but it does need more research; it is extremely complicated. Valuing the effect on human health just looks at one organism. If we are looking at ecosystems, we are looking at a whole range of organisms, and some of the changes, some of the damage that an ecosystem will suffer as a result of air pollution is quite subtle, so changes from a certain type of plant growth, heather for example, to a grass-based system counts as damage in ecosystem terms. To the public, it may not look that different, so it is a very difficult and very complex area. We are working towards valuing the ecosystem impacts, but we are not able to do so at the moment.

Q169 Dr Turner: Do you think that the 2007 Air Quality Strategy may have been compromised and may not be as radical as it might have been because of an obvious complete lack of any cost-benefit analysis and methodology applied to ecosystems, but not much evidence of a cost-benefit analysis even

applied in public health? Had there been a rigorous cost-benefit analysis, do you think we could have ended up with a more radical Air Quality Strategy?
Mr Wlliamson: I think that is difficult to say; we are making a judgment on something we are not able to do. The estimates certainly I get from my economic colleagues are that we have captured the main, the largest value in terms of monetary value impacts plus the effect it has had on mortality of $PM_{2.5}$. The other impacts, if we were able to, and we hope to be able to, value them, would be substantial, but it is not thought to be game-changing, as it were, they would not change radically the direction of travel; we are already moving in the way that we believe would be right.

Q170 Dr Turner: Well, what further action do you think government is going to have to take on air quality if the UK is going to meet the long-term goals of the EU's sixth Environmental Action Plan?
Jim Fitzpatrick: I think we have outlined during the course of answering some of the other questions that there are a whole range of actions that we need to be addressing, and particularly we have been discussing mostly transport. Having outlined these, it is very much a matter of trying to make sure for vehicle emissions that either low-emission zones or fiscal incentives are in place, whether it is technology and the introduction of the new Euro standards that manufacturers conform to the requirements which are laid out to them, whether it is local authorities being able to benefit from a better understanding of traffic management schemes, low congestion schemes or low-emission zones which will help or whether it is the Local Transport Act helping local authorities to negotiate cleaner buses with the bus operators. There are whole ranges of different ways that the improvement in air quality can be achieved, and that is only just mentioning a few that we have mentioned already this morning. There is a lot of research being undertaken by transport, and you have mentioned yourself the hydrogen situation, and Daniel outlined that this will obviously be examined by the Low Emission Unit, all the way through to, as Ms Walley mentioned, DCLG and planning policy and guidance in respect of section 106 agreements and developers being required to put in charging points as a sort of modern way forward to again encourage the use of electric vehicles. All of these things are at the disposal of local and central government and they are initiatives that can be followed by local authorities or by vehicle manufacturers, and obviously we would hope that they would all be best embraced to make sure that we can improve the quality of the air which we all have to breathe because, regardless of where we are in the country, it is flowing around and everybody is impacted by it, but we know where the hotspots are in Central London and these clearly have to have a bit of a focus.
Mr Wlliamson: Going beyond that to look at the ecosystem impacts, there is a strong dependency on trans-boundary air pollution, so again it is working both on a national emissions basis and international emissions. The UK is a very strong and active participant in the Convention on Long-Range Trans-Boundary Air Pollution, where a lot of drivers for that are the ecosystem impacts, the environmental impacts and the kind of impacts that are encapsulated in the sixth Environmental Action Programme.

Q171 Dr Turner: What about shipping and aviation then in that context?
Jim Fitzpatrick: Well, I actually asked and one of the other areas, which I was just about to come in on before you supplemented your question, one of the other initiatives within the plan is on shipping and I was asking Tim earlier about what the impact of shipping is, given that there would not seem to be necessarily, apart from the flow of air, a direct correlation between what happens on the seas and what happens on land. Of course, shipping is the highest emitter of sulphurous fumes and the MARPOL[2] agreement which was reached at the IMO[3] and the IMO's determination to take on board emissions demonstrates that they recognise that shipping has to play its part in addressing the challenge of climate change and addressing the challenge of emissions. With aviation, similarly, clearly there are benchmarks laid down and targets laid down for aviation with the Government's policy of having policies in place to make sure that the level of emissions, particularly carbon, are not exceeded beyond the levels which are the accepted policy, and I think it is 2004/05 for aviation and earlier for shipping, that we try and reach these international agreements to make sure that they engage and play their part responsibly in addressing climate change and addressing emissions and pollution, and both industries have clearly indicated that they want to do that and that those negotiations are taking place both at the IMO and at ICAO.[4]

Q172 Dr Turner: Are you satisfied with the urgency of those negotiations, given the background of the WHO report which suggests that worldwide 60,000 premature deaths result from shipping emissions? The world's busiest shipping lane is ten miles offshore from my constituency, so this is very much affecting my patch and this is something which at least European governments acting together can address by regulation by banning excessively polluting ships from our waters.
Jim Fitzpatrick: I think I am more confident about shipping than aviation in an international sense because the agreement that was reached last year at the IMO in respect of addressing emission levels and the carbon footprint was very positive. The discussions at Montreal and ICAO were less so and, in that instance, the decision of the UK and the EU was to set its own targets on aviation in respect of international travel, and the IMO did seem to have a more positive forward-looking policy. However, they were both supposed to be part of the

[2] International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto
[3] International Maritime Organization
[4] International Civil Aviation Organization

Copenhagen Conference and I am not privy to the final detail, but my understanding is that, as part of the follow-on process, aviation and shipping, playing their part in the whole climate change conference agenda, will be part of the ongoing dialogue. I certainly, as the former Aviation and Shipping Minister at Transport last year, felt personally that shipping was addressing public concerns internationally more aggressively and positively than aviation was, which is why the UK Government and the EU decided that we wanted to make sure that we set our own stall out because we were concerned very much, as you described, about the impacts of shipping and the Channel as the busiest sea lane near our borders which would impact on the health of our citizens.

Mr Vaughan: In particular, on shipping the MARPOL Agreement was amended in 2008 to achieve reductions of something in the region of 88% of oxidous sulphur with benefits of up to £700 million for the UK.

Q173 Joan Walley: Just on shipping, I am sure that there will be many ports and local authority areas where, if agreement can be got on emissions from shipping in the port areas, there could be remarkable improvements in terms of air quality, so I wish you well on that, and I will not go down the aviation route with the court case which is at Heathrow today, but can I just go back to local authorities. You talked just now about the wonderful good practice that there was and you referred to the case study that you had in Sheffield, but I put it to you that it is very hit and miss, is it not, the standard of awareness amongst local authorities around the country on how to actually draw up air quality control plans. My experience is that, whatever procedures there might be, when you look at the way in which planning permissions are linked into the whole planning guidance and the local planning statements that there are, there is very little being done in large parts of the country to really get strong air quality control agreements together.

Jim Fitzpatrick: Well, I think that we must share at least some agreement on that because we convened the Air Quality Summit late last year to make sure that we could give a higher profile to the good practice, the best practice which was happening in certain parts of the country and share that with as many local authorities as possible. Forgive me, but I cannot remember how many local authorities turned up at that.

Mr Vaughan: Eighty.

Q174 Joan Walley: I would be very interested to know whether or not Stoke-on-Trent did.

Mr Vaughan: Yes, they did.

Q175 Joan Walley: I would just be interested to know whether or not you have got any answer to the residents who have great public awareness that they do not want certain facilities in the wrong place which goes against the grain of transport policy and actually encouraging safe routes to schools and all of that when you get large lorries using narrow, unsuitable roads for waste transfer stations.

Jim Fitzpatrick: Robert has just advised me, we had around 80 to 100 local authorities there as a third of local authorities in England and Wales in attendance, which was a measure of the interest that there was. It was a very well-attended and respectable turnout from local authorities. In my own constituency in inner East London, we have exactly the same issues with residents saying, "We want a ban on HGVs on this road because it is too close to a school" or "It's too narrow a road and we're worried about child safety, let alone air quality". I am sure those issues are being replicated right across the country and it very much is a matter for local authorities to listen to residents as part of the democratic process and I hope that the successes which have been achieved in certain areas, that that best practice can be shared with communities who have similar concerns to try to make sure that they can replicate that success in their own locality.

Q176 Joan Walley: Do you think you could do more to help DCLG prioritise making progress on this agenda?

Mr Vaughan: Well, we do provide guidance, DCLG provides guidance on pollution control, PPS23,[5] and we have also provided guidance to local authorities which was launched at the event that the Minister refers to on the use of planning in low emissions and in low-emission strategies, and we are working with a number of councils, beacon authorities, in England in particular to promote better use of planning arrangements and planning guidance to improve air quality. More local authorities are now building in air quality considerations through the provision of supplementary planning guidance to ensure that air quality is taken into account in the preparation of planning developments and planning proposals, so effort is being put into that area to provide assistance to local authorities to ensure that planning takes account of air quality impacts and also that, where it is possible to develop those through section 106 agreements, they are able to take account of the impacts they have on developments so that local authorities can take advantage of that.

Mr Instone: We do have a very strong and statutorily underpinned system of local air quality management which in fact puts quite a lot of requirements on local authorities both to review the level of air quality in their areas and, if there are problems identified, take specific action to address it. Indeed, some have criticised the system for being too heavy-handed because it is quite a strong system, so there is a very strong statutory underpinning in this area which sets the framework for the way local authorities have to go about it, and of course we have a very large number of local air quality management areas which have been declared by local authorities as a result of this process.

[5] Planning Policy Statement 23 is intended to complement the pollution control framework under the Pollution Prevention and Control Act 1999 and the PPC Regulations 2000.

Q177 Joan Walley: I think it would be very helpful, if the Committee has not already got the detail of that, to have the detail of that before us for our Report.
Jim Fitzpatrick: Which particular piece of information is it that you want?

Q178 Joan Walley: What has just been referred to there in terms of—
Mr Vaughan: The statutory system, what the system is. I am sure we can provide that.

Q179 Joan Walley: Yes, because I think the concern is that it does not seem to be applied right the way across the board.
Mr Vaughan: The statutory system, well, the legal requirements are laid down in Part IV section 80-91 of the Environment Act 1995 and all local authorities are required to review and assess local air quality and, where they have indentified air quality problems, they must carry out further detailed assessments as to what the sort of extent of the problem is, what pollutants are particularly of concern and whether there is any exposure to local residents, the population, and then put in place action plans to address those concerns. As Daniel has said, there are about 230/240 local authorities which have declared air quality management areas and they might be no more than a single house or a row of houses or they might be for the whole authority, depending entirely on how the authority chooses to address the issue.

Q180 Joan Walley: But, given all that, what I do not understand is why it is so difficult for local authorities to actually set up low-emission zones. Why do we not have more of them?
Mr Vaughan: I think local authorities have different ways of tackling the issue.

Q181 Joan Walley: Or sometimes not at all.
Mr Vaughan: Low-emission zones might seem an attractive solution in many instances and some authorities have set them up. Obviously, London has set up its low-emission zone and other authorities, such as Oxford and Norwich, have focused their low-emission zones on a particular type of transport, buses. We have spoken to local authorities about what prevents them from setting up low-emission zones and many do quote things like competition with other authorities, the risk of displacement of pollution to other areas of their authority, depending on the size of the low-emission zone they chose, and also the need to actually negotiate that with the politics of local government as well, so many have considered them, but, as I say, they have come to different conclusions as to what the best approach is, and often low-emission zones, whilst they might be a very sensible approach in many ways, local authorities have properly determined what is the best approach at a particular time.

Q182 Joan Walley: Can I just ask finally on this: is there anything that is being done at the moment to make local authorities give more attention to this as part of the planning process, and we touched on it, but to really make it be considered as part of the planning process?
Jim Fitzpatrick: Well, DfT are in the lead on low-emission zones. They have a study at the moment, looking at the effect of this in Europe and working out responses to the questions that Daniel raised about whether they can be introduced, should they be introduced, what is the cost, how best are they applied, what vehicles to apply them to, so I think they are producing this data to be able to disseminate it to local authorities and to be able to give best advice to those authorities who do want to use LEZs as a way to improve local air quality, so we know that they are researching and collating that at the moment. Obviously, when that is ready, I am sure that DfT will be publishing it for local authorities to be able to look at and see if it is a tool and, if so, which element of the tool would be good for their area.

Q183 Jo Swinson: I want to turn to the issue of power stations. Why does the UK have six of the ten power stations that emit the most NO_x anywhere in Europe?
Jim Fitzpatrick: The Environment Agency is obviously the statutory authority which has responsibility for licensing power stations. Each installation must have a permit which allows them continuing emission limit values and other conditions based upon the application of the best available techniques. As I say, the Environment Agency has to decide what they should be for each installation and, in that instance, they are the ones who issue the licence and they have to be satisfied that those requirements are being met.

Q184 Jo Swinson: In issuing their licences, to what extent do they assess the environmental and the public health impacts of these power stations?
Mr Vaughan: The Environment Agency carry out a full detailed assessment of all impacts a power station might have or any installation, for that matter, where they are the regulator. In the particular instance of a power station, it is determined that SCR, for example, was not economic to retrofit for the power stations concerned, the coal-fired and oil-fired power stations, at the present time and they considered that a different method of abatement was more economically viable and the best available technology.

Q185 Jo Swinson: My understanding is that, when the decision was made not to fit them with this selective catalytic reduction technology, that was because the plants had a limited life. Is that going to be reviewed now that the working life of those plants has been extended? Will the Environment Agency now require them to fit the appropriate technology to deal with the emissions or look to closing them, or is this just going to keep going on where they will have their lives extended, pumping out all of that pollution?
Mr Vaughan: I am afraid I cannot answer that question.

Jim Fitzpatrick: The regulator can review the permit conditions at any time and I am advised that they will certainly do so when the best available technology reference document for large combustible plants is revised in 2012, so it is very much a matter for the Environment Agency, but there will be a requirement in due course that they will have to review the best available technology element.

Mr Instone: It is worth noting there is, if you like, a double standard of review here. You have not only got the EU reviewing their guidance documents, which are known as BREFs, as a means of keeping up-to-date with technology; but we also have, going through the final stages of the process in Brussels at the moment, a revised EU Industrial Emissions Directive. We have got, if you like, a process of review in Europe which is rightly refining and bringing standards up-to-date to allow for changes in technology. This is not a static situation therefore.

Mr Williamson: It is probably worth noting as well that the Environment Agency regulate within the framework of the Air Quality Directive so meeting limit values, but also the National Emission Ceilings Directive, so the national ceilings and the national total emissions. It is finding a space between those two legislative requirements in which to operate the permits.

Q186 Chairman: Nevertheless, there seems to be a slight assumption behind what you are saying that as long as we are doing as badly as the rest of Europe everything is okay?

Jim Fitzpatrick: I do not accept that description, Chairman. I know that we have discussed earlier in these proceedings the question from Dr Turner about whether we are satisfied that certainly because we are within a Directive then we are okay. Clearly there is an imperative to get within a Directive otherwise the discretion we had about infraction proceedings and fines comes into being; and naturally we do not want to go there if we can at all avoid at. By the same token, because of the developing science, the emerging data, the serious nature of the impact of air quality on public health, the research which is being undertaken by the Department of Health, by the Department for Transport, by ourselves, clearly indicates that just getting within the confines of Directives ought not to be our objective; we want to get to the best possible place on air quality. So I fully accept your concern clearly implicit in the question you raise. We would agree with you that we do have to do better, which is why we are striving as much as we can.

Mr Instone: Could I just add to that also on the point about "it's okay to do as badly as Europe", or is it? The points that were made earlier about our actively influencing new Directives in Europe both in relation to emphasising the importance of $PM_{2.5}$, where we have got the very strong links with health—perhaps stronger than in any other area—we have brought that into the process of revision at the EU level; secondly, the concept that was already mentioned earlier in our evidence, about getting in the idea of exposure reduction; those are all initiatives that we have very strongly been pushing in Europe to try to make the future EU Directives more responsive and better targeted on the health impacts. That is therefore a very dynamic situation where we have been strongly influencing the way that Directives are framed in Europe to make them much more closely aligned particularly with our health objectives.

Q187 Dr Turner: Obviously policies to deal with air quality depend to a large extent on accurate monitoring. What can you tell us about the development of air quality monitoring by both local government and central initiatives in the UK at the moment? Where are we at?

Mr Williamson: We operate an extensive network of monitors and we supplement that using complex modelling techniques. We believe that gives us a better spatial coverage than just using monitoring. It also allows us to understand those locations where you would not otherwise have an air quality monitor. We spend a considerable sum of money every year supporting that network. It is designed primarily to serve the requirements, and the very prescriptive requirements, of the European Air Quality Directives; but it serves a number of other functions as well. It is our primary tool for generating data for research so we can better characterise and understand what is a very complex area.

Q188 Dr Turner: Are you, for instance, able to deploy the sort of technology which exists which can identify, for instance, an individual polluting vehicle entering a low-emission zone?

Mr Williamson: There are some technologies, remote sensing technologies, which have been developed. There is a limit to the number of pollutants that they can actually address and pick up. PM_{10} is a difficult one, simply because the way in which you analyse gases is slightly different from the way in which you analyse a solid particle, which is made up of a number of different components and does not behave like a gas. Those technologies do exist but they are very much for research rather than ongoing monitoring. The kind of monitoring equipment that we own and have out in the field is expected to run 365 days a year, 24 hours a day. The kind of equipment that exists to measure roadside emission plumes from vehicles is not that robust, and I do not think that would be the right use of that equipment; but there are some significant developments. There are constant developments in the field of monitoring. One of the areas that is receiving a lot of attention at the moment on a Europe-wide basis is a portable emissions monitoring system—so onboard monitoring systems particularly for HGVs; and that will be something that is introduced through the Euro VI emissions standard for Heavy Goods Vehicles.

Q189 Dr Turner: This may seem a simplistic question, but without being able to monitor vehicles individually how can you police a low-emission zone effectively?

Mr Williamson: All vehicles on the road are required to conform to what are called the "Euro standards", the emissions standards laid down through a series of Directives in Europe. They are age-dependent, so from a certain date all new vehicles will have to be of a certain Euro standard. By understanding how old the vehicle is, using number plate recognition technology or other systems, then we can work out which Euro standard they should conform to. Euro standards have already been introduced. Those vehicles will have been tested and there is an ongoing process of research looking at the real world emission levels of those vehicles, and that is factored into our national atmospheric emissions inventory; and that is one of our principal tools for understanding the behaviour of the emissions in question. A lot of it relies on modelling, but it is modelling very much based in real world understanding of what vehicles do

Q190 Dr Turner: Surely if these vehicles are tested—and vehicle testing is normally an annual process—anything can happen in between?
Mr Williamson: The testing I am referring to is not the MOT test. Again, that is a relatively limited test in terms of emissions. The kind of testing I am talking about is ongoing research undertaken by the DfT—and by others in Europe as well, so there is a Europe-wide programme—who will constantly test vehicles both on test bed, so a rolling road situation, and actually on real world driving conditions.

Q191 Martin Horwood: First of all, Minister, gentlemen, can I apologise for being late. The reason I am late is relevant to my question actually. I drove to my local station at Cheltenham Spa to find that my train had been cancelled; I then drove to Swindon to find there were no parking spaces; and I have had to drive the entire distance to London, thereby adding to the capital's particulate matter quite considerably! What policies are being developed to encourage people to switch to alternative low carbon forms of transport?
Jim Fitzpatrick: I think we covered some of this a little earlier, Mr Horwood, in terms of the range of initiatives and incentives that are being promoted by government: all the way through from the developing of more electric vehicles; the encouragement of hybrids; the vehicle tax incentives for hybrids and low-emitting vehicles; the Act on CO_2 campaigns to raise people's awareness of their own carbon footprint and to try encourage them out of their vehicles; and the present campaign, I think, is drive five miles less per week. So there are a whole number of public awareness initiatives. There are a number of incentives, fiscal and otherwise, to encourage individuals and vehicle manufacturers to produce and to purchase cleaner vehicles. The Local Transport Act provides for local authorities to engage in contracts with bus operators; and a lot of local authorities are demanding cleaner fleets be operating within their areas; so there are a whole number of different ways that we are trying to encourage people out of individual vehicles and into more collective forms of transport by modal shift and others.

Q192 Martin Horwood: I have to say, as a member of this Committee my awareness was pretty high, but it did not make my journey any easier. If I had tried to take the bus I think I would have been waiting all week. Are you talking to ministers in, for instance, DfT about the need to meet the kind of targets we have been talking about and the urgent need to invest in things like rail infrastructure? The recent stimulus package during the height of the recession, the same amount of money that we spent on the VAT cut could have paid for the entire backlog of rail utilisation projects in this country, could it not?
Jim Fitzpatrick: You are tempting me to answer questions on behalf of Treasury and the DfT at the same time when we are here to give evidence on behalf of Defra, but I am quite happy to offer an opinion.

Q193 Martin Horwood: I understand that you are having conversations with them about this in the light of the tasks?
Jim Fitzpatrick: Forgive me, we outlined a little earlier the comprehensive nature of the engagement with DCLG, DECC, DfT, Treasury, the Department of Health in terms of dealing with air quality and a number of its different aspects. We clearly have an interest to make sure that as transport is a contributor to the deterioration or to the quality of the air that we breathe, and we are the ministry which is responsible for air quality, we have to have a relationship and we clearly do engage with them to make sure, as best we can, that the policies which they implement help us in that regard, much as they help government in an holistic approach to government policy.

Q194 Martin Horwood: Are you happy or unhappy with the contribution they are making so far—DfT?
Jim Fitzpatrick: As somebody who was a Transport Minister for two years, up until last July, I think I would probably say that we are happy with what is being achieved so far; but as we have been discussing this morning—and I think the Chairman said maybe I should not be too close to transport in respect of this—we can always do more. We know we can do more. We know that there are initiatives and opportunities for all government departments to improve performance on every subject, and air quality is no different. We would hope that there would be an improvement in transport's profile in respect of the impact it has on air quality; and I am sure that colleagues in the Department for Transport are working hard to achieve that.

Q195 Martin Horwood: On my way here I drove through the London low-emission zone, but this is still quite an isolated example, is it not? We do not yet have any national framework for low-emission zones. When countries like Germany have already got them in place, are we not even disadvantaging people like our own haulage industry by giving them

no incentive to develop vehicles that will comply with low-emission zones? Continental competitors might well be ahead of the game now because of the national frameworks in countries like Germany?

Jim Fitzpatrick: Just before you arrived colleagues were explaining the various obstacles to the introduction of low-emission zones, and the fact that the Department for Transport are carrying out a study at the moment as to how best to introduce low-emission zones. There is the understanding that the London Zone is quite an expensive one to run because it operates on automatic number plate recognition systems, as opposed to other European models where they are operating on a paper-based system or a warden system or whatever. It is learning these lessons to work out what is most useful and what can be deployed to best effect to reduce the emissions and improve local air quality. In terms of vehicle manufacturers, given the trans-national nature of companies and Euro standards, I would be very surprised if we were giving an advantage to foreign manufacturers because Germany has its own. Most of these companies are producing for world markets these days, and if they know that the Euro Zone has the sixth standard coming in that would be replicated in other countries in due course; and for the 27 Member States' manufacturers it would be commonsense for them to produce to the same standard right across the board, surely.

Q196 Martin Horwood: In effect you are relying on the Euro Zone to raise air quality by being ahead of our game?

Jim Fitzpatrick: As Mr Instone explained only a moment or two ago, for example on $PM_{2.5}$ we are actually leading Europe and we are giving them our latest evidence and data to say this is more of an issue than perhaps it was thought before; so we are not relying on other Member States and then just cosying up to their standards. We are actually trying to lead in our own right at the same time. One of the benefits of being part of the European Union is that we do not have to reinvent the wheel on our own: we can see what is happening in other Member States, share that best practice, learn from each other and then apply those lessons to positive effect if at all possible.

Mr Instone: It is worth adding on that, we have talked at some length about the importance—and we have given some examples—of close collaboration with other government departments in the UK; but a very key part of what we also do is to have very close contact with officials in other countries in Europe so that we can compare what we are doing and influence them even before proposals get formally tabled by the Commission in Brussels. That is an absolutely key part of what we do, to learn from each other on that.

Q197 Martin Horwood: If that is true, and if that has been true over time, why is it that the Netherlands and Germany are so far further advanced in having national frameworks for low-emission zones?

Mr Instone: Different countries are bound to go at somewhat different speeds, just as different local authorities in the UK are going at somewhat different speeds. I think the interesting question is it is precisely because Germany and the Netherlands (you are quite right) have introduced them more widely, because they are further ahead, that is making us look very hard and benchmarking ourselves against what they have done. It is also true that other countries in Europe, apart from those, have made even less progress with introducing low-emission zones. Yes, there is an element of variable geometry, but I think the geometry would be more variable if we were not all busily learning from each other.

Q198 Dr Turner: Do you think government could be doing more to encourage retrofitting of things like particulate traps and other methods of reducing vehicle emissions?

Mr Instone: We already have systems for introducing particulate traps, and that is something which, for example, the low-emission zone in London has encouraged. This is something that is under very active consideration. One of the arguments in support of low-emission zones—obviously there is a balance of advantage and disadvantage as has been mentioned before—one of the advantages of low-emission zones is that they can encourage the use of new technology, particularly retrofitting, that would not otherwise occur. I stressed earlier the importance, in improving air quality, of doing something about the existing often older vehicles in the fleet, which can be even more important in the short-term than getting new vehicles on the road. One of the things we are very actively looking at is the scope for low-emission zones to encourage retrofitment. You are absolutely right, one can take this further than simply particulate traps, so this is something that is under very active consideration.

Mr Vaughan: Also in the past, DfT has supported reduced pollution certificates, or has issued reduced pollution certificates, which are also available for vehicles that have retrofitted to the correct Euro standard. For Euro V, they issued 39,000 reduced pollution certificates, which allowed vehicle hauliers to claim against VED for vehicles that were retrofitted or met the Euro V standard, which was about 10% of the fleet.

Q199 Dr Turner: Which leads me directly on to the fact that the Treasury announced in 2009 that they planned to incentivise the early uptake of Euro VI for HGVs. Has this started yet, and if not, when?

Mr Vaughan: It has not started yet because, firstly, the Euro VI has only recently come in. The Community actually incentivise once the standard is available. The actual determination of the fine detail of the standard is still yet to be agreed. The Treasury have made it clear that those standards are not available to incentivise yet.

Q200 Dr Turner: Brake and tyre wear has been something of an intractable problem, particularly producing particulates. Has the Government got

any plans to control this? What research has been undertaken to analyse the health effects of particulates from brake and tyre wear?

Jim Fitzpatrick: I think it is fair to say that, as tailpipe emissions have decreased, emissions from brake and tyre wear are becoming of increasing relative importance, because there is more research, there is more evidence, there is more data, research advice has been conducted on options to reduce tyre and brake wear but many of these have negative effects on road-holding, so there is a lot of further work to be undertaken. The increasing uptake of hybrid vehicles will have some positive effect on brake wear as a proportion of the vehicle braking effect is translated into power. Obviously all-electric vehicles are likely to have these systems. In one sense new technology is, in itself, helping eliminate some of these emissions; but also, because of the greater understanding of the whole question of air quality and emissions, there is greater focus being given on brake and tyre pollution; and obviously that is a matter for much further research.

Q201 Chairman: I think we have probably covered the ground we wanted to this morning. Thank you very much for coming in, it has been very helpful to us.

Jim Fitzpatrick: Thank you, Chairman. We will supply you with the two or three pieces of evidence that came up during the course of discussions in due course.

Written evidence

Memorandum submitted by Calor Gas Ltd (AQ01)

SUMMARY

The UK renewables strategy is over-reliant on a mass switch to biomass combustion. The air quality damage in terms of an increase in particulate emissions has been costed by Government at potentially £557 million as a result of premature death: in 2020—one year alone—up to 1,175,000 life years will be lost. The corresponding impact of increased morbidity (disease) has not yet been measured by Government. The combustion of wood in large quantities will lead to rises in the emissions of most of the other pollutants meant to be addressed by the Air Quality Strategy, and in other dangerous pollutants not targeted by the Strategy. The cost of these emissions in terms of human health and the environment should be known, and thrown into an ultimate judgement of the viability of the policy.

SUBMISSION

1. Our submission concentrates on aspects relating to the air quality problems caused by particulates. Their impact on mortality, morbidity and the environment are fairly well understood, quantified and known to be highly significant.

2. There is one significant aspect of the UK renewables strategy that will make the targets on particulates harder to reach—an aspect of policy which deliberately and significantly increases the amount of particulate pollution in the air. The Government's Air Quality Strategy 2007 reads at para 95: "Where practicable and sensible, synergistic policies beneficial to both air quality and climate change will be pursued". We describe below how the air quality strategy and the climate change policy are in conflict.

3. The UK renewables strategy aims at a big shift to the generation of heat and electricity by biomass: "We will ramp up the supply and use of biomass for heat, power and transport. . ." (The UK Renewable Energy Strategy 2009, p16). The renewable heat targets are to be met, "mainly through encouraging switching by industrial, commercial and residential customers located off the gas grid from oil, coal or electrical heating, to biomass or other renewable technologies" (para.4.1.6 of "The UK Renewable Energy Strategy 2008"). The strategy contemplates the target of 38TWh of small scale biomass installations. What does it mean for air quality? And, what does it mean for human health, given that air quality is correlated with levels of cardiovascular disease.

4. Some of the problems with biomass are frankly described in the consultation paper, "The UK Renewable Energy Strategy 2008":

> "4.6.14 The potential cumulative effect on air quality of fine particles and nitrogen dioxide emissions from a future large-scale deployment of biomass appliances or plant is not yet well understood. . .In rural areas the impact on air quality, and public health, is likely to be lower, due to both lower population densities and 'background' levels of pollution.
>
> 4.6.15 The results from preliminary analysis undertaken by AEA Energy and Environment on behalf of DEFRA indicates that if high levels of solid combustible biomass were used in dense urban areas, where heat demand is highest, the impact on air quality would be likely to be very significant. Stringent emission controls on individual plant would mitigate this effect. . .".
>
> "4.6.17 There is currently no clear advice about the locations, types and sizes of boilers that would not cause air quality issues, and there is currently no agreed European test procedure.
>
> 4.6.18 In response to these issues we are considering possible measures that will allow the deployment of biomass-fired plant, in both rural and urban areas, at the maximal sustainable rate that does not compromise our objectives on air quality or public health. . .".
>
> "4.6.25 Given that equipment deteriorates over time and needs to be operated properly, we may need to update regulations to ensure that installed equipment continues to be run in a way that meets emissions standards. . .".

5. In sum, biomass boilers without stringent controls will cause significant pollution in urban areas. The resulting pollution is being directed to rural areas because of lower existing levels of pollution in the countryside. We do not yet know the effect of particulates and NO_x from biomass boilers—and, as the boilers age, they will pollute more.

6. Para 5.17 of the Government's "Biomass Strategy" (2007) states that, "Substitution of natural gas with biomass, on the other hand, generally leads to increases in emissions of all major pollutants". LPG has a similar emissions profile to natural gas. So, insofar as the renewables policy and RHIs manipulate a switch from natural gas or LPG—as is the clear intention—increases in all major pollutants are to be expected. We know from an AEA study ("Technical Guidance: Screening Assessment for Biomass Boilers" July 2008) that a typical domestic wood burning boiler of < 50kWth would emit over 15kg of large particulates (PM_{10}) and over 15kg of small particulates ($PM_{2.5}$) per year per household. The paper states: "For modern appliances with well-designed combustion the particles emitted are all thought to be less than 2.5?". This is no comfort. As "The Air Quality Strategy" (2007) states: "Recent reviews by WHO and Committee on the Medical

Effects of Air Pollutants (COMEAP) have suggested exposure to a finer fraction of particles ($PM_{2.5}$, which typically make up around two thirds of PM_{10} emissions and concentrations) gives a stronger association with the observed ill-health effects". These observed ill-effects include congestive heart failure, heart disease, cerebrovascular problems and asthmatic attacks.

7. On 26 March 2009, in a Written Answer (col 695/6W) to Graham Stringer MP, the Government quantified the social (=health costs in terms of increased mortality) costs caused by emissions from biomass plants under various scenarios. For an uptake of 52TWh of biomass the social costs were estimated as £2,803,000,000 and for 38TWh (the Government target) the comparable costs were £557,000,000—these figures were calculated on the basis of existing technology.

8. Andrew Tyrie MP asked a follow-up question answered on 10 November (col 219W):

> "***Mr Tyrie:*** To ask the Secretary of State for Energy and Climate Change what recent assessment he has made of the effects of the use of biomass boilers installed to meet Renewable Energy Strategy targets on (a) air quality, (b) levels of particulate emissions and (c) levels of (i) morbidity and (ii) mortality.
>
> ***Jim Fitzpatrick:*** (a) The Government have, in support of the development of the Renewable Energy Strategy (RES), carried out modelling of the effect of an increase in the use of biomass for heat and power on the emissions, ambient air concentrations and public health impacts of fine particles ($PM_{2.5}$), coarser particles ($PM_{)}$ and nitrogen dioxide. The key air quality results of this analysis are given in the Renewable Energy Strategy on page 121.
>
> (b) As part of the analysis the increases in the emissions of particulates were estimated over a number of different scenarios. For $PM_{2.5}$ these were between 0.75 and 9.1 ktonnes from a baseline in 2007 of 82 ktonnes. For PM_{10}, emissions were estimated as being between 1.3 and 9.5 ktonnes from a 2007 baseline of 135 ktonnes.
>
> (c) (i) The impacts on morbidity resulting from the uptake of biomass as a renewable energy source were not assessed.
>
> (ii) The mortality health impacts of these scenarios were estimated to be between 340,000 and 1,750,000 measured as the number of life years lost in 2020 from the impact on air quality of increased biomass combustion".

9. Presumably, then, the social costs of the increase in particulate emission would be higher than £557m because this costing does not include morbidity. This could be significant. The emission of particulates is estimated to advance 8,100 deaths a year (=mortality) in Great Britain and to cause an additional 10,500 respiratory admissions to hospital (=morbidity) ("Quantification of the Effects of Air Pollution on Health in the United Kingdom", DoH, 1998).

10. In relation to particulates, then, the renewables strategy as currently conceived is significantly costly in terms of damage to air quality and human health. The precautionary principle would argue for examining whether there may be other ways of meeting the carbon emission reduction targets other than with such a heavy reliance on biomass—especially if, as we would assert, other route maps would be dramatically less costly (the "Impact Assessment" of UK renewables strategy undertaken by Government costs the policy at £56 billion even after taking into account all the climate change benefits).

11. The Government's Air Quality Strategy covers the following pollutants: particulates, oxides of nitrogen, ozone, polycyclic aromatic hydrocarbons, ammonia, sulphur dioxide, benzene, 1,3 butadiene, lead and carbon monoxide. Wood smoke contains emissions of all these pollutants except, perhaps, ammonia. We are not aware of any work the Government have undertaken to quantify the emissions of these pollutants which will be caused by the full implementation of the biomass strategy. Once again, the precautionary principle would suggest not proceeding with the policy until we have assessed the likely impact on human health and the environment.

12. We would strongly urge the Committee to consult the website www.burningissues.org—it is the website of the American Clean Air Revival campaign (Calor has no connection with this organization). This website catalogues, in harrowing detail, backed up with overwhelming scientific data, the emissions released by burning wood and the danger they present. The emissions go far beyond those covered by the Air Quality Strategy, and therefore presumably will not trigger any prophylactic measures to counteract them. These include the carcinogens creosote, methyl chloride and dioxins; and radioactive caesium. We will confine ourselves to referencing just two points made by this very informative site: the US study which found that fireplace wood ash contained up to 100 times more radioactive caesium than would be allowed as a discharge from a nuclear plant; and the WHO estimated in 1997 that wood smoke causes 2.7-3 million premature deaths worldwide. We suggest that the full human and environmental risks of a mass move to the large scale combustion of wood should be known before the harvest of damage in terms of death and disease is established ten or twenty years hence.

26 November 2009

Memorandum submitted by the Institute of Air Quality Management (AQ02)

SUMMARY

The monitoring and modelling of air quality in the UK is, in general, adequate.

The health and environmental risks of poor air quality are well understood in Defra and parts of DH/HPA but less well so elsewhere.

The delivery chain for achieving good air quality is wholly inadequate and pitifully resourced. It is also fragmented and the responsibility of many arms and agencies of central and local government, not all of which are playing their proper part in the process.

The primary means of improving air quality in England is to address emissions from road traffic. Although improvements in vehicle technology will play a part in this, the IAQM believes that much needs to done to understand the science of air pollution more fully and that the air quality objectives will only be achieved and maintained by influencing the behaviour of individuals and reducing the need for the use of the private car.

SUBMISSION.

1. There is an extensive programme of air quality monitoring in the UK. In part this is the national Automated Urban and Rural Network (AURN) and in part it is regional and local networks operated by local authorities and other bodies. Although there are some arguments about just how well the data from these activities reflect the exposure of the public it is fair to say that there is only limited scope for improvement in this area.

2. The UK also makes considerable use of air quality modelling to provide estimates of air quality in areas where monitoring is not carried out. Although the absolute reliability of such modelling has been questioned, there is no evidence to suggest that the procedures are poorly executed.

3. The health and other environmental risks associated with poor air quality have been clearly identified by bodies such as the Committee on the Medical Effects of Air Pollution (COMEAP) and these have been acknowledged in those parts of Defra and DH/HPA with responsibilities for these matters. It must be realised, however, that this only represents current knowledge. Although much work has been done in this field in recent years there are still many questions that remain to be answered. What is clear, as the recent COMEAP report (Long-Term Exposure to Air Pollution: Effect on Mortality) states, is that a large number of deaths every year are advanced by the effects of air pollution and in particular by very fine particulate matter. There is still much debate over which specific element(s) of this are responsible for advancing deaths but the evidence is strong that particles are the main pollutant to address. There is also an acceptance in these bodies that road traffic is the predominant, although not the only, cause of air quality problems. This is especially the case in London but it is also a major factor in most other towns and cities in the UK.

4. It is much more questionable whether these risks are understood in other parts of Government. One difficulty in this is that Climate Change (CC) has dominated the "pollution agenda" in recent years with the consequence that measures have been introduced to address CC which have had adverse effects on air quality. One specific measure in this respect has been the encouragement of increased use of diesel vehicles. These do emit lower amounts of carbon dioxide but also emit greater quantities of particles and nitrogen dioxide, the main pollutant of concern (see also Para 16).

5. The delivery chain for improving air quality is, at best, fragmented and often non-existent. There is a view held in some quarters that technological measures being introduced, especially in the road transport field, will deliver all the improvements that are needed. The evidence from monitoring shows that, following an improvement in air quality in the 1990s following the initial introduction of catalytic converters, there has been little further improvement in spite of supposed improved vehicle technology. It is worth noting that the largest step change in overall air quality was in 1992 with the introduction of the three-way catalytic converter. In particular this brought about improvements in carbon monoxide and total oxides of nitrogen. In contrast the effects on nitrogen dioxide concentrations were minimal. This is usually attributed to the fact that increases in the numbers of vehicles on the roads has swamped any benefits that may accrue from the technological improvements.

6. A further difficulty is the need for balancing approaches. Reference has already been made to the dominance CC issues have gained on the pollution agenda. There is a clear need for such global issues and, generally, local issues such as air quality to be treated in conjunction so that measures to address one do not have an adverse effect on the other and, where possible, have mutually beneficial effects.

7. Another issue of balance is that between national and local measures. National measures tend to be broad brush and, assuming they are effective, will produce overall benefits. There are, however, many cases where air quality problems arise as a consequence of local problems which are not amenable to control by national measures. Defra has recognised this in the early drafts of its submission to the EU for an extension in meeting the Limit Value for nitrogen dioxide by identifying areas where different types of traffic sources are responsible for air quality problems.

8. A major stumbling block to delivering improved air quality is a lack of co-ordination between the various parties involved in the process. This problem exists at both national and local level. In the national case, as has already been stated, Defra and DH/HPA have at least some understanding although this may not spread across the entire Departments. On the other hand there are other Government Departments; DfT, CLG, DECC and HMT for example, where there appears to be at best very limited awareness of air quality issues and, often, a total lack of understanding that air quality is still a major problem in terms of its health impacts and its wider environmental impacts. It is actually imperative that these Departments are involved in the Air Quality Management (AQM) process as each has an important part to play. Equally, although other Government Departments may not have quite the same direct involvement in AQM as these, they do have the potential to assist in delivering improved air quality by managing their own emissions.

9. DfT must be more closely engaged as traffic, and in particular road traffic, is the main cause of air quality problems in much of the UK. CLG has a major role in the planning process in particular and in local government in general. DECC must be involved to ensure a harmonisation of AQM and CC policies and HMT has an essential role in providing funding.

10. At a local level it is essential that similar links are established and maintained between the air quality professionals and the transport planners, climate change officers and development control planners. Although there are some local authorities where such links do exist there are many where they do not. There does not appear to be any consistent link between whether such relationships exist or not and whether an area has one or two tiers of administration. There are examples of good links where the highways functions are at a county council level and air quality is a district council function and of poor links where both functions are exercised in unitary authorities and vice versa.

11. There is another issue that is important at the local level. This is the question of Local Transport Plans (LTPs). There are a number of points that must be addressed here. First, in the current round of LTPs (LTP2) air quality was cited as one of the four key shared priorities with tackling congestion, improving road safety and improving accessibility. In spite of this research (Dotun Olowoporoku, University of the West of England, PhD thesis in preparation) shows that in many cases air quality has been treated as the fourth in order of priority. This is largely due to the requirement for the preparation of Joint LTPs by groups of local authorities of which maybe only one or two have Air Quality Management Areas.

12. The draft guidance for the next round of LTPs (LTP3) is likely to exacerbate this problem as air quality has been given a lower priority than was the case in LTP2. Given that when it was specifically listed as one of four, presumably equal, priorities air quality was nonetheless downgraded by many local authority Transport Planners it is unlikely that with the proposed LTP3 guidance the same Transport Planners will accord it the priority it needs.

13. The main problem in managing air quality is that the resources available are wholly inadequate. There is an apparent lack of proportion in the allocation of funds for various initiatives. This can be best illustrated by comparing the funding for various road safety measures and that for air quality work and the health impacts of road accidents and air quality. In the case of road safety there are numerous high profile campaigns, in particular the regular drink-driving campaigns, and many cases of extensive traffic management schemes, some of which may result in deterioration in local air quality. These measures are targeted at an annual death toll of approximately 3,000. In contrast, poor air quality which is believed to be responsible for at least 24,000 deaths advanced per year only attracts general attention when there is a major episode such as the London smog of 1952. Episodes such as this are, fortunately, rare and no subsequent episode has had the same impact. An episode in London in December 1991 was analysed in detail in a report for DoH (Anderson et al, 1995) which concluded that between 100 and 180 deaths during and after the episode could be attributed to air pollution. In July and August 2003 there were increases in deaths over and above what would have been expected. Many of these were attributed to the high temperatures experienced at the time but an analysis (Stedman JR, 2004) estimated that between 423 and 769 of the 2,045 "additional" deaths between 8 and 13 August were due to poor air quality; specifically particles and ozone. The range in this case is due to uncertainty in the magnitude of the effects of ozone.

14. It is, of course, necessary to strike a balance on this issue. It is appreciated that in a reasonably large proportion of, but not necessarily all, road traffic accidents the number of years of life lost by individual casualties will be greater than that lost by many individual victims of air pollution. It is, however, also necessary to consider the total loss of life years. The current estimate on this is an average of eight months per person per year which, based on a population of 60,000,000, equates to 40,000,000 years of life lost per year. In contrast, even allowing for a loss of 50 years of life per casualty in road traffic accidents, these equate to 150,000 years of life lost per year.

15. It is recognised that achieving improved air quality is not going to be an easy task. Part of the difficulty is that it is never going to be a simple task to quantify the outcomes of proposed measures in advance of their introduction. There is a need for more rigorous scientific research into air pollution. Although we do know far more now than was the case in 1952, there are still many questions that are unanswered.

16. Two major issues concern the two pollutants of greatest concern for LAQM: nitrogen dioxide and particulate matter. In the former case we have seen a marked reduction in the concentrations of total oxides of nitrogen (nitrogen dioxide + nitric oxide) but this is almost entirely due to reduced concentrations of nitric oxide. The Air Quality Expert Group (AQEG) produced a report (December 2007) on this which does

identify some possible causes but also highlights a number of areas for further work. More recent work (Carslaw, 2009) suggests that increased concentrations of nitrogen dioxide that have been observed, particularly at roadside sites, are due to increased emissions of primary nitrogen dioxide from diesel-engine cars.

17. In the case of particles, there is still uncertainty as to whether particle mass is the most important metric and, if so, which size fraction, or whether particle numbers or surface area are the critical issue. There are also key questions on source attribution for particles and on whether different size fractions may have different health impacts. One school of thought suggests that the finer fractions may be most important in chronic effects, and in particular with advancing mortality, whereas the coarser particles may be responsible for acute effects such as triggering asthmatic attacks.

18. Although, as has been stated, it is difficult to be precise in identifying the outcomes of measures introduced to improve air quality, the current financial situation does present one opportunity in this respect. It is generally accepted that the majority of air quality problems in the UK arise from emissions from road traffic. There have been a number of reports that road traffic has reduced due to the financial crisis and this potentially presents us with an effective intervention study into the outcomes of reducing the amount of road traffic in the UK. Attempts to do so have been made in the past with short term events such as the fuel delivery problems in 2000. These events, however, were too short for any meaningful conclusions to be drawn as normal variations in air pollutant concentrations swamped any other effects.

19. Even if this opportunity does produce evidence on the amount of reduction in road traffic necessary to meet the EU Limit Values for air pollution there still remains the problem of achieving those reductions in the long term. This will require a major change in the mindset of the general population and, in particular, amongst users of the private car. It is certain that there will be a need for the use of innovative means of transport and for better, more flexible public transport to meet the needs of the travelling public. There is also the need for other measures to reduce the need for travel. There are current examples such as increased home working but these are often offset by the lack of local facilities which encourage people to use their cars to travel to out-of-town shopping centres.

20. This submission has concentrated on those issues that are associated with the Local Air Quality Management process in the UK. There are also air quality issues that lie almost wholly within the remit of Her Majesty's Government, although measures taken to improve local air quality will assist in achieving targets in these matters. One of these of concern both in relation to human health and to eco-systems is the steady increase in concentrations of background, tropospheric ozone. Others are a widespread problem with the deposition of nutrient nitrogen on sensitive habitats and a residual problem of acid deposition.

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1 December 2009

Memorandum submitted by Joanna Guske (AQ04)

The current almost exclusive focus on climate change has produced a sense of public helplessness and apathy. The challenge seems too big, the dangers too far away and the effects of individual effort too small to be worth the trouble. In any case there is still some doubt about our culpability.

Air pollution is a different matter. Action to improve the quality of the air we breathe has the great advantage of producing immediate, measurable, perceivable results. We all benefit or suffer as a result of what we do here and now in this country.

However, there is a surprising lack of public awareness of the high levels of UK air pollution, its impacts on human health and the cumulative effects of individual contributions to it. We need public education and democratic involvement to tackle the problem.

Campaigns should make it clear that apart from contributing to climate change, and landing the UK with financial penalties for non-compliance with EU targets, air pollution is right now affecting the health of everyone, (particularly our children); costing us all money (NHS); reducing our productivity (impacting on the economy). There is no doubt about the cause and the effect of air pollution, or that we, as individuals, can (and must) take action to stop it.

The attached suggestions address some of the elements of polluting behaviour that could be tackled with minimal legislative and life-style changes. In each case, there would be an almost immediate measurable improvement in air quality, the proposed action could be implemented relatively quickly, and would have positive spin-offs.

Air Quality

Public Responsibility

County Councils, Town Councils, Parish Councils, Environmental Organisations, the Media, Universities, Schools, celebrities and individual members of the public at all levels and ages must become involved.

Decentralisation and separation from party politics is essential, as is the inclusion of the young in schools and universities. Finding solutions and implementing strategies require individual input and affirmation. The use of local referenda on the action to be taken, as well as local penalties and financial benefits would support compliance.

Educational campaigns should:

— engage individual responsibility;

— raise awareness that we all contribute to air pollution, and that whatever we put into the air affects us all;

— change attitudes so that polluting becomes socially unacceptable (like drink driving and smoking in public places); and

— promote optimistic solidarity—(if we work together, we can do it).

Initial Action

1. *Reduce traffic pollution*

— general speed limit of 50mph (we did it in the 70s);

— turn off engines when not moving (at traffic lights, in traffic jams, when chatting on mobile, scrapping ice off windscreens);

— congestion charge for all towns and cities; and

— pedestrian zones in all town and city centres.

Enforcement: signs, fines and education; monitoring displays (see point 7).

Incentives: reduced road tax for cars fitted with devices to limit speed and turn off engine when stationary; more park and ride facilities; buses to replace cars on the school run.

Incidental advantages: promotion of new technology and jobs; reduction in road casualties; increased use of (high-speed) buses and trains for longer journeys; less long-distance haulage; reduction in CO_2.

2. *Plant more trees*

— All cities, towns, gardens, car parks, schools, farms should have trees.

— All planning permission for new building should include trees.

— Farmers and landowners and developers should be encouraged to plant trees; conserve existing trees; avoid felling.

Enforcement: education, fines for unnecessary felling; monitoring displays (see point 7).

Incentives: financial bonuses and/or reductions in community and business charges.

Incidental advantages: jobs; improvements in farm animal welfare and wildlife habitats; enhanced human well-being; reduction of CO_2; more oxygen.

3. *Ban Bonfires*

We all know that smoke kills. Smoking and stubble burning are already banned.

Bonfires are:

— used to dispose of waste that produces toxic fumes;

— used to dispose of waste that should be recycled;

— wasteful of potential biomass fuel (wood, wood-chips, leaf-logs), and compost;

— an increasing health hazard and public nuisance in the countryside; and

— the cause of thousands of complaints each year.

Enforcement: education; fines (culprits easily identifiable); monitoring displays (see point 7); public pressure.

Incidental advantages: Promotion of new technology and jobs; promotion of local recycling and production of cheap (or free) compost/mulch; fewer neighbourhood disputes; enjoyment of gardens, open windows and drying washing out of doors.

4. *Reduce public use of energy*

(a) Reduce heating in public places

Enforcement: Education; central regulation for public sector; encouragement for private sector to set thermostats lower.

Incidental advantages: reduced expenditure on energy; may encourage householders to turn down the thermostat; reduction of CO_2.

(b) Turn off street lights after mid-night (or fit movement sensors)

Enforcement: education; reduced expenditure on energy.

Incentive: reductions in community charge.

Incidental advantages: reduced expenditure; less light pollution, reduction of CO_2.

5. *Decentralise (clean) energy production*

This will:

— promote individual responsibility for personal energy consumption;

— remove current opposition to large-scale clean energy production; and

— reduce consumption of fossil fuels.

All new buildings to provide (some of) their own clean energy:

— photovoltaic cells;

— individual wind-turbines on roofs;

— large south-facing windows; and

— hydro-electric power linked to any nearby moving water (including down-pipes from gutters).

All existing buildings to be modified to do the same.

Enforcement: mandatory by, say, 2015—fines thereafter.

Incentives: reductions in community charge; grants; better HIPS ratings.

Incidental advantages: Promotion of new technology and jobs; energy/money saving; small scale units less visually and audibly intrusive; surplus production can be sold back to the grid; reduction of CO_2; monitoring displays (see point 7).

6. *Tax aviation fuel (starting with private usage)*

Incidental advantages: income for the exchequer; promotion of new, fuel-efficient technology; jobs; reduced noise pollution; reduction of CO_2.

7. *Air pollution monitoring display-units*

(Solar/light powered) in and around every factory, airport, motorway, city, town, village, school, hospital, etc showing:

— annual local targets;

— position in relation to targets; and

— current emission levels.

Enforcement: fines for failure to meet targets; local rating included in tourist information, job adverts, HIPS; local public reaction to possible loss of revenue, income and the value of real estate.

Incentives: awards; reduction in local taxes/community charges; increase in popularity and value of local area, amenities and real estate.

8 December 2009

Memorandum submitted by Environmental Protection UK (AQ05)

Summary of Our Views

National-level monitoring and modelling has generally been successful, but does not pick up many local air quality hotspots caused by issues such as street canyons, bus stops, minor junctions, pedestrian crossings, etc. These local hotspots are the source of significant public exposure to polluted air.

The health and other environmental risks associated with poor air quality have been identified by bodies such as the Committee on the Medical Effects of Air Pollution (COMEAP). However, many Government reports and strategies currently rely on outdated recommendations for premature death and monetised health impacts. Outside of parts of Defra and the Department of Health the health effects of air pollution, and indeed the fact that air pollution is still a problem at all, seems to be only dimly understood by government.

The delivery chain for air quality is fragmented. Responsibility for meeting air quality objectives lies with Defra, however delivery largely rests with other government departments and bodies such as the Highways Agency, who often do not dedicate adequate resources to the problem. At a local level, local authorities often lack the national enabling actions and political will to act decisively on air quality.

Effective delivery will need the delivery system to be re-examined, and national enabling actions to be taken alongside stronger obligations at regional and local levels. Greater resources need to be provided at all levels. Tight integration on air quality and climate change policy is currently lacking/improving this situation will reduce the costs of achieving air quality and climate change targets as well as reducing the risk of unintentional policy trade-offs, as we have seen with promotion of diesel vehicles.

Detailed Comments

We have detailed our comments below in each of the four areas requested by the Committee:

The monitoring and modelling systems used by the Government and whether these provide an adequate measure of air quality

1. Two separate levels of monitoring/modelling are used in the UK:

   — National-level monitoring/modelling organised by Defra, which includes the Automated Urban and Rural Network (AURN). National-level monitoring and modelling is used to monitor compliance with EU Air Quality Limit Values and the UK Air Quality Standards.

   — Local monitoring/modelling carried out by local authorities in support of their responsibilities under the Local Air Quality Management regime.

It is important to note that whilst both levels of monitoring/modelling may use valid techniques, they may not necessarily produce the same results. Indeed, as the Committee's questions suggest, monitoring and modelling will always provide only an approximate indication of public exposure to air pollution.

2. The nationwide system of monitoring, that includes the Automated Urban and Rural Network (AURN), has been implemented successfully and has achieved international acclaim. However, it is important to note that the approach taken by the UK to comply with European monitoring requirements uses relatively few monitoring sites, with the gaps filled in by modelling. Automatic monitoring, as carried out in the AURN, also tends mostly to be urban centre/background sites, rather than the roadside sites where air quality problems are worst. Even where monitoring is at roadside, it is rare that automatic monitors can fit in the narrow streets that are the worst hotspots (see paragraph 3).

3. The 'gaps' in the widely dispersed national monitoring system are filled by air quality modelling. The national-level modelling has been carried out to a high standard using the best available techniques, however it is important to note the limitations of the modelling process at a national level. Modelling is only as good as the input data provided, and the models themselves may also have limitations, for example gas-based models are often used to model particulate (PM_{10}) concentrations. National modelling also fails to recognise the major influence of local congestion and street-scale topography (eg street canyons, bus stops, minor junctions, pedestrian crossings, etc) on air quality.

4. These local factors are now very likely to constitute the majority of problems identified and declared as Air Quality Management Areas (AQMAs) under the Local Air Quality Management (LAQM) process. The fact that national-level monitoring has not picked up these areas has allowed national modelling to also overlook them, meaning that these problem areas are not included in terms of reporting against the national Air Quality Standards. This effectively devolves action on these poor air quality hotspots to local authorities alone, which have neither the binding legal commitment nor in many cases the effective tools to take meaningful action and resolve the problem(s).

The extent to which the Government fully understands and has identified the health and environmental risks caused by poor air quality

5. The health and other environmental risks associated with poor air quality have been clearly identified by bodies such as the Committee on the Medical Effects of Air Pollution (COMEAP), and these have been acknowledged in those parts of Defra and the Department of Health/Health Protection Agency with responsibilities for these matters.

6. However, COMEAP's latest recommendations for quantifying the health impacts of particulate matter are currently failing to find their way through into official estimates of premature deaths and monetised health impacts. The current (2007) Air Quality Strategy used a premature death co-efficient for PM_{10} from COMEAP's 1998 quantification report (a far lower figure than that recommended in their latest 2009 report). The health impact quantification methodology used in the 2007 Air Quality Strategy has been used in several subsequent reports, for example the recent Cabinet Office report 'The Wider Costs of Transport in English Urban Areas in 2009', which means that health impacts continue to be widely underestimated. The Campaign for Clean Air in London provided a detailed explanation of these issues in a letter to Mayor Johnson dated 20th September 2009.[1]

7. Although bodies such as COMEAP have done much good work, there are still many questions that remain to be answered. For example, there appears to be a lack of clarity regarding how air pollution affects individuals, both in terms of differing levels of personal exposure to pollutants and regarding how susceptible different people are to the effects of pollution. Average figures, for example the 7–8 month average shortening of life cited in the UK Air Quality Strategy, can be of limited use for determining health impacts.

8. The evidence base for the health effects of air pollution is often not thoroughly communicated amongst government and the general public. The health impacts of air quality in the UK are estimated at almost twice those of physical inactivity (Defra Air Quality Strategy 2007, Chief Medical Officer's Report 2004), yet it fails to receive quite the level of attention of the latter. Similarly, some studies have suggested that the cardio vascular risk of exposure to traffic pollution "may well be similar to that played by passive smoking" (COMEAP 2006)/the comparative level of national action, however, seems to be very different.

9. Outside of Defra and the Department of Health it is questionable whether these risks are fully understood. There has been very little linkage made between air quality and other policy areas of health and environmental risks/the causes and effects of air pollution are still dealt with in different departments, for example DfT, DCLG, DoH. The consequent lack of joined up policy fails to emphasise the multiple wins that would be achieved by co-ordinated policies. For example the promotion of cycling and walking can help relieve congestion, reduce conventional (air quality) emissions, and see a significant increase in average levels of physical activity thus reducing the incidence of heart disease and increasing resilience to the impacts of air pollution. In addition to this, it would help reduce climate change related emissions.

The extent to which the delivery chain for air quality is coherent, integrated, co-ordinated and effective and whether the bodies with responsibility for managing air quality have appropriate incentives, understand their role and responsibilities, and are adequately resourced

10. The delivery chain for improving air quality is, at best, fragmented. At a national level, Defra and the DoH/HPA have at least some understanding although this may not spread across the whole department. On the other hand there are other government departments, DfT, CLG, DECC and the Treasury for example, where there appears to be at best very limited awareness of air quality issues and, often, a total lack of understanding that air quality is still a major problem in terms of its health and wider environmental impacts. It is imperative that these departments are involved in the air quality management process as each has an important role to play. DfT must be more closely engaged as traffic, and in particular road traffic, is the main cause of air quality problems in much of the UK. CLG has a major role in the planning process in particular and in local government in general. The Treasury has an essential role in providing funding.

11. Harmonisation of air quality and climate change policy is key, as both policy areas are largely aiming to address the same combustion processes. Coordinated policy can lead to lower overall costs, whilst un-coordinated policy can cause unintentional trade-offs. The current departmental split between air quality (Defra) and climate change (DECC) is therefore unfortunate, and there is currently little evidence of the assurances that policy would be 'joined up' given at the time that DECC was created. Win-win measures between climate change and the natural environment (including air quality) are not being identified and fast tracked, whilst the potential negative effects of climate measures are not being fully identified before implementation. Time consuming and expensive policy amendments are often later needed; examples of this include sustainability considerations with liquid biofuels, and the air quality impacts of biomass combustion.

12. Government agencies also have a key role to play, in particular the industrial regulators (the Environment Agency, SEPA and NIEA in England and Wales, Scotland and Northern Ireland respectively) and the Highways Agency. The industrial regulators have a legal duty to address the problem where a

[1] See—www.cleanairinlondon.org/blog/_archives/2009/9/20/4327468.html

regulated installation is causing a breach of an air quality limit value. By contrast the Highways Agency are simply obliged to, in effect, 'not make air quality worse', and as a result AQMAs brought about by roads managed by the HA often go unaddressed, which is a major area of frustration for local authorities.

13. We have previously mentioned the disconnect between national- and local-level monitoring (see paragraph 4). A similar situation exists with delivery/national Government (Defra) is the legally obligated party, and local authorities are only required to 'work towards' achieving the Air Quality Standards, which can restrain the political will needed to tackle the problem at a local level. This problem is especially acute in cities such as London, where the current mayor holds many of the powers needed to improve air quality yet fails to take ownership of the problem, as exemplified by the content of the recently released London Mayor's draft Air Quality Strategy.

14. Within local authorities themselves links need to be established and maintained between the air quality professionals, transport planners, climate change officers and development control planners. Although there are some local authorities where effective links exist, there are many where they do not. Outside of unitary authorities air quality is a district-level function, whilst transport rests with the county councils. However there does not appear to be any consistent relationship between the local authority structure and the existence of effective cross department links for air quality—there are good and bad examples under both unitary and multi-tier arrangements.

15. One of the other missing links in the delivery chain is the role of Regional Government; in most regions over half the local authorities will have declared AQMAs. Regional Government has been given no clear tasks or roles in trying to help relieve the problem, which is especially significant considering their role in regional transport programmes and spatial planning. There also seems to be a significant lack of air quality assessments for future developments coming through the channel of Strategic Environmental Assessments for Regional Spatial Strategies and Local Development Frameworks—this is extremely important as it is very difficult to deal with the air quality impacts of thousands of new homes when they are presented to air quality officers piecemeal at a development control level.

16. Much can be learnt from overseas examples of air quality management. For example in the Unites States clear roles and responsibilities under their Clean Air Act are assigned to the Environmental Protection Agency (federal level), and states, tribes, and other local agencies.[2]

The steps that need to be taken to ensure that air quality targets will be met in the future

17. Policy measures tend to fall into two distinct groups. The first is nationally-based technical 'end-of-pipe' fixes for vehicle emissions, which previously seemed to offer the solution to the air quality issue. However, evidence from monitoring shows that, after a marked improvement in air quality during the 1990s following the initial introduction of catalytic converters, there has been little further improvement in spite of supposed improved vehicle technology. This is usually attributed to the fact that increases in the numbers of vehicles on the roads has swamped any benefits that may accrue from the technological improvements. This is not to undermine the importance of further improving vehicle emission standards, but is an acknowledgement that 'end of pipe' measures have suffered from diminishing returns, and cannot be solely relied upon to deliver compliance with air quality objectives.

18. The second group of measures are those concerning local action planning. These are delivered in the main by local authorities, and have to exist within the national context of more and more traffic being forced on to the roads. The most many local authorities can do is to re-route traffic from current hotspots, potentially at the risk of creating new ones. Although in Local Transport Plan 2 air quality was a 'shared priority', it was rarely an equal one. There seems to be little support from national government in raising the profile of air quality at a local level—whilst it is a statutory obligation, at the moment this is often the only reason it is kept on councils' agendas.

19. An effective way forward will need a tight balance between national and local measures. National measures tend to be broad brush and, assuming they are effective, will produce overall benefits. There are, however, many cases where air quality problems arise as a consequence of local problems which are not amenable to control by national measures. Defra has recognised this in the early drafts of its submission to the EU for an extension in meeting the Limit Value for nitrogen dioxide, by identifying areas where different types of traffic sources are responsible for air quality problems. Enabling actions taken at a national level will allow for a more tailored approach to be taken at a local level.

20. One example of where the national—local approach can be taken is with Low Emission Zones (LEZs)—designated areas where only vehicles meeting certain emission standards are allowed to enter. The main LEZ in the UK encompasses almost the entirety of Greater London, and at present applies to larger vehicles only, however there are simpler, cheaper more flexible way of implementing LEZs.[3] Whilst LEZs are an effective tool for addressing areas of poor air quality very few local authorities have implemented one. The main reason for this is the lack of a national framework for local LEZs to operate within, and the lack of a national testing and certification scheme for retrofit emissions abatement equipment (one exists for

[2] This is explained at www.epa.gov/air/caa/peg/understand.html
[3] Many European examples are shown at www.lowemissionzones.eu

PM_{10}, but not NO_x). Without these, local authorities find it very difficult to establish a LEZ and, if they do, national vehicle operators may potentially have to comply with several different LEZs with different standards and criteria.

21. We have detailed the fragmented nature of the delivery system in paragraphs 10 to 12 above, and it is clear that delivery needs to be rethought, and obligations to act to improve air quality imposed on a number of key delivery bodies. One of these is the Highways Agency, who need a stronger obligation to actively improve air quality rather than simply 'not make air quality worse'. Local authorities also need a stronger obligation than simply 'working towards' the Air Quality Standards, as they are required to under the LAQM regime. We note that, at the time of writing, Defra is undertaking a review of the LAQM regime, and we look forward to seeing the outcomes.

22. At both national and local level, work on air quality is under resourced. There is an apparent lack of proportion in the allocation of funds for various initiatives. This can be best illustrated by comparing the funding for various road safety measures and that for air quality work, and the health impacts of road accidents and air quality. In the case of road safety there are numerous high profile campaigns, in particular the regular drink-driving campaigns, and many cases of extensive traffic management schemes, some of which may result in deterioration in local air quality. These measures are targeted at an annual UK death toll of approximately 3,000. In contrast poor air quality, which is believed to be responsible for at the very least 24,000 deaths advanced per year in the UK, only rarely attracts public attention.

23. It is generally accepted that in the medium- to long-term improvements in air quality will be secured via measures taken to tackle climate change, for example the greater use of electrically propelled vehicles would do a great deal to improve air quality. However, at the current time there is very little integration between air quality and climate change policy, with the result being some adverse effects from well intentioned measures. One specific example here has been action to lower vehicle CO_2 emissions through tax measures and public information; this has encouraged diesel vehicles which normally emit lower amounts of carbon dioxide than petrol equivalents, but greater quantities of particles and nitrogen dioxide. The Government's vehicle labelling and 'Act on CO_2' schemes both largely ignore air quality, despite their US equivalents including both a CO_2 and air quality metric.[4]

24. Both air quality and climate change policy need to be integrated with transport, policy and a strong push put forward towards introducing widespread notions of healthy urban planning. Infrastructure we build now will last 50 to 100 years, and over the last 50 years we have seen an 800% increase in road traffic. A long-term vision for transport is needed now/the alternative is that we micro-manage the ever-increasing amount of traffic on the roads, which will significantly hamper work to both improve air quality and reduce emissions of greenhouse gases.

9 December 2009

Memorandum submitted by the Woodland Trust (AQ06)

1. The Woodland Trust welcomes the opportunity to respond to this consultation. We are the UK's leading woodland conservation charity. We own over 1,000 sites across the UK, covering around 20,000 hectares (50,000 acres) and we have 300,000 members and supporters. We have three main aims:

- Enabling the creation of more native woods and places rich in trees.
- Protecting native woods, trees and their wildlife for the future.
- Inspiring everyone to enjoy and value woods and trees.

SUMMARY

The extent to which government has recognised the health and environmental impacts risks caused by poor air quality is unclear.

Trees and woodland have a measurable impact in reducing air pollution and reducing the incidence of diseases exacerbated by airborne pollutants. This impact is proportionately greater in urban areas yet tree cover in urban areas is under threat.

Air quality benefits are supplemented by the other benefits of trees and woods in particular relating to management of surface water and reduction in building energy budgets.

There is a need for co-ordination across government departments, particularly within local government to ensure that the overall cost benefits of improved air quality are protected.

Urban tree cover should be maintained and increased to intercept airborne pollutants especially particulates.

[4] http://www.epa.gov/greenvehicles

The conclusions to the Government's National Expert Group on Transboundary Pollution (NEGTAP) 2001 report in relation to trees and woodland focussed on canopy trees and overlooked the threats to the woodland ecosystem posed by nitrogen.

Targeted establishment of new trees and woodland could be used as a buffer to intercept pollutants to the benefit of existing woodland, other habitats and the wider environment.

The Extent to Which the Government Fully Understands and has Identified the Health and Environmental Risks Caused by Poor Air Quality

Health

2. It is unclear to us the extent to which government has recognised the health and environmental impacts risks caused by poor air quality. It is already the case that air quality limits for particulates are exceeded in many urban areas on a regular basis. Air quality can be expected to worsen with climate change.

3. Climate change projections,[i] released this year, show that by 2080 London will be between 2°C and 6°C hotter than today. Already the temperature differential between the city centre and surrounding suburbs may be as much as 100C on summer days. Increased temperature combined with pollution from traffic emissions and other sources leads to increases in ground-level ozone. This has an impact both on those with respiratory and chronic lung conditions, and also on children and adults with an active outdoor lifestyle.[ii]

4. Airborne pollutants, principally particulate matter of 10 microns (PM_{10}) or less, NO_2, SO_2, and O_3, affect lungs and exacerbate respiratory and heart diseases and PM_{10} may carry carcinogenic compounds into the lungs. Moderate concentrations of SO_2 can result in reduced lung function particularly in people suffering from asthma. O_3 irritates the airways of the lungs, increasing the symptoms of those suffering from asthma and lung diseases.

5. A review of the economic benefits of UK trees and woods commissioned by the Woodland Trust earlier this year identified the impact of trees and woodland in reducing air pollution and, stemming from this, the effect trees have in reducing the incidence of diseases exacerbated by airborne pollutants.[iii] An electronic version of this document is included with this submission. This included:

- Absorbing gaseous pollutants such as nitrogen dioxide (NO_2), sulphur dioxide (SO_2), and ozone (O_3).
- Intercepting particulate matter (PM) such as dust, pollen, and smoke.
- Releasing oxygen (O2) through photosynthesis.
- Transpiring water and shading surfaces, thus lowering local air temperatures, thereby reducing O_3 levels.

6. Airborne concentrations of PM_{10} increase in urban areas due to increase automobile wind disturbance and eddies formed around buildings. PM_{10} fall out near the point source. Trees near urban areas therefore tend to capture PM_{10}. The air quality improvement effect of trees is thus proportionately greater in urban than rural areas per unit area of trees, since in urban areas trees are closer to sources of air pollution.

7. Yet the 'Trees in Towns II' report commissioned by DCLG and published in 2008[iv] showed how tree canopy cover in urban areas is under threat, potentially exacerbating existing poor air quality, increasing urban heat island effect and will be amplified by any increase in summer temperatures. This may highlight either a lack of understanding of the impact of tree cover and urban green space, or a lack of co-ordination across departments of government, or possibly both.

Environment

8. We believe there were shortcomings in the conclusions to the Government's National Expert Group on Transboundary Air Pollution (NEGTAP) 2001 report in relation to trees and woodland. Although the report identified that estimated critical loads for nitrogen were exceeded in the vast majority of UK woods, it only considered implications for canopy trees. Threats to the woodland ecosystem posed by nitrogen and implications for woodland management, as highlighted in a report on the long-term ecological changes to British Woodland produced by Natural England,[v] were overlooked.

9. While the report identified the need to reduce nitrogen pollution, it failed to highlight that targeted establishment of new trees and woodland could be used as a buffer to intercept pollutants to the benefit not just of existing woodland but other habitats and the wider environment (as outlined above for air quality and health).

THE EXTENT TO WHICH THE DELIVERY CHAIN FOR AIR QUALITY IS COHERENT, INTEGRATED, CO-ORDINATED AND EFFECTIVE AND WHETHER THE BODIES WITH RESPONSIBILITY FOR MANAGING AIR QUALITY HAVE APPROPRIATE INCENTIVES, UNDERSTAND THEIR ROLE AND RESPONSIBILITIES, AND ARE ADEQUATELY RESOURCED

10. The importance and opportunities for urban tree and woodland cover to mitigate pollution and the impacts of climate change in relation to air quality are at odds with their management. Both the Trees in Towns II report for DCLG and an earlier report from the London Assembly—the 'Chainsaw Massacre'[vi]—highlight problems in a deteriorating urban tree cover with the potential for serious impacts on air quality. The reports also make clear the lack of adequate investment in tree management.

11. In order to take full advantage of the opportunities for improving air quality it is essential that co-ordinated action is taken across government at all levels. For instance the role of Green Infrastructure GI) and well targeted tree planting and woodland creation in improving air quality needs to be recognised in plans for climate adaptation by central government and local government. It needs to be integrated into action by planning departments as part of responsible development, in highways departments in the maintenance and development of infrastructure, into housing departments, parks and countryside management, as well as within the business sector in terms of promotion of corporate social responsibility.

12. The importance and the opportunities to support improvements in air quality are supplemented by the other benefits of trees and woods in particular relating to management of surface water and reduction in building energy budgets. These have been highlighted in the recent report on the UK trees and forests in combating climate change.[vii]

13. It has been estimated that doubling the tree cover in the West Midlands alone would reduce mortality as a result of poor air quality from particulates by 140 people per year.[viii] On top of which there would be a significant reduction in morbidity resulting in fewer people in doctors' waiting rooms and lower costs in terms of hospital treatment and fewer people on incapacity benefit.

14. The Campaign for Greener Healthcare and the initiative to establish an NHS Forest[ix] illustrate a growing consensus amongst health professionals of the importance of trees to peoples' health and wellbeing. The campaign endorses the role of trees in improving air quality and health outcomes. The importance of that role will increase as the climate changes. Trees provide a critical factor in adaptation relating to health care.

THE STEPS THAT NEED TO BE TAKEN TO ENSURE THAT AIR QUALITY TARGETS WILL BE MET IN THE FUTURE

15. Whilst clearly reduction at source in pollution provides the best remedy for improving air quality, we strongly believe that there are short-term important aspects of management of tree cover which can contribute. This should include:

- Increasing the understanding in government at all levels of the importance of green infrastructure and trees in particular in maintaining and improving air quality in urban areas.
- Co-ordination across government departments, particularly within local government to ensure that the overall cost benefits of improved air quality are protected eg that savings in arboricultural costs don't reappeared magnified as increases in admission and treatment costs in local health services.
- Maintaining and increasing urban tree cover to reduce urban heat island effect and the generation of ground-level ozone.
- Increasing and targeting urban tree cover to intercept airborne pollutants especially particulates.
- Using targeted woodland creation to buffer existing woodland and other important habitats through the interception of nitrogen and other pollutants.

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Memorandum submitted by the Air Quality Management Resource Centre, University of the West of England, Bristol (AQ07)

THE KEY POINTS MADE IN OUR RESPONSE CAN BE SUMMARISED AS FOLLOWS:

Over the last decade, the UK's Local Air Quality Management regime has identified a very large number of air pollution 'hotspots' that were unforeseen. In this regard the Review and Assessment part of the LAQM process can be considered as a major policy success.

The LAQM process has not been as successful at controlling or mitigating air pollution problems as it has been at identifying them. A number of key reasons lie behind this. They include a lack of political priority and other drivers for action at a local authority level, a tendency for policies at a national level to focus on technical measures and not adequately support potential measures at a local level, and a continuing growth in road traffic on urban networks that are unable to cope with the traffic flows (both in terms of congestion and having characteristics that prevent the dispersion of the consequent pollution).

Air quality has not been effectively integrated within policies concerning transport, spatial planning or health at either local or national levels and this has led to it failing to be given due regard in these areas

ABOUT THE AIR QUALITY MANAGEMENT RESOURCE CENTRE AT UWE, BRISTOL

1. The AQMRC is based at the University of the West of England, Bristol and was formed in 1998. Since 1999, it has (in partnership with Air Quality Consultants Ltd.) held a contract with Defra (and formerly with DETR) for undertaking management tasks in relation to the Local Air Quality Management process. These tasks include:.

- — the appraisal of local authority Review and Assessment reports;
- — the management of archives of reports and Air Quality Management Area orders;
- — the maintenance of databases to record and track these documents and other elements and indicators of progress within the LAQM system;
- — the operation of a telephone, email and internet based helpdesk service to help local authorities with their work; and
- — support in the writing and updating of official guidance for Defra and the Devolved Administrations.

2. In addition to the LAQM contract with Defra and the Devolved Administrations, AQMRC has also carried out a wide-range of other LAQM work for UK local authorities. This has included carrying out and providing assistance for review and assessment work and air quality action planning, support and facilitation for consultation and engagement exercises with the public and other key stakeholders, and training provision to enhance capability and capacity, specifically for LAQM but also in related areas of air pollution, climate change, and land-use and transport planning. AQMRC has a significant research background based on air quality management funded by prestigious research organisations including ESRC, NERC and EPSRC. This has generated an extensive peer reviewed publications list, and has allowed the development of a renowned track record in supervising and examining PhD students in the field of LAQM. AQMRC was also instrumental in the design and development of the Institute of Air Quality Management in order to promote and support the increasing number of professionals working in this field.

3. AQMRC are internationally recognised for their leadership in the field and have been involved in a number of major international projects. The group has also had significant involvement in the promotion of the UK LAQM Framework as good practice in a range of contexts, including the EU Framework V INTEGAIRE (Integration of Environmental Governance and Air Quality in Europe) project, the provision of support for the development of air quality capacity in Bangkok Metropolitan Administration, and in the development of the South African National Framework on Air Quality (which used the UK system as a basic model).

4. The AQMRC is a part of the Institute for Sustainability, Health and Environment (ISHE). This is an Institute comprising a wide-range of research groups covering key areas of research into: sustainable communities and the built environment; public health and well-being; and environmental sustainability.

RESPONSES TO THE SPECIFIC ISSUES RAISED:

5. The following sections provide specific responses to the issues raised in the call for evidence.

The Monitoring and Modelling Systems used by the Government and Whether these Provide an Adequate Measure of Air Quality

6. The answer to this depends upon the spatial scale of analysis that is used or required. National monitoring networks and modeling efforts provide an adequate basis for determining the general spatial and temporal variation in air pollution across the UK. The adequacy declines when shorter timescales or smaller spatial scales of analysis are required. Thus this question fails to distinguish between monitoring and modelling carried out by national and local government. Through the LAQM system, which requires (where appropriate) modelling and monitoring to be carried out by Local Authorities, there is a strong case for arguing that the Government has established a system whereby LAs are its 'eyes and ears' on the ground with regard to air quality—a fact that has allowed the Government to identify well over 500 individual air quality hotspots in the UK—many of which would be invisible to them were they to rely solely on the national monitoring and modelling programmes.

7. National modelling is unable to recognise and account for the major influence on air quality of local congestion and street scale topography (eg street canyons, bus stops, minor junctions, pedestrian crossings etc). These very local circumstances now constitute the majority of problems identified and declared as AQMAs by the LAQM process.

8. Automatic monitoring as carried out in the AURN tends mainly to be focused on urban centre/background sites rather than roadside sites where AQ problems are worst (although this is now changing due to EU regulations). Even where monitoring is at roadsides, it is rare that automatic monitors can actually be sited in the narrow streets that are the worst hotspots (see above). The fact that the national monitoring network has not picked up these areas has allowed the national modelling to also overlook them.

9. National modelling itself only covers major roads (predominantly trunk roads) and these tend not to be the ones where the problems caused by congestion and canyon effects occur.

10. The LAQM process can be split into two clear sections—Review and Assessment and Action Planning. The Review and Assessment part of the process can be considered to be a significant achievement. When the LAQM regime was established in 1997, it was thought that there would only be the need for the declaration of a handful of Air Quality Management Areas, and yet 10 years later, despite a vastly cleaner transport fleet, 60% of Local Authorities have now had to declare AQMAs. Although some information from this process is used to address the EU-orientated work (such as the reporting to Defra of Local Authority operated automatic monitoring sites that exceed the Limit Values), there is little sign that national policies are significantly responsive to the, now widespread, problems at the LA level.

The Extent to which the Government Fully Understands and has Identified the Health and Environmental Risks Caused by Poor Air Quality

11. Within Defra, and in the Department of Health (eg COMEAP) there is a significant understanding of the risks of poor air quality. However there is little evidence that that this appreciation is shared by the departments that are more closely related to the control of many air pollution sources (eg DfT, DECC, BERR).

12. Government reports have identified the health impacts of air quality in the UK as being almost twice those of physical inactivity (£20 billion compared to £10.7 billion—Defra Air Quality Strategy 2007, Chief Medical Officers Report 2004) yet it fails to receive quite the same level of attention as the latter within medical and media circles. Similarly, some studies have suggested that the cardiovascular risk of exposure to traffic pollution "may well be similar to that played by passive smoking" (COMEAP 2006), however at the level of national action there seems to be little evidence of comparative attention being given to the issue.

13. There seems to be a lack of clarity regarding how the Government communicates the health risks of air pollution on individuals, both in terms of differing levels of personal exposure to pollutants and to how susceptible people are to the effects of pollution. For example, the seven to eight month average shortening of life cited in the Air Quality Strategy is probably an over-estimate for the majority of people, but a very significant under-estimate for the most sensitive individuals. Without making health information meaningful to people, it is not likely that air pollution will raise high enough on local political agendas for effective action to be prioritised by local authorities.

14. There has been very little linkage made between air quality and other policy areas covering health and environmental risks—the causes and effects of air pollution are still dealt with in different departments DfT, DCLG, DoH. The consequent lack of joined-up policy fails to emphasise the multiple wins that would be achieved by much greater coordination of policies. One example would be the promotion of cycling and walking. This can help relieve congestion, reduce emissions of 'conventional' air pollutants, and see a significant increase in average levels of physical activity (thus both reducing the incidence of heart disease, and increasing resilience of individuals to the impacts of air pollution). In addition to this it would also help reduce climate change related emissions. If we turn this round and look at what bio-fuel policies have achieved, they may have failed even to reduce the climate impacts that they were introduced to mitigate, but they also failed to address any of the other negative impacts of transport (there is some evidence to suggest that they may be slightly less harmful in terms of 'conventional' air pollution emissions but this is not well established).

15. There has been a failure to provide suitable information to relevant stakeholders on the health effects of air pollution. Like it or not, the main statistic that the public and media are interested in is "How many people die every year from air pollution?". The only authoritative figure that has been produced for this is from the 1998 COMEAP report (The quantification of the effects of air pollution on health in the United Kingdom) that cited 24,000 premature deaths for 1995–96. At the time there was some concern that this might be an over-estimate, yet by 2007 it was still the only figure that the Royal Commission for Environmental Pollution could cite in its report on the Urban Environment. In addition to an initial perception that this might have been too high, there is often an assumption made that, over time, this figure is likely to have reduced. Contrary to this though, the science on the impacts of air pollution on health has advanced and based on the latest evidence (as summarised in work such as COMEAP's 2009 study "Long-term effects of Air Pollution on Health") groups ranging between Clean Air For London (see their submission to the EAC for further details) and the European Environment Agency currently suggest that this figure should be somewhere between 30,000 and 50,000.

The Extent to which the Delivery Chain for Air Quality is Coherent, Integrated, Coordinated and Effective and Whether the Bodies with Responsibility for Managing Air Quality have Appropriate Incentives, Understand their Role and Responsibilities, and are Adequately Resourced

16. With regard to nitrogen dioxide, the Government is now at risk of failing to meet the EU Limit Value in 2010, but a decade ago the Government established its own domestic "Air Quality Objective" for this pollutant setting an achievement date of 31st December 2005, confident that it would be able to meet it. By the end of 2005 it was clear that a significant number of Local Authorities were not meeting this objective. However, there is little evidence that the clear and widespread failure to meet the objective at this time resulted in a significant 'ramping up' of action at the national level. There has therefore been nearly 5 years' notice that the expected improvements in UK air quality have not materialised at the rate anticipated and the failure to meet the EU Limit Values is in no way a sudden surprise.

17. The revision of the Air Quality Strategy in 2007 provided a suitable time to tackle this, however the final document has been widely criticised for downplaying behavioural change measures and placing too strong a reliance upon technical interventions (and even then not being prepared to push forward action in many circumstances where benefits out-weighed costs). In the light of the widespread failure to meet the 2005 NO_2 objective, one of the most significant parts of the AQS revision can be seen to be the clear statement that the UK air quality objectives had no legally binding status and were merely "statements of policy intent".

18. AQ policy seems to have been forced down two separate roads in the UK with little alignment or co-ordination between them. These are:

- Nationally based technical end-of-pipe fixes which, at best, are only able to produce increasingly small incremental improvements post Euro 3/III, and in practice often appear not to work as expected or hoped and, in any event, air quality gains from these measures being quickly eroded by growth in traffic.
- Local action planning, which has to exist within the national context of more and more traffic entering the road network and individual vehicles travelling further each year, and struggle against a low profile for air quality at both national and local levels, with few obvious political champions for clean air.

19. The most that many LAs can do is to re-route traffic from current hotspots but this has the potential risk of creating new problems elsewhere. Although in LTP2 AQ was a "shared priority", research we have undertaken reveals that air quality was rarely an equal one and was often seen by LAs as the least important area of the stated priorities.

20. There is little support from national government in raising AQ's profile at a local level—whilst it is a statutory obligation at the moment this is often the only thing that means it is kept on councils' agendas—and the statutory obligations are focused far more on assessing air quality than on bringing about improvements. More work on supporting local activities would go a long way—but there is little evidence that the national policy response offers any ideas other than technical measures. Air quality needs to be more closely integrated with transport planning at local and national levels, and a strong policy and implementation emphasis given to introducing healthy urban planning. The current planning system still deals with development in a piecemeal way. It is unable to deal with the differences in timescale that exist between the renewal of urban infrastructure and the growth in traffic—leaving our urban centres choked by levels of traffic that they were never designed for. It is also unable to adequately cope with the cumulative impacts of new developments.

21. One of the other missing links in the delivery chain is the role of regional government. In most regions over half the LAs have now declared AQMAs. Despite this, regional government offices have been given no clear tasks or roles in trying to help relieve the problem—especially significant considering their role in regional transport programmes and spatial planning. There also seems to be a significant lack of air quality assessments for future developments coming through the channel of SEAs for RSSs and LDFs—LA officers seem to be tasked with dealing with assessing the major housing provision on a development-by-development level which is unable to cope with the likely cumulative impacts of 1000s of new houses.

THE STEPS THAT NEED TO BE TAKEN TO ENSURE THAT AIR QUALITY TARGETS WILL BE MET IN THE FUTURE

22. There has been recent discussion that the costs for failure to meet the EU Limit Values will be borne (directly or indirectly) at a LA level. This may be an entirely inappropriate action as LAs will claim that the support and policy steer that they have been given have always made it clear that responsibility for achieving EU Limit Values rests with central government not themselves. The strongest direction given was in phrases such as "responsibility to work towards meeting the objectives". Following the clear failure of a large number of authorities to meet the 2005 NO_2 objective, at the point where stronger central direction would be most appropriate, the government chose to clarify the situation by stating that there was no expectation for either LAs or the Secretary of State to meet the objectives, and confirming that the objectives were merely "statements of policy intent". The time to threaten LAs with financial costs of not meeting the objectives would have been a decade ago, at which point it may well potentially have been a significant driver for action. However, over the last ten years there has been limited incentive for LAs to place air quality high on their political agendas. As a consequence local actions have been limited in concept, scope, implementation and have had limited effect.

23. Local action backed up by direct support from central government remains a basic requirement particularly in terms of an integrated offering in air quality, transport and land-use planning policies.

10 December 2009

Memorandum submitted by Leicester City Council (AQ08)

(i) THE EVIDENCE

The key air quality issue in Leicester is nitrogen dioxide from traffic in the City centre and in other areas where there is exposure in proximity to the major road network. Leicester's single Air Quality Management Area reflects this, comprising the whole City centre and 'ribbons' along the major radial and peripheral road corridors.

In our experience, government 'top-down' predictions over the last decade of a fall in traffic-generated nitrogen dioxide have been over-optimistic and continue to be so. Given considerable year-on-year fluctuations due to gross meteorology and other extraneous factors, no robust downward trend is detectable in our monitored data. Indeed, Leicester City Council has had to extend its Air Quality Management Area in 2008 so, at least locally, the situation is deteriorating.

It is very difficult to attribute any change to a given intervention since the impacts of individual measures are currently so small as to be undetectable within the limits of methodological error and background 'noise'. Any slight trend is almost certainly largely attributable to improvements in vehicle technology rather than the impact of any local interventions.

Leicester City Council is probably more fortunate than most in the resources currently allocated to air quality monitoring and modelling. We have an extensive automatic monitoring network and access to a computer dispersion model. However, it seems to us that the picture of air quality across the UK since the introduction of the LAQM regime in 1995 has been somewhat patchy due to differences in approach and priorities. This can only vitiate a proper appreciation of the importance of air quality in some areas.

While there are some impressive consortium arrangements in large conurbations there is no consistency: There should be minimum standards for automatic monitoring, possibly on a 'monitoring stations per capita' basis. Web-based dispersion models should allow consortium-based sharing, allowing wider access and methodologically more consistent modelling. Government and local provision should be formally integrated, in order to make national provision more homogeneous.

There is scope for specialist functions of this type (eg maintenance of monitoring networks, data management, provision of dispersion modelling) to be shared across groups of local authorities on a county or region basis, reducing costs to individual local authorities, in particular those with very limited resources to devote to this function.

(ii) LAQM PROCESSES

Coupled with very slight or nonexistent downward trend, observed annual means for nitrogen dioxide fluctuate significantly year-on-year at a given site. Even over a decade, trends are difficult to discern from 'noise'. If this is coupled with the very real constraints on local authorities to exert any significant control over local air quality over time scales of this order, the requirement to produce annual Progress can be regarded as excessive. The same is possibly true of three-yearly Assessments, unless very significant infrastructure change takes place.

The current concept of the AQMA is an arbitrary and artificial construct. There is also significant latitude allowed in the methodology of establishing boundaries. While problems may manifest themselves at 'hotspots', for example at major road junction, the causes (and therefore the remedies) tend to be network-wide. Precise boundaries are therefore of little significance, which throws into question the value of the process of arriving at them and of periodically adjusting them. Perhaps the procedural stage of declaring an

AQMA should be eliminated and the process move directly from Review and Assessment to Action Planning, where this is warranted. Any specific geographical requirements will be identified in the former and can be addressed in the latter.

(iii) The Interrelationship with Other Policy Areas

Transport Planning

Leicester City Council is producing a Detailed Review and Assessment of Air Quality to be reported by April 2010. The following year, we will need to model the impacts of the preferred package of measures developed for the next round of transport planning. Not only is this needless duplication, the Review and Assessment exercise will also not have the benefit of detailed understanding of the content of the forthcoming LTP, which will not have crystallised until the following year. This is clearly pointless and a waste of resources.

In cases where traffic is the dominant source of pollution, and transport interventions are the principal remedy, it is desirable to align the time-scale for Review and Assessment with that for Local Transport Planning. In the light of the previous comments about processes (section ii), an integrated, five-yearly cycle would be appropriate.

There is also needless duplication in the respective DEFRA and DfT annual reporting regimes, which require rationalising.

The last Transport Planning framework required air quality targets to be set. In practice, these fell short of meeting the Objectives and were merely projections of the air quality impact of implementing the constrained package of measures which the local authority could develop under current conditions. This raises an interesting philosophical issue: Should policies drive targets or targets drive policies?

There is no formal duty on local authorities to deliver the air quality Objectives, which is not unreasonable since this is to a large extent beyond their medium-term control. However, where there are exceedances, there is a formal duty to draw up time-based Action Plans. This creates a mismatch in time horizons, where Action Plans are integrated with Local Transport Plans. The latter are specific, short term bids for funding allocation which lead to the implementation of concrete projects 'on the ground'. The former are only likely to be realised through radical measures over the long term. It follows that Local Transport Planning Guidance should make explicit provision for a longer-term 'look ahead' beyond the immediate package bid, perhaps more speculative but nonetheless evidence-based: the last section of 'LTP-3' should be a glimpse of 'LTP-4'.

Climate Change Strategy

There is a tendency in some quarters to regard climate change as so pressing that it should be 'the only game in town'. While climate change is undoubtedly to most the biggest issue in the long term, this approach of 'moral panic' is neither necessary or desirable. As many have observed, the danger is that air quality will be marginalised. This risk is compounded by the current separation of air quality and climate change functions in the government departmental structure.

We consider that the developing Low Emission Strategies approach is the way forward and should be rolled out nationally: This means policy integration between Air Quality and climate strategy, through LAQM, transport planning and land-use planning (LDF/SPD's). The aim should be to identify 'win-win' solutions. Evaluation of options should be rigorously evidence- based through access to modelling resources.

This approach ensures that interventions are cost-effective and therefore make the best use of resources, avoiding waste through duplication, overlaps and policy conflicts. The latter are a real danger, for example the use of automotive diesel engines, particularly those using some biofuels, and the combustion of woody biomass in fixed installations. Potential policy conflicts like this need to be explicitly identified and addressed at national level.

The 'Low Emissions Strategies' approach is also more conducive to public understanding, and perhaps therefore acceptance, lack of which is a serious barrier to progress at present. Such an approach gives environmental policy a force, direction and coherence which it otherwise lacks.

National Performance Indicators for air quality do not refer to local authority areas as a whole. The rationale for this is that there is an existing statutory framework of air quality Objectives, which makes this unnecessary. However, our experience is that the latter tends to be overlooked in corporate performance reporting, leading to air quality being separated from climate change emissions and marginalised. In addition, the performance indicators for local authority 'estates and operations' are expressed in terms of mass emissions which are difficult to relate to the concentration-based Objectives. Air quality needs to be explicitly linked with climate change in the framework of local performance indicators and Local Area Agreements.

(iv) Aligning Powers and Responsibilities

There should be a formal national framework of local authority powers and obligations, linked to a nationally recognised package of interventions. Progress between comparable authorities should be benchmarked:

> The reality is that current Local Authority powers are inadequate to make a real difference to air quality in the medium-term. The legal, fiscal and political conditions are simply not in place. This is compounded by lack of political will in some areas. To put this in perspective, where nitrogen dioxide from traffic is the key issue, a reduction of the order of ten percent in current traffic flows would be required to make any difference at all to annual mean values; At locations where annual means are considerably in excess of the Objective criterion we calculate that reductions in traffic volumes of considerably more than fifty percent would be required.

An honest and realistic appreciation is needed of the huge level of intervention needed to meet the air quality Objectives: This implies rigorous evaluation of policy options at national and local level. The tendency of government to devolve technically challenging and politically unpopular decisions to local authorities, under the pretext elevating local choice to a political principle, is merely a cloak for inaction. There has been little government-led debate on potential, radical interventions and therefore little public understanding or acceptance. The reality is that radical, unilateral action equates to economic and political suicide for local administrations. This is perfectly illustrated by the grim political fate of recent proposals to introduce road charging in Manchester and Derby. Until a lead is set by government in identifying, promoting and implementing specific interventions at national level, there will be little progress.

There is a widespread perception by the public that environmental interventions like road charging are merely a 'wheeze' by government and local authorities to raise extra revenue. This perception is aggravated by sections of the media, and the whole enterprise is bedevilled by polarisation between environmental enthusiasts on the one hand and other powerful interest groups on the other. Interventions of this type must be explicitly fiscally neutral or, indeed, confer an identifiable economic benefit to some sections of the community; ie they must be offset by reductions in taxation elsewhere before they become politically acceptable. It follows that there needs to be a radical shake-up of the whole fiscal framework to support a uniform approach across the UK.

10 December 2009

Memorandum submitted by Allan G Norman (AQ09)

1. I would wish to draw to the Committee's attention the view of many people in Port Talbot (the most polluted town in Wales) that there is no truly independent body that will present the truth about air quality to the people.

2. The recent example of the granting of a licence to Prenergy for a large woodchip power station in the town shows quite clearly that the Environment Agency sees one of its primary responsibilities under the Environment Protection Act 1995 as "to make a contribution towards attaining the objectives of achieving sustainable development" as determined by ministers, even when the ministers are obviously wrong. It has accepted dubious computer modelling data and set spurious limitations on the pollution arising from the new plant that it knows cannot be achieved by the company in the knowledge that the source of the PM_s or PAHs cannot be proven. Therefore, no action will be taken against the company even if the pollution in the town exceeds even more the guidelines set by Europe and the UK government. There is a complete lack of trust in the Environment Agency.

3. Fear of the potential loss of jobs should too much pressure be put on Corus regarding air pollution means also that the local council and the Welsh Assembly do all in their power to obfuscate the true state of air pollution in the town.

4. The people of Port Talbot do not appreciate being treated like children. It is quite possible that the town will shortly be the site of some 7 power stations—3 biomass & 2 Gas stations in the town and a further 2 within the Corus site. No right-minded person would accept that this is appropriate for such a small area which includes the M4 and the affects of sea spray. The air quality will inevitably deteriorate even further. The people of Port Talbot feel helpless. Their health and that of their children is at severe risk.

10 December 2009

Memorandum submitted by the Natural Environment Research Council (AQ10)

1. The Natural Environment Research Council is one of the UK's seven Research Councils. It funds and carries out impartial scientific research in the sciences of the environment. NERC trains the next generation of independent environmental scientists.

2. Details of NERC's Research and Collaborative Centres and Major programmes are available at www.nerc.ac.uk.

3. NERC's comments are based on input from Professor Roy Harrison, Professor of Environmental Health at the University of Birmingham and NERC Theme Leader for Environment, Pollution and Human Health, and Swindon Office staff.

4. Summary:

— The current regime of air quality management has failed to deliver anticipated improvements in air quality, especially in the case of nitrogen dioxide, particulate matter and ground-level ozone.

— There have been failures to anticipate the factors which have led to a stalling in air quality improvement with respect to nitrogen dioxide and particulate matter. In the case of ground-level ozone, international action across continents is required.

— Probably the weakest link in delivering better air quality has been local government, which lacks the expertise, resources and in some cases the political will and powers needed to take decisive action.

— There are fundamental weaknesses in basic knowledge in some areas which need to be remedied by further strategic research.

Written evidence

The monitoring and modelling systems used by the Government and whether these provide an adequate measure of air quality;

5. The United Kingdom has a number of advanced automatic and manual monitoring networks for different pollutant groups. Although in a number of cases the monitoring commenced prior to EU Directive requirements, the measurement techniques and spatial density of the network are nowadays largely prescribed by EU Directives. Contracts for network management are awarded by competitive tender and generally speaking the quality and cost-effectiveness of UK networks is very high. EU Directives allow a lower network density if numerical modelling is carried out to provide information on zones which are not directly monitored, and the UK follows this option. As a general statement, the monitoring systems used by government provide an adequate measure of current air quality. Some pollutants (because of EU Directives) are monitored at far higher density than is necessary for the protection of public health (for example, carbon monoxide) whereas in the case of other pollutants (eg dioxins) greater reassurance could be given to the public over the level of exposures if a greater number of monitoring sites were operational.

6. The quality of modelling work is variable in relation to current pollutant levels and there are serious questions over the ability of government-sponsored modelling work to predict future air quality on timescales both of days and years. As an example, the failure of abatement policies to reduce airborne particle (PM_{10}) concentrations since 2000 was not foreseen by modelling. The Defra evidence budget for air quality has changed little in real terms over the past 20 years, but during this time there has been a steady shift of funds away from research, including modelling, into monitoring, to the detriment of the better knowledge and understanding of air quality processes which underpin model development.

The extent to which the Government fully understands and has identified the health and environmental risks caused by poor air quality

7. While the responsibility for managing air quality lies with Defra, expertise in understanding the health impacts of poor air quality lies within the Health Protection Agency, key personnel having transferred a few years ago to the HPA from the Department of Health. Since 1993, the Department of Health has been advised by the Committee on the Medical Effects of Air Pollutants (COMEAP) and until recently by the Expert Panel on Air Quality Standards (EPAQS), a Defra committee with a joint Defra/HPA Secretariat. Recently, EPAQS has become the Sub-Committee on Standards of COMEAP. Through these expert committees, the Government has access to extremely high quality advice from UK experts, and the UK has been a world leader in interpreting the evidence base on air quality and health and in quantifying the public health impacts of poor air quality. It is notable that in international fora such as expert meetings organised by the European Union or World Health Organisation, it is typical for UK medical and environmental scientists to play a very major role. Regarding the environmental risk caused by poor air quality, Defra sponsors research in the area of pollutant effects on the environment which has influenced EU policy on critical loads.

8. Many uncertainties remain in relation to the impacts of air pollutants upon human health and the environment. For example, the WHO air quality guidelines for nitrogen dioxide which form the basis of the EU Directive Limit Values for this pollutant are poorly supported by evidence from research. There are also many unanswered questions relating to the health effects of airborne particles. In particular, Limit Values

do not discriminate between particles of different chemical composition and from different sources. Were it to be demonstrated that specific types of particles were of higher toxicity than other types, policy could target the more toxic particles thereby allowing more cost-effective air quality improvements. Regrettably, UK government funding of research in air quality and health has been at a very low level in recent years and the topic has not been a high strategic priority for the Medical Research Council. Excellent work was done with European Union funding up to FP5 but the more recent Framework Programmes have not supported significant work in this research area. NERC is funding a new research programme jointly with MRC and ESRC on Pollutant Exposures and Human Health which may include work on air pollutants.

The extent to which the delivery chain for air quality is coherent, integrated, co-ordinated and effective and whether the bodies with responsibility for managing air quality have appropriate incentives, understand their role and responsibilities, and are adequately resourced.

9. The management of air quality in the UK depends upon a complex inter-linkage of responsibilities. The general policy framework is set by Defra but increasingly over recent years has been dictated by the requirements of European Union Directives. When the UK National Air Quality Strategy was established in 1997, the majority of objectives were set on the basis of advice from the government's Expert Panel on Air Quality Standards, or WHO guidelines. Nowadays, by far the majority of objectives are determined by European Union Limit Values set in Brussels. Many of the measures which are influential in controlling air quality are also set from Brussels. These include legislation such as the Large Combustion Plant Directive, the National Emissions Ceilings Directive and Directives dealing with the quality of fuels and the exhaust emissions from road vehicles. The requirements of the Directives are translated into UK law and practice by Defra, the Environment Agency and the Department for Transport. Overall, although complex, this establishes a coherent framework.

10. The regulation of atmospheric emissions from major industries is the responsibility of the Environment Agency. This activity takes place within the framework provided by the Integrated Pollution Prevention and Control (IPPC) regulations established by the EU and Directives such as the Large Combustion Plant Directive. The Environment Agency is in most instances an effective regulator and the UK has some of the best control of industrial emissions in the world.

11. Most major industrial installations are sited outside of urban areas, but it is within major urban areas that the poorest air quality is encountered. The pollutants causing the most major compliance problems are nitrogen dioxide and particulate matter (measured as PM_{10}). Responsibility for local air quality management lies with local government and this has proved to be by far the weakest link in the delivery chain for good air quality.

12. The largest number of air quality management areas have been declared due to exceedence of the annual average Limit Value for nitrogen dioxide. The air quality situation with regard to this pollutant was until recently expected to improve dramatically as a result of reduced oxide of nitrogen emissions from road vehicles, but this improvement has not materialised. Nitrogen dioxide in the atmosphere arises from two sources. The first is direct emissions, which historically comprised only a small proportion of the total oxides of nitrogen emitted from combustion sources such as traffic. The second is the atmospheric oxidative conversion of nitric oxide (which comprises the major nitrogen oxide emission from traffic) to nitrogen dioxide by reaction with atmospheric ozone. Projections of improvements in nitrogen dioxide concentrations have been largely confounded by increased direct emissions of nitrogen dioxide, such[5] that while total oxides of nitrogen emissions have been falling, the percentage of nitrogen dioxide in those emissions has been increasing. This was looked at in depth by Defra's Air Quality Expert Group who concluded that this arose mainly from two factors. The first was the retro-fitting of particular types of particle traps on buses which enhance the emissions of nitrogen dioxide; the second being that more recent diesel engine technologies lead to a higher proportion of nitrogen dioxide in the emissions. Whilst the former effect was clearly foreseeable, the latter appears to have been overlooked until it showed up in the air quality data. This is very much a weakness of the framing of emissions regulations and of foresight within responsible agencies. As a result of these problems, current trends in nitrogen dioxide at the majority of monitoring sites are relatively flat (ie concentrations are changing little year by year) whilst some sites have shown marked increases in nitrogen dioxide. As tighter and better framed emissions regulations for vehicles will take considerable time to deliver benefits, the only way of achieving rapid improvements in air quality is through reductions in traffic volumes.

13. The situation with regard to airborne particulate matter (PM_{10}) has also proved problematic. Central urban concentrations were declining at a significant rate up to 2000. Since that year, however, the decline has ceased and concentrations have been almost constant.[6] This is contrary to expectations based on the projections of emissions. A large proportion of PM_{10} particles at UK sites comprises secondary sulphates and nitrates which are formed within the atmosphere from the oxidation of sulphur dioxide and oxides of nitrogen. While the emissions of sulphur dioxide have been falling dramatically and those of oxides of nitrogen declining slowly, there has been no perceptible change in the concentrations of nitrate and sulphate

[5] Trends in Primary Nitrogen Dioxide in the UK, Air Quality Expert Group, Department for Environment, Food and Rural Affairs, London, 156pp (2007).

[6] Why are PM_{10} Concentrations in Europe not Falling?, R.M. Harrison, J. Stedman and D. Derwent, New Directions, Atmospheric Science Perspectives Special Series, Atmos. Environ., 42, 603 – 606 (2008).

particles during this period. The causes of this effect (referred to as non-linearity) are not fully known and further research is strongly justified. Shipping will soon become the dominant source of sulphur dioxide emissions in Europe, and abatement measures in this sector have lagged far behind those in other sectors.

14. The second most important contributor to airborne particles in polluted urban areas is road traffic. The continued tightening of EU Directive Limits on exhaust emissions should have led to a substantial reduction in airborne particle concentrations from traffic, which does not appear to be the case as judged from the air quality data. The most likely reasons for this are twofold. Firstly, motor engine manufacturers design their engines to meet emissions standards on specific test cycles. If such test cycles do not well represent the modes of the engine during urban driving, on-road emissions can be appreciably higher than those evaluated in the standard test cycle. Secondly, only rather recently has it been recognised that a substantial proportion of the PM_{10} emitted by road traffic does not come from the exhaust pipe. Rather, it comes from abrasion sources such as the wear of brakes, tyres and road surface, and by the turbulent suspension of particles from the road surface into the air. The factors determining the non-exhaust particle sources are not particularly well understood but it is likely that this source has remained constant or even increased over the past decade due to changes in traffic fleet volumes, speeds and the general increase in vehicle weights.

15. A further source of airborne particles for which we have very poor UK data is wood smoke. There is concern that with continuing increases in the cost of fossil fuels and electricity, more home-owners will turn to wood burning for home heating. Across mainland Europe, this is a major source of PM_{10} within urban areas and there must be a real prospect that this will increase in the UK with a substantial associated detriment to the achievement of air quality targets for PM_{10} and $PM_{2.5}$.

16. Responsibility for compliance with air quality strategy objectives lies with local government authorities. Unfortunately, such authorities have proved highly ineffective at improving air quality. In many cases, they lack the knowledge and expertise to make the necessary judgements of the measures necessary and in some cases lack the political will or powers to bring about the necessary improvements. If local authorities are going to remain the main agent for ensuring compliance of local air quality with the objectives of the National Air Quality Strategy, there needs to be a considerable enhancement in their knowledge base and a strengthening of the political will to make hard decisions which will lead to genuine air quality improvements.

17. A further pollutant which is more of a problem in rural than urban areas and which lies outside of local air quality management regulations is ground-level ozone (not to be confused with stratospheric ozone which plays an important role in filtering harmful ultraviolet light). Ground-level ozone is harmful both to human health and to growing crops, and there is serious concern that despite action in Europe to limit the emissions of the pollutants responsible for its formation in the atmosphere (oxides of nitrogen and volatile organic compounds), the lack of effective action outside of Europe will lead to a substantial global increase in ground-level ozone concentrations.[7] European policy has been rather effective in reducing peak summer-time concentrations of ground-level ozone, but the hemispheric background which is heavily influenced by precursor emissions in Asia and North American continues to increase.

The steps that need to be taken to ensure that air quality targets will be met in the future.

18. There are a number of measures which would be highly beneficial in the long-term improvement of the air quality situation in the UK. These include the following:

(a) There should be a requirement for the measurement of the nitrogen dioxide content of the emissions from all combustion sources, including road vehicles. Limits should be set on emissions of nitrogen dioxide, whereas the current emission limits apply only to NOx (which is the sum of nitrogen dioxide and nitric oxide).

(b) There needs to be intensive research on the emissions of non-exhaust particles from road vehicles culminating in the establishment of regulatory limits on the emissions of non-exhaust particles under standard test conditions.

(c) A far greater implementation of traffic management measures is required in order to reduce exceedences of air quality objectives for nitrogen dioxide and PM_{10}.

(d) There needs to be strong enforcement of regulations against wood burning within urban areas.

(e) Firm international action is required to ensure continued reductions of sulphur dioxide, oxides of nitrogen and volatile organic compounds which are the precursors of secondary particle formation in the atmosphere. In particular, the regulation of sources such as shipping and aircraft, which to date have been little affected by emissions regulations, needs to be a high priority. Action on the emissions of precursors of ground-level ozone needs to be taken worldwide in order to generate benefits with respect to this pollutant.

[7] Ground-level Ozone in the 21st Century: Future Trends, Impacts and Policy Implications, Science Policy Report 15/08, The Royal Society, 132p (2008).

(f) There needs to be a considerable strengthening of the local air quality management regime in terms of both raising the performance level of local government officers and also strengthening the regulations requiring local air quality management.

(g) The capability of Defra to predict future air pollutant concentration trends has been very poor in some areas. This reflects fundamental weaknesses in the understanding of basic air pollution processes which can only be remedied by an increase in strategic research in the field.

11 December 2009

Memorandum submitted by the Chartered Institution of Water and Environmental Management (AQ11)

INTRODUCTION

The Chartered Institution of Water and Environmental Management (CIWEM) is the leading professional body for the people who plan, protect and care for the environment and its resources, providing educational opportunities, independent information to the public and advice to government. Members in 98 countries include scientists, engineers, ecologists and students. This response has been prepared by CIWEM's Air Panel which comprises academics and practitioners working in the air quality field.

1. SUMMARY

1.1 The UK has a long history of managing air quality going back to when coal was first used as a fuel. Since the Clean Air Act of 1956 the winter smogs[8] caused by burning coal gradually disappeared, such that by the late 1970s this type of smog was a thing of the past. Since then the dominant source of poor air quality has been, in most areas, traffic emissions. Emissions from motor vehicles have been controlled for nearly 40 years, yet we fall short of ambient air quality objectives, continue to exceed EU limit values, and pay no regard to the WHO guidelines set for the protection of human health. People continue to be adversely affected by poor air quality.

1.2 UK air quality policy relies on computer modelling that does not properly account for congested traffic. This modelling has consistently forecast improvements since the early 1990s, yet the reality in many locations has been that air quality over the last decade or so has remained the same or deteriorated.

1.3 Local Air Quality Management (LAQM) has been implemented since 1997, yet new air quality management areas (AQMAs) continue to declared, as monitoring programmes have been extended and non-compliance with the objectives identified. Few have been revoked.

1.4 We now know more about air quality than at any time in history, yet air quality management, nationally and locally, has failed to deliver clean air.

1.5 We believe that there are significant gaps in our knowledge and approach to managing air quality in this country.

1.6 Our concerns can be summarised by five key inter-related issues that need addressing:

(a) Lack of leadership and responsibility.

(b) Climate change diverting political interest away from air quality.

(c) Inadequate research funding.

(d) Over reliance on modelling.

(e) Lack of local authority priority.

2. LACK OF LEADERSHIP AND RESPONSIBILITY

2.1 We believe that air quality management at both the national and local levels has delivered little because of the lack of high-level leadership.

2.2 This is illustrated by the fact that it is rare for a member of the Cabinet nationally or locally to publically speak about air quality. While to a certain extent this reflects society's change in focus to climate change, it does not reflect the severity of the issue.

2.3 Information campaigns, at public expense, are undertaken to reduce road traffic injuries and death, yet no similar campaigns are undertaken to educate the public on the impacts of traffic on air quality and subsequently their health.

2.4 We believe that without political leadership air quality management will continue to be marginalised and ineffective, and the health of many people will continue to be adversely affected, with an associated reduction in their quality and length of life.

2.5 There is a public perception that the air quality issues have been solved, when this is clearly not the case.

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[8] The word smog is derived from smoke and fog.

2.6 There is a lack of co-ordination between the departments that should be involved in the management of air quality. It affects and is affected by transport, planning, local government structure and funding mechanisms.

2.7 At the national level Defra, Department of Health (DH), Department for Transport (DfT), Department of Communities and Local Government (CLG), Department for Energy and Climate Change (DECC) and Her Majesty's Treasury (HMT) all have an important role to play, so it is encouraging that the Cabinet Office Strategy unit has included air pollution in its approach to the wider costs of transport in English urban areas (http://www.cabinetoffice.gov.uk/media/307739/wider-costs-transport.pdf).

2.8 Air Quality Management Areas (AQMAs) are often declared due to emissions from roads that come under the responsibility of the Highways Agency (HA). Although the HA has responsibility for air quality on paper there is little evidence of measures being implemented that have had a significant impact on air quality along HA roads. Often the HA's contribution is limited to giving directions to local planning authorities where new development is predicted to increase traffic. Whilst it is recognised that it is difficult to reduce emissions from HA roads without a very significant reduction in emissions / traffic the agency has been reluctant to even consider measures that might improve the situation, such as implementing lower speed limits. Where lower speeds have been introduced the primary objective has been to relieve congestion, not improve air quality.

2.9 It is the same at the local level. For those areas outside London where there is a two-tier local government structure, there can be conflict. If only one or two Districts have an AQMA, for most of the County it is not a priority.

2.10 However, even within unitary authorities, the environmental protection department tends to have a lower status, and hence power, than the transport department, and air quality management is often marginalised.

2.10 The guidance and shared responsibilities for the second round of Local Transport Plans (LTPs) encouraged the inclusion of the Air Quality Action Plan (AQAP) within the second local transport plan (LTP2). Some transport authorities successfully achieved this, but for most, if included at all, it was simply an add-on, not fully integrated into the plan.

2.11 DfT is giving more responsibility during the third local transport plan (LTP3) process to local authorities to determine their own priorities. This 'downgrading' of air quality will result in even less consideration being given to the full integration of air quality issues within local transport planning.

2.12 The monitoring and management of air quality is undertaken by Environment Departments (Defra/ Environmental Protection), whereas the main cause, road traffic, is the responsibility of transport/traffic departments (DfT/Transport) which have historically been more concerned with traffic congestion and infrastructure provision than environmental protection.

3. Climate Change

3.1 Climate change dominates the political air pollution agenda, to such an extent that some measures are being taken that have a detrimental impact on air quality and funding for air quality management and research has been reduced too much.

3.2 At first sight it would appear that the mitigation of greenhouse gas emissions and the improvement of air quality have a common goal, and indeed for measures that reduce energy demand this is the case. However, there are some technologies that have lower carbon dioxide emissions but higher emissions of nitrogen oxides (NO_x),[9] nitrogen dioxide (NO_2), and particles (PM_{10}/$PM_{2.5}$) to the detriment of local air quality.

3.3 Whilst climate change will have very significant impacts on our weather in the future, it should not be forgotten that hundreds of thousands of people are currently suffering and dying prematurely in the UK from the effects of poor air quality. The AQS gave the reduction in average lifetime in the UK as seven months, which is considered an underestimate.

3.4 The climate change agenda has resulted in measures that promote the use of diesel vehicles which have higher particulate matter (PM) and primary NO_2 emissions than petrol vehicles. For example, for many years the fuel duty on diesel was set higher than petrol in recognition of the higher PM emissions, but this has been removed because of the lower carbon dioxide (CO_2) emissions.

3.5 Another example has been the promotion of biomass boilers in urban areas where there is existing poor air quality. Whilst using renewable energy sources must be good for society, we believe burning biomass where there is poor existing air quality is inappropriate.

3.6 In many small market towns the only solution to poor air quality is reducing congestion in town centres. Building a by-pass is often an unacceptable solution, and even where it is acceptable locally, there is little money available for such schemes. As a consequence residents continue to be exposed to poor air quality.

[9] NO_x is typically regarded to be nitrogen dioxide (NO_2) and nitric oxide (NO). Most NO_x is emitted from combustion processes as NO but is rapidly converted to NO_2 in the atmosphere.

4. Research.

4.1 Insufficient research is being undertaken to solve our air pollution issues.

4.2 When air quality was higher up the political agenda there were on-going programmes sponsored jointly by Defra and DfT (and their predecessors) to fund the on-road measurement of emissions to ensure an up-to-date database on which all national and local modelling is based. This appears to have been halted and there is little real world data for Euro 4 vehicles, let alone Euro 5 HGVs, which are now using our roads. This work is expensive but essential. An update of the Emission Factor Toolkit, which is used extensively for local air quality management, assessing the impacts of new development, and national modelling, has been promised by Defra for several years, but has failed to materialise. Therefore modelling, a key tool in the management of air quality, is based on out-of-date data. This adds to the uncertainity of the impacts predicted.[10]

4.3 For vehicles meeting future emission standards it is assumed that emissions will drop in direct proportion to the improvement in the emission limits, which has historically proved to be an over-simplistic approach. It is, therefore, hard to have confidence in this information when projecting forward into the future.

4.4 The emissions database needs to be extended to include primary NO_2 and, for vehicles fitted with selective catalytic reduction, ammonia.[11] Diesel vehicles emit a higher percentage of the NO_x as NO_2 than petrol vehicles. The increasing percentage of new cars and vans using diesel has resulted in a change in the proportion of primary and secondary NO_2 emissions from traffic. This has been exacerbated by the conversion of NO to NO_2 in the exhaust of heavy duty vehicles fitted with some diesel particle filters, to assist the removal of PM.

4.5 Also, the DETR-funded TRAMAQ programme was undertaken several years ago to understand in some detail emissions from different driving conditions, such as congestion. This data was not converted into user-friendly tools for use in LAQM. Much of this data may no longer be relevant as the vehicle fleet has changed to meet new emission standards, but it needs updating and converting into useable data for managing air quality.

4.6 Finally, further research is needed into how both NO_2 and nitric oxide (NO) behave in the atmosphere. It is likely that further vehicle emission legislation is needed that controls NO_2 as well as NO_x emissions.

4.7 The UK (DETR) invested substantial sums of money in the Particle Management Programme (PMP), in association with a number of other EU member states, as well as Switzerland and Japan. The aim was to recommend a new type approval test procedure to measure the number of particles rather than the mass. We need to show similar international leadership on the NO_2 issue.

5. Modelling

5.1 The current methods of modelling air quality at a national level cannot take account of local characteristics, with the consequence that poor air quality in some areas is being inadequately taken into account in national decision making. This is not a criticism of the modelling per se, but rather a recognition that local issues cannot be reflected in national models and that a mechanism to account for significant local issues needs to be built into a more robust decision-making process.

5.2 UK policy formulation in recent years has been based on cost-benefit analysis, which has been inadequate at accounting for the costs and benefits, and the uncertainties attached to both. Though extended and updated in the Stratgy Unit's 2009 report, the precision attached to such figures is unmerited.

5.3 The approach is inappropriate for identifying the best policies for achieving the EU limit value, which is a legally binding requirement. Cost-benefit analysis[12] has a role in identifying priorities for a range of possible options, but not how to meet a mandatory requirement. For the latter cost effectiveness is the most appropriate technique to use. This is the means of identifying the cheapest package of measures to society to meet a target.

5.4 National modelling is undertaken on behalf of Defra to identify air quality policies and quantify the emissions benefits of a range of measures. Extensive modelling was undertaken as part of the review of the Air Quality Strategy (AQS),[13] and more recently as part of the evidence base for understanding how and when the UK will achieve the EU limit values for PM_{10} and NO_2. This is necessary to identify an action plan to justify Defra's application for a time extension under the 2008 Air Quality and Cleaner Air for Europe, Directive (EU/2008/50)[14] but the NO_2 modelling fails to account for many local exceedances (arising from congested traffic).

[10] Air quality modelling will always have uncertainty because of the difficulty in accurately simulating complex atmospheric processes in mathematical terms. However, the more accurate the emissions inputting into the dispersion models the more accurate the end results will be.

[11] These vehicles use a urea solution in water to produce ammonia on board, which is an integral part of the emission-reduction process.

[12] Cost-benefit analyses put an economic cost to the benefits of a measure. This is irrelevant if a mandatory limit has to be achieved.

[13] The most recent Air Quality Strategy was published in 2007.

[14] An application for a time extension for achieving the PM_{10} limit value was submitted in 2009, and Defra has announced its intention of submitting a time extension application for NO_2 in 2010.

5.5 This modelling is clearly very dependent on the emissions factors used, for which there are significant concerns, as highlighted above.

5.6 The modelling approach for the AQS was cost-benefit analysis. We are concerned that due to the time lag in policy development, the 2006 US reassessment that doubled the health impacts of $PM_{2.5}$ was not incorporated in the 2007 AQS, nor in the 2009 Strategy Unit figures. For example the dose-response relationships for the impact of $PM_{10}/PM_{2.5}$ on health came from the recent work of the Committee on the Medical effects of Air Pollution (COMEAP), yet ignored the comments of two eminent US scientists, who concluded that COMEAP had significantly under-estimated the health impact.[15] If the US coefficient of 6–17% were used instead of the 6% taken in the AQS, further abatement measures are shown as cost effective. Air pollution costs would be increased to £20–30 billion, well in excess of other wider costs of transport in the Strategy Unit's 2009 report.

5.7 Another issue of cost benefit analysis is how revenue from fuel duty is included in the calculations. Measures that reduce HMT income are a disbenefit, and although the price of carbon can be included, this is insufficient to outweigh the loss of revenue in the NATA model ('New Approach to Transport', revised version to apply in 2010, www.dft.gov.uk/consultations/archive/2008/consulnatarefresh/natarefresh2009.pdf).

5.8 The national air quality modelling undertaken does not allow for local circumstances, such as topography and the presence of street canyons. Concentrating exclusively on the national model results in a number of measures, for example the introduction of low-emission zones, seeming not to be cost effective. However at a local scale they may be.

5.9 Defra's initial modelling showed that even in 2015 the NO_2 limit value would not be achieved in many areas.

6. Local Authority Priorities

6.1 Whilst central government is responsible for international and national measures to improve air quality, the LAQM regime has devolved responsibility to local government for local measures. However, air quality is not high on the agenda for most local authorities (LAs). LAQM only requires LAs to 'work towards' achieving the objectives. Responsibility for achieving the mandatory EU limit values lies with Defra.

6.2 Without a mandatory requirement Council Chief Executives are not going to prioritise air quality. Councillors are often reluctant to draw attention to the issue, because they are competing with other areas to draw people, and hence traffic, to their particular retail and commercial locations. The Government's policy of giving local authorities more control over the setting of their own priorities is likely to result in air quality being marginalised even further.

6.3 Over 230 local authorities have declared air quality management areas, mainly for exceedence of the NO_2 annual mean objective. When LAQM was first introduced it was thought that there would be a handful of AQMAs in London, not hundreds with some even in the most rural districts. There was concern that the declaration of AQMAs would affect property prices however is no evidence that this is the case.

6.4 LAQM has been very successful at monitoring and modelling air quality, and since the first AQS was published in 1997 technical understanding in most LAs has increased exponentially. The air quality function is undertaken within the Environmental Protection Departments, often by knowledgeable specialist air quality officers. The more local authorities have understood air quality in their areas, more or larger AQMAs have been declared.

6.5 In recent years Defra has provided direct grant funding to local authorities for LAQM modelling and monitoring of air quality. This has been perceived as additional money, and has given local authorities an incentive to fulfil the LAQM review and assessment requirements.

6.6 However as local authorities are only under an obligation to 'work towards' achieving the objectives there is no incentive to implement measures which might be unpopular. This is despite air quality in many areas remaining unchanged or deteriorating.

6.7 Defra has supplied a range of tools for LAQM review and assessment. However, similar tools have not been provided for air quality action planning, and LAs have often found it difficult to understand the cost and emissions impacts of different potential measures. As a consequence most AQAPs have been a long list of general measures with little or no understanding of their relative importance.

6.8 Even where the impacts have been quantified little has been achieved. The problem is that radical action is generally required to comply with the air quality objectives. In many AQMAs a large reduction in emissions, particularly of NO_x, is needed. The relationship between NO_x emissions and NO_2 concentrations is complex and non-linear. Reducing NO_x emissions by small amounts, say 10–20%, may make no difference to measured air quality. Where the annual mean NO_2 objective is exceeded by 25% or more (ie is greater than 50 $\mu g/m^3$), very large changes to emissions and traffic are required. In small market towns, the only viable

[15] Long-term Exposure to Air Pollution: Effect on Mortality, Committee on the Medical Effects of Air Pollutants, Department of Health, June 2009. This report took two years to be published after the consultant draft was issued in 2007. Peer reviews in Appendix 2 of the final report.

option is the building of a new road to take the traffic away from busy residential historic streets, where dwellings are close to the carriageway. If the problem is within a district, the council has no direct control over transport, but even in unitary authorities, there is little incentive to give air quality any priority.

6.9 Unless LAs have a statutory duty to achieve the air quality objectives it is unlikely that they will prioritise air quality. However, careful consideration will need to be given to whether new powers will be required.

6.10 It should be noted that LAs have no direct responsibility for achieving EU limit values, and that these apply over a much wider area than the UK objectives. The latter apply where there is likely to be public exposure over the relevant averaging time, the former apply more or less everywhere (exceptions include a few places where the public do not go such as the central reservation of motorways).

6.11 A new approach is required, that may require giving LAs new powers to introduce low-emission strategies, to ensure that the EU limit values are achieved by 2015. These new powers are likely to be necessary to ensure that the EU grants the UK government a time extension from the current requirement for compliance by 2015 with the NO_2 limit value.

6.12 We believe one solution may be for local and national government to have joint responsibility for the delivery of the air quality action plan. The local authority could estimate how much of the required emissions reduction they can realistically achieve, with the gap being filled by national and international measures. The action plan would need to be drawn up initially by the LAs and Defra approve it and agree its contribution. This would be an iterative process to ensure that the balance between local and national measures is appropriate.

11 December 2009

Memorandum submitted by the Low Emission Strategies Partnership (AQ12)

SUMMARY

To date, air quality policy in the UK has focused too heavily on monitoring, review and assessment, with limited requirements for action to reduce emissions.

We recommend that the Government:

— revises the air quality policy framework in order to drive action on emission reductions; and

— recognises the opportunities provided by the adoption of Low Emission Strategies.

1. INTRODUCTION

The Low Emission Strategies Partnership

1.1 The Low Emission Strategies (LES) Partnership welcomes the opportunity to provide evidence to the Environmental Audit Committee's inquiry into Air Quality.

1.2 The LES Partnership (www.lowemissionstrategies.org) was established in 2007 to disseminate good practice in reducing transport emissions of toxic air pollutants and greenhouse gases. The Partnership specifically seeks to accelerate the deployment and penetration of low-emission transport fuels and technologies. This is achieved by supporting local authorities to adopt and implement low-emission policies, strategies and measures.

1.3 Phase I of the programme established 18 'peer group' projects across 15 local authorities, providing expert advice and sharing best practice. The Partnership also produced a guidance document 'Low Emission Strategies: Using the planning system to reduce transport emissions'. An updated draft of this document has progressed to the final stages of approval with a view to publishing it on the Defra website as a joint Defra and LES Partnership guidance report. Funding has been secured for Phase II, which will run from November 2009 to March 2011, building on progress made during the first phase.

1.4 The Partnership Board includes representatives from London Borough of Greenwich, London Borough of Hillingdon, Sefton Metropolitan Borough Council, Sheffield City Council, Wigan Metropolitan Borough Council, Mid-Devon District Council, Leeds City Council and Cenex (Centre of Excellence for Low Carbon and Fuel Cell Technologies).

Low Emission Strategies

1.5 As defined by the Partnership, a Low Emission Strategy provides a package of measures to help mitigate the transport impacts of development. The primary aim is to reduce transport emissions by accelerating the uptake of low-emission fuels and technologies in and around a development site. In this way, Low Emission Strategies can exploit opportunities presented to catalyse innovation and enable market transformation. Low-emission strategies may address both the construction and operational phases of a development. They can also complement other design and mitigation options, such as travel planning and the provision of public transport infrastructure.

1.6 Strategies may be secured through a combination of planning conditions and legal obligations (section 106 agreements). They may incorporate policy measures and/or require financial contributions to the delivery of low-emission transport projects and plans. For example, typical operational phase measures include emission-based parking policies, investment in low-emission infrastructure, fleet emission improvement, low-emission procurement and supply chain initiatives and contributions to local transport projects and strategic monitoring.

1.7 In reducing transport emissions, low-emission strategies improve local air quality and reduce greenhouse gas emissions associated with climate change. They also contribute to local government performance targets, provide local economic benefits, help to streamline planning decisions and contribute to wider sustainable development goals.

2. Factual information

2.1 In June 2008, the LES Partnership published a Consultation Draft of Good Practice Guidance, Low Emission Strategies: Using the planning system to reduce transport emissions.[16] An updated draft of this document has progressed to the final stages of approval with a view to publishing it on the Defra website as a joint Defra and LES Partnership guidance report. This guidance includes an annex with details of practical examples of Low Emission Strategies adopted by local authorities in order to reduce transport emissions at development sites.

3. Recommendations for action.

3.1 Improvements in air quality require a co-ordinated approach at local, national and international levels. The LES Partnership is primarily concerned with action at a local authority level.

3.2 The principal weakness in the approach to air quality over recent years has been an over-emphasis on monitoring and assessment, to the detriment of concerted action on the ground. This is a result of a policy framework that is process driven and emphasises review and assessment, with limited regard for implementation. In particular, the requirement for local authorities to merely 'work towards' compliance with the Air Quality Objectives is ineffectual. The difficulty in resolving this issue is that compliance is not simply related to local authority action, but is also affected by regional and national factors. Furthermore, research into health impacts has identified potential adverse effects even below the levels set by the Air Quality Objectives.

3.3 Nevertheless, Local Air Quality Management has been successful in developing a large body of evidence on air quality in the UK. We have a good understanding of the actions that are possible, and an increasing understanding of their likely costs and benefits. We now need strong drivers for action and strong mechanisms for delivery.

3.4 The LES Partnership was established in response to these concerns, and we subscribe to the following approach:

(a) pursuit of cost effective emission reductions, wherever they can be achieved;

(b) use of robust, quantitative assessment to support decision making;

(c) recognition of the links between air quality and climate change, and the importance of pursuing win-wins and actively managing trade-offs; and

(d) recognition of opportunities to reduce emissions through the planning system, by the implementation of low-emission strategies.

3.5 The LES Partnership therefore recommends that the Government:

(i) revises the air quality policy framework in order to drive action on emission reductions; and

(ii) recognises the opportunities provided by the adoption of Low Emission Strategies.

11 December 2009

Memorandum submitted by Mr Peter Wilson (AQ13)

I live close to the Corus Steel works, which has been implicated as being the main source of PM_{10} pollution in Port Talbot. Following the failure of PM_{10} air quality objectives in 2007. I responded to the Welsh Assembly Government consultation and later in April 2008 to the Defra consultation that requested a time extension until 2011 to achieve PM_{10} air quality objectives.

Two reports, which were intended to identify the main sources of the PM_{10} pollution from the Port Talbot Steelworks, have recently been published:

(i) Port Talbot Steelworks PM_{10} permit review by the Environment Agency Wales (Jan 2009).

[16] www.lowemissionstrategies.org/downloads/LES_Consultation_Draft.pdf

(ii) An Independent Review of Monitoring Measures Undertaken in Neath Port Talbot in Respect of PM_{10} by Dr Enda Hayes by University of the West of England, Bristol (Oct 2009).

Both of the reports referenced have been written at the request of the Welsh Assembly Government under the direction of the Radioactivity and Pollution Prevention Branch, which in turn is under the auspices of the Department for Environment, Sustainability and Housing.

In my view the wider political aspirations of the WAG are seriously hindering any proper investigation into the main sources of PM_{10} pollution from the steelworks, and also the relocation of the AURN air quality monitoring equipment. Consequently public health is being compromised. My submission (attached) is intended to make the Environment Audit Committee fully aware of issues that are not being openly discussed by the WAG, the EAW or Defra.

Summary

1. It has been claimed by both the Welsh Assembly Government (WAG) and Defra that, after correction for natural phenomena such as sea salt, Port Talbot achieved the NAQS objectives for PM_{10}. The Environment Audit Committee might conclude that the 46 exceedences recorded in 2007 will not be repeated again and that no follow-up action is necessary. This would be a huge mistake for the following reasons.

2. An independent review by Dr Hayes of West of England University for the WAG adjudicated that LAQM guidance procedure had not been used to relocate the AURN TEOM device in July 2007. The correct methodology for industrial locations such as Port Talbot requires the TEOM device to be sited at the point of maximum impact, as determined by dispersion modelling. A modelling study undertaken for the Action Plan of 2003 showed that the Taibach Fire station, where the AURN TEOM is currently sited, is 700 metres from the modelled point of maximum impact. This argument appears to have also been accepted by the Environment Agency Wales in their report *Port Talbot Steelworks PM_{10}* Permit Review Jan 2009. The conclusion that must be drawn is that the AURN TEOM has recorded appreciably less PM_{10} pollution than it would otherwise have done had it been sited at the point of maximum impact. Consequently monitored PM_{10} exceedences since July 2007 are likely to have been under-recorded. There are serious failings by the local authority and the WAG regulator that need to be urgently addressed.

3. The short-term objective for PM_{10} was only just achieved in 2008 despite the fact that the AURN TEOM was located 700 metres away from the modelled point of maximum impact. Additionally one of the two blast furnaces in the steelworks was mothballed from October 2008 until August 2009, so fewer exceedences than usual have occurred over the period. It will be a while before normal steel production returns, so it is too soon to claim any long-term improvement in air quality.

4. Open discussion about certain facilities within the steelworks such as the sinter plant and blast furnaces is being systematically suppressed and excluded from official reports that are meant to determine the main sources of PM_{10} pollution in the steelworks. In their place unidentified sources are being blamed. This strategy is being used to protect the fragile position of Corus. A recent review of the steelworks by the EAW did highlight the fact that the sinter plant's stack is zero percent compliant with BAT and that parts of the blast furnaces are only 35% compliant. Corus has already submitted a report that argues the facilities already use indicative BAT thereby delaying any further improvements indefinitely. In my view this state of denial means that pollution reduction measures only happen at the pace that Corus can afford them, which is far too slow.

5. Three wood-burning power station projects are currently being considered by the UK Government and Welsh Assembly for Port Talbot's industrial area adjacent to the Margam-Taibach Air Quality Management Area. Although I recognised that stringent emission limits for PM_{10} are being imposed the following question has to be asked. Why is the UK Government asking the EU for a time extension to achieve air quality objectives, whilst at the same time adding more PM_{10} pollution to the problem?.

Relocation of the AURN TEOM

6. In July 2007 the redevelopment of the Groeswen Hospital site forced the relocation of the AURN TEOM. A decision was made by Neath Port Talbot Council under the overall supervision of AEA Technology and the WAG to relocate the TEOM to the Taibach Fire Station. A report was commissioned by the WAG in February 2008 "A review of 2007 Automatic PM_{10} Air Monitoring data in Port Talbot", which outlined the sites shortlisted and methodology used to relocate the AURN TEOM. It also looked into whether the exceedences recorded from the two separate AURN positions could be combined.

7. In October 2008, I made a serious complaint to the WAG that improper methodology had been used to choose the new location of the AURN monitoring equipment (TEOM). Specifically that: "The positioning of the TEOM has not followed the principles laid down in the LAQM Technical Guidance. In November 2006 the Welsh Assembly re-classified the Margam-Taibach AQMA to 'Industrial Background'. Prior to this the area was classified as 'Urban Background'". The LAQM Technical Guidance requires that "for Industrial Sites, where specific sources are being targeted (in this case PM_{10}), monitoring should be carried out at the point of maximum impact as determined by dispersion modelling. AEA Technology have

compared two shortlisted sites in their report to the WAG but there is no evidence that dispersion modelling has been used. Dispersion modelling examples (from the Margam Tiabach Action Plan 2003) show that both short-listed sites, the Taibach Fire Station and Dyffryn school, will significantly under-record compared to the point of maximum impact. This was previously determined to be on the boundary of the AQMA to the East of the blast furnaces. The Corus model used 18 separate sources from chimney stacks, blast furnaces, to iron ore stockpiles around the industrial area. These emissions are analysed together with Met weather data to produce predictions for concentrations of pollution".

8. The Environment Agency appear to have accepted this argument in their permit review report of the steelworks and have very recently sited one of their own TEOM monitors in a compound fairly close to the modelled point of maximum impact. The dispersion modelling study from the Margam-Taibach Action plan 2003 is shown overleaf and has been copied from the EAW Steelworks review report.[17] Although the additional TEOM from the Agency is welcome for shadow monitoring purposes, it cannot be considered as a substitute for the AURN TEOM. The AURN TEOM records the official air quality for Port Talbot, which is used to show compliance with air quality objectives, for historic analysis and consideration of further planning applications.

9. Had it not been for the fact that a Port Talbot resident (supported by Friends of the Earth Justice Section) had threatened legal action in March 2008, then it is unlikely that the WAG would even have bothered to launch a review of air quality or action plan consultation. Belatedly, in March 2009, the WAG commissioned "An Independent Review of Monitoring Measures Undertaken in Neath Port Talbot in Respect of Particulate Matter". The contract was awarded to Dr Enda Hayes of West of England University. The contract was awarded a full year after the air quality results for 2007 were ratified. This is just one of several failings of the WAG that will be highlighted in my submission.

10. Other failures to adopt LAQM guidance were highlighted by Dr Hayes in his report, particularly in Recommendation 2—Generation of an emissions database and undertaking a new dispersion modelling study. In this section Dr Hayes focused on two separate failures by the WAG and Local Authority in the past to adopt guidance. Firstly that dispersion modelling had not been used to relocate the AURN TEOM and secondly that local model verification (or calibration) had not been used to correct modelled studies of pollution so that they more accurately reflected the pollution being measured by the TEOM.

11. An explanation is required from Dr Hayes as to why both these important and fundamental recommendations were edited out of the executive summary version. In fact the Recommendation 2 in the executive summary was completely different from the main report. In short all the failings highlighted in the main report had been removed.

12. Consequently, it would be helpful to know from Dr Hayes what changes to his report were required by the WAG in August 2008 that led to a delay in publishing by several weeks.

13. Dr Hayes was not asked in his review to undertake a new dispersion modelling study, which would have assisted the relocation of the AURN TEOM. Neither have the WAG utilized the existing dispersion modelling study from the Action Plan of 2003. A year has gone by and the AURN TEOM is still monitoring air quality a long distance from the modelled point of maximum impact. Other TEOM monitors in the town have been placed in locations away from known pollution hot spots and are consequently recording few if any exceedences.

14. It is clear that PM_{10} pollution can be reduced significantly or made to disappear altogether simply by selective positioning of the air quality monitors in the AQMA. This is a clear failure to protect the public. It is sad to remark, that the Pollution Prevention branch of the WAG has proven itself either incapable or unwilling to investigate this matter properly. Indeed they commissioned a report *A review of 2007 Automatic PM_{10}* Air Monitoring data in Port Talbot, which attempted to defend the flawed procedures highlighted by Dr Hayes.

15. This failure to protect health must be addressed as a matter of urgency. The WAG needs to clarify what its intentions are regarding the AURN position. If the Audit committee cannot follow this up, who then? Who else can compel the WAG to adhere to guidance and the recommendations of an independent review?

Port Talbot PM_{10} air quality in 2008–09

16. Despite the fact that the AURN monitoring equipment has been located 700 metres away from the modelled point of maximum impact, at least 34 exceedences were recorded in 2008. This is only one less than the allowed limit of 35. Port Talbot was on track to fail the NAQS objective in 2008 but large cuts backs in steel production and the mothballing of a blast furnace in the final quarter of the year prevented further PM_{10} exceedences. Corus have operated on one blast furnace from October 2008 until August 2009 so much fewer exceedences have been recorded than normal over this period. Consequently it is important to keep any claimed improvement in air quality for 2008 and 2009 in perspective.

[17] Diagram not printed.

17. Historical record of PM_{10} air quality taken from UK air quality archives is shown below.

	2003	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*NAQS limit*
Exceeds of PM_{10}—24hr limit	43	38	30	35	46	34	15	35
Annual Average	32	31	30	31	27	29	25	40

18. At least 60% of PM_{10} pollution comes from the steelworks and the steel industry has been in a severe recession for 18 months with production at less than 50% capacity. Until normal levels of steel production resume, no proper judgements can be made about whether there has been a general improvement or not.

Main sources of PM_{10}

19. The WAG and the EAW seem unwilling to implicate the blast furnaces and the sinter plant as main sources of PM_{10} in their reports. This completely defies the logic of the monitored data. I live adjacent to the steel works and see these facilities operating throughout the day and also at night too. I can personally vouch along with other residents of the town that they are the main sources of fine dust from the steelworks.

20. Comments made by Dr Hayes are contradictory. On one hand Dr Hayes states emphatically "that the blast furnace and sinter plant are not likely to be the main contributors" but then later it is concluded that the main sources are likely to be stacks, to the South West of the Taibach Fire Station TEOM, and that theses sources are simultaneously emitting large amounts of Carbon monoxide in conjunction with PM_{10} and lesser amounts of sulphur dioxide (implicating the blast furnaces and sinter plant stack).

21. In my opinion there appears to be an unwritten rule in reports commissioned by the WAG that whenever PM_{10} pollution is discussed facilities such as the blast furnaces and the sinter plant are not blamed directly. In their place unidentifiable sources are flagged up as the likely sources of PM_{10} but these are never located. This inability to discuss the problem is a recipe for inaction.

22. The EAW report "Port Talbot Steelworks PM_{10} Permit Review Jan 2009" clearly implicates the blast Furnace and the sinter plant facilities by triangulation.[18]

23. Emissions data submitted to the Action Plan of 2003 indicate that the sinter plant stack has a PM_{10} emission rate of 20grams per second making it the largest of any within the steelworks. The EAW Port Talbot Steelworks PM_{10} permit review Jan 2009 highlighted that the sinter plant stack is still zero percent compliant with BAT and that parts of the blast furnaces are only 35% compliant.[19]

24. This being the case, it seems illogical for anyone including Dr Hayes to conclude that the sinter plant and blast furnaces are unlikely to be significant contributors of PM_{10}. In any event, dust from these facilities will be re-suspended by site traffic doubling up on the PM_{10} pollution.

25. Corus have been given 18 months by the EAW to present a BAT appraisal for the sinter plant. I have already read a report written by Corus in which they argue that BAT is already employed; so no doubt the 'Mexican standoff' will continue. This has become a farcical merry-go-round, where each party must be seen to be going through the motions. The loser in all this is the cardiac and respiratory health of residents.

New planning applications, more PM_{10}

26. I have been very critical of the UK Government and Welsh Assembly Government for agreeing to site three biomass power stations in the industrial area adjacent to the Margam Taibach Air Quality management Area.

(i) 15MW—Locally sourced woodchip (Western Wood Energy/ECO_2).

(ii) 35MW—Waste wood (Western Wood Energy).

(iii) 350MW—Imported Woodchip (Prenergy).

27. Common sense should have prevailed. Port Talbot still has an air quality problem and it should not be targeted with more facilities that could worsen air quality. Planning law as it stands means that so long as emissions can be shown by dispersion modelling to be insignificant then the applications can be approved indefinitely.

28. There is a general failure by the Environment Agency to undertaken local verification (or calibration) of the dispersion models used, which is a requirement of guidance, especially in areas like Port Talbot that have complex terrain and high model uncertainty. In applications for new PPC licences, stack emissions are proven safe with dispersion model software such as ADMS, by Cambridge Environmental Research Consultants (CERC). The ability of the dispersion model to predict to a required standard is proven by software validation examples, which can be downloaded from CERC's website. I highlighted to the EAW that ADMS' ability to model pollution was not consistent across all the examples listed by CERC, especially those that required the complex terrain module of the program. Port Talbot requires the use of two additional software modules of ADMS not commonly used in other locations to account for the complex terrain and coastal landscape.

[18] Diagram not printed.
[19] Table not printed.

29. In a recent planning application for Prenergy Power Ltd, the EAW allowed for a dispersion model software accuracy of 50% to predict the annual average benchmark and 24hr mean objective level. This is far more optimistic than the 25–30% accuracy achieved in the validations from CERC that used the specialist complex terrain module. Essentially, the software in the CERC study examples was seen to systematically under-predict pollution levels so that they were on average 1/3 to 1/4 of those observed.

30. When the local health board and I both complained to the EAW about the optimistic accuracy being assumed for Prenergy's dispersion modelling study, our complaint was misrepresented in the permit document, so that it could easily be disregarded. This is totally unacceptable. The modelled results should have been given higher factors of safety to offset modelling uncertainty and bias for under-prediction. The requirement for local model verification to LAQM guidance highlighted by Dr Hayes in my view is fundamental. Until this aspect of guidance is adopted all past, present and future modelling studies for Port Talbot will not properly reflect the higher levels of pollution currently being recorded by the air quality monitoring equipment.

31. The EAW knew about the need to undertake the local verification procedure to correct dispersion models but issued a permit to Prenergy regardless without correcting the applicant's modelled emissions. The reason why they did this in my opinion was that the power station filters were already on the theoretical limit of their performance and any further reduction in emission limits would have resulted in the failure of the application.

32. Filtering standards of 6mg/Nm^3 have been specified for Prenergy's stack by the EAW in an attempt to limit PM_{10} emissions that could cause further exceedences. The emission limit imposed is three times more stringent than is normally achieved with BAT, (typically around 20mg/Nm^3). The EAW has a poor record of achieving compliance in the Port Talbot location and I suspect there is a high risk the Prenergy Power Station won't maintain this standard for very long, if indeed it manages to at all. I do not think the attitude of the EAW is helpful to maintaining air quality standards.

33. The EAW as part of its charter has a legal responsibility to support ministers and find sites for renewable energy projects. Herein lies the problem for Port Talbot, as pollution reduction comes a poor second. The issue here is that the EAW have both a legal and moral responsibility to improve air quality in Port Talbot and it is indefensible to compromise people's health with false assessment.

34. I hold the view that government plans for biomass energy production in the UK are being promoted well beyond the resources available to fuel it. I oppose the building of six 300MW supersized schemes and other 150MW ones that will burn 25–30 million tonnes of imported wood annually. This is a totally unsustainable amount of timber and a great deal of environmental damage will result.

Abbreviations

AMDS—Air Dispersion Modelling Software.

AQMA—Air Quality Management Area.

AURN—Automatic Urban & Rural Network (Air Quality Monitoring Network).

BAT— Best Available Technique.

CERC—Cambridge Environmental Research Consultants.

EAW— Environment Agency (Wales).

MW— Mega Watt.

LAQM—Local Air Quality Management.

PM_{10}—Particulate Matter below 10 microns.

PPC— Pollution Prevention and Control.

TEOM— Tapered Element Oscillating Microbalance (Air Quality Monitoring Device).

WAG – Welsh Assembly Government.

13 December 2009

Memorandum submitted by the Campaign for Clean Air in London (CCAL) (AQ 18)

ONE OF THE WORST PUBLIC HEALTH FAILINGS OR "COVER-UPS" IN MODERN HISTORY WITH OVER 250,000 PREMATURE DEATHS DUE TO POOR AIR QUALITY IN THE UK UNDISCLOSED OVER 10 YEARS*

Introduction

1. I am writing on behalf of the cross-party Campaign for Clean Air in London (CCAL) to submit a memorandum to the Environment Audit Committee's (EAC's) inquiry into Air Quality which opened on 21 October and closes on 14 December 2009. Thank you for the opportunity for do so. The EAC's announcement of the inquiry can be seen at:

http://www.parliament.uk/parliamentary_committees/environmental_audit_committee/eacpn211009.cfm

2. The purpose of CCAL is to achieve, urgently and sustainably, at least World Health Organisation (WHO) recommended standards of air quality throughout London. CCAL operates under the auspices of The Knightsbridge Association, an amenity society. Further details of CCAL's mission and its supporters can be found at www.cleanairinlondon.org.

3. CCAL supports strongly all the comments made by ClientEarth and Environmental Protection UK in their responses to this inquiry (except if in conflict with this letter in which case this letter prevails):

> CCAL calculation for the UK using COMEAP 2009's 6% coefficient and methodology described in Appendix 3. In other words, the Government seems to have decided not to disclose since 1998 an updated estimate of the number of premature deaths due to exposure to dangerous airborne particles ($PM_{2.5}$ or PM_{10}). There is a separate question as to whether the 250,000 figure is a substantial underestimate.

Summary

4. No effective strategy: In CCAL's carefully considered view, the UK does not have an effective strategy to comply fully with air quality laws and shows no sign of developing one. The EAC's inquiry is therefore timely.

5. At separate public meetings in November and December 2009, highly respected members of COMEAP (the Committee on the Medical Effects of Air Pollution) were referring still to 8,100 premature deaths per year due to PM_{10} in urban areas of Great Britain (Table 1.1 on page 3 of the COMEAP 1998 report). CCAL can find no other official number disclosed by the Government for total premature deaths due to $PM_{2.5}$ or PM_{10} in the UK since 1998. The COMEAP 1998 report was titled 'Quantification of the Effects of Air Pollution on Health in the United Kingdom' and recommended a coefficient of 0.75% per 10 $\mu g/m^3$ PM_{10} (eg 1.07% $PM_{2.5}$) See also:

http://www.advisorybodies.doh.gov.uk/comeap/statementsreports/airpol7.htm

6. CCAL estimates, using COMEAP's 2009 recommendation of a 6% coefficient per 10 $\mu g/m^3$ $PM_{2.5}$, there were around 35,000 premature deaths due to dangerous airborne particles ($PM_{2.5}$) (which would be the same for PM_{10} based on current government advice) in the UK in 2005 (and perhaps 51,537). See Appendix 2 and paragraph 25 below.

7. Failings or 'cover-up' of the real health impact: Assuming CCAL is correct, pending a better estimate from the Government, it is not unreasonable to assume there have been some 350,000 premature deaths due to $PM_{2.5}$ and/or PM_{10} over the last 10 years compared to the 81,000 premature deaths one might have assumed from COMEAP or government published figures. In CCAL's view, this 'gap' of over 250,000 may represent one of the biggest public health failings or 'cover-ups' in modern history. Action: We need clarity now on the actual and Precautionary Principle figures.

8. CCAL is concerned separately, based on a close reading of the Peer Review of the COMEAP 2009 report, that COMEAP may be substantially underestimating the health impact at 6% per 10 $\mu g/m^3$ $PM_{2.5}$. Higher coefficients of 12%, 15%, 16% and/or 17% are possible.

9. Modeling is not 'fit for purpose': The Government's modeling of air quality concentrations over the last decade has not been 'fit for purpose'. It has pointed and continues to point to expected sharp reductions in concentrations of dangerous air pollutants. Each year, the Government registers apparent 'surprise' when actual results show the opposite picture. What is more alarming is that the UK has justified less monitoring of air pollution than other countries on the back of its commitment to modeling. This is not acceptable and again endangers public health and the successful planning and delivery of an effective strategy to improve air quality. Action: Future strategy should assume no change in concentrations under business as usual until modeling is proven to be reliable.

10. No coherent delivery chain: The almost total disjunction between the Government's responsibility, on behalf of the Member State, and the 'work towards compliance' duty on local authorities has been a recipe for failure. In general, local authorities (and the Mayor of London) seem to have little appetite to take action they are not required to take. Action: The Environment Agency should be given national responsibility, authority, accountability and adequate resources to ensure full compliance everywhere with air quality laws (perhaps as in the USA; proposed at Heathrow; and/or in relation now to flooding). Alternatively or additionally, a very clear chain of delivery needs to be defined for each layer of government and others. See also Appendix 5.

11. Next steps: Many steps need to be taken to improve air quality in the UK and comply fully with air quality laws. These include: scrapping COMEAP and replacing it with a body more like the Health Effects Institute in the USA; giving the Mayor of London sole responsibility for complying immediately with EU limit values for PM_{10}; using everything including the 'kitchen sink' to ensure full compliance with EU limit values for nitrogen dioxide (NO_2); and launching a major campaign to build public understanding of the health risks of poor air quality and the actions needed to minimise them.

12. The opportunity: Protecting public health and complying with air quality laws also offers many co-benefits. The UK could show at the 2012 Olympics how air pollution and wider sustainability issues can be tackled successfully in major cities. Ridicule is in prospect if air quality is not tackled.

Health and Environmental Risks Caused by Poor Air Quality

Warning: CCAL has a lay understanding of epidemiology but has made every reasonable effort to ensure the accuracy of its statements on health risks.

Health risks—Dangerous airborne particles (see also Appendix 1)

13. Dangerous airborne particles are usually categorised by size: fine particles called $PM_{2.5}$ (less than 2.5 micrograms per cubic metre (?/m^3)); coarse particles called $PM_{2.5}$-10; and PM_{10} (less than 10 ?/m^3). $PM_{2.5}$ arises largely from combustion and $PM_{2.5}$-10 arises largely from mechanical processes eg tyre and brake wear. A recent EEA/ETC report estimated that within Europe about 70% of PM_{10} comprises $PM_{2.5}$. ie 0.75% per 10 μg/m^3 PM_{10} = 1.07% per 10 μg/m^3 of $PM_{2.5}$.

14. Note: COMEAP's advice is that there is little risk in the coarse fraction so its health impacts are often not quantified ie all the risk for PM_{10} is contained in $PM_{2.5}$. Some scientists disagree and consider that toxicity appears across the PM fraction. CCAL has adopted COMEAP's stance for simplicity ie the number of premature deaths due to $PM_{2.5}$ and PM_{10} is the same.

15. CCAL's understanding of the timeline of knowledge about the health risks of $PM_{2.5}$ and PM_{10} is set out in Appendix 1 and more briefly below.

16. In 1998, in its report titled "Quantification of the Effects of Air Pollution on Health in the United Kingdom", COMEAP proposed in paragraph 9.18 on page 57 a hazard rate (or risk coefficient) for short-term exposures of 0.75% per 10 μg/m^3 PM_{10} as a 24-hour mean for all ages. It felt there was insufficient data to allow acceptably accurate quantification of [long-term] health effects.

17. In March 2001, in its report titled "Statement and Report on Long-Term Effects of Particles on Mortality", COMEAP proposed a hazard rate (or risk coefficient) for long-term exposures of 0.1% per 1 μg/m^3 drop in annual mean $PM_{2.5}$ for those aged 30 years and over (ie 1.0% per 10 μg/m^3).

18. In June 2009, in its report titled "Long-Term Exposure to Air Pollution: Effect on Mortality", COMEAP proposed in paragraph xiii on page 3 a hazard rate (or risk coefficient) for long-term exposures of 6.0% per 10 μg/m^3 increase in annual mean $PM_{2.5}$ for those aged 30 years and over.

19. CCAL urges the EAC to consider the Peer Review comments submitted on COMEAP's draft report (see Appendix 1 of COMEAP 2009) which include serious criticisms of COMEAP's choice of coefficients and of the elicitation process used by COMEAP to choose the recommended coefficient:

> See: http://www.dh.gov.uk/ab/COMEAP/DH_108151

20. CCAL urges the EAC to consider Defra's report on the impact of delay in complying with air quality laws on race. It is titled 'UK notification to the European Commission to extend the compliance deadline for meeting PM_{10} limit values in ambient air to 2011, Race Equality Impact Assessment (England)'. See Appendix 6.

21. CCAL is not aware of any update on the total societal costs of poor air quality since Table 2.14 on page 90 of the Defra 2007 Air Quality Strategy (AQS):

> http://www.defra.gov.uk/environment/quality/air/airquality/publications/stratreview-analysis/chap-2-icgb.pdf

While 6% remains the COMEAP 2009 recommendation, the range for 2005 societal costs is £8.582 billion to £20.165 billion. The 7 to 8 months average national impact in life expectancy appeared in the Foreword of the same 2007 AQS.

22. Applying COMEAP 2009 recommendations using the Precautionary Principle suggests a coefficient of 15%. Even however at a lower 12%, the societal costs were £16.238 billion to £38.115 billion in 2005 (per Table 2.14 in the 2007 AQS).

Government or COMEAP statements re premature deaths due to $PM_{2.5}$ in the UK in 2005

23. At separate public meetings in November and December 2009, highly respected members of COMEAP were referring still to a 1998 COMEAP figure of 8,100 premature deaths per year due to PM_{10} in urban areas of Great Britain (Table 1.1 on page 3 of the COMEAP 1998 report). CCAL can find no other official number disclosed by the Government for total premature deaths due to $PM_{2.5}$ or PM_{10} in the UK since 1998. The COMEAP 1998 report was titled 'Quantification of the Effects of Air Pollution on Health in the United Kingdom'. See also:

> http://www.advisorybodies.doh.gov.uk/comeap/statementsreports/airpol7.htm

The public events were the Environmental Protection UK autumn conference on 12 November 2009 and the Royal Society of Chemistry's annual conference on 9 December 2009.

CCAL's lay calculation of premature deaths due to $PM_{2.5}$ in the UK in 2005

24. The European Topic Centre on Air and Climate Change estimated in its paper titled 'Health Impacts and Air Pollution—An exploration of factors influencing estimates of air pollution impact upon the health of European citizens' in December 2008 estimated that there were 51,537 premature deaths attributable to exposure to ambient PM_{10} concentrations in the UK in 2005 (Table 1.1 on page 8):

See: http://air-climate.eionet.europa.eu/reports/ETCACC_TP_2008_13_HealthImpact_AirPoll

25. CCAL has calculated the number of premature deaths due to $PM_{2.5}$ in the UK in 2005 using three separate methods (see Appendix 2).

26. CCAL estimates that between 33,000 to 40,000 people died prematurely due to $PM_{2.5}$ (or PM_{10}) in the UK in 2005 assuming the COMEAP 2009 6% coefficient. The number may be as high as 51,537 (see paragraph 25 above). Note that levels of $PM_{2.5}$ have been broadly static over the last 10 years.

27. Assuming CCAL is correct, pending a better estimate from the Government, it is not unreasonable to assume there have been some 350,000 premature deaths due to $PM_{2.5}$ and/or PM_{10} over the last 10 years compared to the 81,000 premature deaths one might have assumed from COMEAP or government published figures. In CCAL's view, this 'gap' of over 250,000 may represent one of the biggest public health failings or 'cover-ups' in modern history.

28. CCAL is concerned separately, based on a close reading of the Peer Review of the COMEAP 2009 report, that COMEAP may be substantially underestimating the health impact at 6% per 10 $\mu g/m^3$ $PM_{2.5}$. Higher coefficients of 12%, 15%, 16% and/or 17% are possible.

CCAL's lay calculation of premature deaths due to $PM_{2.5}$ in London boroughs in 2005

29. CCAL has similarly calculated the number of premature deaths due to $PM_{2.5}$ in London in 2005 for each London borough (Appendices 3 and 3A). CCAL estimates that there were between 3,500 (assuming a 6% coefficient) and 6,500 (assuming a plausible 12% coefficient) and 7,900 (using a wider 15% coefficient) premature deaths due to $PM_{2.5}$ in London in 2005. The actual numbers may be around 10% higher depending on average population-weighted exposures in outer London. These numbers dwarf the 1,031 premature deaths due to PM_{10} in 2005 that the Government told Mayor Livingstone which were based on a coefficient of 0.75% per 10 $\mu g/m^3$ increase in PM_{10} (per COMEAP's 1998 recommendation) (refer to CCAL letter to Mayor Johnson dated 20 September 2009).

Health risks—Nitrogen dioxide (NO_2) (see also Appendix 4)

30. At Environmental Protection UK's autumn conference on 12 November 2009, CCAL recollects Professor Jonathan Ayres, Chairman of COMEAP, making a personal comment (ie not official COMEAP policy) to the whole meeting that public exposure to ambient concentrations of nitrogen dioxide in the urban environment is 'irrelevant' for public health. CCAL recollects Professor Ayres went on to emphasise though that NO_2 has the advantage of being very easy to monitor and it is a reliable indicator of hazardous vehicle emissions. Despite these important clarifications, CCAL considers that Professor Ayres' personal comments could be a source of public confusion and therefore merit clarification from the Government.

Environmental risks

31. CCAL draws the EAC's attention to the European Commission's press release dated 12 December 2007 which included estimates of the cost impact of air pollution on biodiversity. See:

http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/07/571&format=HTML&aged=1&language=EN&guiLanguage=en

Summary health issues and the effective communication of them

32. A cynic might say that COMEAP in 2009 chose not to increase its coefficient of total mortality for $PM_{2.5}$, despite significant new research published n 2005 and 2006, because: it did not wish to 'run' ahead' of WHO advice (2006); the European Commission's CAFÉ programme; and/or Defra's Air Quality Strategy (2007). A cynic might also suggest that COMEAP may have been concerned about presenting health impact coefficients much higher than those it had identified in 1998 and 2001.

33. CCAL's carefully considered view, influenced by comments in the Peer Review of COMEAP 2009, is that COMEAP is likely to have understated (perhaps very substantially) in 2009 the health impact of poor air quality.

34. Further, CCAL considers that the Precautionary Principle should be followed when public health is at risk. On this basis, COMEAP's 2009 recommendations point to coefficients of 12% or 15% per 10 $\mu g/m^3$ $PM_{2.5}$.

35. Irrespective of the correct coefficient for total mortality, CCAL considers it important to communicate the health impact of poor air quality appropriately (ie in a manner which is meaningful and most useful) to different audiences. There are four common metrics: premature or attributable deaths; total (eg national) years of life lost (YLL); average reduction in life expectancy across the whole UK population;

and years lost per statistical victim. In CCAL's experience, premature death and years of life lost per statistical victim are the most effective measures to use for communication with the general public. Clearly, as with all risks, it is important to explain the meaning of the metric carefully. YLL may be appropriate for economists et al.

36. Please note that CCAL has not mentioned the health impact of other forms of air pollution in this memorandum eg ozone (O_3) and sulphur dioxide (SO_2).

37. In CCAL's view, Londoners should be warned that up to one person in eight who died in Greater London in 2005 may have done so due to exposure to dangerous airborne particles (assuming only average UK population-weighted exposures in London). Research published in 2001 by Professor Nino Kunzli suggests that those who die prematurely due to dangerous airborne particles may do so, on average, 9.8 years early. On this basis, the health impact of poor air quality in London is similar or greater to that for alcoholism, obesity and/or smoking.

Steps that Need to be Taken to Ensure that Air Quality Targets will be Met in Future

38. Many steps need to be taken to improve air quality in the UK and comply fully with air quality laws including those set out below.

39. The Government must 'grip' the UK's serious air quality problem and deliver on its responsibilities.

40. The Government must disclose as a matter of urgency its assessment of the number of premature deaths due to dangerous airborne particles ($PM_{2.5}$) in each region of the UK in 2005 (or preferably a more recent year) (using at a minimum COMEAP 2009's 6% coefficient) together with a Precautionary Principle number (eg the 15% coefficient). Also an estimate of the years of life lost per statistical victim. These metrics are provided for other health risks eg obesity and smoking.

41. The Government should scrap COMEAP or revamp it to ensure its independence, effective governance and focus on highlighting multiple metrics and adopting explicitly a faster review of evidence and the use of the Precautionary Principle approach to protect public health. CCAL would favour replacing COMEAP with a body more like the Health Effects Institute in the USA with its Independent Board of Directors (with legal duties). See: http://www.healtheffects.org/index.html

42. The Government must weigh benefits and costs against the need to meet air pollution deadlines whether for air quality or climate change.

43. The Government should give the Mayor of London legal responsibility for ensuring full compliance with air quality laws for PM_{10} immediately.

44. The Government needs to take a strong lead on ensuring compliance with air quality laws for NO_2. In CCAL's view this may require 'every measure available including the kitchen sink'. See Defra's write up of its NO_2 measures workshop dated 4 August 2009.

45. It is imperative that planning takes place now to ensure full compliance with air quality laws for $PM_{2.5}$ since these are likely to drive public health benefits once EU limit values for PM_{10} and NO_2 are met.

46. CCAL has proposed 65 recommendations to improve air quality in London (Appendix 7). Many are relevant nationally. These include 'The London Matrix', 'The London Principle' and 'The London Circles'.

47. The Government must maximise economy of scale benefits by taking an active lead and giving directions on measures such as inner-city low-emission zones (to avoid national waste and chaos).

48. The Government must drop its myopic focus on CO_2 to the exclusion of other air pollutants. In particular, its approach to diesel has been a significant cause of poor quality in our biggest cities.

49. A major public understanding campaign should be launched to warn people about the dangers of poor air quality and the measures individuals can take to reduce its impact.

50. Government should press the European Commission and the WHO to update urgently (and well before 2013) their recommendations for the health impact of poor air quality based on the most up to date scientific research referred to in this memorandum or otherwise.

51. Protecting public health and complying with air quality laws will show how air pollution and sustainability can be tackled successfully. The 2012 Olympics offers an opportunity to do so.

APPENDIX 1

HEALTH RISKS—DANGEROUS AIRBORNE PARTICLES

52. Dangerous airborne particles are usually categorised by size: fine particles called $PM_{2.5}$ (less than 2.5 micrograms per cubic metre (?/m^3)); coarse particles called $PM_{2.5}$-10; and PM_{10} (less than 10 ?/m^3). $PM_{2.5}$ arises largely from combustion and $PM_{2.5}$-10 arises largely from mechanical processes eg tyre and brake wear. A recent EEA/ETC report estimated that within Europe about 70% of PM_{10} comprises $PM_{2.5}$. ie 0.75% per 10 $\mu g/m^3$ PM_{10} = 1.07% per 10 $\mu g/m^3$ of $PM_{2.5}$

53. Note: COMEAP's advice is that there is little risk in the coarse fraction so its health impacts are often not quantified ie all the risk for PM_{10} is contained in $PM_{2.5}$. Some scientists disagree and consider that toxicity appears across the PM fraction. CCAL has adopted COMEAP's stance for simplicity ie the number of premature deaths due to $PM_{2.5}$ and PM_{10} is the same.

54. CCAL's understanding of the timeline of knowledge about the health risks of $PM_{2.5}$ and PM_{10} is set out below.

55. Initially, scientists considered that the health impacts of air pollution included respiratory problems and perhaps cancer. They used time series studies that analysed the rise in deaths around the time of air pollution 'episodes'. Subsequent research identified the dominance of cardiovascular disease as a cause of death. Long term, so-called cohort studies, undertaken over decades have tracked the health impact of $PM_{2.5}$ and found a lack of 'threshold' ie no safe level of exposure.

56. The two studies most widely cited in the literature are based on the American Cancer Society (ACS) and Harvard Six Cities cohorts (COMEAP 2009, page 174). The ACS cohort study followed several hundred thousand people in metropolitan areas across the USA.

57. In 1998, in its report titled "Quantification of the Effects of Air Pollution on Health in the United Kingdom", COMEAP stated in paragraph 9.18 on page 57:

> "We have taken as a coefficient of effect an increase of 0.75% per 10 $\mu g/m^3$ PM_{10} as a 24-hour mean. On this basis, we estimate that PM_{10} contributes to the advancement of around 8,100 deaths in the urban population of Great Britain annually".
>
> "In the view of this subgroup and COMEAP, in addition to the effects recorded here, it is likely that long-term exposure to air pollutants also damages health. At present there are insufficient data to allow acceptably accurate quantification of these effects and the sub-group was not confident in applying UK estimates of exposure-response coefficients from long-term studies undertaken elsewhere. However, if estimates made elsewhere, especially in the USA, do apply in the UK, they suggest that the overall impacts may be substantially greater than those we have as yet been able to quantify". Paragraph 1.14 on page 3:
>
> See: http://www.advisorybodies.doh.gov.uk/comeap/statementsreports/airpol7.htm

It seems the full report can no longer be purchased or accessed online. CCAL has a copy.

58. In other words, based on time series studies, COMEAP 1998 proposed a hazard rate (or risk coefficient) for short-term exposures of 0.75% per 10 $\mu g/m^3$ PM_{10} as a 24-hour mean for all ages. It felt there was insufficient data to allow acceptably accurate quantification of [long-term] health effects.

59. In March 2001, in its report titled "Statement and Report on Long-Term Effects of Particles on Mortality", COMEAP stated in paragraph 59 (iv) on page 23:

> "Although intended as only a rough comparison, this does suggest that the gain in life years from the cohort studies is at least 10 fold greater than estimates from the time series studies alone".
>
> "For long-term exposures it stated in the Table in paragraph 10 on page 3 "0.1% based on a 1 $\mu g/m^3$ drop in annual mean $PM_{2.5}$ [for those aged 30 years and over]. Estimate considered most likely to be around this size":
>
> See: http://www.dh.gov.uk/ab/COMEAP/DH_108596

60. In other words, based on cohort studies, COMEAP 2001 proposed a hazard rate (or risk coefficient) for long-term exposures of 1.0% per 10 $\mu g/m^3$ drop in annual mean $PM_{2.5}$ for those aged 30 years and over.

61. Kunzli et al (2001) stated in 'Assessment of Deaths Attributable to Air Pollution: Should We Use Risk Estimates Based on Time Series of on Cohort Studies':

> "In our impact assessment, we assumed that cases' deaths were due to cardiorespiratory disease and that these air pollution-related deaths had the same age distribution as all persons who died from cardiorespiratory diseases. Thus, the amount of time lost, per statististical victim, turned out to be 9.8 years, which corresponds to a change in life expectancy of approximately 0.6 years in the total population":
>
> See: http://aje.oxfordjournals.org/cgi/reprint/153/11/1050

Note: Professor Kunzli's 0.6 years (ie 7.2 months) is very similar to the Government's current seven to eight months (across 61 million people).

62. Pope et al (2002) proposed in 'Lung Cancer, Cardiopulmonary Mortality, and Long-Term exposure to Fine Particulate Air Pollution' an average adjusted mortality relative risk associated with a 10 $\mu g/m^3$ change in fine particles measuring less than 2.5 ?m in diameter of 1.06 (95% CI 1.02-1.11):

> See: http://jama.ama-assn.org/cgi/reprint/287/9/1132

63. Jerrett et al (2005) stated in 'Spatial analysis of air pollution and mortality in Los Angeles'. This study was based on data selected from the ACS cohort for the period 1982-2000:

"After controlling for 44 individual covariates, all cause mortality had a relative risk (RR) of 1.17 (95% confidence interval = 1.05-1.30) for an increase of 10 μg/m^3 $PM_{2.5}$ and a RR of 1.11 (0.99-1.25) with maximal control of both individual and contextual confounders":

See: http://www.ncbi.nlm.nih.gov/pubmed/16222161

64. COMEAP published an Interim Statement on 18 January 2006 recommending the use of coefficient based on the average exposure period reported by Pope et al 2002 as:

". . .our best, current, estimate of that linking $PM_{2.5}$ and all-cause mortality in the UK' (COMEAP 2009, page 60)"

"Our interim conclusion is then that the effects on mortality of long-term exposure to a mixture of air pollutants, represented by $PM_{2.5}$, are best characterized by the following coefficient, expressed in terms of the percentage change in relative risk of all cause mortality per 10 μg/m^3 change in annual average $PM_{2.5}$:

with 95% CI (1.02-1.11)

"We note this represents a change from that provided in our last report. This reflects the expansion of the evidence-base in this area and our deeper understanding of the effects of pollutants, and other factors, on health". COMEAP 2009, page 61:

See: http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@ab/documents/digitalasset/dh_096803.pdf

65. In 2006, the World Health Organisation published updated global guidelines on air quality. This recommended a coefficient of 6% per 10 μg/m^3 increase in $PM_{2.5}$ which has been used by the European Commission and others in the CAFÉ (Clean Air for Europe) studies:

See: http://www.euro.who.int/Document/E90038.pdf

66. Laden et al (2006) stated in 'Reduction in Fine Particulate Air Pollution and Mortality, Extended Follow-up of the Harvard Six Cities Study':

"We found an increase in overall mortality associated with each 10 μg/m^3 increase modeled either as the overall mean (rate ratio [RR], 1.16; 95% confidence interval [CI], 1.07-1.22) or as exposure in the year of death (RR 1.14; 95% CI, 1.13-1.44)":

See: http://ajrccm.atsjournals.org/cgi/reprint/173/6/667

67. In 2007, Defra published its Air Quality Strategy which adopted the 6% coefficient per 10 μg/m^3 increase in $PM_{2.5}$.

68. Pope et al (January 2009) stated in 'Fine-Particulate Air Pollution and Life Expectancy in the United States':

"A decrease of 10 ug per cubic meter in the concentration of fine particulate matter was associated with and estimated increase in mean (+/-SE) life expectancy of 0.61+/-0.20 year":

See: http://content.nejm.org/cgi/reprint/360/4/376.pdf

69. In June 2009, in its report titled "Long-Term Exposure to Air Pollution: Effect on Mortality", COMEAP stated in paragraph xiii on page 3:

"Best estimate of 1.06 with 95% confidence interval 1.02-1.11.

"Our representation of the uncertainty regarding the coefficient linking the relative risk of death from all-causes to long-term exposure to $PM_{2.5}$ is given in the figure.

"For the purposes of conducting impact assessments regarding all-cause mortality and assessing policy interventions designed to reduce levels of air pollutants, we have recommended that the full distribution of probabilities be used as an input into Monte Carlo analysis, the approach we favour. Alternatively, we suggest that the plausible 'low' and 'high' values of 1.01 and 1.12, respectively, based approximately on the 12.5% and 87.5% percentiles of the overall range of plausibility, could be used in sensitivity analyses.

"We also recommend that the wider interval of 0 to 15% (relative risk 1.00 and 1.15) be included in any report on quantification of risks from long-term exposure to particulate air pollution represented by $PM_{2.5}$":

See: http://www.dh.gov.uk/ab/COMEAP/DH_108151

COMEAP went on to state on page 60:

"We have chosen the coefficient based on the averaged exposure period reported by Pope et al (2002) as our best estimate, current, estimate of that linking $PM_{2.5}$ and all-cause mortality in the UK. This coefficient is based on the largest available cohort study".

70. Commenting on this and other criticism of it for excluding key scientific research, COMEAP stated in paragraph 1 on page 179 "A cut-off date of early 2006 was adopted for published work which was considered in detail. We note that this, unfortunately, excludes an important and influential review by Pope and Dockery (2006) and recommend reading of that review to readers of this report".

71. In other words, based on cohort studies, COMEAP 2009 proposed a hazard rate (or risk coefficient) for long-term exposures of 6.0% per 10 μg/m^3 increase in annual mean $PM_{2.5}$ for those aged 30 years and over.

72. CCAL urges the EAC to consider the Peer Review comments submitted on COMEAP's draft report (see Appendix 1 of COMEAP 2009) which include serious criticisms of its choice of coefficients and of the elicitation process used by COMEAP:

See: http://www.dh.gov.uk/ab/COMEAP/DH_108151

73. CCAL urges the EAC to consider Defra's report on the impact of delay in comply with air quality laws on race. It is titled 'UK notification to the European Commission to extend the compliance deadline for meeting PM_{10} limit values in ambient air to 2011, Race Equality Impact Assessment (England)'.

74. CCAL is not aware of any update on total societal costs since that in Table 2.14 on page 90 of Defra's Air Quality Strategy 2007 (AQS):

http://www.defra.gov.uk/environment/quality/air/airquality/publications/stratreview-analysis/chap-2-icgb.pdf

While 6% remains the COMEAP 2009 recommendation, the range for 2005 societal costs is £8.582 billion to £20.165 billion. The seven to eight months appeared in the Foreword of the same Defra AQS.

75. Applying COMEAP 2009 recommendations using the Precautionary Principle suggests a coefficient of 15%. Even however at a lower 12%, the societal costs were £16.238 billion to £38.115 billion in 2005 (per Table 2.14 in the Defra AQS referred to above).

APPENDIX 2

CCAL's LAY CALCULATION OF PREMATURE DEATHS DUE TO $PM_{2.5}$ IN THE UK IN 2005

76. The European Topic Centre on Air and Climate Change estimated in its paper titled 'Health Impacts and Air Pollution—An exploration of factors influencing estimates of air pollution impact upon the health of European citizens' in December 2008 that there were 51,537 premature deaths attributable to exposure to ambient PM_{10} concentrations in the UK in 2005 (Table 1.1 on page 8):

See: http://air-climate.eionet.europa.eu/reports/ETCACC_TP_2008_13_HealthImpact_AirPoll

77. CCAL has calculated the number of premature deaths due to $PM_{2.5}$ in the UK in 2005 using three separate methods. CCAL's first estimate—The European Environment Agency's report titled 'Spatial assessment of PM_{10} and ozone concentrations in Europe (2005)' provides (in Figure 3.4 on page 20) an estimate of around 650 premature deaths per million ie 61 times 650 = 39,650 premature deaths due to PM_{10} (or $PM_{2.5}$) in the UK in 200:

See: http://www.eea.europa.eu/publications/spatial-assessment-of-pm10-and-ozone-concentrations-in-europe-2005-1

78. CCAL's second estimate is based on the methodology in its letters to Mayor Johnson dated 20 September and 17 November 2009 respectively.

The total number of UK deaths (all ages) in 2005 was 582,700 (Annex B, Table B1 on page 97 of the report via the link below):

http://www.statistics.gov.uk/downloads/theme_population/KPVS32_2005/KPVS2005.pdf

Less 1.9% to get deaths of people aged 30 and above (per CCAL letter to Mayor Johnson dated 17 November) = 571,629 deaths.

Exposed to 10.144 μg/m^3 $PM_{2.5}$ as the UK population-weighted average for 2005 (see Appendix 3).

Gives for $PM_{2.5}$ and PM_{10} (ie assuming $PM_{2.5}$ and PM_{10} premature deaths are the same as seems to be current government policy):

6% adjusts to 5.74%	=	32,811 premature deaths
12% adjusts to 10.86%	=	62,079 premature deaths
15% adjusts to 13.22%	=	75,569 premature deaths

Therefore, assuming COMEAP's 6% coefficient (2009) gives 32,800 premature deaths for 2005 using the same 6% assumption and the same other parameters (ie 10.144 μg/m^3 of anthropogenic (ie man-made) $PM_{2.5}$) used in the Defra AQS 2007.

79. CCAL's third estimate uses the methodology indicated by Professor Kunzli et al (2001):

A calculation of the equivalent to 7 to 8 months across 61 million people.

Using (say) 7.5 months, as the average for 61 million people, CCAL calculates:

(Premature deaths in 2005) x (105 x 9.8 x 12) = (7.5 months x 61m). Hence, premature deaths for 2005 constant levels of $PM_{2.5}$ is 37,050.

Where 105 is the number of years for the whole cohort to die and 9.8 is the average life lost per victim and 12 converts it to months.

80. CCAL therefore estimates that between 33,000 to 40,000 people died prematurely due to $PM_{2.5}$ (or PM_{10}) in the UK in 2005 assuming COMEAP 2009's 6% coefficient. The number may be as high as 51, 537.

81. Assuming CCAL is correct, pending a better estimate from the Government, it is not unreasonable to assume there have been some 350,000 premature deaths due to $PM_{2.5}$ and/or PM_{10} over the last 10 years compared to the 81,000 premature deaths one might have assumed from COMEAP or government published figures. In CCAL's view, this 'gap' of over 250,000 may represent one of the biggest public health failings or 'cover-ups' in modern history.

82. CCAL is concerned separately, based on a close reading of the Peer Review of the COMEAP 2009 report, that COMEAP may be substantially underestimating the health impact at 6% per 10 $\mu g/m^3$ $PM_{2.5}$. Higher coefficients of 12%, 15%, 16% and/or 17% are possible.

APPENDIX 3

AGREED CALCULATION OF PREMATURE DEATHS DUE TO $PM_{2.5}$ IN LONDON IN 2005

CCAL and the Health Protection Agency (HPA) have used national average annual $PM_{2.5}$ concentrations from Defra's Air Quality Strategy 2007 to calculate the Attributable Deaths in London in 2005 due to exposure to $PM_{2.5}$ and the following further assumptions:

(i) London has the same anthropogenic $PM_{2.5}$ (ie man-made fine particles) annual average population-weighted mean as the whole UK of 10.144 $\mu g/m^3$ (gravimetric) (see Table 2.11 on page 87 of Volume 3 of Defra's Air Quality Strategy 2007) in 2005.

(ii) http://www.defra.gov.uk/environment/quality/air/airquality/publications/stratreview-analysis/chap-2-icgb.pdf

(iii) Note that Defra assumed (on page 87) the level of non-anthropogenic $PM_{2.5}$ to be constant and estimated it to be about 3.37 $\mu g/m^3$ annual average population-weighted mean.

(iv) Dr Heather Walton of the Health Protection Agency confirmed in a presentation to the Air Quality Summit held on 30 November 2009 that Inner London is estimated to have exposure levels for $PM_{2.5}$ 50% higher than the UK national average ie 15.216 $\mu g/m^3$;.

(v) 52,995 total deaths in London in 2005 from Table 4.1b on page 57 of National Statistics: Key Population and Vital Statistics, Local and Health Authority Areas. These deaths comprised 17,650 in Inner London and 35,345 in Outer London. See: http://www.statistics.gov.uk/downloads/theme_population/KPVS32_2005/KPVS2005.pdf

(vi) The death rate of those dying before 30 years of age as 1.9% of total deaths from Table 6.1 on page 47 of National Statistics, Population Trends, No. 124, Summer 2006. See: http://www.statistics.gov.uk/downloads/theme_population/PT124.pdf

(vii) Calculated that there were 52,995 x (1—0.019) = 51,988 total deaths in London in 2005 of people aged 30 and above split between 17,315 in Inner London and 34,673 in Outer London; and

(viii) Applied the recommendations from COMEAP's 2009 Report to use a coefficient of 6% per 10 $\mu g/m^3$ of $PM_{2.5}$ as the best estimate of Attributable Deaths, with a sensitivity of 12% and a wider interval of 15% (which COMEAP said should be used in any report on quantification of risks from long-term exposure to air pollution represented by $PM_{2.5}$).

The calculation of premature deaths is explained in the footnote on page 46 of the COMEAP 2009 Report. It says:

> "If the new concentration change in population-weighted mean for the policy interest is –x $\mu g/m^3$ (with a negative sign as the analysis usually concerns reductions), then the new RR [Relative Risk] for an x $\mu g/m^3$ reduction is calculated as 1.06-x/10 [assuming 1.06 is the RR for a 10 $\mu g/m^3$ increase in $PM_{2.5}$]. As the equation represents a curved relationship, concentration increments need to be identified as increases or decreases—the new RR will have a different value for a given concentration increment depending on whether it is for an increase or a decrease".

CCAL and the HPA have therefore used the above log-linear function to scale the results to ensure an accurate number and applied the resulting RR to the number deaths of people of 30 years of age and older.

The agreed calculations for London in 2005 using the different coefficients and assuming 1.5 times UK average population-weighted exposures for Inner London and 1.0 times for Outer London are:

6%: Attributable Deaths = 17,315 x $(1—1.06^{-15.216/10.000})$ + 34,673 x $(1—1.06^{-10.144/10.000})$ = 3,459
12%: Attributable Deaths = 17,315 x $(1—1.12^{-15.216/10.000})$ + 34,673 x $(1—1.12^{-10.144/10.000})$ = 6,508
15%: Attributable Deaths = 17,315 x $(1—1.15^{-15.216/10.000})$ + 34,673 x $(1—1.15^{-10.144/10.000})$ = 7,900

Previously CCAL had simply applied the RRs of 1.06, 1.12 and 1.15 figures for the 10.144 $\mu g/m^3$ reduction in $PM_{2.5}$ as indicated on page 46 of the COMEAP Report 2009 can be done as an approximation. The differences for a 15.216 $\mu g/m^3$ and 10.144 $\mu g/m^3$ reduction in $PM_{2.5}$ become:

Instead of 6%: $1—1.06^{-15.216/10.000}$ = 8.48% $1—1.06^{-10.144/10.000}$ = 0.0574 ie 5.74%
Instead of 12%: $1—1.12^{-15.216/10.000}$ = 15.84% $1—1.12^{-10.144/10.000}$ = 0.1086 ie 10.86%
Instead of 15%: $1—1.15^{-15.216/10.000}$ = 19.16% $1—1.15^{-10.144/10.000}$ = 0.1322 ie 13.22%

APPENDIX 4

HEALTH RISKS—NITROGEN DIOXIDe (NO_2)

83. At Environmental Protection UK's autumn conference on 12 November 2009, CCAL recollects Professor Jonathan Ayres, Chairman of COMEAP, making a personal comment (ie not official COMEAP policy) to the whole meeting that public exposure to ambient concentrations of nitrogen dioxide in the urban environment is 'irrelevant' for public health. CCAL recollects Professor Ayres went on to emphasise though that NO_2 has the advantage of being very easy to monitor and it is a reliable indicator of hazardous vehicle emissions. Despite these important clarifications, CCAL considers that Professor Ayres' personal comments could be a source of public confusion and therefore merit clarification from the Government.

84. In a written question on 27 October 2009, Lord Berkeley asked:

> "To ask Her Majesty's Government what harmful air pollutants are likely to be present in ambient air when concentrations of nitrogen dioxide (NO_2) are high; and in what proportions".

85. Lord Davies of Oldham replied in a statement:

> "Nitrogen dioxide (NO_2) arises directly and indirectly from combustion processes. Concentrations are generally highest close to their emission sources, primarily road transport followed by the power generation industry and other industrial and commercial sector sources.
>
> "The nature of the combustion processes and fuel used will determine the presence of other pollutants, such as particulate matter, polycyclic aromatic hydrocarbons, benzene, carbon monoxide and sulphur dioxide. It is not possible to define the proportions that these pollutants may be present in at any particular location at any one time. Proportions will vary with time, the distance from sources, meteorology, and chemistry depending on the type of combustion processes and emissions released":
>
> See: http://www.theyworkforyou.com/wrans/?id = 2009-10-27a.138.0

86. Please see COMEAP's statement on the quantification of the effects of long-term exposure to nitrogen dioxide on respiratory morbidity in children (October 2009):

> See: http://www.dh.gov.uk/ab/COMEAP/DH_108150

87. Please note that WHO confirmed in 2006 its concerns about the health impact of exposure to NO_2. In this respect, Dr Michal Krzyzanowski (who lead that report) expressed a personal view to CCAL that there has been much less research into the health effects of NO_2 than that for $PM_{2.5}$ and PM_{10}. He commented similarly to CCAL that NO_2 concentrations should not be made worse by measures to reduce other pollutants.

88. Please note that recent research by David Carslaw that indicates NO_2 levels may not fall as levels of oxides of nitrogen (NO_x) fall eg with newer standards for European vehicle emissions.

APPENDIX 5

THE DELIVERY CHAIN FOR AIR QUALITY

89. The almost total disjunction between the Government's responsibility, on behalf of the Member State, and the 'work towards compliance' duty on local authorities is a recipe for failure. In general, local authorities (and the Mayor of London) seem to have little appetite to take action they are not required to take. Action: The Environment Agency should be given national responsibility, authority, accountability and resources to ensure full compliance everywhere with air quality laws (perhaps as in the US, proposed at Heathrow and in relation now to flooding. Alternatively, a very clear chain of delivery needs to be defined for each layer of government.

90. Britain's Transport Infrastructure Adding Capacity at Heathrow: Decisions Following Consultation published by the Department for Transport in January 2009 paragraph 64 on page 24 stated:

> "On air quality, the Environment Agency would be responsible for overseeing monitoring and analysing air quality data. Because background emissions, emissions from surface transport, both airport-related and non-airport-related, and aviation emissions are contributory factors to air quality around Heathrow, the Agency would report any breaches to both Secretaries of State. The CAA, in respect of noise, and the Environment Agency, in respect of air quality, will have the necessary powers to ensure that relevant parties take their share of the remedial action needed to comply with the respective legal limits. The Agency would take account of its duties and relevant guidance provided by the Secretary of State for Environment, Food and Rural Affairs, in agreement with the Secretary of State for Transport":
>
> http://www.dft.gov.uk/pgr/aviation/heathrowconsultations/heathrowdecision/decisiondocument/decisiondoc.pdf

91. Defra Air Quality Forum on 24 February 2009 minutes:

> "CCAL were concerned that the Mayor for London and local authorities were only required to work towards the achievement of the air quality objectives. They suggested that the Secretary of State should issue a direction under the legislation, which stated that "at a minimum, the Mayor and the local authorities should commit to use their best efforts to implement successfully actions to improve air quality in London, when it exceeds limit values, which are meaningful when judged in the context of all their available powers and the deadlines applicable under UK and European law". CCAL considered this would allow the necessary actions to be enforceable by various people at local and national level":
>
> http://www.defra.gov.uk/environment/quality/air/airquality/panels/forum/documents/aqforum-minute-090224.pdf

13 December 2009

Memorandum submitted by the Joint Nature Conservation Committee (AQ14)

1. Summary

1.1 This response focuses on the impacts of air quality on the natural environment in the context of UK nature conservation policies and obligations.

1.2 There is strong evidence of the effects of air pollution on semi-natural ecosystems in the UK. Large areas of sensitive ecosystems remain at risk from atmospheric deposition in 2020. This includes nature conservation sites protected under national and European legislation.

1.3 The UK's monitoring networks for concentrations and deposition of the main atmospheric air pollutants are adequate. There is a need to review monitoring requirements in respect of ecosystem impacts. JNCC is funding work in this area in collaboration with Defra and the country conservation agencies.

1.4 The Government's understanding of, and commitment to, investigating the environmental risks of air quality at a broad level is good. However, there is a need for more work to interpret effects in relation to policies for biodiversity and ecosystem services.

1.5 Impacts on ecosystem services should be a central part of air pollution policy alongside human health. There are synergies between air pollution policies focused on human health and environmental health.

1.6 The UK Air Quality Strategy should give greater attention to protection of ecosystems, including more ambitious targets.

2. The Monitoring and Modelling Systems Used by the Government and Whether these Provide an Adequate Measure of Air Quality

2.1 The UK monitoring networks and atmospheric models for concentrations and deposition of air pollutants are considered adequate for national-level assessments and reporting. It is recommended that they should be maintaine[1].[20] Monitoring is an essential part of the evidence base needed to underpin policy. Appropriate monitoring allows changes to be detected and quantified and therefore provides an objective basis for assessing the nature and seriousness of threats to biodiversity. It improves the understanding of the processes causing change and enables the testing of predictive models.

2.2 There are also a number of monitoring schemes which provide evidence of air pollution impacts on ecosystems. Some of these schemes have been established and designed specifically to monitor the effects of air pollution on a small sample of sites and also provide information on the process underlying responses. Examples include the government-funded Acid Waters Monitoring Programme, Environmental Change Network and Forest Level II survey. A number of other schemes, which are not specifically targeted at assessing air pollution impacts, provide useful data on changes to vegetation which can be correlated to atmospheric deposition. As such, they provide a general detection mechanism, but attribution of a signal to a specific pressure, ie air pollution, is more difficult. An example is the Countryside Survey[2] which has shown vegetation change between 1978 and 2000, stabilising in 2007, consistent with a response to excess nitrogen and which correlates significantly with nitrogen deposition.

2.3 However, there are no schemes which provide direct and comprehensive assessment of air pollution impacts on terrestrial semi-natural ecosystems. This gap was identified in the report of the National Expert Group on Transboundary Air Pollution[3] in 2001, which made recommendations for further monitoring. Yet, there are a wide range of surveillance schemes covering different aspects of UK biodiversity. Therefore, in collaboration with Defra, CCW, Natural England and SNH, JNCC is currently funding a research project to collate the evidence of nitrogen effects on biodiversity. This project will analyse a range of broad-scale vegetation datasets in order to correlate vegetation change with nitrogen deposition. It will use the results,

[20] For local impact or regional assessments, for example in respect of risk assessments of impacts from a local installation on a protected nature conservation site, the number and location of monitoring sites and the relatively coarse resolution of long-range models mean that in some cases additional monitoring is required.

together with other air pollution research and review, to provide evidence of nitrogen deposition and how it affects the UK's and devolved administrations' conservation policy obligations and targets, for example, those under the UK and country Biodiversity Strategies.

2.4 The project will assess the adequacy of the evidence base and whether new surveillance or a modification to existing surveillance is required. The recommendations will be put to the UK Terrestrial Biodiversity Surveillance Strategy[4] Implementation Group. This work relates closely to a recommendation in the draft report of the Review of Transboundary Air Pollution[1] which states there should be a review of existing soils and vegetation schemes and proposals. However, the scope of their recommendation is wider than nitrogen deposition, which is the focus of the JNCC led study (as this is seen as the priority), and includes ozone, acidification and heavy metals.

3. The Extent to Which the Government Fully Understands and has Identified the Health and Environmental Risks Caused by Poor Air Quality

3.1 There is unequivocal evidence that air pollution has caused widespread changes to sensitive ecosystems in the UK. The Government funds a substantial research programme on air pollution effects on ecosystems, including a number of valuable long-term field manipulation experiments. This has provided the UK with a strong evidence base to support policy development, for example in relation to the National Emissions Ceilings Directive and the Gothenburg Protocol (and their current reviews).

3.2 The Government has commissioned a Review of Transboundary Air Pollution (RoTAP) which is due to publish its report in the spring 2010. The RoTAP report aims to review the current state of rural air pollution issues in the UK, evaluate the extensive measurements of atmospheric pollutants and their effects, and produce a synthesis of current understanding which will be used to inform air quality policies. The draft report is currently out for public consultation with a deadline of 11 January 2010.

3.3 It describes widespread exceedance of critical loads for acid and nutrient nitrogen deposition and presents strong evidence that nitrogen has reduced plant species diversity in semi-natural habitats across the UK. It also states that there is ongoing chemical recovery in soils and freshwaters, in response to reductions in deposition. However, recovering freshwater biological communities do not resemble their pre-acidification communities.

3.4 Therefore the Government's understanding of, and commitment to, investigating the environmental risks of air pollution at a broad level is good. However, it is also important to consider the significance of these effects in terms of the UK's biodiversity commitments.

3.5 In particular, the Habitats Directive[5] requires Member States to take measures to maintain at, or restore to, favourable conservation status, the natural habitats and species of Community Importance. The UK's second report under Article 17 of the directive,[6] on the conservation status of habitats and species, identified air pollution as a threat to the conservation status of 53 out of the 77 habitats reported on for the UK Atlantic region.

3.6 The UK environment agencies and conservation agencies also use critical loads and levels when assessing the impacts of point sources on sites of international and national importance (ie Special Areas of Conservation[21] and Areas/Sites of Special Scientific Interest). The agencies have jointly developed a database of relevant critical loads for interest features on these protected sites and have modelled acid and nutrient nitrogen deposition to sites, apportioning this to major sources or source sectors. This shows that based on 2005 emissions, 79% of Special Areas of Conservation (57% by area) exceed the nutrient nitrogen critical load and 68% (40% by area) exceed the acidity critical load.[7] As well as a tool for informing site-specific risk assessment, it is potentially a useful policy tool to help target emission reductions.

3.7 Over the past decade, nutrient nitrogen critical load exceedance has remained virtually unchanged with approximately 60% of sensitive semi-natural habitat area in the UK being exceeded.[8] Even with the currently proposed emission reductions put in place, it is calculated that by 2020 approximately 50% of sensitive habitat area will still exceed the critical load.[1] While the majority of this exceedance will be driven by deposition of reduced nitrogen (arising from ammonia emissions, the major source of which is agriculture) a significant amount will still come from oxidised forms of nitrogen (sources include transport, shipping, power generation and industry).

3.8 The ecosystem services concept offers an additional approach to evaluate the marginal benefits of different air pollution polices. Such an approach would provide a holistic consideration of the positive and negative impacts of air pollution on the services ecosystems provide and the resulting effects on human well-being. Defra funded a scoping study in 2008[9] which scoped the potential for the approach to be applied to air pollution policy, using ammonia as a case study. It showed potential for the methodology, but data gaps remain particularly regarding the valuation of marginal benefits. However, the approach in respect to air pollution policy remains in its infancy and we recommend further development to identify and rectify the most critical data gaps and greatest uncertainties, such that the application of the concept in respect of air pollution is sufficiently robust to inform future policy development.

[21] Special Areas of Conservation are defined under the Habitats Directive.

3.9 In conclusion, the UK Government has a strong understanding of the environmental risks caused by air pollution, although a number of research questions remain (for example, see the draft RoTAP report). There is convincing evidence of pollution impacts on ecosystems in the UK. In addition, risk assessment approaches, such as those based on critical loads, show a continued widespread threat to nationally and internationally protected sites and biodiversity in the wider countryside.

4. The Extent to which the Delivery Chain for Air Quality is Coherent, Integrated, Coordinated and Effective and Whether the Bodies with Responsibility for Managing Air Quality have Appropriate Incentives, Understand their Role and Responsibilities, and are Adequately Resourced

4.1 Responsibility for air pollution policy and control is spread across different government departments, both centrally and locally, as well as government agencies.

4.2 The conservation agencies are statutory advisers under pollution and planning legislation and provide advice on the local impacts of air pollution arising from point sources, road schemes and other planning casework in relation to the various statutory obligations in addition to more strategic advice at a country and UK level. The conservation agencies generally support a more strategic approach to planning which influences sources of air pollution. Regional spatial plans provide an opportunity to address air pollution impacts on natural ecosystems, including protected sites. However, in practice this is difficult as there is a lack of both guidance and of atmospheric deposition modelling and source attribution tools available for use at the regional level. The country conservation agencies have found plans to be variable in quality and the extent to which they consider air quality.

4.3 One area which appears to fall between current governance structures is that of ammonia from agriculture, with the exception of large pig and poultry installations which are regulated under the Environmental Permitting Regulations (EPR) in England and Wales and the Pollution Prevention and Control (PPC) (Scotland) Regulations. Potential impacts of ammonia emissions from such installations are therefore considered as part of the permitting regime. However, we advise that improved co-ordination at the planning and permitting stage, and greater involvement of the relevant environment agency during the planning process, would improve the efficiency of assessments. For other agricultural activities, which do not fall under the EPR or PPC (Scotland) Regulations, there are no formal mechanisms for dealing with emissions from other agricultural activities, other than the non-mandatory codes of good agricultural practice[10] in each country. For example, dairy and cattle farming was responsible for 56% of ammonia emissions in the UK[11] in 2005 and yet land use planning currently fails to take account of this. It would be beneficial to have a framework within land-use planning policy within which agricultural development could take place.

5. The Steps that Need to be Taken to Ensure that Air Quality Targets will be Met in the Future

5.1 Our evidence focuses on the impacts on biodiversity in relation to both concentrations of air pollutants and deposition. Our response in section 3 outlined the strong evidence of air pollution impacts on UK ecosystems. Whilst air pollution policies and commitments will reduce emissions further, and recovery from acidification is evident in some locations[1] there remains a continuing risk to ecosystems. Effects on ecosystems and their goods and services, should be a central driver for air pollution policy, alongside human health considerations. However, this is not always the case, for example the Air Quality Strategy (AQS) includes only a partial consideration of air pollution impacts on ecosystems. Therefore, this section of our response considers the gaps or shortfalls in current policies and where these could be better targeted to protect ecosystems.

Emission Ceilings

5.2 Exceedance of ecosystem critical loads was a major driver for the National Emissions Ceilings Directive and the Gothenburg Protocol. These policy instruments are now being reviewed, which will introduce lower national emission ceilings as well as additional pollutants, including fine particulates. There are many synergies between air pollution policies driven by human health issues and that for ecosystems, for example ammonia is a source of secondary fine particulate matter as well as a major contributor to eutrophication, and it is important that the co-benefits are maximised whilst conflicts minimised. Modelling studies in the UK and Europe have shown that even with the implementation of the maximum feasible technical reductions in emissions, a significant exceedance of critical loads remains.[12] Deposition of 'reduced' nitrogen (arising from ammonia emissions) is a major component of nutrient nitrogen and acid deposition. The nature of ammonia sources and the pollutant's atmospheric chemistry mean that policies which consider local spatial targeting of emissions should be considered in addition to broad-scale national emissions ceilings.[13]

5.3 While the Environmental Audit Committee's inquiry is focused mainly on local air quality in certain regions, it also noteworthy that the Government is predicting that it will fail to meet its NECD target for NO_x. The NECD UK NO_x ceiling is 1,167kt and Defra predicts we will be 11% short of this target in 2010.[14] This is in part due to increase coal burning for electricity production.[15]

5.4 In response to a 1998 Environment Agency consultation on "Controls of Emissions from Coal and Oil Fired Power Stations", CCW and English Nature called upon the Agency to require the fitting of Selective Catalytic Reduction (SCR) on existing and new power stations to control NO_x emissions. At this time the technology was well founded and was being applied in other parts of Europe, such as Germany, where coal burning also provides a major source of electricity.

5.5 A report commissioned by Defra in 2008[16] investigated how the UK could achieve compliance with the NO_x National Emission Ceiling for 2010 in a cost-effective manner. It recommended that the lowest cost option would be to target road transport, the cement industry, other industrial combustion (ie gas boilers, turbines, and engines) and coal power stations (bringing forward fitting of SCR, which is obligatory under current legislation by 2016).

Air Quality Strategy

5.6 The 2000 AQS did not address the impact of air pollution on ecosystems to any significant extent. It was primarily concerned with the improvement of air quality for the protection of human health. The Government have stated that the scope of the strategy should be progressively extended to address key ecosystem impacts.[17] JNCC welcomes this and are pleased to see that the 2007 AQS went some way to encompass wider concerns, such as atmospheric deposition (and critical loads exceedance), ammonia and ozone. However, despite this, we remain concerned that the 2007 AQS still provides little in the way of protection of ecosystems from air pollution, over and above actions and commitments already in place. For example, it excludes ammonia, which is now seen as a priority[6] and avoids setting targets or objectives for critical loads exceedance (although the Government did include critical loads exceedance when evaluating the benefits of different policy options for the 2007 AQS).

5.7 JNCC has raised these concerns with Defra, and its predecessor bodies, on a number of occasions over the past 10 years and has advised that the AQS still fails to fully address Government commitments and policies for biodiversity.

5.8 The AQS considers the impacts of NO_x and SO_2 on ecosystems and defines national objectives for ecosystems for these two pollutants. These are $20ugm^{-3}$ annual mean/winter mean for SO_2 and $30ugm^{-3}$ annual mean for NO_x. The UK is currently meeting these objectives, where they apply. The NO_x objective is notably lower than the annual mean limit value for NO_2 for protection human health ($40ugm^{-3}$). However, protection of ecosystems from these pollutants is inadequate under the AQS. It states that compliance with the objectives is not required in areas less than 20km from an agglomeration or less than 5km from built-up areas, major roads or Part A process. This is derived from the monitoring provisions of the 1st Air Quality Daughter Directive. However, these are the very areas where sensitive ecosystems are vulnerable to exceedance of the objectives. We have used the term exclusion zones to define these areas. It is estimated that 37% of SSSIs (and ASSIs) and 53% of Natura 2000 sites and Ramsar sites lie within the exclusion zones and are therefore not protected by the objectives.[2]

5.9 We have advised Defra that this conflicts with the UK's nature conservation commitments, for example Article 6 of the Habitats Directive which requires prevention of deterioration to Special Areas of Conservation.

5.10 The review of the strategy in 2006 considered options for extending the 2000 Strategy's objectives for SO_2 and NO_x for protection of vegetation, but none was adopted in the 2007 strategy which stated that Defra will instead "take forward additional analysis and consider how best to ensure protection of ecosystems against air pollution in the medium to the long term". JNCC has offered to support the Government on this further work.

5.11 The new Directive on ambient air quality and cleaner air for Europe has amended the monitoring provisions regarding vegetation objectives to include provisions for Member States to place monitoring in "particularly vulnerable areas". This offers scope for extending compliance of the objectives to defined areas within exclusion zones. The conservation agencies are currently considering this and will advise Defra in their response to current consultation on the transposition of the Directive which closes on 29 January 2010.

5.12 The main drivers stated for this air quality inquiry are related to the UK's failure to meet the PM targets under the EU Air Quality Framework Directive and the prediction that it will fail to meet the NO_2 limit value in parts of the country. Close to major urban, industrial areas or major roads the NO_x vegetation objective is also exceeded. This includes a number of protected sites. However, as they occur in the 'exclusion zones', there is currently no obligation within the AQS to meet this objective. Yet, these breaches are generally a result of emissions from the same sources that are responsible for the current breaches of human health standards. So there are benefits of tackling NO_2 in relation to human health that could represent a 'win-win' situation for ecosystem protection.

5.13 In future, many of the reductions in air pollution will be driven by efforts to reduce greenhouse gases. It is essential that the effects of climate change policies on air pollution emissions (and atmospheric chemistry), for example policies on power generation (CO_2) and agriculture (CH4 and N2O), are fully considered at an early stage in policy formulation, so that the co-benefits can be maximised and potential conflicts addressed. This is recognised by the Air and Local Environment Programme at Defra and the devolved administrations.

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14 December 2009

Memorandum submitted by the Local Authorities Coordinators of Regulatory Services (LACORS) (AQ 15)

Introduction

LACORS (The Local Authorities Coordinators of Regulatory Services) is part of the LGA Group. LACORS promotes quality regulation to councils in the areas of trading standards, environmental protection, licensing and gambling, food safety, health and safety, hygiene and standards, animal health and welfare and private sector housing. LACORS offer comprehensive advice and guidance to councils and their partners, disseminating good practice and providing up-to-date information on policies and initiatives that affect local people and local services. We lobby on behalf of councils and ensure that legislation and government policy can be practically implemented, and with our colleagues in the LGA group, ensure we contribute to sector-led improvement. www.lacors.gov.uk

LACORS works with all local authorities across England and Wales in a number of key policy areas, including that relating to environmental protection.

Summary

The monitoring and modelling systems provide an adequate measure of air quality. It is the question of how actions to improve air quality can be delivered more effectively that now requires additional focus.

There is a significant evidence base regarding the health impacts of air pollution; however the Government may not be using the most up-to-date information.

It is often frustrating for local authorities working towards improving air quality that they lack control over many of the main sources of pollution in their areas and funding for measures.

The delivery chain for air quality is fragmented and there is a need for more co-ordinated working at all levels of government and between the various stakeholders.

Significant behaviour change is required to reduce emissions and greater public understanding of air quality sources and impacts is necessary to achieve this.

Detailed comments on the areas of interest to the Committee are set out below.

The monitoring and modelling systems used by the Government and whether these provide an adequate measure of air quality

1. Local monitoring, national monitoring and modelling and the associated reporting are well established and relevant local authorities have developed a considerable amount of expertise in this area. Overall, the monitoring side of local air quality management works well. The current system may not provide an exact measurement of public exposure due to the limitations of locating monitoring stations where exposure is highest, but we consider that it does provide an adequate measure of air quality.

2. There does sometimes appear to be a disconnect between local monitoring and Department for Environment, Food and Rural Affairs (Defra) central modelling, on which we would seek further clarification.

3. Whilst the measurement of air quality is of course important, it is the question of how actions to improve air quality can be delivered more effectively that now requires additional focus.

The extent to which the Government fully understands and has identified the health and environmental risks caused by poor air quality

4. There is a significant evidence base on the health impacts of air pollution, especially with regard to particulate matter. The Committee on the Medical Effects of Air Pollution (COMEAP) has produced several reports, including on the effect on mortality of long-term exposure to air pollution. Other international studies have also contributed to our understanding of the impacts.

5. However, the oft-quoted figure of 24,000 premature deaths per year is now ten years old and based on the impacts of particulate matter alone; as a result, figures for air pollution are likely be higher when taking into account other pollutants such as ozone and sulphur dioxide. In a letter to Mayor Johnson dated 20 September 2009, the Campaign for Clean Air in London highlighted that figures for premature deaths caused by air pollution could be significantly higher than those used by the Government, if calculated using more up-to-date relative risk coefficients and by applying the precautionary principle.[22]

6. The Air Quality Strategy 2007 and many other Government publications quote the statistic of seven to eight months of life lost which may not necessarily be the most effective way of expressing the impact, especially to the public. Averaging out the health impacts across the general population diminishes the impact per person actually affected ie years lost per statistical victim, which could be as high as 9.8 years.[23]

7. In comparison with particulate matter, there is much less evidence on the impacts of nitrogen dioxide partly, due to relatively limited research. As a result, some people doubt the need for action although LACORS would advocate a precautionary approach. Moreover, nitrogen dioxide targets are of course enshrined in EU legislation.

8. That the health impacts of air quality are relatively well established has not translated into prioritisation of the issue by the Government, particularly outside of Defra.

9. There is no question that the UK must act to improve air quality; indeed, failure to meet EU objectives and the known health impacts make it imperative. This being the case, the Government should use cost-effectiveness analysis to assess which measures should be taken as opposed to cost-benefit analysis which has a tendency to rule out many actions that could make a significant difference. Several measures considered in the Air Quality Strategy 2007 were ruled out for this reason.

10. We would also encourage the Government to review the weighting given to air quality impacts in its analyses to ensure that the figures are appropriate and up-to-date with current evidence.

11. It is not only the Government that needs to better understand the risks posed by poor air quality. If we are to be successful in reducing emissions, significant behavioural change such as a modal shift away from private vehicle use is needed by the public. In addition, many 'big wins' for air quality, such as low-emission zones, require significant public buy-in for them to be politically tenable. The experience of the referendum on congestion charging in Manchester illustrates this point. Air pollution often cannot be seen, smelt or tasted by the public and most people do not understand that it harms their health, all of which contributes to its low profile.

[22] http://www.cleanairinlondon.org/

[23] Knzli et al (2001). Assessment of Deaths Attributable to Air Pollution: Should We Use Risk Estimates based on Time Series or on Cohort Studies? *American Journal of Epidemiology,* 153 (11), 1050 – 1055.

The extent to which the delivery chain for air quality is coherent, integrated, co-ordinated and effective and whether the bodies with responsibility for managing air quality have appropriate incentives, understand their role and responsibilities, and are adequately resourced

12. The delivery chain for improving air quality is fragmented, largely due to so many different actors, both centrally and locally, having an interest or control, be it the measurement of air pollution, its health impacts or control over its sources. This can result in no one organisation fully grasping all aspects of air quality which can result in the issue 'falling through the cracks'.

13. It is often frustrating for local authorities working towards improving air quality that they have a lack of control over many of the main sources of pollution in their areas, such as roads overseen by the Highways Agency and bus operators, and insufficient funding to implement measures.

14. The Highways Agency has a commitment to 'not make air quality worse' and to work with local authorities on Local Air Quality Management; however there is frustration amongst some local authorities that the air quality in their areas is largely affected by traffic from roads that are the responsibility of the Highways Agency. The Highways Agency is itself constrained by limited funding for 'environmentally incentivised schemes', which has to cover the full spectrum of the environment and is not sufficient to address air quality problems. There are some localised problems of communication between local authorities and the Highways Agency that the Highways Agency is seeking to resolve through improved internal arrangements, which are to be welcomed.

15. Buses can be a significant source of pollution in some areas and for local authorities outside of London the deregulation of bus services has left them with very limited power over the quality of both services (routes, timing etc) and vehicles standards.

16. The Department for Transport (DfT) contends that the introduction of Quality Bus Contracts and Partnerships have restored the balance of power in this respect. However, Quality Bus Contracts have had very limited take-up as they are expensive and complex to establish. Bus companies also prefer the informal approach of Quality Bus Partnerships and are therefore reluctant to enter into a more formal contract.

17. Links between central government departments require improvement. Recently, Defra and DfT appear to be linking up more effectively including quarterly liaison meetings between officials from these departments and LACORS officers. However, truly consistent joined-up policy across all relevant departments is still lacking. Although Defra and DfT are principal government departments with regard to air quality, it is essential that the Department for Energy and Climate Change, Communities and Local Government, Department of Health and HM Treasury also engage in and indeed prioritise air quality issues, which they appear to have been somewhat reluctant to do thus far.

18. We recognise that there is also a challenge for local government to work more effectively across authorities, both between departments and across geographical areas. This can be, but is not always, more pronounced in two-tier areas where air quality officers sit within the district authority and planners, who can lever key action on air quality, are located at the county level.

19. The link between air quality and planning is crucial. The places we live have too often been planned around private transport and individual journeys. The work done by the low-emission strategies group highlights some best practice in using the planning system to encourage new technologies and reduce emissions from developments.[24]

20. Co-ordinated policies across departments in both central and local government would help to highlight the links to other public health issues such as obesity, physical fitness and climate change which could increase awareness and the profile of air quality.

21. Local authorities are not adequately resourced to make many of the changes required to bring about a significant improvement in air quality, for example public transport improvements and making cycling and walking easier. Many would be willing to take further measures, but are constrained by a lack of funding. At a time when local government is facing even greater pressure on budgets, which must be stretched and shared between competing services, lack of action does not necessarily denote a lack of understanding or commitment.

22. A recent Cabinet Office report on urban transport[25] estimated the health costs of particulate matter alone to be in the region of £5–10 billion per annum. Combined with the threat of EU infraction fines potentially running into hundreds of millions of pounds, a compelling economic argument for investing in measures to mitigate air pollution becomes clear.

The steps that need to be taken to ensure that air quality targets will be met in the future

23. As outlined in the response above, there are many barriers to improving air quality. Some parties argue for strengthened duties or targets on local authorities to deliver cleaner air or to deliver EU targets. Whilst recognising that the current wording in the Environment Act 1995 could be tightened, placing a more stringent duty on local government is completely meaningless without the necessary powers and funding that could actually deliver air quality improvements, and indeed duties on others to act.

[24] http://www.lowemissionstrategies.org/
[25] http://www.cabinetoffice.gov.uk/strategy/work_areas/urban-transport.aspx

24. As highlighted in the section above, the Highways Agency has a duty not to make air quality worse. A duty to improve air quality where possible would drive further action. This should also be accompanied by an appropriate increase in funding for measures.

25. Detailed guidance on Quality Bus Contracts was only extremely recently published by DfT and we hope that this will help QBCs to be taken up more widely. However, there is still likely to be a lack of control over bus services in most areas outside of London. One option is devolving the distribution of bus subsidies to local level would allow the funding to be targeted according to local priorities, which could include encouraging the uptake of cleaner vehicles, improving service performance and reducing congestion.

26. Low-emission zones can be effective mechanisms for reducing emissions and are more widely implemented in other EU member states.[26] Although a 'one size fits all' approach would not be appropriate, a national framework setting out common standards for different types of vehicles that local authorities could select from depending on the nature of local pollution sources, and a common easy-to-enforce approach, would have a number of benefits. It would help to provide more of a central lead, reducing the political and financial risk involved in their establishment; provide more consistency for industry affected; help to prevent the displacement of higher-emission vehicles such as buses into other areas with lower standards; and reduce the scope for concern that businesses will locate in other nearby areas. LACORS has had initial discussions with DfT and Defra on this issue and will continue to liaise with them on how this framework might look to ensure that, if produced, it contains what local authorities need.

27. Central government could play a useful role by co-ordinating a stronger and more comprehensive evidence base on the effectiveness of measures that local authorities could access to inform their air quality action plans. Central collation of this information, for example what measures work well or not in which type of area or situation, would reduce duplication at local level across the country.

28. In the future, it must be ensured that the planning system gives more consideration to reducing reliance on cars. 'Retrofitting' existing poor planning is not easy, but greatly improved public transport and cycling and walking infrastructure can play a big role in this and would bring major benefits including for air quality, climate change, fitness and general wellbeing.

29. The challenges of finding funding for measures such as public transport improvements have been highlighted earlier in this response. The Department for Health is the key beneficiary of reducing pollution levels in terms of health benefits and consideration should therefore be given to providing some funding for local authority actions through Primary Care Trusts.

30. It is vitally important that the Government adopts and uses the most up-to-date evidence regarding impacts on health and mortality of air pollution and that the public is made aware of this evidence.

31. Behavioural change would bring some of the greatest benefits for air quality and climate change, although it is hard to achieve; as discussed in paragraph 11, it is important that public understanding of air quality issues is raised. Defra carried out a 'Citizen's Jury' in 2006 to explore public views on air quality.[27] The results showed that at the beginning of the exercise, there was no understanding of how air quality is measured, the health impacts, or that action can be taken by individuals to improve it. At the end of the process the participants agreed that the issue of air quality was more important than originally thought, due to the health impacts. The citizen jurors recommended a public awareness campaign that provided information on the cause and implications of air quality and what individuals could do to make a difference and how they would benefit as a result. This campaign should now be delivered with urgency, funded by central government and delivered in co-operation with local authorities.

32. Other initiatives could also be rolled out on a wider basis as part of such a campaign. For example, air alerts established in London[28] and Sussex[29] provide free alerts of expected air pollution incidents and related health advice to those with medical conditions that are exacerbated by air pollution. Innovations such as the low-pollution route option available on www.walkit.com can also help raise awareness.

33. The relationship between air pollution and climate change is not straightforward and it is essential that further effort is made to consider both these challenges in an integrated and holistic manner at both the local and national level. Many actions to encourage a modal transport shift will benefit both and these 'win-win' solutions should be taken wherever possible. There must also be greater recognition that there are sometimes trade-offs, for example, recent years have seen a marked uptake in the use of diesel vehicles and biomass burning. Both are considered to be beneficial for carbon dioxide reductions, but can have negative consequences for local air quality and hence people's health.

34. The opportunity to raise the profile of air quality by linking to the momentum surrounding climate change and CO_2 reduction campaigns should be taken wherever possible. The Government must also ensure that opportunities are not missed to integrate air quality considerations into research on transport modal changes.

[26] http://lowemissionzones.eu/
[27] http://www.defra.gov.uk/environment/quality/air/airquality/publications/citizens-jury/index.htm
[28] http://www.airtext.info/
[29] http://www.sussex-air.net/AirAlert/Default.aspx

35. More effective and joined-up policy is required between all the relevant central government departments and links between all organisations must be strengthened: between central government departments, local authorities, the Highways Agency, the Environment Agency and other stakeholders.

36. There is no simple solution to the issues around local authorities working together more effectively, which requires greater partnership working. One option is to create more strongly shared responsibility across tiers of local government, for example, responsibility for delivering certain elements of the air quality action plan sitting where the ability to deliver them resides.

14 December 2009

Memorandum submitted by Dr Mark Broomfield (AQ 17)

1. This evidence is provided by Dr Mark Broomfield, technical director with Enviros Consulting Ltd. The views set out in this document are my own, and do not necessarily represent the views of Enviros Consulting Ltd.

2. In summary, my evidence is as follows:

- Air quality differs from other areas of environmental science, in that it can be readily measured. There are tools available to forecast air quality, and their strengths and limitations are well understood.
- Air quality differs from other areas of environmental science, in that public exposure to polluted air is very hard to manage.
- The Government's monitoring systems provide an adequate measure of air quality. A change in the substances measured, and a move away from measurement towards more detailed analysis would be helpful.
- The health and environmental risks caused by poor air quality are relatively well understood. Research into some new areas (eg micro-organisms, fine particulate matter and ammonia) would be helpful.
- Appropriate systems are in place for control of emissions and management of ambient air quality.
- The delivery of improvements in air pollution derived from road traffic is the key weakness in the system. Consequently, air quality continues to fall below the relevant standards and objectives in some areas.
- It is recommended that guidance is given to local authorities to support them in deciding to take steps to manage air quality, where the need to do so outweighs other considerations.
- It is recommended that a Public Service Obligation to deliver satisfactory air quality could be placed on relevant departments.

3. The Committee has asked to be informed on a number of specific issues. I have set out my views and supporting evidence on some of these issues below.

Introduction

4. It may be helpful for the Committee to appreciate key differences between the management of air quality, and the management of other environmental pathways for exposure to pollution.

5. Air quality science has had the benefit of many years of investment in research to develop tools for monitoring and forecasting/estimating air quality. Additionally, air quality issues are relatively amenable to the use of forecasting tools. For example, the influence of meteorology on the dispersion of air pollutants is essentially repeatable, and can therefore be coded into predictive model systems. In contrast, other pathways for exposure to environmental pollution cannot be forecast in the same way. This means that there are highly detailed tools available for measuring and forecasting air pollution. The use of these instruments and models is more widespread than is the case for other environmental media.

6. A very important difference is the difficulty of managing exposure to air pollution. In the case of (for example) water pollution, people can be advised or prevented from drinking a particular water supply. In the case of a hazardous contaminated land site, access can be prevented. While these measures are undesirable, relatively straightforward controls are available. In contrast, in the case of air pollution, the public cannot be advised not to breathe the air. The management measures broadly comprise moving people away from a source of pollution, and reducing emissions from the source(s) of air pollution. In many cases, neither option is particularly straightforward or attractive.

7. The availability of measurement and forecasting methods, and the difficulty of control, have shaped the practice of air quality management in the UK.

The monitoring and modelling systems used by the Government and whether these provide an adequate measure of air quality

8. The Government's systems for measuring air quality comprise principally the following:

— A wide-ranging network of air quality monitoring stations (www.airquality.co.uk).

— Interpolated datasets of background air quality (www.airquality.co.uk).

— A framework for local authorities to assess air quality in their boroughs known as "Local Air Quality Management", supported by a set of assessment and modelling tools (www.defra.gov.uk/environment/quality/air/airquality/index.htm; see also www.uwe.ac.uk/aqm).

— A system of regulation of industrial pollution implemented by the Environment Agency and local authorities.

9. The availability of detailed air monitoring methods, together with quality assurance procedures and systems for data dissemination means that the Government's monitoring systems provide an adequate measure of air quality.

10. The monitoring systems used on behalf of national and local government deliver an extremely large body of data. There is limited benefit in continuing to expand this network. Instead, attention should be limited to monitoring air quality in areas of high pollution; areas which are representative of the range of exposures experienced by the public; and locations which are required to fulfil obligations under European directives.

11. It would be more beneficial to investigate the measurements carried out in more detail. At present, most datasets are simply analysed to identify compliance with air quality objectives and guidelines. There is much more information within these datasets which could be developed—for example, to support models of exposure. The European-funded OpenAir project is an example of work in this area (www.openair-project.org). More detailed data analysis could be brought more into the mainstream of Government's thinking on air quality.

12. It would also be very useful for investment to be shifted towards measurements of other substances, rather than focusing mainly onEn those specified under the European directives. Substances which are particularly relevant at present include ultrafine particulate matter and nanoparticles. There is considerable concern about these fractions of particulate matter, but very little environmental data compared to the much more widespread data available for larger size fractions such as PM_{10}. There is a need for baseline measurements of Chromium VI with an appropriate Limit of Detection, following the guideline published in the recent EPAQS report www.defra.gov.uk/environment/quality/air/airquality/panels/aqs/index.htm). More widespread measurements of airborne hydrogen fluoride and hydrogen chloride would be helpful in support of the development of installations such as power stations and waste management facilities. Measurements of a wider range of volatile organic compounds, particularly focusing on halogenated compounds, would also be helpful for a wide range of industrial and waste management processes.

The extent to which the Government fully understands and has identified the health and environmental risks caused by poor air quality

13. There has been considerable research into the health and environmental risks posed by poor air quality. This has highlighted potentially significant health risks posed by a range of air pollutants, and has led to the development of methods for evaluating these risks to health (eg www.dh.gov.uk/ab/COMEAP/DH_108151). Health risks are also considered by the Expert Panel on Air Quality Standards. While there remains some uncertainty in this area, compared to other environmental pathways, the health and environmental risks caused by poor air quality are relatively well understood. This enables the loss of life and associated costs to the UK economy resulting from poor air quality to be estimated–for example, as in the introduction to the Environmental Audit Committee (EAC) call for evidence.

14. The risks to health and the environment caused by poor air quality are discussed in the Air Quality Strategy 2007, and form a key input into the specification of air quality standards, and the system of air quality management in the UK.

15. The main outstanding areas of knowledge and understanding are on substances other than those forming the mainstream of local air quality management. Further attention to these substances would be beneficial:

— Micro-organisms from sources including agriculture, waste management and sewage processing;

— Ultrafine particulate matter and airborne nanoparticles; and

— The potential effects of ammonia on ecosystems. There is very limited evidence of the effects of ammonia on ecosystems. This limited evidence has been used as the basis for a substantial regulatory burden on operators of intensive livestock farms and waste management facilities. Further evidence on the significance of such effects, and the types of habitat site which could be affected would be helpful.

Is the delivery chain for air quality coherent, integrated, coordinated and effective? Do the bodies with responsibility for managing air quality have appropriate incentives, understand their role and responsibilities, and have adequate resources?

16. In broad terms, the delivery chain for air quality management is as follows:

— Assessment of air pollution from individual sources (ie "what goes up"): this is carried out by the source operators, and is typically regulated by the Environment Agency and/or local authorities. Appropriate systems are in general in place via the pollution control or land-use planning systems.

— Assessment of ambient air quality (ie "what comes down"): this is the responsibility of local authorities. Now that local authorities have had considerable experience of local air quality management, they generally have appropriate arrangements in place for air quality assessment.

— Management of ambient air quality where needed: this is the responsibility of local authorities working jointly with the Highways Agency, the Environment Agency, and local authority highways and environmental teams. The delivery of improvements in air pollution derived from road traffic is the key weakness in the system.

17. Road traffic is the principal cause of air quality problems in the UK, and lies behind the vast majority of declared air quality management areas. However, it is often difficult to deliver genuine improvements in air quality in these areas. The reasons for this include the following:

— It can be technically difficult to identify an effective solution to an air quality problem.

— Dealing with an air quality problem (eg by restricting traffic) could result in further problems (eg reduced economic activity in a town centre, or air quality problems elsewhere).

— Changes in or restrictions to road traffic tend to be unpopular with local people, and are difficult to deliver politically. People are often not aware of an air quality problem, but would be acutely aware of traffic restrictions. Good practice for public consultation on air quality was studied by the University of the West of England (www.uwe.ac.uk/aqm/files/Steps_to_Better_Practice_Guidance_on_LAQM_Consultation.pdf).

— The primary responsibility of highways bodies is the safe and effective delivery of road transportation infrastructure. This can work against the need to reduce traffic to deliver satisfactory air quality.

18. In some cases, air quality and highways improvements can go hand in hand. However, where a choice has to be made between improving air quality and maintaining highway capacity, it is often air quality which is sacrificed. The evidence for this is the relatively high number of air quality management areas in which air quality continues to fall below the relevant standards and objectives.

The steps that need to be taken to ensure that air quality targets will be met in the future

19. To meet air quality targets in the future, it is important that an appropriate balance is struck between achieving air quality, and other issues which affect the public. These include economic issues, land-use policies, noise, health and wellbeing, and highways considerations (safety, capacity etc). The weight to be given to achieving air quality targets and the means by which this can be achieved will always be a matter of judgement.

20. It may be helpful for air quality policy guidance (www.defra.gov.uk/environment/quality/air/airquality/local/guidance/index.htm) to assist local authorities in identifying unambiguously what steps are appropriate in order to achieve air quality targets, having regard to other potentially competing policy objectives. This could give more weight to a local authority in taking the difficult decisions and securing the changes needed to deliver genuine improvements in local air quality.

21. The benefits of achieving air quality targets can be quantified in economic terms, and set in the context of the costs and benefits of other policies. In the light of this, it may become apparent that achieving the targets is not a sufficiently high priority at present. One option to increase the priority given to achieving air quality targets would be to specify a Public Service Agreement for Defra, the Department of Health and the Department for Transport to work together to deliver satisfactory air quality under the LAQM regime.

14 December 2009

Memorandum submitted by the Royal Borough of Kensington and Chelsea (AQ 19)

The following comments respond to the four points posed by the Committee.

Summary

Over-reliance on modelling pollution levels by the Government, without sufficient reference to actual monitoring results has led to over optimistic predictions.

Ignoring mounting evidence of more serious health effects from fine particle is short-sighted and for government objective setting is irresponsible.

In failing to meet the EU PM_{10} target, the Government has demonstrated that air quality is not a national health priority.

Local authorities are however committed to spending considerable effort on addressing the air quality problem through local initiatives.

There must be a far more coherent approach from all levels of government ensuring that actions are co-ordinated and support each other. This must include measures which address climate change issues to ensure that conflicts are resolved and enable air quality to be targeted effectively.

In Response to Point 1

1. The Government's reliance on modelling future levels and reliance on optimistic assumptions has been at odds with monitoring data for a number of years, yet there has been a reluctance to acknowledge this. For some time it has become apparent that the expected improvements as a result of decreasing emissions through improved vehicle technology (implementation of Euro standards) has not materialised as measured pollution levels at a significant number of inner urban monitoring stations. This is likely to be due to a number of reasons:

- models contain a large number of uncertainties and simplifications;
- laboratory test cycle emissions rarely reflect real life use of vehicles or the deterioration of vehicle technology over time;
- real driving conditions are difficult to simulate eg time varying traffic speeds, congested stop start driving;
- assumptions in the way the fleet changes may be inaccurate;
- the effects of retrofitting particulate traps to vehicles may be poorly understood;
- the increasing proportion of NO_x being emitted directly as NO_2 especially in diesel vehicles;
- the use of national scale models.

In Response to Point 2

2. Central London local authorities have been dismayed by the apparent reluctance of the Government and their advisers COMEAP to acknowledge recent international research particularly into the health effects of fine particles. These are showing, through long term studies, that the impact of fine particle concentrations below the current objectives is having a significant impact on cardio-respiratory health. Concentrating on "hotspots" where the objectives are exceeded is important in the short term, but is ignoring the longer term public health implications of objectives set at a level where significant harm to health is occurring.

In Response to Point 3

3. The delivery chain for air quality management should be led and be executed more effectively at a national level. The failure to meet the PM_{10} objective level and the very high likelihood that NO_2 will follow a similar fate, has demonstrated that the UK Government is not committed to addressing this issue. In the last review of the national air quality strategy many national measures considered in the review were not considered cost effective/beneficial including Low Emissions Zones consequently this has led to a delay in the implementation of measures that could have improved the air quality situation.

4. With background concentrations relatively high, it is extremely challenging to manage air quality and make significant improvements despite the actions of local authorities without significant intervention from national and London Government working far more closely together. More co-ordinated actions which have already been shown to be effective should be applied across action plan areas.

5. The Government has focused much attention on producing strategies and detailed guidance which aim to devolve most of the responsibility to local authorities. Local authorities are obliged to inform the Government on progress with action plans, which takes a considerable amount of time each year. Feedback from Defra has largely been in the form of questioning the methodology used rather than commenting on the conclusions being drawn by local authorities that local action alone is not sufficient to meet targets.

6. It would be of greater value to spend more time implementing the targets within the action plan, of which we as a council have over 20 rather than on reporting. Most of these actions involve collaborating with other departments such as our transportation and highways department, contracts managers, and the planning department and many external organisations.

7. Many local authority actions have a limited impact because they can only address a small proportion of the pollutant emissions within the borough. There is also considerable uncertainty over the extent to which these measures can deliver the improvements necessary to meet the air quality objectives. Many measures are by their nature trials and do not necessarily deliver the expected benefits. Limited resources and data are available to evaluate the emissions reductions that the measures can deliver.

8. A considerable amount of scientific evidence and technical data is continuously emerging on PM_{10} and NO_x and how these pollutants react in the atmosphere and contribute to overall concentrations. The complexity of this information with data often remaining in the scientific community and the fact that it cannot be easily applied means it is not possible to produce effective solutions.

9. In any case many sources are beyond the direct control of councils, for example the huge volumes of traffic passing through individual boroughs are often under the direct control of other agencies and authorities. For example in London the major routes are under the control of TFL. Traffic management schemes often have a limited effect or simply move the problem elsewhere. The Mayor's air quality strategy has identified that an 80% reduction in traffic is necessary to achieve the air quality limit value for NO_2 in London.

10. Other organisations/disciplines must be given ownership of the air quality problem as it is too often seen as an environmental issue and as such sits within Environmental Health departments and consequently it is not given sufficient priority in other departments.

11. As we enter the next stage of the recession, local authorities are faced with further reductions in resources. This could put our air quality action plans and monitoring sites at risk. These sites provide important information and have demonstrated clearly that improvements to air quality have not occurred as predicted and in some cases have deteriorated.

12. As a central London borough, our incentive to improve air quality is driven primarily by the associated health effects of air pollution and the concerns voiced by people living and working in our borough. London has the poorest air quality not just in the UK but across Europe and quantifying the health consequences of this has proved challenging. Previous attempts to quantify the impacts were likely to be underestimates and recent research suggests that PM_{10} levels are causing approximately 3,000 premature deaths in London each year.[30] The Government must support further research into the health and cost implications of the issue which will emphasise the severity of the situation.

In Response to Point 4

13. In order to ensure that the UK meets the objectives in the future, air quality needs to be more prominent within the environmental agenda. The issue is often overshadowed by carbon campaigns in the media making public awareness of the problem extremely limited and directly by promoting biomass and some biofuels (as carbon neutral fuels) which in most cases can be significant negative effects on air quality.

14. As a borough, 69% of PM_{10} and 37% NO_2 (2006 total) is derived from road transport sources. The Government should be applying more pressure on the vehicle industry to recognise their role in reducing PM_{10} and NO_2 emissions. Stronger support and incentives should also be given for the development and application of alternative fuel use.

15. It should also be recognised that a balance should be reached between achieving the PM_{10} and NO_2 objectives and the imperatives of carbon reduction measures. One example being the perception that diesel is a 'greener' fuel than petrol. Carbon emissions from diesel vehicles are lower due to fuel efficiency, but this is at the expense of PM_{10} emissions, particularly in urban areas. With particulate abatement systems leading to elevated tailpipe NOX emissions in diesel vehicles, the Government should be re-educating car owners. The introduction of local measure such as graduated resident parking permits (higher for diesel vehicles) can be met with some frustration from the public who were informed that they had made the greener choice of vehicle.

16. A valuable step would be to extend the banding system for Vehicle Excise Duty to include PM_{10} and NO_2 and ensure that vehicles are labelled clearly with this information. This would ensure that both carbon and local air pollutants are considered when purchasing a vehicle.

17. Taking into consideration the capital's contribution to air pollution in the UK, the Mayor of London should reconsider his decision to defer Phase 3 of the Low Emission Zone and his plans to scrap the western extension of the Central Congestion Zone. These decisions will hinder any improvement initiatives introduced by London authorities and as a consequence further jeopardise the chance of reaching the national objectives in the future.

[30] Estimates for London have been calculated by Professor Frank Kelly using the European Environment Agency (2005) Spatial assessment of PM_{10} and ozone concentrations in Europe http://www.eea.europa.eu/publications/spatial-assessment-of-pm10-and-ozoneconcentrations-in-europe-2005-1

18. The Government should be targeting the use of private transport and taxi use more aggressively, making public transport a more convenient and preferable choice. With taxi's being responsible for around 35% of road transport PM_{10} exhaust emissions in central London, the Mayor plans to restrict older vehicles but could be criticised for only requiring Euro 4 standard from 2012.[31] More stringent measures should be implemented on a national level.

19. The recently introduced national scrappage scheme should be funded after February 2010 and be extended to include more manufacturers and vehicles such as taxis. This scheme provides a clear incentive for car owners and the Government must continue to support these initiatives in order to meet future air quality objectives. It would be an advantage in future to offer the incentive only where the replacement is a low emission vehicle.

20. The planning system also has a vital role to play in the management of local air quality. Current legislation is not robust enough, making air quality a low priority on the list of planning considerations. The demand for housing and new roads in this country will inevitably exacerbate the situation when we approach the next set of air quality objectives.

21. There are a total of 235[32] local authorities in the UK which have declared Air Quality Management Areas but it is unclear of the significance of this in the planning process. Air quality should be an integral aspect of the process and influence decisions regarding transport and energy options. Air quality assessments and modelling calculations submitted by developers invariably result in over optimistic predictions of the impacts and should be replaced rapidly by low emission strategies.

22. As renewable energy use increases, there needs to be a clearer message regarding the impacts of biomass, CHP and decentralised energy production on air quality. There must be recognition that encouraging power generation especially in heavily populated cities already exceeding air quality objectives will be detrimental to health and reduce the likelihood of achieving objectives unless very strict standards can be applied. Legislation should be strengthened to make the Clean Air Act legislation more relevant to biomass and biofuel use in Smoke Control Areas and if necessary make new regulations that apply to CHP and waste to energy plant.

23. With a significant proportion of NO_2 and to a lesser extent PM_{10} deriving from domestic emissions, in order to meet the objectives the Government must also review standards in terms of the energy efficiency of buildings. Focus should not be just on new housing but measures to replace old boilers including scrappage that takes into account air quality improvements as well as carbon, retro-fitting abatement to communal boiler systems, extending grants for upgrading energy efficiency measures.

24. The planning system should promote naturally ventilated buildings, reducing the heating and cooling requirements of large developments.

25. In conclusion, optimistic predictions of future air quality have meant the Government has acted too late and London is failing to achieve the NO_2 and PM_{10} limit values. The EU has recently announced that no time extension will be granted with respect to the PM_{10} derogation for London. The detrimental health impacts and potential costs in fines must be recognised. Brave, innovative and robust measures need to be introduced in order to tackle this issue on a national scale.

14 December 2009

Memorandum submitted by Johnson Matthey Catalysts (AQ 20)

1. Summary of Key Points

Central government has a key role to play in incentivising and encouraging lower emissions.

It is important to clean up public vehicle fleets (primarily buses and taxis) as soon as possible, as these are the largest sources of emissions in our towns and cities. Our company and Eminox have technology and the experience to provide the retrofit systems for buses.

Low emission zones are an important part of any strategy to reduce emissions in towns and cities.

A national framework for low emission zones should be established to ensure consistency throughout the UK in both standards and certification.

DPF technology is well proven on non-road mobile machinery and its use should now be mandated on sites throughout the UK.

Ensuring that as many vehicles as possible have a DPF will reduce diesel particulate levels and improve public health. It will also reduce black carbon emissions, thereby reducing the global warming impact of the UK vehicle fleet. We have data showing that the estimated climate impact of fitting a filter to a Euro III double deck bus is equivalent to a fuel saving of 44%.

Diesel rail locomotives should be fitted with exhaust aftertreatment to remove PM and NO_x.

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[31] GLA (2009) Clearing the Air (consultation draft for the London Assembly and functional bodies).
[32] UK Air Quality Archive http://www.airquality.co.uk/index.php

2. Background

Johnson Matthey welcomes this inquiry into air quality, and would like to comment in particular on the steps that need to be taken to ensure that air quality targets will be met in the future.

As one of the largest UK companies in the chemicals sector, Johnson Matthey has been supplying catalysts for the control of air pollution since the late 1960's and has supplied one third of all autocatalysts made since production first started in 1974. Johnson Matthey has 15 manufacturing sites and 9 technology centres supporting our emission control technologies business around the world.

The technologies developed at Johnson Matthey have made it possible to reduce oxides of nitrogen (NO_x), hydrocarbons (HC_2) and carbon monoxide (CO_2) from petrol powered vehicles by over 95% from pre-regulation levels.

Johnson Matthey has also developed diesel particulate filter (DPF) technologies to reduce emissions of the mass of particulate matter (PM) from diesel engines by over 90% and the number of particles by over 99%. Johnson Matthey is the owner of CRT® and SCRT® technology that is licensed to Eminox Ltd for supply to the UK retrofit market.

The Johnson Matthey SCRT® system combines CRT® DPF technology with selective catalytic reduction (SCR) to reduce emissions of all four regulated pollutants from diesel engines.

3. Promoting Technological Change and Cleaner Vehicles

Central government has a key role to play in incentivising low emission vehicles through further changes to vehicle excise duty and other tax regimes, with a focus on air quality as well as CO_2. Grants for retrofitting abatement equipment, targeted directly at reducing tailpipe emissions from heavy duty vehicles (HDVs), were introduced very effectively in the UK in the mid 1990s and are now used in other European countries. There is further scope for increasing the differentials between vehicles conforming to different emissions standards.

We would also welcome measures that would promote the uptake of cleaner freight vehicles through green procurement standards. Such measures would have a beneficial effect across the UK.

4. Reducing Emissions from the Public Transport Fleet

Some towns and cities have already made strenuous efforts to ensure that their buses in particular are as clean as possible, and have embarked on programmes to fit diesel particulate filters (DPFs). This includes London, which was at the forefront of this movement but is now in danger of being left behind by other UK and European cities, which have already started retrofitting combined DPF and SCR (selective catalytic reduction) systems to reduce NO_x as well as PM.

The Mayor of London's Air Quality Strategy draft does propose retrofitting the remaining Euro III buses in the London fleet with NO_x abatement equipment by 2015. This is welcome, but should be started next year instead of waiting. Technology has been proven in a two-year trial, which TfL has stated was a success. The technology enables a Euro III (and indeed a Euro II) bus to meet emissions levels equivalent to Euro V. This SCRT® technology is not only technically proven, but commercially as well. Our partner Eminox has supplied more than 300 systems throughout Europe.

In addition, other local authorities should be encouraged to do this, as it is a cost-effective way of reducing fleet emissions and improving air quality in town and city centres, where the greatest number of inhabitants will be affected.

We would encourage all local authorities to develop low emissions strategies for all of their public sector vehicles, to include minimum emissions requirements for these fleet vehicles. We believe that public sector captive fleets can and should comply with Euro IV standards immediately. In this context, we would ask that specific encouragement be given to promoting retrofit (of DPF + SCR) as a cost effective option for achieving this standard.

5. Low Emission Zones

As well as implementing tighter emissions standards on the captive fleet, it is also important to reduce emissions from other vehicles. This should be done by specifying a minimum Euro emissions standard, in the way that London has already done. Aftertreatment systems in the form of DPFs and/or SCR systems can be fitted to vehicles to effectively increase their Euro standards.

We would suggest a minimum level of Euro IV for heavy duty and Euro 4 for light duty vehicles, moving to Euro V/5.

In order to ensure consistency of zones throughout the UK, a national framework for local low emission zones will be essential–see below.

6. National Framework for Low Emission Zones

A National Framework for Low Emission Zones should establish a nationally recognised standard for emissions and vehicle identification, supported by a national certification scheme of retrofit technologies, as a matter of urgency.

This would make it much easier for a local authority to establish a local 'Low Emission Zone' and to prescribe what standard of vehicle would be allowed to enter, providing that they operate within the national framework.

In the development of the London LEZ, TfL worked with authorities such as VOSA and VCA to develop certification of approved retrofit particulate abatement technologies. This certification could become a nationally recognised standard, which local authorities could use as part of their own schemes under a National Framework.

We believe that it is feasible to extend a National Certification Scheme for retrofit of PM abatement technologies to also cover NO_x, given appropriate Government support. This would greatly facilitate technologies that will also help address concerns over failures to meet NO_2 limit values.

Since it has now been established that the retrofit of particulate traps is cost-effective and cost-beneficial within a short timeframe, we also believe that a National Framework for Low Emission Zones should be supported through government grant funding and/or other financial incentives to encourage retrofit. This approach has helped to achieve excellent compliance rates in other countries such as Holland and Germany, both of which successfully operate LEZ schemes within a national framework, supported through national funding for retrofit technologies.

7. Reducing Emissions from Construction and Demolition Sites

Johnson Matthey is the market leader for diesel particulate filter systems in Switzerland, the largest market for aftertreatment systems for non-road mobile machinery (NRMM).

It is widely acknowledged that reducing emissions at construction sites will make an important contribution to meeting the UK's obligations under the Ambient Air Quality Directive. We are however disappointed that the part of the Best Practice Guidance (BPG) related to reducing emissions from construction machinery has not been enforced by the GLA, in spite of there being a number of approved aftertreatment suppliers and systems, including Johnson Matthey, on the list managed by the Energy Saving Trust.

It is encouraging to see that the Mayor of London, in his draft Air Quality Strategy, intends to address this, albeit three years after the launch of the Guidance. The BPG should now be mandated for all construction sites in London, and also nationwide, as construction sites around the country suffer from the same poor air quality as those in the capital.

Government departments and local authorities should in particular include full implementation of the BPG in procurement policies, and ensure that strategic applications require implementation of the BPG.

8. Climate Change

It is important to ensure that as many diesel vehicles and machines as possible are fitted with a DPF, for public health, air quality and climate change reasons.

The effects of PM on health and air quality are well documented, but there is a growing body of evidence confirming that black carbon, emitted from diesel engines, is a significant contributor to climate change. Black carbon has been estimated to be the second largest contributor to global warming, with emissions from diesel vehicles comprising nearly a quarter of total black carbon emissions.

DPF fitment is the most appropriate action to take to reduce black carbon emissions. Using a Euro III double deck bus as an example, we estimate that the black carbon savings from fitting a DPF could be 30% of the total climate impact, equivalent to a 44% improvement in fuel consumption. Fitting DPF technology to diesel engines such as trucks, buses, construction machines, emergency generators and trains will not only improve air quality and public health, but will be highly beneficial to short term climate change and local urban warming in London.

14 December 2009

Memorandum submitted by ClientEarth (AQ 21)

Summary

Concentrations of PM_{10} and NO_2 in London are far in excess of EU limits, which are set at levels designed to protect human health.

While PM_{10} is a problem in London and several other large conurbations, NO_2 is a national problem.

At present there is no credible strategy in place which will ensure that limit values for PM_{10} and NO_2 are attained within an acceptable timeframe.

The air quality delivery chain in the UK is incoherent and ineffective and prevents effective strategies from being developed and implemented.

The system needs to be rationalised and simplified, with one organisation being given strategic responsibility, appropriate powers and adequate funding for ensuring compliance with EU air quality law.

There needs to be dissuasive penalties and legal sanctions for failure to attain EU air quality limits.

Air quality limits are in place to protect human health and as such should be enforceable in the courts by concerned individuals.

Background

1. Directive 2008/50/EC[33] (the '2008 Directive') imposes standards for ambient levels of certain air pollutants including particulates (PM_{10}) and nitrogen dioxide (NO_2). These standards are known as 'limit values'.

2. The limit values for PM_{10} became legally binding in 2005 as a result of an earlier directive (the '1999 Directive').[34] Since then the annual average and daily limit values in London have been breached in 2005, 2006, 2007 and 2008 (finalised figures for 2009 are not yet available). On 11 December 2009, the European Commission rejected an application by the UK Government to utilise a provision in the 2008 Directive to postpone the deadline for compliance with the limit values in London until 2011. The Commission held that the UK was not eligible for a time extension because it had failed to implement all appropriate measures to achieve compliance by the 2005 deadline and did not have a credible strategy in place for achieving compliance by the postponed 2011 deadline.

3. The Commission began infringement proceedings against the UK in January 2009 for failure to attain the limit values for PM_{10}. Because the Commission rejected the time extension application it is expected that it will escalate these proceedings in early 2010.

4. The limit values for NO_2 will come into force on 1 January 2010. Government forecasts predict that the limit values for NO_2 will be breached throughout the UK until at least 2015 (see in particular paragraphs 55 to 59 of the draft Defra document dated February 2009, extract attached as Annex 1).[35] Unlike the problems with PM_{10}, which is principally a London issue, NO_2 limits are likely to be exceeded in urban areas throughout the UK. The 2008 Directive allows a Member State to postpone compliance with the NO_2 limit values until 2015, with the approval of the Commission, if it demonstrates that it has taken all appropriate measures to achieve compliance by the initial 2010 deadline and produces a credible strategy which demonstrates that compliance will be achieved by the extended 2015 deadline. However, the Mayor of London's draft air quality strategy (relevant extracts attached as Annex 2),[36] which was published for preliminary consultation in October 2009, fails to demonstrate how compliance will be achieved by 2015, and does not even attempt to achieve compliance by the original deadline of 1 January 2010.

5. It is therefore clear that neither central government nor the Mayor is developing an effective strategy for meeting the UK's obligations under the EU air quality directives. In ClientEarth's opinion, this failure is in a large part attributable to the inadequate institutional and procedural structures currently in place in the UK. This submission focuses on the delivery chain in Greater London, as this is where the country's air quality problems are most acute and where there is least clarity in the air quality delivery chain. However, this analysis has nationwide relevance.

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[33] Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe.

[34] Directive 1999/30/EC of the European Parliament and of the Council of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matters and lead in ambient air.

[35] The Defra document is available in full at: http://www.defra.gov.uk/environment/quality/air/airquality/panels/forum/documents/aq-forum-draft-no2-approach-paper0902.pdf

[36] The Mayor's draft air quality strategy is available in full at:http://www.london.gov.uk/mayor/environment/air_quality/docs/AQS09.pdf

The air quality delivery chain in Greater London

6. There are two legal frameworks relating to ambient air quality; one implementing the 1999 Directive, and a separate framework derived from the Environment Act 1995. The two frameworks are technically separate but in practice operate in tandem.

7. The EU framework has its legal basis in the 1999 Directive, as the 2008 Directive has not yet been transposed into UK law (however, the limit values under the two directives are identical). The 2008 Directive will be transposed by the Air Quality Standards Regulations 2010, which were published in draft form for consultation in November 2009 (the 'Draft Regulations'). The deadline for transposition of the 2008 Directive is 11 June 2010.

8. The limit values under the 1999 Directive are transposed by the 2007 Air Quality Standards Regulations (the '2007 Regulations'), which impose a duty on the Secretary of State (the 'SoS') to take appropriate measures to attain the limit values and give him powers to give directions to the Mayor of London and Local Authorities in Greater London.

9. The Draft Regulations, once adopted, will also require the SoS to produce an Air Quality Plan for any zone where limit values are in exceedence, and a Short-Term Action Plan in zones where higher 'alert thresholds' are breached. These plans must demonstrate how compliance with the limit values and alert thresholds will be achieved in the shortest period possible.

10. The framework established by the Environment Act 1995 imposes a duty on the SoS to prepare a National Air Quality Strategy setting out aims and objectives for the achievement of national air quality standards. These national standards are set out in the Air Quality (England) Regulations 2000 (the '2000 Regulations'), and are identical to the EU limit values laid down in the 2007 Regulations.

11. However, the National Air Quality Strategy does not have statutory force and imposes no direct obligations upon any regulatory body (although the Environment Agency is under a duty to have regard to it when discharging its general pollution control functions under the Environment Act 1995).

12. The National Air Quality Strategy is therefore implemented through a system of local air quality management that obliges Local Authorities to undertake an assessment of air quality in their areas and where the standards under the 2000 Regulations are not being met, produce action plans aimed at achieving the national standards.

13. In London, the system is further complicated by an additional layer of government: the Mayor of London, who sits between central government and the Local Authorities. The Mayor is required by the Greater London Authority Act 1999 to produce an air quality strategy for London, which must:

(a) implement the National Air Quality Strategy; and

(b) achieve the national standards set out in the 2000 Regulations.

14. The SoS can give directions to the Mayor of the London if his strategy does not meet these requirements. Local Authorities are required to have regard to the London Air Quality Strategy in fulfilling their local air quality management duties, and to provide the Mayor with information, advice and assistance in preparing his strategy.

15. The Environment Agency has no duties or powers directly relating to the attainment of air quality limit values under either the EU or domestic framework. However it is responsible for regulating emissions of air pollutants from large stationary sources, principally through the allocation of permits under the Environmental Permitting Regulations 2008. However, under EU law, all public bodies are under a duty to take all measures to ensure and fulfil obligations of EU law.

Summary of Duties and Powers

16. *Secretary of State* (currently the Secretary of State for Environment, Food and Rural Affairs):

— Duty to attain EU limit values under 2007 Regulations and endeavour to maintain the best ambient air quality compatible with sustainable development.

— Power to give directions to Mayor of London and local authorities within Greater London to attain EU limit values under the 2007 Regulations.

— Duty to produce National Air Quality Strategy which achieves national air quality standards.

— Produced the 2000 Regulations, that imposed national air quality standards (which are identical to EU limit values).

— Proposed duty to draw up and implement air quality plans for zones where limit values are exceeded and Short-term Action Plans where alert thresholds exceeded (under the Draft Regulations).

— Duty to assess and monitor air quality.

Mayor of London

— Duty to produce London Air Quality Strategy which implements National Air Quality Strategy and achieves national standards set by the 2000 Regulations.

— Power to give directions to local authorities within Greater London.

Local Authorities

— Duty to assess air quality and prepare action plans aimed at achieving limit values under 2000 Regulations.

— Duty to have regard to the London Air Quality Strategy in carrying out these duties.

— Duty to assist the Mayor in preparing the London Air Quality Strategy.

— Power over industrial emissions from smaller industrial installations.

Environment Agency

— Power over industrial emissions through issue of pollution permits to large industrial installations.

— Administers National Emission Reduction Plans under the Large Combustion Plant Regulations.

— Duty to have regard to the National Air Quality Strategy in carrying out these functions.

Access to the Courts

17. In a landmark decision in 1991, the European Court of Justice held that because air quality standards were adopted in the interests of protecting human health, EU citizens must be entitled to ensure in court that air quality standards are actually complied with.[37] The Aarhus Convention,[38] which has been ratified by both the EU and the UK, also gives citizens rights to access the courts to enforce environmental law.

18. However, it is very difficult for citizens in England and Wales to obtain judicial remedies where EU air quality law is breached as a result of the following features of the legal system.

19. First, the jurisprudence of the courts in relation to judicial review does not in practice allow courts to review the substantive legality of a case. The courts will therefore only overturn an administrative decision where it has been made as a result of procedural irregularity, and will not look into whether the decision itself is lawful. This is in contravention of Article 9(2) of the Aarhus Convention, which gives an express right to the review of the 'substantive', as well as the 'procedural' legality of a public authority's decision, act or omission.

20. Second, the costs system in England and Wales means that an unsuccessful claimant has to pay the costs of the respondent, in addition to their own, means that bringing a legal challenge is prohibitively expensive. This is in contravention of Article 9(4) of the Aarhus Convention, which obliges parties to make sure that access to justice is not 'prohibitively expensive' or unfair.

21. ClientEarth has submitted a communication to the Aarhus Convention's Compliance Committee regarding the UK's non-compliance which highlights these issues (see extract attached as Annex 3).[39]

22. Finally, injunctive relief is rarely available in the courts of England and Wales, which is in contravention of Article 9(4) of the Aarhus Convention which requires that adequate and effective remedies are available, including injunctive relief.

Problems with the Current System

23. There is no clear delivery chain for air quality in the UK, and particularly in London. Powers and duties for compliance with air quality law in London are divided between three tiers of government: central government, the Mayor of London and Local Authorities. In addition, the Environment Agency, which is an 'Executive Non-departmental Public Body,' has some limited air quality duties and powers. Further, while Defra has principal responsibility for air quality within central government, it is reliant on cooperation from other departments, particularly the Department for Transport and the Department for Energy and Climate Change, as the transport and energy sectors are together responsible for the majority of emissions of the relevant air pollutants.

24. Having two separate legal frameworks governing delivery of air quality causes further confusion, leading to a lack of understanding of roles and responsibilities, both within the various tiers of government with responsibilities for delivering air quality and among individuals and bodies trying to hold them to account. ClientEarth recently wrote to the Mayor and the Environment Committee of the Greater London Authority (the body responsible for holding the Mayor to account) to explain the Mayor's legal duties in producing the London air quality strategy. Feedback from members of the Environment Committee suggested that prior to our intervention understanding of the legal framework had been low.

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[37] Case C-361/88 Commission v Germany [1991] E.C.R I-2567.

[38] United Nations Economic Commission for Europe, Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, Aarhus, Denmark, 25 June 1998.

[39] The full communication is available at: http://www.unece.org/env/pp/compliance/Compliance%20Committee/33TableUK.htm

25. Neither framework establishes clear and legally enforceable duties. Only the SoS is under any legal duty to attain the EU limit values under the EU framework. The Environment Act framework does not impose any meaningful legal duties on the SoS, the Mayor or Local Authorities, merely requiring the production of plans which work towards achieving air quality standards but which are not legally binding.

26. Neither framework establishes dissuasive penalties for non-compliance. While the 2007 Regulations and the Draft Regulations place a legal duty on the SoS to take measures to meet the EU limit values, they do not impose any penalties on him for failing to do so. This is in breach of Article 30 of the 2008 Directive and therefore leaves the UK open to enforcement action from the EU Commission for failure to transpose the 2008 Directive correctly.

27. The lack of clear and legally enforceable duties, coupled with the significant barriers to access to the courts (as outlined in paragraphs 17-22 above) means that it is very difficult for concerned individuals or groups to obtain judicial remedies where government fails to meet the limit values.

28. The only likely legal sanction for a failure by the SoS to comply with the limit values is therefore the threat of infringement action by the Commission, which is an uncertain, lengthy and politically driven process. In 2005, the average time taken from the Commission issuing a letter of formal notice to the ECJ giving judgment was 47 months. Consequently, sanctions imposed by the ECJ are out of step with the political cycle in the UK, with the result that penalties are often imposed against an administration with little responsibility for the breach because those responsible will have left office.

29. The consequences of such a system are perfectly illustrated by the current impasse over NO_2 in London. The Mayor's draft London Air Quality Strategy does not contain adequate measures to deliver compliance with the national air quality standards for NO_2. The Mayor claims that £70–100 million of central government funding, together with action at the national level, is required to tackle the NO_2 problem. However, the Mayor has no power to demand funding from the SoS and is under no firm legal duty to achieve the limit values. The Mayor can therefore simply produce a final Air Quality Strategy which does not achieve the limits, claiming that he cannot achieve the limit values without adequate funding from central government. The SoS could make directions requiring him to revise the strategy, but this would be pointless unless backed with the requisite funding. A more likely scenario is that the Mayor will produce an Air Quality Strategy which does demonstrate compliance with the limit values, but then fail to implement the measures that are contained in it. The SoS can then blame the Mayor for failing to meet the NO_2 limit values in the knowledge that the only probable consequence will be an enforcement action by the Commission at some point in the distant future.

Recommendations

Recommendation 1

30. Streamline the existing legal framework so that there is only one air quality regime incorporating the requirements of the 2008 Directive. This would require the National Air Quality Strategy and the Mayor's Air Quality Strategy to achieve the EU limits rather than the national standards. The consultation document accompanying the Draft Regulations states that Defra is already considering this as an option (extract attached as Annex 4).[40] This would be an ideal opportunity to introduce more far-reaching reform of the system.

Recommendation 2

31. Impose a statutory duty on one agency for ensuring compliance with EU air quality limit values.

32. To carry out this function, this body would need to be independent from government, and granted wide statutory powers, including the power to give directions to the Government, and where these directions are not followed, enforce them through the courts.

33. To order to enforce directions through the courts, this body would need to be able to seek a number of remedies which at the moment are rarely available in the courts of England and Wales. In addition to financial penalties, courts would need to have the authority to grant injunctive relief, such as making declarations of non-compliance and issuing directions ordering the SoS to take specific measures.

34. This body would also need considerable additional funding to enable it to carry out these additional functions.

35. Responsibility for monitoring air quality may need to be passed from Defra to this body in order to avoid any possibility of the monitoring process becoming politicised.

36. The Environment Agency would be the obvious choice for this role. There are already proposals for the Environment Agency to be given such responsibility and powers for ensuring compliance with air quality laws at Heathrow Airport (see DfT decisions following consultation, January 2009, attached as Annex 5).[41]

[40] The consultation document is available in full at: http://www.defra.gov.uk/corporate/consult/airquality-transposition/consultation.pdf

[41] The DfT document is available in full at: http://www.dft.gov.uk/pgr/aviation/heathrowconsultations/heathrowdecision/decisiondocument/decisiondoc.pdf

37. Similarly the Flooding and Water Management Bill gives the Environment Agency overall strategic responsibility for flood management. The air quality crisis is a problem of similar magnitude to flooding and requires a similar restructuring of the institutional framework.

Recommendation 3

38. Make:

— The National Air Quality Strategy (currently produced by the SoS under the Environment Act 1995);

— Air Quality Plans (to be made by the SoS under the draft Air Quality Standards Regulations 2010); and

— The London Air Quality Strategy (made by the Mayor of London under the Greater London Authority Act 1999) subject to the approval of the Environment Agency, to ensure that the measures set out in them deliver compliance with the EU air quality directives.

39. Once approved, these documents should become legally binding on all levels of government and enforceable through the courts by both the Environment Agency and citizens. This is similar to the US system, where the Environmental Protection Agency ('EPA') is responsible for approving state air quality plans, which then become federal law, enforceable by both the EPA and citizens. The US, and particularly California, has had considerable success in tackling air quality problems.

Recommendation 4

40. Give citizens a central role in enforcing air quality laws. Citizens should therefore be given identical enforcement powers to the Environment Agency.

41. First, this would require civil procedures rules to be reformed to allow citizens to bring legal challenges for failure to comply with air quality law (and environmental law more generally) without the risk of incurring huge legal costs.

42. Second, courts must have the authority to review both procedural and substantive aspects of air quality (and other environmental) cases.

43. Third, courts must have the authority to grant a variety of remedies, including injunctive relief as well as financial penalties.

44. This would improve the efficiency of enforcement and ensure compliance with EU and international law under the Aarhus Convention. This is an area in which ClientEarth has considerable in-house expertise and experience.

45. Adopting our second, third and fourth recommendations would satisfy the requirement under the 2008 Directive that Member States must lay down penalties for infringement of the limit values which are effective, proportionate and dissuasive.

Recommendation 5

46. Any fines received by the courts should be paid into a hypothecated air quality fund.

14 December 2009.

Memorandum submitted by Barry & Vale Friends of the Earth (AQ 23)

Friends of the Earth in Wales have criticised the UK Air Quality Strategy since the first 1998 version, for seriously undercounting the harm to health from traffic-generated particulates and I write this from my involvement over more than a decade. I represented FoE on Defra's Air Quality Forum 1997–2002 and compiled responses to consultation on the UK's Air Quality Strategy Reviews. I participate in professional meetings on air pollution (NSCA, DMUG, IEH UK Annual Reviews) and in international environmental health science and assessment, including the European Airnet conferences and the PINCHE project on child environmental health.

This response is restricted to particulate pollution of the ambient air, whether or not covered by the Air Quality standards.

1. *Whether the Government is developing an effective strategy for meeting its obligations under the EU Air Quality Directives*

We attach our objection (PM_{10} extension-resp toDefra March09.doc) to the Government's request to the Commission for extra time to meet the PM_{10} standard for 2005. This gives arguments why current plans are not effective for meeting the 2005 PM_{10} standard at Port Talbot and the infraction proceedings against the UK should continue. The Commission have rejected the request for time extension in respect of London, judging the action plan inadequate, and likewise very recently in respect of Port Talbot as we had pressed

from FoE locally and centrally (attached FOE consultation response PM_{10} (10Mar09).pdf). Thus for these two areas, the Commission agrees with us that the answer to the Committee's question of 'effective strategy' is—no! For London and other areas requiring action on traffic emissions, we argued specific proposals for extra measures in response to the AQS in 2006 and in the latest objection:

Proposed Additional Measures for Abating Traffic-related PM_{10} and NO_2:

- Speed limit of $\sim$50 mph through and near to urban areas on all roads including motorways;
- Taxation to improve the public transport to private car cost ratio;
- Giving real force to 'smog' alerts, including incentives or legal measures to reduce vehicle use for the duration; and
- Congestion charging that reduces traffic in congested areas could be helpful.

2. *Whether the strategy is enough to ensure that air pollution is reduced to acceptable levels*

We answer this from the standpoint that particulate pollution is a major public health hazard (worse than secondary cigarette smoking) and that the EU standards do not adequately address this hazard. The WHO guideline for $PM_{2.5}$ of 10 μg/m3 (cf. 12 μg/m3 adopted in Scotland) shows the EU standard (25 μg/m3) is quite inadequate. Moreover, there is no standard for ultrafine particulates (nanoparticles, <0.1μg/m3) that are probably the most harmful pollution fraction.

1. The first AQS chose PM_{10} as index, when inhalation was better approximated by $PM_{2.5}$ and the QUARG report[1] gave several other reasons for choosing $PM_{2.5}$ (which we considered persuasive). While the UK persuaded the European bodies to choose PM_{10} (1998 AQS, the choice was driven—it is said—by the current head of Defra' AQ section, Martin Williams), the USA was then switching to $PM_{2.5}$. It has taken till the latest review of air strategy in Europe to introduce $PM_{2.5}$ monitoring and tentative standards. Thus the UK's choice of PM_{10} was not based on science and has led to misplaced effort on PM_{10}.

2. The AQS has ignored ultrafine particles, despite their recognition as probably the major reason for adverse health impact and appreciation that they are hardly captured by the PM_{10} index. Our criticisms drew on the Royal Society conference of 1999 (Ultrafine particles in the atmosphere, Royal Society 2000) and contacts with specialists in fetal toxicology at Liverpool Univ. under V Howard (Microscopical Society seminar, now Professor at University of Ulster). Versions of the AQS repeatedly promised that ultrafine particles would be covered in the next review, and this promise was broken twice. The real reason given by Martin Williams was that Defra's AQ team did not know how to regulate ultrafine particles in the atmosphere (the AQ section's responsibility) and ignored the possibility of tackling them at source (combustion industry and vehicles, the latter by the DfT).

3. We have submitted criticisms of the EPAQS reports, including their ignoring of ultrafine particles. This fault was evidently prescribed by Defra's AQ section, for the chair Prof. Anthony Seaton is a pioneer on identifying ultrafine particles as having the major impact on health, and long-term member (current chair of COMEAP) stressed ultrafine particles are probably the main hazard to a European meeting in 2003.[2]

4. We have pointed out that COMEAP under the DoH has consistently underestimated the harm to health as shown in epidemiology studies;[3] (reports of 1998 and 2001), including in its latest report (dated June 2009; Annex 1).[42] As this is over two years old and was to provide underpinning for the 2006–07 AQS review, it appears that it has been held up for political reasons, as it's at odds with the findings of the leading epidemiologists internationally and, effectively, failed its peer review.

Thus the figures the Committee call quotes from the AQ Strategy are too low by a factor two (maybe three times):

> "estimated to reduce the life expectancy of every person in the UK by an average of seven to eight months with estimated equivalent health costs of up to £20 billion each year".

They should read 15–24 months and up to £60 billion/year.

For an up-to-date scientific review on the hazards to health from ultrafine particles, we attach as Annex 2 an extract of the evidence given by Prof. V Howard at a recent public inquiry (Ringaskiddy).[43]

Whether the Strategy will suffice to reduce particle pollution to acceptable levels (as the Committee asks) must be answered with a resounding no! While no 'safe' levels of PM and ultrafines have been identified, it:

(a) doesn't suffice to meet the PM_{10} standards;

(b) doesn't seek to meet the WHO's $PM_{2.5}$ guideline; and

(c) ignores the ultrafine particle issue entirely, despite scientists believing it is the most serious fraction.

[42] Annex not printed.
[43] Annex not printed.

References

[1] Quality of Urban Air Review Group, 1996 report, chaired by Prof. Roy Harrison.

[2] Jon Ayres, Health Effects of Airborne Particles, to MVEG sub-group on Euro 5 and Euro 6, 4 September 2003 http://ec.europa.eu/enterprise/automotive/mveg_meetings/subgroup_euro/meeting1/ayres_presentation.pdf

[3] UK continues to undercount Air Pollution's Health-harm, British Medical Journal letters on-line, 23 September 2007 http://www.bmj.com/cgi/eletters/335/7615/314£177008

15 December 2009

Memorandum submitted by the Environment Agency (AQ 25)

1. Summary

Air quality in the UK is not improving sufficiently quickly to meet UK air quality objectives within the required timescales.

There have been significant reductions in emissions of the key air pollutants through the Environment Agency's regulation of installations under IPPC/EPR.

There is an extensive network of air quality monitors in the UK but the modelling methods used to predict pollution impacts sometimes do not represent accurately the impacts of industrial processes.

Some effects of morbidity from air pollution are not included in the UK's cost-benefit methodology. The cost of effects on the natural environment are also not included. This may lead to the impacts of air pollution on wildlife being given inadequate attention.

We believe the measures identified as cost beneficial in the UK's Air Quality Strategy 2007 should be implemented. The National Ammonia Reduction Strategy that was also proposed should be put in place to protect sensitive habitats.

The Department for Transport's (DfT) Sustainable Development Framework for Transport Planning needs to give more weight to air quality in its matrix of challenges to ensure that transport planning delivers its contribution to improving the UK's air quality.

Transport and spatial planners should use the range of measures available to them to improve air quality and reduce its effects on people's health and sensitive ecological systems.

2. Introduction

2.1 There is growing evidence that the mechanisms for delivering acceptable air quality are failing in a number of areas, particularly the measures related to transport. The UK has had to seek additional time for compliance with the EU limit values on particulates. Improved monitoring and assessment by local authorities has led to the designation of more Air Quality Management Areas for nitrogen dioxide and the UK will be seeking additional time for compliance with the EU limit values on nitrogen dioxide. Whilst there have been gradual reductions in the national emission of nitrogen oxides the complex atmospheric chemistry of these compounds has led to increasing levels of ozone in some urban areas. Peak levels of ozone across the UK are generally declining but background levels are increasing, a situation which has implications both for human health and agricultural productivity.

2.2 The Environment Agency regulates the release of air pollutants in England and Wales from approximately 2,800 large and more complex industrial installations e.g power stations, oil refineries and chemical plants. We also regulate facilities where waste is handled, stored, treated or disposed of, such as landfills, waste transfer and treatment facilities, as well as intensive livestock units and food manufacturing factories. We do this under the Environmental Permitting Regulations (2007).

2.3 Overall, the Environment Agency has helped to bring about significant reductions in emissions of a number of key pollutants through the application of the IPPC/EPR permitting regime. Releases of sulphur dioxide from regulated installations have reduced by 60% from a 2000 baseline; particulate matter (PM_{10}) by 44% and nitrogen oxides by 15% The value of health benefits from the reductions in emissions of sulphur dioxide, nitrogen oxides and particulate matter from installations we regulate is estimated to have totalled £1,100 million between 1990 and 2005.

3. Monitoring Air Quality in England and Wales

3.1 There is an extensive network of monitors in the UK that monitor levels of nitrogen dioxide, ozone, particulates (PM_{10} and $PM_{2.5}$) and sulphur dioxide in the air. Around 400 of these are funded by Defra and the devolved administrations. The largest of the monitoring networks, with 130 sites, is the Automatic Urban and Rural Network (AURN). In addition to the national networks there are many sites operated by local authorities as part of their Local Air Quality Management activities. Some of these sites are also affiliated with, and provide high quality data to, the national networks.

3.2 Modelling is a valuable tool for assessing levels of air pollutants provided that reliable data on emissions are available. Defra use modelling to supplement their monitoring of air quality in order to predict the levels of air pollution in the UK. However, all models involve degrees of uncertainty and there have been instances where monitoring on the ground has shown that models have over- or under-predicted ground level concentrations arising from point sources. Potentially, this could lead to exceedences of air quality standards being missed or regulatory effort expended unnecessarily on non-existent exceedences.

3.3 The Environment Agency carries out occasional monitoring campaigns in the vicinity of installations we regulate as part of our pollution control responsibilities. Usually these are for a short period of time (3—6 months).

3.4 The monitoring of emissions from installations we regulate under environmental permitting is the responsibility of the operator. The pollutants monitored, the techniques used and the frequency of monitoring are prescribed by the permit. This may need to reflect the requirements of EU legislation such as the Waste Incineration Directive. Any monitoring must comply with MCERTS requirements where applicable and the results are submitted to our local offices where they are made publicly available. MCERTS is the Environment Agency's Monitoring Certification Scheme. It provides the framework for businesses to meet our quality requirements. If operators comply with MCERTS we can have confidence in the monitoring of emissions to the environment. MCERTS accreditation is managed by the UK Accreditation Service (UKAS). Data on the emissions of key pollutants from installations we regulate are published by us in our Pollution Inventory which is publicly available.

3.5 We are developing a new capability to coordinate and monitor air quality in the event of emergency incidents, for example the Buncefield oil terminal fire. We are working with partners to test the new arrangements and expect them to be fully operational in 2010.

4. Has the Government Fully Understood and Identified the Health and Environmental Risks Caused by Poor Air Quality?

4.1 The UK Air Quality Strategy (AQS) has generally identified the pollutants that are likely to have the greatest health effects and has set controls for these. It has taken steps in the right direction by also including controls for $PM_{2.5}$. However, the mechanism for particulate toxicity, especially involving ultra fine particles is not fully understood. The Environment Agency believes there is merit in the World Health Organisation, the European Union, government and academia investigating further the effects of particles smaller than $PM_{2.5}$,for example PM1 and PM0.1, in order to develop reliable dose-response relationships which can then be used as a basis for setting standards.

4.2 Unlike the European Commission's Clean Air For Europe (Café) programme the Government's cost-benefit methodology for assessing air quality policies and measures does not fully include morbidity effects such as chronic bronchitis, restricted activity days (RADs), respiratory medication use and lower respiratory symptoms. This risks leading to a substantial underestimate of the costs of the effect of poor air quality on morbidity.

4.3 The UK AQS focuses on human health effects as there is currently no method to cost the effects of poor air quality on the natural environment. The impacts of air pollution may therefore be underestimated.

5. The Air Quality Delivery Chain

5.1 The delivery chain through which declared policies for the improvement of air quality are translated into actual improvements on the ground is complicated by the number of bodies whose activities can have an impact on air quality. Local authorities, Government departments including Defra, DfT, DCLG, BIS, DECC and the Environment Agency all have roles.

5.2 A key example is the relationship between transport planning and local air quality control. If air quality objectives are unlikely to be met local authorities are required to declare an Air Quality Management Area (AQMA) and develop an Air Quality Action Plan (AQAP) to work towards meeting the objectives. In about 95% of cases road transport emissions are the main reason for local authorities declaring AQMAs. Many of the roads contributing to pollution hotspots are the responsibility of DfT and the Highways Agency and in the past neither body has given a high priority to air quality issues in their plans. We have particular concerns that this situation may continue within the DfT's recent Sustainable Development Framework for Transport Planning (see point 6.4 below). We have further concerns that the guidance for the 3rd round of Local Transport Plans (LTPs) does not specifically require prioritisation for dealing with air quality issues.

5.3 The DfT is also responsible for vehicle standards and implements EU requirements via type approval procedures. These have not always produced the results intended. For example, regenerative traps for particulates have increased emissions of primary nitrogen dioxide by diesel-fuelled vehicles.

5.4 In some instances policies in one part of the delivery chain could be in direct conflict with those elsewhere. For instance, the widespread introduction of biomass burners may help deliver renewable energy targets but, if they are not designed to the highest air quality emission standards or are poorly operated, they could have an adverse impact on air quality.

6. Steps to Ensure Air Quality Targets Will be Met

6.1 Local authorities do not have the powers to ensure that actions identified in their Air Quality Action Plans are implemented. In some areas we are aware that actions which were identified for other parties up to 10 years ago have still not been delivered.

6.2 If air quality targets are to be met, we believe the Government and devolved administrations should implement as quickly as possible the measures identified as cost beneficial in the UK AQS, published in July 2007. The 'exposure reduction' concept for particulates (by which general levels, including background, are reduced instead of focussing on hotspots) should be put into practice as soon as is practicable. This provides the greatest benefit to the population as a whole by reducing their exposure to fine particles.

6.3 Transport planning policies alone will not be sufficient to address the problem of vehicle pollution in urban areas. Additional measures such as higher vehicle standards, work on hybrid vehicles and the enforcement of vehicle emission regulations are all needed The effect on air quality of the scrappage schemes for the most polluting vehicles needs further investigation. Measures to regulate traffic along the worst polluted routes using established traffic management techniques, and the establishment of low emission zones, may also be appropriate.

6.4 We believe that DfT's recent Sustainable Development Framework for Transport Planning needs to give more weight to air quality in its matrix of 'challenges' since air quality is currently not given sufficient consideration. We believe a 'challenge' that specifically relates to the human health effects of traffic-related air pollution should be included under the goal of "Improve quality of life". The goal to "contribute to better safety, security and health" does have the 'challenge' of "reducing the social and economic costs of transport to public health, including air quality impacts" but we do not consider this to be sufficiently strong to achieve the necessary outcome.

6.5 Where people live, work, shop and undertake leisure activities, and how they get there, has a crucial influence on air quality. Decisions on such matters may be taken at local, regional or national level with major projects now coming under the aegis of the Infrastructure Planning Commission. With few exceptions, air quality is not usually seen as a key issue when such decisions are taken. Any proposed major infrastructure development should be subjected to a detailed air quality impact assessment.

6.6 We are a statutory or recommended consultee on individual development proposals and strategic environmental assessments of local and regional spatial and transport plans. If air quality is to be safeguarded, planners working at both a regional and local level should use whatever opportunities arise to reduce the effects of poor air quality. Planning policies have a fundamental effect on the generation and dispersion of air pollution and the exposure of local populations to poor air quality. The Environment Agency has proposed a number of key, high-level air quality objectives for Regional Planning Bodies and Local Authorities that we would like to see implemented. These are that transport and spatial planning:

- should aim to achieve improvements in local air quality and public health;
- should seek to minimise the adverse air quality impact of all new transport schemes and developments, particularly where there may be cumulative impacts from multiple developments;
- should pursue the sustainability appraisals for regional spatial strategies, local development documents and the strategic environmental assessments for local transport plans contain an appropriate assessment for air quality; and
- should ensure that all proposed developments which could adversely affect air quality have received an appropriate assessment of air quality effects and a health impact assessment.

6.7 In addition the Environment Agency believes that:

- all local planning documents should include policies which address air quality if relevant;
- the guidance developed by Environmental Protection UK on "Development Control—Planning for Air Quality" should be used in the planning process;
- the techniques described in the "London Best Practice Guidance: The control of dust and emissions from construction and demolition" should be a condition of development where relevant;
- planning policies in local development frameworks and supplementary planning documents should require travel plans for major developments and use the DfT guidance on this matter; and
- Low Emission Strategies should be used to ensure new developments are designed with the lowest environmental impact possible.

6.8 The impact of ammonia emissions on natural habitats is an issue of concern. Currently 60% of sensitive habitats exceed the critical load for nutrient nitrogen (Review of Transboundary Air Pollution, Draft Report) and ammonia is a major source of this nutrient. Agricultural activities are the principal source of this pollutant but only a small fraction of national ammonia emissions comes under current regulatory control. The Environment Agency agrees with the need for a national ammonia reduction strategy, as proposed in the UK's AQS 2007, but we are concerned that there are still no definite proposals.

6.9 The Local Air Quality Management regime should include objectives for the protection of vegetation.

7. Other Matters

7.1 The Department for Transport consulted on the proposals to expand Heathrow Airport. The Environment Agency concluded that the evidence presented was not sufficiently robust to be sure that the proposed development will not lead to a breach in the long-term EU air quality limit value for nitrogen dioxide. However the decision has been made to go ahead with expansion on the basis that additional flights would only be allowed if air quality limit values had already been complied with.

7.2 The Secretary of State for Transport proposed that the Environment Agency should have a role in assessing and monitoring air quality around the airport to ensure, along with other partners, that the air quality limit values will be met. The exact form of the Environment Agency's role is still under discussion with government but is likely to fall into three main areas:

— Coordination of air quality monitoring and modelling to assess compliance with air quality limits;

— Auditing of studies to assess the extent to which future capacity can be released; and

— Action in the event that limit values are, or are likely to be, breached.

7.3 We have developed consistent and auditable techniques for the assessment of impacts from major sources and believe that there is scope to apply similar approaches to air quality impact assessments undertaken for major developments such as airports.

16 December 2009

Memorandum submitted by the Environmental Industries Commission (EIC) (AQ 26)

1. Environmental Industries Commission (EIC)

EIC was launched in 1995 to give the UK's environmental technology and services industry a strong and effective voice with Government.

With over 280 Member companies, EIC is the largest trade association in Europe for the environmental technology and services (ETS) industry. It enjoys the support of leading politicians from all three major parties, as well as industrialists, trade union leaders, environmentalists and academics.

EIC's Transport Pollution Control Working Group (TWG) represents over 40 Member companies including world leaders in the supply of exhaust aftertreatment, suppliers of clean and low greenhouse gas fuels, suppliers of catalysts and catalysed components and consultants covering transport and the environment.

2. Introduction

The Government's National Air Quality Strategy concludes that poor air quality is estimated to reduce the life expectancy of every person in the UK by an average of seven to eight months–impacting particularly on children, the elderly and those in poor health. A recent report from the Committee on the Medical Effects of Air Pollutants increased estimates of the mortality rate from long-term exposure to particulate pollution. It concluded that a 10-microgram-per-cubic-metre increase in fine particulate matter ($PM_{2.5}$) increases overall mortality rates by 1–12%. According to recent estimates, poor air quality caused 5,000 premature deaths in 2005 in London alone.

Particulate matter (PM) in particular has major health implications–the National Air Quality Strategy states that "both short-term and long-term exposure to ambient levels of PM are consistently associated with respiratory and cardiovascular illness and mortality as well as other ill-health effects". However, the finest particles of particulate matter are known to be the most damaging to health.

The new Ambient Air Quality Directive sets new targets for $PM_{2.5}$. This includes an average annual exposure reduction target and, to ensure a minimum degree of health protection everywhere, a limit value, which is to be preceded in a first stage by a target value. Whilst more work is required to understand the UK situation on $PM_{2.5}$, the initial view is that the UK should meet the limit value of the Ambient Air Quality Directive but may struggle to meet exposure reduction targets.

EU air quality limits for particulate matter were breached in London in each of 2005, 2006 and 2007. Current projections show that these laws will still be breached in London in 2011 and beyond.

Road transport is one of the most significant contributors to poor air quality. For example, a recent European Environment Agency report[44] concluded that road transport is the most significant source of NO_x (39.4% of NO_x emissions from all 27 Member States) and the second largest emitter of PM_{10} (15.9%) and $PM_{2.5}$.

[44] 'Annual European Community Long Range Transboundary Air Pollution Convention Emission Inventory Report 1990–2006'.

Under the Ambient Air Quality Directive, deadlines for complying with PM_{10} standards can be postponed for three years (mid–2011) and for a maximum period of five years for nitrogen dioxide and benzene (2010–15). To qualify for a postponement, emissions of the pollutant have to be within a "margin of tolerance". If emissions are above the "margin of tolerance" Member States face infraction proceedings from the Commission for failure to comply.

In addition to meeting the "margin of tolerance," Member States have to be able to demonstrate that "all appropriate measures have been taken at national, regional and local level to meet the required limit values".

EIC does not accept that this is the case in the UK for the following reasons:

- Nationally the Government has failed to sufficiently support the introduction of Low Emission Zones across the UK. Our Members welcome the Local Air Quality Management Guidance but believe that it should be supported through the urgent introduction of a National Framework of Low Emission Zones—see section 3.
- The Government has also failed to sufficiently incentivise retrofit of the most polluting vehicles. This is despite retrofitting diesel vehicles being highly cost-effective. For example, the US Environmental Protection Agency has concluded that retrofit generates US$13 of health benefits for every US$1 spent.
- Local authorities have failed to take a lead by retrofitting their captive fleets to high standards—see Section 8.
- In London—which has "presented the greatest challenge"—Phase III of the Low Emission Zone is currently under threat, with potentially major implications for the UK's ability to meet the PM_{10} limit values, and the 'Best Practice Guidance on the Control of Dust and Emissions From Construction and Demolition' has so-far been ignored, despite commitments to its full implementation—particularly on the Olympic site—see Section 5.

Despite this, and following consultation, Defra recently submitted a request to the Commission to postpone the deadline for meeting the PM_{10} targets under the Directive. The UK's application concerned 8 zones/agglomerations (out of 43 in the UK), most notably London. The application was rejected by the Commission on 11 December 2009.

A similar requirement to postpone the deadline for meeting the NO_2 target is also expected—the UK currently has NO_2 exceedences along 3,500km of road. From current measures, Defra expect about 850km of road to still exceed the NO_2 limit value in 2015.

In rejecting the UK's application to postpone the deadline for meeting the PM_{10} targets, the European Commission concluded that there are important elements missing from the Mayor of London's draft Air Quality Strategy—see Section 5—"such as a clear timetable for the implementation of the abatement measures envisaged, as well as an estimate of the improvement of air quality which can be expected by 2011".

The Commission also concluded that:

> "The notification also includes references to a number of local air quality action plans relevant for the zone. However, several of those local plans have not been updated for the purpose of demonstrating how compliance will be achieved by 2011 and can, therefore, not be considered relevant for assessing the notification. In view of the significant uncertainty regarding the contents and objectives of the draft strategy and the absence of up-dated local air quality action plans, the Commission considers that an air quality plan demonstrating how compliance with the limit values will be achieved by the new deadline as required in Article 22(1) of Directive 2008/50/EC has not been provided for zone 1. The Commission therefore considers that the United Kingdom has not provided all relevant information necessary for the Commission to assess the notification".

Action to improve air quality is, therefore, an urgent priority

The area of interest that we shall address in this submission is the steps that need to be taken to ensure that air quality targets will be met in the future.

3. National Framework for Low Emission Zones

EIC believe that one of the most effective ways to meet the UK's air quality obligations is through targeted programmes focused on cleaning up the most polluting vehicles. These areas will continue to suffer from poor air quality unless measures are implemented at a local level.

The Low Emission Strategies Group convened by Sheffield City Council is clear evidence that local authorities are keen to adopt Low Emission Zones as a measure for improving air quality. However, little progress has been made in areas other than London.

EIC welcomed the recent Defra Local Air Quality Management Guidance as an important tool for helping local authorities improve the management of air quality in their areas, including providing guidance for the introduction of Low Emission Zones. However, the guidance provides insufficient Government support for local authorities to adopt these measures cost effectively. It also fails to facilitate consistency between any new Low Emission Zones.

EIC acknowledge that vehicle classification for any new Low Emission Zone is a decision for local authorities, however a situation whereby vehicle operators have to comply with different vehicle restrictions in different parts of the country is undesirable.

EIC believe that the Local Air Quality Management Guidance should be supported through the urgent introduction of a National Framework of Low Emission Zones. A similar scheme operates very successfully in Germany (EIC would be pleased to provide further information on this scheme if required).

This would leave local authorities with the decision on whether, when and where to have a Low Emission Zone—providing that they operate within the national framework.

3.1 *How Would a National Framework for Low Emissions Zones Work?*

A National Framework should establish a nationally recognised standard for emissions and vehicle identification—supported by a national certification scheme of retrofit technologies (see section 4).

3.1.1 Emission Standards

A National Framework would set a nationally recognised emission standard for light and heavy duty vehicles.

Using the heavy-duty vehicle classifications, the standards should be set as follows:

- Class A—Euro V vehicles and better.
- Class B—Euro IV, or Euro II/Euro III plus approved particulate filter.
- Class C—Euro III, or Euro I/II plus approved particulate filter.
- Class D—Euro II and lower.

The terminology 'approved particulate filter' refers to the databases held by EST for the RPC and LEC approvals which have formed the basis of the London LEZ categorisations for phases 1, 2 and 4.

Equivalent emission standards should cover light duty vehicles, as again defined for the London LEZ Phase 3.

3.1.2 Vehicle Identification

A window sticker could be used to indicate the emission standard of the vehicle—this would be valid nationally. Local authorities would then decide the minimum emissions standard that is allowed into the Low Emission Zone.

The Low Emission Zone could then be enforced manually by local authorities[45]—as in Germany—simply checking whether there is a sticker in the windscreen or not.

3.1.3 Facilitating Consistency

Without a National Framework, if local authorities adopted their own Low Emission Zone—even under the new Local Air Quality Management Guidance—vehicle operators could be forced to comply with different vehicle restrictions in different parts of the country.

Inconsistency between Low Emission Zones would increase the cost and complexity of compliance and place a significant burden on vehicle operators.

3.1.4 Creating New Jobs.

EIC believe that a National Framework for Low Emission Zones would help create many new jobs in the UK's environment industry.

Approximately 3,500 people are currently employed in the UK by the retrofit market. Furthermore, an estimated 80% of the UK's retrofit market is supplied by UK owned companies. The UK's share of this market could increase significantly through effective Government support for the introduction of Low Emission Zones across the UK—helping create many new jobs.

4. *National Certification Scheme of Retrofit Technologies*

A National Framework for Low Emissions Zones should be supported with the introduction of a National Certification Scheme of retrofit technologies.

In the development of the London Low Emission Zone, Transport for London worked alongside authorities such as VOSA and VCA to develop a list of approved retrofit particulate abatement technologies for compliance with the scheme across the full range of heavy-duty vehicles. A vehicle fitted with an approved technology is issued with a Reduced Pollution Certificate or Low Emissions Certificate to confirm compliance. EIC believe that this certification could become a nationally recognised standard, which local authorities could use as part of their own schemes under a National Framework.

[45] Paragraph 36 of Schedule 22 of Environment Act 1995 can include the pursuit of air quality standards in Traffic Management Orders.

EIC believe that it is feasible to extend a National Certification Scheme for retrofit of PM abatement technologies to also cover NO_x—given appropriate Government support. This would greatly facilitate technologies that will also help address future concerns over failures to meet NO_2 limit values.

In his draft Air Quality Strategy, the Mayor of London proposed that by 2015, subject to central Government support in establishing a suitable certification and testing regime, London introduce an emissions standard for NO_x (Euro IV) into the London Low Emission Zone for HGVs, buses and coaches.

EIC fully support this proposal and urge the Committee to include amongst its recommendations the urgent introduction of a National Certification Scheme of retrofit technologies to cover PM and NO_x abatement technologies.

One basis for such a scheme might be chassis dynamometer testing for initial approval of the NO_x abatement technology, plus a requirement for an on-board datalogger which could be interrogated at the annual vehicle test to confirm that the system has been operational in service. We would be pleased to expand on this proposal if required.

5. *London Air Quality Strategy*

EIC generally welcomes the set of policies and proposals contained in the Mayor's draft Air Quality Strategy, which seems to acknowledge the role of retrofit technologies in reducing vehicle emissions from the existing vehicle parc. The new proposals for a further phase for the London Low Emission Zone (LEZ) in 2015, coupled with the retrofit of PM and NO_x abatement technologies to diesel-powered buses remaining in the fleet at that time, are particularly welcome.

Our major concerns are two-fold: (1) a greater degree of urgency is needed if these policies are to be transformed into practice; and (2) the funding gap that needs to be filled to deliver the more ambitious (and arguably the more effective) of the proposals to proceed in a timely and effective manner, which is expected to be in the region of £70—100 million. EIC is very concerned that unless this is funding gap filled, the Strategy cannot be implemented properly.

6. *Funding for Retrofit*

Barack Obama's American Recovery and Reinvestment Act of 2009 provides US$300 million of funding through the Diesel Emissions Reduction Act to heavy-duty diesel vehicle and equipment owners to retrofit their fleets—at a time when the US Environmental Protection Agency has concluded that retrofitting diesel vehicles is highly cost-effective and generates US$13 of health benefits for every US$1 spent.

In Germany, up to €2,000 is available to contribute to the capital costs of a particulate filter. In Holland, funding available on a sliding scale depending on the size of the engine and emission reduction performance of the technology—up to €11,000 is available per vehicle.

This could be focussed initially on London in order to fill the funding gap identified in the Mayor's draft Air Quality Strategy.

EIC believes that the Government should incentivise the uptake of transport pollution control measures by:

- Announcing a National Framework for Low Emission Zones supported by funding for retrofit of PM and/or NO_x abatement technologies—see Section 3.
- Introducing an equivalent "Enhanced Capital Allowance" for retrofit technologies. Similar to the existing Enhanced Capital Allowance scheme, EIC believe that vehicle operators purchasing retrofit technologies to clean up polluting vehicles should be entitled to 100% first-year capital allowance.
- Incentivise the early uptake of Euro VI vehicles through the continued use of the Reduced Pollution Certification (RPC) scheme.

In advance of the 2009 Budget, EIC called for the extension of the Reduced Pollution Certification (RPC) scheme from 1 October 2009 for all heavy-duty vehicles that meet the Euro VI levels before they become mandatory. We welcomed, therefore, the announcement in the Budget that the Government would introduce measures to incentivise the early uptake of Euro VI vehicles before the standard becomes mandatory.

The Reduced Pollution Certification (RPC) scheme offers reduced rates of vehicle excise duty to heavy goods vehicles and public service vehicle operators who take action to reduce the emissions of their vehicles to a certain level—before the corresponding mandatory requirements come into force. Since October 2007, RPCs have been available for lorries and buses that meet Euro V standards before they become mandatory in October 2009. This is similar to the scheme that existed prior to October 2006 for Euro IV vehicles.

The RPC scheme is an excellent example of Government policy helping to commercialise new technologies ahead of regulatory requirements. This helps create a "lead market" for emission reduction technologies, which can be exported across the EU once mandatory standards come into force.

7. *Promoting Technological Change and Cleaner Vehicles*

Central Government has a key role to play in incentivising low emission vehicles through further changes to vehicle excise duty and other tax regimes, with a focus on air quality as well as CO_2. Grants for retrofitting abatement equipment, targeted directly at reducing tailpipe emissions from heavy duty vehicles (HDVs), were introduced very effectively in the UK in the mid 1990s and are now used in other European countries. There is further scope for increasing the differentials between vehicles conforming to different emissions standards.

We would also welcome measures that would promote the uptake of cleaner freight vehicles through green procurement standards. Such measures would have a beneficial effect across the UK.

8. *Reducing Emissions from the Public Transport Fleet*

Some towns and cities have already made strenuous efforts to ensure that their buses in particular are as clean as possible, and have embarked on programmes to fit diesel particulate filters (DPFs). This includes London, which was at the forefront of this movement but is now in danger of being left behind by other UK and European cities, which have already started retrofitting combined DPF and SCR (selective catalytic reduction) systems to reduce NO_x as well as PM.

The Mayor of London's Air Quality Strategy draft does propose retrofitting the remaining Euro III buses in the London fleet with NO_x abatement equipment by 2015. This is welcome, but should be started next year instead of waiting. Technology has been proven in a two-year trial, which TfL has stated was a success. The technology enables a Euro III (and indeed a Euro II) bus to meet emissions levels equivalent to Euro V.

In addition, other local authorities should be encouraged to do this, as it is a cost-effective way of reducing fleet emissions and improving air quality in town and city centres, where the greatest number of inhabitants will be affected.

We would welcome acceleration of the take up of cleaner vehicles into taxi fleets, including introducing age-based limits for taxis. London's introduction of a requirement for all newly-licensed PHVs to meet a minimum Euro 4 standard for PM emissions from 2012 should not overlook the option for retrofitting older vehicles to meet this standard; full wall-flow filter systems can reduce the particulate matter emissions of Euro 3 taxis to better than Euro 4.

We would encourage all local authorities to develop low emissions strategies for all of their public sector vehicles, to include minimum emissions requirements for these fleet vehicles. We believe that public sector captive fleets can and should comply with Euro IV standards immediately. In this context, we would ask that specific encouragement be given to promoting retrofit (of DPF + SCR) as a cost effective option for achieving this standard.

9. *Reducing Emissions from Construction and Demolition Sites*

Dust and emissions from demolition and construction sites can have a significant impact on air quality, not only on the site itself but also on the health of people living and working in the surrounding area.

Construction sites are often located in areas of high air pollution, such as London—adding a further health burden on those living close to these sites.

A significant proportion of these emissions come from non-road mobile machinery used on demolition and construction sites. For example, the City of Westminster's draft Air Quality Strategy estimates that construction sites are responsible for 16% of road transport emissions of particulate matter.

It is widely acknowledged that reducing emissions at construction sites in London and across the UK will make an important contribution to meeting the UK's obligations under the Ambient Air Quality Directive.

Whilst the London Low Emission Zone ensures that heavy-duty vehicles over 3.5 tonnes used on major construction sites in London, including the Crossrail site, meet EU emission standards for particulate matter, equivalent standards for the construction machinery used on site do not exist.

Emission standards for construction machines are much lower than the equivalent on-road vehicle. The Non-Road Mobile Machinery Directive sets emissions standards for new engines but this does not have any impact on existing machinery. Furthermore, even new construction equipment cannot achieve equivalent emission standards to on-road vehicles.

In 2006, the Mayor of London published 'Best Practice Guidance On the Control of Dust and Emissions From Construction and Demolition' to assist architects, consultants, developers and local authority officers in establishing best practice for reducing emissions across all aspects of managing a demolition or construction site, including from non-road mobile machinery.

The London Best Practice Guidance states that non-road mobile machinery with power outputs of over 37kW should be fitted with suitable after-treatment devices listed on an approved list managed by the Energy Saving Trust. Fitting suitable after treatment devices to existing machinery—in line with the 'Best Practice Guidance'—can reduce emissions by at least 85%.

We are disappointed, however, that this part of the Best Practice Guidance has not been enforced by the GLA, in spite of there being a number of approved aftertreatment suppliers and systems on the list managed by the Energy Saving Trust.

Whilst it is encouraging to see that the Mayor of London, in his draft Air Quality Strategy, intends to address this, albeit three years after the launch of the Guidance, air quality in London has suffered for the reasons given below:

- To-date, there has been a total failure to enforce the section of the guidance relating to non-road mobile machinery on any major construction site in London, so air quality is not being protected.
- The construction for the Olympic Games represented an enormous opportunity to demonstrate the 'green credentials' of the ODA, but the implementation of DPF retrofit on diesel plant over 37kW has been delayed (by lack of ambition and lack of will) to the stage where much of this opportunity has passed—see Section 9.1.
- The Crossrail project represents the next opportunity for positive action in this area, but there are already signs that the implementation of DPF retrofit will not be pursued. As GLA has direct control over this project as a division of TfL, we would expect a robust implementation programme.

EIC also recommend that the BPG, or equivalent, is rolled out nationwide, as construction sites around the country suffer from the same poor air quality as those in London

At the heart of this must be consistent emission standards for non-road mobile machinery, including a recommendation that local authorities introduce a requirement to fit suitable after-treatment devices to all non-road mobile machinery operating over a specified power output threshold in line with the London 'Best Practice Guidance.'.

Government departments and local authorities should in particular include full implementation of the BPG in procurement policies, and ensure that strategic applications require implementation of the BPG.

9.1 *London 2012*

The Olympic Delivery Authority's Sustainable Development Strategy includes a commitment to full implementation of the 'London Best Practice Guidance.'

Furthermore, Lord Sebastian Coe, Chairman of the London Organising Committee of the Olympic Games, has recently stated:

> ". . . during the development of our Olympic facilities, all works will be carried out in accordance with the Olympic Park Code of Construction Practice. This will be published on the London 2012 website shortly and sets out a series of measures the ODA (Olympic Delivery Authority) will apply throughout the construction and legacy transformation phases to control and minimise dust and emissions from construction activities. This includes ensuring works are carried out in accordance with the [London] Best Practice Guidance: The Control of Dust and Emissions from Construction & Demolition"..

Despite these commitments, the Olympic site has failed to implement the Guidance. Construction started on the Olympic site in April 2006, yet I was recently informed in writing that the ODA "haven't retrofitted any plant on site".

EIC recently submitted a Briefing Paper to the ODA which clearly demonstrated that fitting suitable after treatment devices to existing construction machinery is cost effective, has huge environmental benefits and does not jeopardise fuel efficiency, machine functionality or the safety of vehicle operators.

It is disappointing that the ODA appears to have disregarded this expert input in reaching its decision to hold a "pilot study" of after-treatment devices on the Olympic site.

It remains EIC's firm belief that starting a "pilot study" now is unacceptable when there has been a commitment from day one to comply with all aspects of the London Best Practice Guidance. However, we have tried to cooperate with the ODA to ensure that the abatement of construction plant in line with the Best Practice Guidance occurs as an urgent priority.

Despite this we remain seriously concerned at the apparent lack of urgency the ODA has shown to fulfilling its commitment to comply in full with the London Best Practice Guidance.

Over the last two years the ODA has highlighted "a number of issues" that have been raised regarding the commitment to fitting suitable after-treatment devices to construction machinery in line with the Best Practice Guidance.

Every one of these "issues" have either been addressed through the Precis forum or through the strict accreditation process established by the Energy Saving Trust to ensure after-treatment devices for construction machines operate properly and fully comply with the requirements of the Best Practice Guidance.

The Energy Saving Trust provides an independent certification and register service for pollution control technologies to ensure that it satisfies the requirements of the London Best Practice Guidance. Conformity testing is carried out on approved technologies to ensure an ongoing high level of performance and upholding of Energy Saving Trust certification standards.

As part of the accreditation process, each aftertreatment device is required to comply with strict standards concerning warranties; functionality; safety and emission control. EIC remains extremely concerned that the ODA's "pilot study" is proposing to address exactly the same issues.

Furthermore, in response to a recent question by Darren Johnson in the London Assembly, Boris Johnson, Mayor of London, recognised "that the work carried out in the development of the BPG, as well as EST's certification process for after treatment devices, provide overwhelming evidence of their environmental benefits. It is also clear that devices certified by EST meet minimum standards for a range of factors, including emissions reductions, noise, safety and engine efficiency". EIC is extremely concerned that the ODA's "pilot study" is proposing to address these issues despite this "overwhelming evidence".

The Mayor went on to state in his response that "as yet, there has been very little use of these devices on actual construction sites in London, or indeed elsewhere in this country". However, diesel particulate filters (DPFs) have been fitted successfully to construction machinery for many years. For example, fitment was mandated in Switzerland for tunneling equipment in 2000, and for other construction machines in 2003. To date, around 10,000 filter systems have been fitted. Filters can be fitted to ensure that the machine's operation is unaffected and the operator's visibility is not impaired.

The Mayor's response also called for a "quick pilot study". The Mayor went on to state that his "officials are pressing for the trial to be as short as possible, and assuming it is successful, that this leads to immediate rollout". It is disappointing that the ODA appears to have ignored the Mayor's request.

I am pleased to attach a copy of EIC's recent paper 'Comments on the Olympic Delivery Authority's Proposed Study Plan for Reducing PM_{10} from Non-Road Mobile Machinery' as supplementary evidence to the Committee's inquiry.

9.2 *Crossrail*

Crossrail is the most significant construction site in Europe.

EIC welcomes Crossrail's commitment to "implement measures to control and limit emissions which will affect some residents and other sensitive receptors as far as reasonably practicable"..

We believe that Crossrail could demonstrate environmental leadership by extending this commitment to full implementation of the Best Practice Guidance. Full implementation of the Best Practice Guidance will ensure that this work has a minimal impact on the health of local people.

10. Climate Change

The effects of PM on health and air quality are well documented, but there is a growing body of evidence confirming that black carbon, emitted from diesel engines, is a significant contributor to climate change. Black carbon has been estimated to be the second largest contributor to global warming, with emissions from diesel vehicles comprising nearly a quarter of total black carbon emissions.

DPF fitment is the most appropriate action to take to reduce black carbon emissions. Using a Euro III double deck bus as an example, we estimate that the black carbon savings from fitting a DPF could be 30% of the total climate impact, equivalent to a 44% improvement in fuel consumption. Fitting DPF technology to diesel engines such as trucks, buses, construction machines, emergency generators and trains will not only improve air quality and public health, but will be highly beneficial to short term climate change and local urban warming in London.

18 December 2009

Memorandum submitted by Friends of the Earth (England, Wales and Northern Ireland) (AQ 27)

Introduction

In this submission, Friends of the Earth picks up and develops two statements made by the Environment Agency in its own submission of evidence:

— that there have been considerable reductions in emissions of the key air pollutants through the Environment Agency's regulation of installations under IPPC/EPR

— that there is currently no method to cost the effects of poor air quality on the natural environment

Both statements are correct as far as they go, but equally, neither tells the full story. This submission is therefore intended to give a wider perspective on these two issues.

SUMMARY

The first part of this submission therefore addresses the fact that the UK dominates the EU-27 tables of large point sources of NOx emissions. This very poor performance is further underlined by the fact that it does so alongside new Member States that have much lower GDP per capita incomes than does the UK.

This is shown to be due to poor implementation of IPPC. In particular, whilst complying with the letter of the law, the UK fails to make proper use of the flexibility contained within IPPC. Used properly, this flexibility allows account to be taken of local factors, but the UK used it to ignore the international benchmark BAT standards on several counts and without proper justification.

One of these counts involved ignoring international advice that assessments should be made in terms of cost per tonne of pollutant abated rather than in terms of a full cost-benefit analysis. This advice is given to avoid a situation whereby the full costs of pollution abatement techniques are set against only the partial benefits of avoiding that pollution, due to the current inability to place a monetary value on ecosystem damage.

However, work is underway at both EU and UK levels to develop a methodology for financially valuing ecosystems, and the second part of this submission focuses on this. Strong correlation between the UK and EU approaches to the basic framework methodology suggest that, to the best of current knowledge, the UK is going broadly in the right direction.

However, much additional research and development work is necessary at both UK and EU levels to reach the point where this methodology can be used to value ecosystems to a satisfactory standard. As currently available to the public, the elaboration of this emerging methodology is less detailed in the UK than in the wider EU. This means that there is a less clearly defined basis for identifying the various steps and actions involved, and therefore a less structured roadmap for relating the implementation of those steps and actions into a coherent body of work to achieve the overall objective of being able to financially value the impact of different policy scenarios on ecosystems.

Friends of the Earth is therefore of the view that the UK should develop a more detailed framework for its work in this field, using the EU work as a prototype, but amending this if it is thought to be more appropriate to the UK situation.

POINT SOURCE NOX EMISSIONS

The issue

In 2008, EU-wide data was published showing that the UK dominated tables of the largest point sources of NOx emissions in the EU-27. Of the top 20 largest emitters, 8 were UK plants.

Top 20 NOx producing point sources in the EU-27 Member States

Country	*Site*	*Capacity (MWe)*	*Current emissions estimate (kilotonnes)*	*Emissions estimate using BAT (kt)*
UK	Drax	3960	58	7
Poland	Belchatow	4,340	40	2
Bulgaria	Maritsa II	1,450	39	2
Spain	Compostilla	1,312	35	2
Spain	Teruel	1,050	31	2
UK	Aberthaw	1,425	24	1
Portugal	Sines	1,256	23	2
UK	Ratcliffe	2,000	23	3
UK	West Burton	2,000	23	2
Bulgaria	Maritsa III	840	23	2
Spain	La Robla	620	23	1
UK	Cottam	2,008	22	3
Greece	Dimitrios	1,570	22	3
Spain	Velilla	-	21	-
UK	Kingsnorth	1,455	20	2
Ireland	Moneypoint	915	20	2
Greece	Kardia	1,200	20	1
UK	Ferrybridge	1,470	20	2
Romania	Turceni	2,310	20	1
UK	Longannet	2,400	19	2

Source: The Swedish NGO Secretariat on Acid Rain/European Environmental Bureau

This dominance of UK plants amongst the largest point sources of NOx was also found to be the case in European Environment Agency data produced around the same time.

However, this dominance is even less to the credit of the UK in light of the fact that the other countries featuring in this table had much lower GDPs per capita. The UK had a GDP per capita income over 16% above the average for the EU-27 in 2007. However, it featured alongside other MSs in this table, all of which have GDP per capita incomes lower than the UK, and most of which are below the EU-27 average – the lowest being only 40% of the EU-27 average.

GDP per capita for the EU-27 Member States (EU-27 average = 100)

EU-27	*2005*	*2006*	*2007*
Germany	115.0	114.0	113.2
Austria	128.7	127.4	128.2
Belgium	121.0	119.6	118.1
Bulgaria	35.3	36.7	38.1
Cyprus	92.5	91.8	92.7
Denmark	126.5	125.6	122.8
Slovakia	60.5	63.6	68.6
Slovenia	86.8	87.7	88.8
Spain	102.9	104.8	106.9
Estonia	62.8	68.3	72.1
Finland	115.1	116.8	116.2
France	112.3	11.8	111.3
Greece	96.1	97.2	97.9
Netherlands	131.0	130.4	130.9
Hungary	64.1	64.9	63.5
Ireland	143.6	145.3	146.3
Italy	105.1	103.2	101.4
Latvia	49.9	53.6	58.0
Lithuania	53.1	56.1	60.3
Luxembourg	264.0	278.9	276.4
Malta	77.4	76.9	77.1
Poland	51.2	52.4	53.6
Portugal	75.4	74.4	74.7
United Kingdom	119.1	117.8	116.2
Czech Republic	76.5	78.5	82.0
Romania	35.4	38.8	40.7
Sweden	123.6	124.4	126.2

Source: Eurostat and Eustat

It is ironic that these tables were being prepared at the same time as the UK was granting IPPC licences to its power sector that required none of them to fit the selective catalytic reduction (SCR) NOx abatement equipment that is commonplace in some other countries. At the same time, it was notifying the European Commission that it would not meet its 2010 ceiling for NOx. So whilst IPPC has led to significant reductions in air pollution, these should not overlook the fact that some very considerable problems remain.

NOx control technology for power plants

There are 2 types of NOx control technology – primary and secondary.

— Primary NOx control technologies modify the boiler to prevent the NOx from being formed in the first place. During the combustion process, NOx is formed from the nitrogen content of the fuel (fuel NOx) and from the combustion process (thermal NOx). There is therefore a whole range of technologies that modify the combustion process to reduce the amount of NOx that is formed – eg by controlling the air flow and/or keeping the combustion To as low as possible whilst still achieving full combustion.

— Secondary NOx control technology cleans up the NOx that is formed during the combustion process. For large plants, such as the power sector, the secondary technology is Selective Catalytic Reduction (SCR), which uses catalysts and ammonia/urea to clean the gas stream emerging from the boiler.

IPPC BAT for NOx from power plants

Integrated Pollution Prevention and Control (IPPC) is the key instrument of EU industrial policy relating to the environment, and it covers a wide range of industrial and agricultural processes. The IPPC Directive itself is a framework Directive in that it sets out the principles of applying IPPC, but does not actually set any controls. These are set at the very local level of each individual plant, where account can be taken of local technical, geographical and environmental conditions.

These local controls are set as Best Available Techniques (BAT) conditions which, put very simply, means that the operator has to use the best way of protecting the environment that can be economically justified. These BAT conditions are set out in legally binding permits for each individual installation. International guidance is provided by BAT Reference Documents (BREFs), which set benchmark BAT standards for each industrial sector and some cross-sector issues, eg. energy efficiency. However, the BREFs are not legally binding.

IPPC therefore represents a combination of EU controls and local flexibility, underpinned for some industrial sectors by legally binding emission limit values (ELVs) set out in the Sector Directives. These Sector Directive ELVs provide minimum standards below which the determination of site-specific BAT may not fall, and the power sector is covered by the LCP Directive (amongst others).

IPPC and LCP Directive NOx controls for existing UK coal-fired power plants

UK existing coal-fired power plants exceed a capacity of 500 MWth, placing them under the strictest controls set by the IPPC and LCP Directives. The NOx BREF BAT standard for existing coal-fired plants of this size is 90-200mg/Nm3, based on a combination of primary NOx controls and SCR. It is not technically possible to meet these emission levels without SCR.

The legally binding minimum emission limit value (ELV) set out in the existing LCP Directive for existing plants of this size is 500mg/Nm3 until 31st December 2015. After that, these plants have to meet a NOx ELV of 200 mg/Nm3, given that they are above the 500 MWth threshold for this requirement. This can only be met by fitting SCR.

Due to the characteristics of its locally-sourced fuel, Aberthaw Power Station has a derogation under the LCPD that gives it a NOx ELV of 1200mg/Nm3 until 1st January 2018, when it will have to meet a NOx ELV of 200 mg/Nm3.

Implementing existing IPPC/LCPD for coal-fired power plants in the UK

(a) The general case

The UK required most of the UK power sector to meet a NOx ELV of only 500 mg/Nm3 i.e the legally binding minimum set under the LCPD. This was justified in terms of it only being reasonable to expect the existing coal-fired plants to fit Boosted over Fire Air (BOFA), an advanced primary NOx control measure.

On the face of it, a valid case could have been made for not requiring SCR, in that most plants could justifiably say that they do not yet know whether they will continue normal operation after 2015, as it is not reasonable to expect them to take a commercial decision on fitting SCR so far in advance. This would give them only 8 years of certain normal operation, which is a bit too short a period for reasonably amortising the debt of fitting SCR. Here, it could therefore be argued that local factors provided justification for derogating from the BREF BAT standards.

However, it would appear that there was more to the UK's decision than this. The operators' permit applications repeatedly referred to being easily able to meet a NOx ELV of 500 mg/Nm3 with BOFA, and Friends of the Earth submitted technical details showing that BOFA was achieving half those emissions. However, this was ignored.

Further, independent of the above, it would appear that SCR was never on the agenda for any UK power plants, due to an OXERA study[46] that the UK used (wrongly) to benchmark its BAT determinations for the power sector – see below.

(b) Aberthaw Power Station

The Aberthaw Power Station application was always going to be distinct from the rest of the UK power sector in that Aberthaw has a different boiler technology that means that it cannot fit BOFA. It was therefore a matter of whether Aberthaw was going to be required to meet a less strict NOx standard or fit SCR.

However, Aberthaw's application proved distinctive in another respect, in that it clearly stated that if it was required to fit SCR, then it would remain open beyond 2018 ie it would have sufficient remaining life to amortise the debt of fitting SCR, which forms the basis of the BREF NOx BAT standard for existing plants of this size. In addition, the station's own calculations showed that the costs per tonne of NOx abated via SCR were well within the figures set out in the Economic and Cross Media BREF as being entirely acceptable in other Member States.

Despite all of this, Aberthaw escaped any requirement to fit SCR, due partly to the UK's IPPC BAT assessment methodology. This determines BAT to be the point on the cost curve beyond which costs start to increase more rapidly. However, this is a relative measure, and it takes no account of whether in absolute terms, costs are still reasonable beyond that point.

[46] "*Best Available Techniques for Abating SO2 and NOx Emissions from Coal-fired Power Stations"*: OXERA for the Environment Agency; February 20th 2004

Another reason was that the Aberthaw application amortised the debt of fitting SCR over only 10 years, thereby over-emphasising the costs. Friends of the Earth complained to the Environment Agency about this, but they benchmarked their decision not to require SCR with a study undertaken by OXERA that concluded that even if the debt was amortised over 15 years, there was no economic case for fitting SCR to any existing power plant in the UK. This ought to have alerted them to the fact that something was wrong, given that SCR is the basis of the BREF BAT standard for NOx controls on existing plants of this size. In fact, what was wrong was that the OXERA study used a methodology explicitly stated by the Economic and Cross media BREF as being inadequate for BAT assessments, and one that should therefore never be used.

This is because the OXERA study was based on a full cost-benefit analysis. However, the Economic and Cross Media BREF states that this methodology should not be used for BAT assessments because of the problems of costing ecological damage – CBA studies therefore overemphasise the costs of fitting a technology. The ECM BREF states that instead, a simple cost effectiveness study should be undertaken, giving a cost/tonne of pollutant abated.

However, despite all of this 'evidence', Friends of the Earth was unable to challenge the decision legally because the BREFs are not legally binding, and Member States are free to determine their own BAT assessment methodologies. This simply left us with a case of one technical opinion against another, which our lawyers advised is a type of case that does not play out all well in the English courts, quite apart from being potentially very expensive as each side proffers additional technical experts to counter the other's experts.

The Aberthaw case study

As Friends of the Earth had done a lot of work looking at the Aberthaw determination, we decided to use that work as a case study to inform the revision of IPPC into the new Industrial Emissions (IPPC) Directive that is currently going through the EU political process.

Before this case study was released, it was checked with Friends of the Earth's lawyers as being entirely compatible with the information that it had in its possession. This case study has been used at EU level, both within the political and legal arenas, and it has been published in the specialist press both within and outside the UK, along with data showing the UK dominating the tables of the EU largest point sources of NOx.

SCR in 2016?

As stated earlier, the existing Large Combustion Plant Directive requires that all existing coal-fired plants larger than 500 MWth have to meet a NOx ELV of 200mg/Nm3 after 31st December 2015. This can only be met by SCR, and it applies to all UK power plants.

The UK is trying to reduce the risk of plants closing rather than fitting SCR by pushing hard for derogations from the provisions in the new Industrial Emissions Directive. The European Parliament's 1st Plenary vote in March 2009 narrowly voted against anything much more than the (necessary) peak load derogations, but the Council position contains derogations aimed at protecting existing plants from having to fit SCR. In these negotiations, the UK aligned with Poland, Bulgaria and Romania, other (much poorer) countries that featured alongside the UK in the EU-27's table of the largest point sources of NOx emissions.

The relationship with the National Emission Ceilings Directive and air quality

In October 2007, most of the UK coal-fired power plants received their IPPC permits, none of them requiring the fitting of SCR. In December 2007, Aberthaw received its permit, again not requiring the fitting of SCR. At exactly the same time, the UK notified the European Commission that it would not meet its 2010 NOx emission ceiling. It was therefore clear that there had been no integrated implementation of the IPPC and National Emission Ceilings Directive.

As a result, in January 2008, the operators were notified that their newly received permits might need to be reviewed and consultations were held as to how to bridge the gap. However, DEFRA now says that new modelling had determined that the shortfall would be smaller than had been previously thought, and as the 2010 data would not be available until 2011, the UK would be in compliance by the time that the previous non-compliance was confirmed.

With regards to local air quality, there is a legal requirement under IPPC to apply stricter standards than Best Available Techniques if these are needed to meet an EU Environmental Quality Standard. Applications therefore need to show that their installation would not exceed any of these standards, and generally, although not always, the local situation is reasonably well addressed.

However, beyond that, the decision that SCR could not be justified at any UK coal-fired power plant has two implications:

— It judges that it is acceptable to 'fill up' to those environmental quality standards, rather than achieve the full technological potential for emissions reduction

— It allows additional NOx pollution to travel away from the immediate vicinity and to contribute to the background levels elsewhere. NOx is a trans-boundary pollutant that can travel long

distances from the source, and this is facilitated by the tall chimneys at industrial installations, designed to disperse the plume away from the immediate vicinity. It therefore forms part of the background levels at locations a long way from the plant.

In terms of air quality, whilst in most localities, traffic is a larger source of local NOx pollution, attention must be paid to all sources if local air quality is to be reduced to acceptable levels. And beyond the health effects of NOx pollution, it is a direct cause of acidification and eutrophication damage to ecosystems and, as a precursor gas to the formation of ground-level ozone, it is an indirect cause of health and ecosystem damage.

Conclusion

The fact that Friends of the Earth was unable to take legal action over the apparently obvious breach of IPPC in the NOx determination at Aberthaw Power Station underlines the fact that the UK did not act in breach of the letter of the law with regards to its implementation of IPPC.

However, it is the view of Friends of the Earth that it did breach the spirit of that law. IPPC contains flexibility to allow for a proper implementation to take account of all relevant local factors. However, it was not intended that a Member State should be able to disregard the BREFs on multiple counts on a justification that itself breaches a clear requirement of the Economic and Cross Media BREF. It was also not intended that Member States should so design their BAT assessment methodology that it ensures that it will only address what amounts to the 'low hung fruit' at any particular time.

It is worth noting that some other Member States do require SCR to be fitted to all their existing coal-fired plants, including those older than 1987. For example, the Netherlands requires all its existing plants to comply with a NOx ELV of 100 mg/Nm3. It is therefore unsurprising that the Dutch authorities are resentful about what they perceive the UK to be 'getting away with'.

However, in reality, the UK is only 'getting away with' this in terms of the letter of the law. In terms of background air quality and ecosystem damage, we are not 'getting away with' it, and the whole issue of NOx pollution from industrial installations, especially the UK's coal-fired power sector, should be addressed in the way that IPPC intended ie ' … *to achieve a high level of protection for the environment taken as a whole … '.* [Article 1, Scope and Purpose of the IPPC Directive].

Financially valuing ecosystems

The issue

The fact that there is currently no robust system for financially valuing ecosystems means that they are being omitted from cost-benefit analyses (CBAs). However, such valuation methodologies are in the process of being developed, both in the UK and at EU level. The UK therefore needs an ongoing programme of work that builds upon current research and development to achieve the crucial goal of a valuation system that is sufficiently robust to enable the impact of air pollution on ecosystems to be included in CBAs.

UK work to date on financially evaluating ecosystem damage

The UK has produced two particularly important documents on financially valuing ecosystems, looking respectively at developing a methodology for such valuations and at embedding an ecosystems approach (including financial evaluation) in government policy:

— DEFRA's *'Introductory guide to valuing ecosystem services'* (December 2007) looks at a comprehensive and systematic means of valuing ecosystems and the services that they provide, to ensure that proper account is taken of those ecosystems and services in policy appraisal. It is described as 'introductory' in recognition of the fact that further testing and development is needed to operationalise the approach in policy appraisal across government.

The methodology is basically an impact pathway approach that looks at the links between ecosystems and the provision of services and how these services contribute to human welfare. It presents 5 key steps:

- — Policy change
- — Impacts on ecosystem
- — Changes in ecosystem services
- — Impacts on human welfare
- — Economic value of changes in ecosystem services

— DEFRA's *'Securing a healthy natural environment'* [2007] sets out an action plan for embedding an ecosystems approach in government policy. Within this plan, Priority Area 4 looks at developing ways of valuing ecosystem services. In practical terms, this Priority Area is developed in terms of:

- — Piloting the valuation of ecosystem services in a range of policy areas, including valuing the benefits of the UK Biodiversity Action Plan and impact assessment for the Marine Bill

— Developing a long-term strategy for environmental valuation in transport appraisal, including the valuation of ecosystem services

— Developing a benefits transfer strategy[47]to facilitate the valuation of ecosystem services

After initial scoping studies, the latest second phase of research – commissioned in 2007 – has built on these. Many of those specifically relating to valuing ecosystems have a target date of the end of 2008, although some are open-ended.

The UK's impact pathway methodology in principle

Although the methodology of valuing ecosystems is still at a developmental stage, Friends of the Earth is satisfied that – to the best of current knowledge – the UK is going broadly in the right direction. We say this on the basis of the strong similarities between the approaches being taken by the UK and the EU.[48]For example:

— Both take an impact pathway approach

— Although the EU approach has only 3 steps, compared to DEFRA's 5, closer examination shows this to be simply due to the EU combining steps that are treated separately by DEFRA

— Both take a marginal value of change as the basis of calculations

— Both are based on Total Economic Value (TEV), which ensures that all values get due recognition, not just those of tradable commodities

— Both recognise that whilst valuing ecosystems is not a new subject, it remains a developing area with much complexity, integrating as it does the two disciplines of ecology and economics

— Both underline the importance of case studies in developing the methodology4 5

— Both have the longer-term aim of mainstreaming this approach in existing policy and project appraisal tools and guidance

The UK's impact pathway methodology in practice

In practice, though, a key point from the above consensus is that much remains to be done to convert the impact pathway methodology from its current form to one where it provides a practical framework for the execution of individual/national valuation studies. Further, where individual studies focus on part of the UK, it is necessary to ensure that these can contribute to the sort of UK-wide studies that are often required to establish the overall impact of particular policy measures.

This process of practical development and refinement can be greatly assisted by converting the broad, key steps of the impact pathway methodology into a series of smaller steps. This enables the highlighting of those areas where specific research efforts, refinement of methodology and co-ordination are required.

A start has been made on this in the UK, where DEFRA's Guidance Document discusses what is involved in each of the 5 key steps in its impact pathway methodology. However, the EU's approach has taken this significantly further,6 operationalising its 3 key steps into a total of 8 steps and converting these into a total of 20 clearly stated main actions.

It is Friends of the Earth's view that an expansion of the UK's approach along these lines will help ensure that the ultimate objective of financially valuing ecosystems is achieved as effectively, as economically and as timeously as possible. Further, if this adoption is formal and public, it will help ensure transparency, and confidence that this issue of valuing ecosystems if being addressed.

Operationalising the EU's impact pathway methodology

The EU's approach is made up of 3 key steps, which are themselves made up of a total of 8 subsidiary steps, which are then converted into 20 main actions:

KEY STEP 1: Exposure assessment: exposure modelling

1. Develop maps of critical loads and levels of exceedances for the relevant scenarios and pollutants. This builds upon existing quantification of emissions and pollution dispersion.

> *Action 1:* Critically assess the possibilities of ecosystem exposure modelling to better serve and suit the needs of the next steps in the assessment framework (eg providing deposition maps on a more detailed scale, extending endpoints for acidification and eutrophication to include biodiversity, effects of enhanced N deposition, increased focus on the implications of and interaction with climate change effects etc)

[47] Undertaking a full ecosystem valuation is a complex and costly exercise. A benefits transfer strategy aims to reduce this by maximising the extent to which the results of a full study for one ecosystem or group of ecosystems can be used to value a similar ecosystem or group of ecosystems

[48] As set out in *Valuation of air pollution, ecosystem damage, acid rain, ozone, nitrogen and biodiversity: Final Report;* Arcadis Ecolas for the European Commission, DG Env; October 2007

Action 2: Determine research priorities on the basis of the results of the critical assessment (action 1) and direct resources accordingly.

2. Develop and ecosystem map distinguishing between ecosystem types

Action 3: Develop an ecosystem map. The major issue is to decide which ecosystem classification and how many ecosystem types to use.

3. Project maps of critical loads and exceedances of step 1 on the ecosystem map of step 2. Determine what ecosystems (areas and types), being exposed to critical loads and/or levels of exceedances, are confronted with changes in critical loads and/or levels when comparing the baseline scenario with each of the policy scenarios

Action 4: Provide an integrated map and database, combining the change of critical loads and levels exceedance and the corresponding ecosystem types.

KEY STEP 2: Ecological response assessment: dose-effect modelling and assessment

4. Develop a comprehensive overview of those ecosystem services that may benefit from reduced acidification, eutrophication and ground-level ozone for each ecosystem type. Define those ecosystem services in an unequivocal way.

Action 5: Develop a comprehensive overview of the ecosystem services that may benefit from acidification, eutrophication and/or ground-level ozone reduction for each ecosystem type. These ecosystem services have to be defined in an unequivocal way (eg by indicating potential overlaps, the way it is valuable to people, assessment guidelines etc). The selection of the ecosystem services potentially benefitting from air pollution abatement requires thorough co-operation with the actions under steps 5 and 6.

Action 6: Have a regular updating of the crucial knowledge on ecosystem service provision in place.

5. Predict the biological and chemical changes in ecosystems as a response to the changes in air pollution exposure between the baseline scenario and each of the policy scenarios. By definition, effects will only occur in those areas where critical loads or levels have been exceeded.

Action 7: Determine the appropriate ecological endpoints of the different ecosystem services provided by each ecosystem type likely to be affected by acidification, eutrophication and ground-level ozone. This requires cooperation with actions under step 4.

Action 8: Organise existing information concerning dose-effect relationships, documenting boundary conditions, spatial coverage and uncertainties.

Action 9: Identify research priorities and define a strategy to direct research efforts to other organisations to reduce uncertainties in dose-effect relationships.

Action 10: Investigate the possibilities of spatially transferring dose-effect relationships. An important condition is that doing so should not add to existing uncertainty, thereby possibly undermining the fragile consensus for the monetary assessment of ecosystem benefits of air pollution abatement.

6. Determine what ecosystem services are likely to be affected by the implementation of the policy scenarios under consideration.

Action 11: Determine the relationship between ecological benefit endpoints and ecosystem service provision. Select indicators and/or develop indices for linking ecological benefit endpoints and ecosystem service flows. This has to be done in close collaboration with actions under steps 4 and 5.

Action 12: Indicate which ecosystem services are meaningfully affected by air pollution abatement scenarios under consideration. This is done by linking information about emission reductions (step 3), dose-effect relationships (step 5) and relationships between ecological benefit endpoints and ecosystem service provision (step 6, action 12) in order to find out about the likely changes in ecosystem service provision.

KEY STEP 3: Economic evaluation: monetary benefit evaluation

7. Determine the likely changes in the quality and/or quantity of ecosystem service provision, comparing ecosystem service provision under the baseline scenario with ecosystem service provision under each of the policy scenarios.

Action 13: Draw up indicators for expressing the change in the quality and/or quantity of ecosystem service provision. The quality of the indicators relates to the ease with which one can determine the changes in ecosystem service flows on the one hand and to their suitability for supporting the actual monetary benefit estimation under step 8 on the other hand.

Action 14: Draw up assessment guidelines for determining indicator values for expressing the change in the quality and/or the quantity of ecosystem services.

Action 15: Determine and describe the change in the quality and/or quantity of the ecosystem service flows that are meaningfully affected.

8. Monetise the likely changes in the quality and/or quantity of ecosystem service provision between the baseline scenario and each of the policy scenarios

Action 16: Identify potentially overlapping benefits that could lead to double counting when assessed independently. Determine a strategy to prevent double counting of benefits (eg more careful design of valuation studies, assessing the value of changes to several ecosystem services in one study etc).

Action 17: Document how changes in the quality and/or quantity of ecosystem service provision act upon the interaction between demand and supply. Identify existing market models that allow accounting for the supply and demand relationships and their resulting price effects. In case such models are not available for certain services, try to describe the likely price effects.

Action 18: Select valuation methods for translating changes in the quantity and/or quality of ecosystem service flows to corresponding welfare changes in monetary terms.

Action 19: Determine the study and reporting design of valuation studies to be carried out so as to allow the transfer or up-scaling of results to other areas.

Action 20: Seek ways to assess, design and communicate the multiple sources of uncertainty. The major aim is to inform decision makers about the uncertainties at hand.

The EU approach emphasises that the overall trajectory for the monetary assessment of ecosystem benefits will be one of step-wise improvements, and therefore not all of the actions identified above can be carried out immediately. Therefore it is necessary to prioritise actions and to gradually allocate resources accordingly.

In practice, this means developing the fundamentals set out in steps 1–6 in order to facilitate the monetary benefit estimation set out in steps 7 and 8. Peer reviewing methodology and the outputs of several key actions is important to build confidence into the assessment process. Regarding the monetary benefit estimation, it is advisable to focus on only a limited number of ecosystem services in the beginning – as knowledge and methodology develop and acceptance among scientists, policy makers and the public grows, more ecosystem services can be added to the benefit of the estimation process. This initial choice of ecosystem service focus will affect the development of steps 5, 7 and 8.

Conclusion

The methodology of the financial valuation of ecosystems is a complex issue that is only currently at the developmental stage. However, within this emerging field, the UK's impact pathway methodology shows a strong correlation in principle with EU approaches, and therefore Friends of the Earth is satisfied that – to the best of the limited knowledge currently available on this subject – the UK is going broadly in the right direction.

However, as currently available to the public, the elaboration of this emerging methodology is less detailed in the UK than in the wider EU. This means that there is a less clearly defined basis for identifying the various steps and actions involved, and therefore a less structured roadmap for relating the implementation of those steps and actions into a coherent body of work to achieve the overall objective of being able to financially value the impact of different policy scenarios on ecosystems.

Friends of the Earth is therefore of the view that the UK should develop a more detailed framework for its work in this field, using the EU work as a prototype, but amending this if it is thought to be more appropriate to the UK situation. Developing and implementing a sophisticated methodology will be demanding, and should proceed as a series of step-wise improvements. However, a more elaborated framework for this work – amended over time if necessary – will facilitate this and provide a coherent basis for the assessment of progress.

27 January 2010

Further memorandum submitted by Calor Gas Ltd (AQ 28)

On 26th January 2010, the Committee was sent a submission on behalf of Calor Gas Ltd calling attention to the extra mortality to be inflicted on the UK as a result of the biomass strategy.

The summary read as follows:

"The UK renewables strategy is over-reliant on a mass switch to biomass combustion. The air quality damage in terms of an increase in particulate emissions has been costed by Government at potentially £557 million as a result of premature death: in 2020 – one year alone—up to 1,175,000 life years will be lost. The corresponding impact of increased morbidity (disease) has not yet been measured by Government. The

combustion of wood in large quantities will lead to rises in the emissions of most of the other pollutants meant to be addressed by the Air Quality Strategy, and in other dangerous pollutants not targeted by the Strategy. The cost of these emissions in terms of human health and the environment should be known, and thrown into an ultimate judgement of the viability of the policy."

Since then early this month HMG has issued a Consultation on the Renewable Heat Incentive, which at pages 34/5 indicates that HMG is minded to increase the allowable particulate emissions by 50%: "In the Renewable Energy Strategy we said that we would work with industry and other key stakeholders to introduce emissions performance standards for biomass boilers which are not adequately covered by other legislation. At the time we considered possible maximum emissions levels of 20g/GJ for particulate matter (PM), and 50g/GJ for nitrogen oxides (NOX). We have now reviewed these limits in consultation with stakeholders and on the basis of research commissioned by Defra, which suggests that they would rule out most currently produced biomass boilers. We are now minded to consider maximum emissions standards for biomass boilers of 30g/GJ for PM and 150g/GJ for NOX, at least in the initial implementation of the RHI. Defra is undertaking further consideration of the potential impact of these revised emissions standards on air quality, and in terms of health costs."

Presumably, the health costs and loss of life years will need to be drastically uprated. This gives the submission by Calor Gas much added force and urgency, and I hope the Committee will look into this aspect of policy because of the damage that will be inflicted otherwise on human hearts, lungs and brains.

5 February 2010

Memorandum submitted by Asthma UK (AQ 29)

As the voice of people with asthma, Asthma UK welcomes the opportunity to contribute to the Environmental Audit Committee's inquiry into Air Quality. Asthma UK is the charity dedicated to improving the health and well-being of the 5.4 million people in the UK whose lives are affected by asthma. We work together with people with asthma, healthcare professionals and researchers to develop and share expertise to help people increase their understanding and reduce the effect of asthma on their lives.

Approximately one in eleven of the UK's population of 61.4 million people is currently being treated for asthma, 5.4 million people.[49]

Air quality is of prime concern to people with asthma and in our annual National Asthma Panel surveys, 66% have told us that traffic fumes trigger their asthma symptoms and 71% feel that the Government isn't doing enough to reduce traffic fumes. Also, 29% say that a reduction in air pollution is the single thing that would make the most difference to their quality of life in relation to their asthma.[50]

Costs to the health services

In 2007/08, there were over 74,000 emergency admissions to hospital because of asthma.[51] Asthma UK believes that up to 75% of hospital admissions for asthma are avoidable. Hospital admissions are costly; the NHS's non-elective spell tariff was £612 for 2007/08. Emergency hospital admissions are estimated to cost the NHS over £61 million per year[52] and the NHS spends around £1 billion a year in total treating and

[49] Health Survey for England 2001. The Scottish Health Survey 2003. Welsh Health Survey 2005/2006. Northern Ireland Health and Wellbeing Survey 2005/2006. Population estimates from Office for National Statistics, General Register Office for Scotland, Northern Ireland Statistics & Research Agency

[50] Asthma UK. National Asthma Panel, 2006. The National Asthma Panel is a telephone-based survey, carried out on our behalf by Ipsos-MORI and typically questions over 1,000 people who are a representative sample of the UK population in terms of the balance of gender, age, socio-economic background and location.

[51] Hospital Episode Statistics, Department of Health; Scottish Morbidity Record, Information Services Division, NHS Scotland; Health Services Wales; Hospital Inpatients System, Department of Health, Social Services & Public Safety Northern Ireland

[52] Methodology: R. Gupta*, A. Sheikh, D. P. Strachan* and H. R. Anderson* 'Burden of allergic disease in the UK: secondary analyses of national databases' Clin Exp Allergy 2004; 34:520–526; Data: GP: Weekly Returns Service Annual Prevalence Report 2001, RCGP Birmingham Research Unit. http://www.rcgp.org.uk/bru
Unit Costs of Health and Social Care 2004, Lesley Curtis, Ann Netten, PSSRU, University of Kent
Prescribing: Source: Department of Health, Prescription Cost Analysis 2004:
http://www.dh.gov.uk/PublicationsAndStatistics/Publications/PublicationsStatistics/Scottish Health Statistics 2004/05
http://www.isdscotland.org/isd/info3.jsp?pContentID=1041&p_applic=CCC&p_service=Content.show& Health of Wales Information Service 2004 http://www.wales.nhs.uk/page.cfm?orgid=1&pid=975
Central Services Agency, Northern Ireland 2004 http://www.centralservicesagency.com/display/statistics
Admisisons: DH reference costs 2004
http://www.dh.gov.uk/PolicyAndGuidance/OrganisationPolicy/FinanceAndPlanning/NHSReferenceCosts/fs/en

caring for people with asthma.[53] Although the reasons for individuals' emergency hospital admissions will be varied, it is reasonable to assume that poor air quality is a factor in many admissions, as there is a large body of published scientific research showing a direct connection between poor air quality and asthma exacerbations. For example, studies have shown a link between living close to main roads and respiratory symptoms, particularly in children. Studies have shown that the worst traffic-related pollutants in terms of health impacts are from diesel-powered vehicles such as trucks, lorries and buses.

Caring for people who experience an asthma attack costs over 3.5 times more than for those whose asthma is well managed.[54] Children are particularly susceptible to poor air quality and the estimated annual cost of treating a child with asthma is higher than the cost for an adult. In 2007-08, 38% of emergency admissions for asthma were children aged under 15. Admissions per head of population were more than twice as high for children as for adults.

Costs to society

Avoidable asthma symptoms have a considerable economic effect outside the health services. Over 12.7 million working days are lost to asthma each year[55] and avoidable factors such as poor air quality affect local economic activities. For example, in our National Asthma Panel survey, 42% told us that traffic fumes discouraged them from walking or shopping in congested areas.

We estimate the annual cost of asthma to society is £2.3 billion,[56] so there is a compelling economic argument to support initiatives to reduce the expenses incurred by avoidable hospital admissions and lost working days.

European legislation

In December last year, the European Union rejected the UK's bid for extra time to reach its air quality targets. Although the EU's statement did not mention penalties, it is possible that the UK could be fined; this is another avoidable cost of failure to reach air quality targets.

Government action

All of these factors make a compelling economic argument for sustained action to improve air quality. The Government should ensure that UK law is compliant with EU air quality legislation. Efforts to achieve emission targets should be monitored and the public should be informed of progress. There should be effective incentives and sanctions in place to ensure that air quality targets are met. Asthma UK supports effective local measures to reduce levels of airborne pollution such as, for example, Low Emission Zones in urban areas, incentives to encourage the use of low-emission vehicles and effective enforcement of industrial emissions regulations. National governments across the UK should be proactive in helping society work towards cleaner air. There will be clear savings in costs to the health services and to the general economy.

11 February 2010

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[53] Methodology: R. Gupta*, A. Sheikh, D. P. Strachan* and H. R. Anderson* 'Burden of allergic disease in the UK: secondary analyses of national databases' Clin Exp Allergy 2004; 34:520–526; Data: GP: Weekly Returns Service Annual Prevalence Report 2001, RCGP Birmingham Research Unit.http://www.rcgp.org.uk/bru
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[54] Calculated from estimated prevalence of treated asthma in National Asthma Campaign 2001 Out in the Open: a true picture of asthma in the United Kingdom today. Asthma J 6 (suppl), and unpublished data from Hoskins G, McCowan C, Neville RG et al 2000 Risk factors and costs associated with an asthma attack. Thorax 55:19–24

[55] 1% sample of claims to incapacity benefit. Department for Work & Pensions, Information & Analytics Department (April-2001 to March 2002, 12,701,000 IB days claimed; June 2002 – May 2003 12,639,000 IB days claimed)

[56] Office of Health Economics. Compendium of Health Statistics, 15th edition 2003–2004. Department for Work & Pensions, Information & Analysis Department (April 2004)

Further memorandum submitted by the Environment Agency (AQ 30)

SUBMISSION MADE BY ALLAN G NORMAN TO ENVIRONMENTAL AUDIT COMMITTEE:

> "The recent example of the granting of a licence to Prenergy for a large woodchip power station in the town shows quite clearly that the Environment Agency sees one of its primary responsibilities under the Environment Protection Act 1995 as "to make a contribution towards attaining the objectives of achieving sustainable development" as determined by ministers, even when the ministers are obviously wrong. It has *accepted dubious computer modelling data* and *set spurious limitations on the pollution arising from the new plant* that *it knows cannot be achieved by the company* in the knowledge that *the source of the PM10s or PAHs cannot be proven*. Therefore, *no action will be taken against the company* even if the pollution in the town exceeds even more the guidelines set by Europe and the UK government. There is a *complete lack of trust in the Environment Agency.*"
>
> [Emphasis added by Environment Agency]

The Environment Agency's response:

PERMITTING OF THE INSTALLATION

We issued the environmental permit to Prenergy Power Ltd on 29 September 2009, but we would not expect the installation to be operational until 2013. The decision to grant a permit followed a lengthy evaluation process and discussions with local people. We also sought the advice of the Local Health Board and we set strict emission limits to protect human health. The strict emission limits are important given the proximity of the Air Quality Management Area for particulates in Port Talbot.

We are confident that the modelling data on which we based our decision to issue the Prenergy permit gives realistic predictions of the impact of the site. Extensive work was undertaken by our Air Quality Modelling and Assessment Unit to ensure that the computer modelling data was sufficiently reliable to allow us to base our decision on it, taking into consideration conservative error margins.

The site will have only one main point source and negligible fugitive emissions of PM10 particulates. All dusty materials on the site will be handled within totally enclosed systems. A second stack on site will only be used during plant start-up and there would only be emissions from it for the initial 12 hours or so of operation.

The impact of additional road transport as a result of the new development has been modelled separately and was included in our decision making. Additional road transport will be kept to a minimum as the primary fuel to the power station will be delivered by ship. All other sources contributing to PM10 particulates in the Port Talbot area are accounted for within the measured ambient background which is included within the modelling work.

Further information on the modelling data used, and responses to previous concerns raised by individuals on this issue can be viewed in the decision document which accompanies the permit.

Biomass plants such as Prenergy's Port Talbot power station will play an important role in helping combat climate change if the wood they burn is sourced sustainably. As part of its environmental permit, Prenergy must prove to the Environment Agency that the wood it burns comes from sustainable sources. This new power station will make an important contribution be a big step towards meeting the Government's climate change and renewable energy targets.

Our policy, in line with Government guidance, allows for the permitting of new sites in areas of failing air quality, providing the additional impact of new sites is negligible. Any other approach would prevent any development, however small, in some areas.

The emission limits in the permit ensure that the contribution of
Prenergy to the ambient air quality will be negligible.

Evidence from other industries using bag filters and information on PAH emissions from contaminated wood-burning facilities (which would produce higher levels of polycyclic aromatic hydrocarbons (PAHs) than the clean wood to be used at this site) gives us confidence that Prenergy will be able to meet the limits set for particulates and PAHs. All other limits set are routinely met by combustion units that utilise similar abatement technology to that to be used at the Prenergy plant.

The Prenergy power station will have one main point source emission to air. As stated, there is a second point associated with plant start-up. The enclosed nature of the operation and controls on the storage, handling and movement of wood and ash should ensure that fugitive emissions are minimised. The permit requires continuous monitoring of PM10s in the emissions to air. This will provide us with the relevant information on the PM10 releases from the site.

Regulation of the Installation

Our regulatory effort is focussed on ensuring that permitted sites operate within their environmental permits. Where a permit holder does breach the conditions of their permit, or other relevant environmental legislation, then the Environment Agency will take appropriate enforcement action in line with our Enforcement and Prosecution Policy.

Since the permit was issued, we have met with the operator and they have confirmed to us, as well as stating publicly in their own press release, that they are confident of being able to operate within the conditions and limits set in their permit.

Our Commitment to Improving Air Quality in the Locality

We are currently working closely with Neath Port Talbot County Borough Council, the Welsh Assembly Government and local industry to improve the air quality in Port Talbot. This work has already included an extensive review of all the environmental permits at the nearby integrated steelworks site.

We have spent a great deal of time listening to the views of local people on the Prenergy Plant and the final decision to grant a permit followed extensive public consultation. The consultation included ongoing engagement with a local pressure group throughout the determination process, a public drop-in surgery in July 2009 to answer questions about the plant and consultation under the Public Participation Directive to which local people were invited to submit their views.

February 2010

Memorandum submitted by the Department of Health (AQ 31)

1. *What action is the Government taking to reduce the impacts of poor air quality on health?*

Government set out the actions it is taking in the 2007 *Air Quality Strategy* for the UK. The strategy recognised the impacts of poor air quality on health, in particular the average reduction of 7–8 months in life expectancy. Additional impacts on health were recognised. The Strategy also set out actions to improve air quality, and thereby reduce the impact on health. The actions are directed at the main source of the polluting activities. These actions include:

- implementing European Directives to reduce total emissions of certain pollutants; control industrial pollution and improve ambient air quality;
- reducing air pollution from other industrial sources through domestic legislation and permitting;
- implementing improvements in vehicles emission standards to reduce emissions from vehicles and measures to incentivise these standards;
- transport related measures to reduce congestion or encourage modal shift;
- other measures to provide advice and assistance to local authorities to implement action plan measures to reduce vehicle emissions through providing guidance and assistance for the introduction of low-emission zones, low-emission vehicles or retrofitment etc.

In addition to these, government also takes action to raise awareness of risks of poor air quality particularly to vulnerable groups. This is done through public information services on air pollution and providing air pollution alerts—see UK National Air Quality Archive http://www.airquality.co.uk/index.php.

Actions from other policy areas across government can also help improve air quality and health. For example, Defra is working with the Department of Energy and Climate Change (DECC) to highlight the linkages between air quality and climate change; and DH and DfT work to encourage physical activity via active travel which also has benefits to the environment and health.

2. *There are a range of air quality standards for promoting good ambient air quality. These include EU Limit Values, EU Target Values, national objectives under the Environment Act 1995 for the nine main health threatening air pollutants, exposure reduction objectives from* $PM_{2.5}$ and Pollution days. How do these standards contribute to action on public health?

All standards contribute to the improvement of public health as part of a regulatory regime designed to incentivise, or enforce, their observance. Standards identify levels of pollution that would be regarded as acceptable in terms of their effects on health. Objectives define the time scale over which achievement of standards is required. EU Limit Values are incorporated into UK legislation.

(a) *Which of them is most important in delivering healthy air quality and reducing exposure to air pollutants?*

DH does not rank such standards in this manner. They each have their merits.

Of the air pollutants, concern is currently focused on particulate matter, ozone and nitrogen dioxide. Ambient concentrations of sulphur dioxide and carbon monoxide have, in general, fallen and their further reduction is no longer a priority from a health perspective. It is accepted that, for pollutants such as particles (whether monitored as PM_{10}), or $PM_{2.5}$[57] nitrogen dioxide and ozone, it is remarkably difficult to define a threshold of effect at the population level. Their impact on health remains a matter of concern and thus achieving standards for these is important. Standards and objectives for these pollutants might therefore be regarded as especially important.

Perhaps more important than standards, *per se*, are exposure reduction objectives. At present this approach is only applied to particulate matter monitored as $PM_{2.5}$. The exposure reduction objective approach is intended to reduce levels of pollutants, progressively, by the application of cost-benefit tested policies. This progressive reduction reflects the fact that health benefits can be achieved by reducing pollution below a specific standard, as the epidemiological evidence does not appear to suggest a threshold. As levels of air pollutants fall and costs of further reduction rise (unless new technology or modal shifts occur) the importance of exposure reduction objectives will increase.

3. *How have the health impacts of poor air quality, in terms of mortality and morbidity, been quantified?*

Briefly, the Department of Health's Committee on the Medical Effects of Air Pollutants (COMEAP) defines concentration-response functions that are combined with information on pollution concentrations and baseline rates for the health outcome to derive an overall health impact. For long-term exposure, the pattern of deaths varies over time and everyone dies at some point, so the preferred approach is to use life-tables to give results in terms of life-years or life-expectancy. This reflects when people die rather than that people die, which is more appropriate. Further details on the approaches are given below.

Overall Approach

The quantification of health effects resulting from exposure to air pollution in the UK uses concentration-response functions (ie coefficients) that link concentrations of pollutants with effects on health. The concentration-response functions used within the UK's Air Quality Strategy are those recommended by the Department of Health's Committee on the Medical Effects of Air Pollutants (COMEAP) (Department of Health, 1998; 2001; 2006; COMEAP, 2009) for particles, sulphur dioxide and ozone. The quantified health impacts of air pollution in the UK are then valued (Interdepartmental Group on Costs and Benefits (IGCB), ie Volume 3 of the Air Quality Strategy (2007)). A monetary cost-benefit analysis (CBA) forms a major part of the overall assessment of the measures set out in the Strategy. The monetary assessment of benefits is based on an impact-pathway approach that follows a logical progression from emissions through dispersion, concentration and exposure to quantification of impacts and their valuation. The benefits are then compared on a consistent basis with the costs associated with the implementation of each policy measure.

The central analysis presented in the Strategy includes health benefits where: (i) there was clear evidence linking the pollutant to the health outcome; (ii) all necessary information to allow quantification (eg baseline rates) was available; and, (iii) COMEAP had recommended a concentration-response coefficient. COMEAP has recommended coefficients for mortality (all-cause and from specific causes) and admissions to hospital (for respiratory and cardiovascular diseases). The Committee, via its quantification subgroup, is currently considering evidence pertaining to additional health outcomes, ie effects on chronic morbidity, eg Chronic Obstructive Pulmonary Disease (COPD) and Chronic Bronchitis, and will report on these in due course.

Why life-years or life-expectancy rather than numbers of deaths?

The Government is often asked 'What is the impact of air pollution on health in the UK'? This question is not as simple as it sounds. If the question was a question about the proportion of total deaths that may involve a contribution from long-term exposure to air pollution and there were no plans to take any action to change levels of pollution, then an estimate per year might be appropriate. However, this is not usually the intention of the question. The intention usually comes from a concern that air pollution ought to be reduced and that lives would be saved as a result. To represent the effects of long-term exposure to $PM_{2.5}$ the question was therefore approached by modelling a hypothetical removal of anthropogenic $PM_{2.5}$ in the year in question and in subsequent years.

[57] Particulate matter (also known as PM, particulates or particulate pollution) is a term used to describe a mixture of solid particles and liquid droplets in the air which can be both man made and naturally occurring. Some examples include dust, ash, pollen, sea spray and smoke. One major source of particulate matter is automobiles (due to the combustion of fossil fuels by their engines). Particulate matter varies in size (ie the diameter or width of the particle). $PM_{2.5}$ means the mass per cubic metre of air of individual particles with a size (diameter) generally less than 2.5 micrometers. $PM_{2.5}$ is also known as fine particulate matter. (2.5 micrometres is one 400th of a millimetre.) Research has shown that different sizes of PM are associated with different health effects. It has also shown that the smaller/finer particles have a greater potential to cause harmful health effects as they are able to penetrate deep into the lung

It is important to realise that if $PM_{2.5}$ is reduced in any one year, then more people will survive into the following year. If the reduction is maintained into the following year, then there will again be a reduction in deaths but the net result will be a combination of three factors:

(i) the reduction in fine particles (which will reduce numbers of deaths)

(ii) the increased size of the population due to survivors from the previous year (larger populations give larger numbers of deaths)

(iii) the increased age of the population due to the survivors from the previous year being one year older (populations with a higher proportion of older people give larger numbers of deaths).

Due to the counteracting effects of factors (ii) and (iii), the reduction in the number of deaths in the second year will be less than in the first. This counteracting effect due to changes in population size and age, accumulates over time so that the reduction in numbers of deaths becomes progressively smaller. Eventually, there will actually be more deaths in the reduced pollution scenario because those in the scenario where pollution was not reduced would have already died. Without new births, the final outcome after about 100 years is that everyone in both scenarios will have died and the net difference in numbers of deaths will be zero.

The complex nature of the change in the pattern of deaths over time, and the fact that, in the long-term, everyone will die, leads to preferring total life years and average gain or loss of life-expectancy as the appropriate metric. These metrics represent the fact that $PM_{2.5}$ affects the timing of people's deaths not whether they die. The impacts of long-term exposure to fine particles are therefore calculated by using the coefficient recommended by COMEAP to predict changes in life-expectancy or life-years using lifetables.[58]

(a) *What is the cost to the economy and to your department from these impacts?*

Cost to the Economy

In 2007, the Air Quality Strategy estimated that the equivalent health costs arising from man-made $PM_{2.5}$ pollution in 2005 might be as much as £20 billion each year.[59] This estimate is based on life-years lost and the monetisation of this loss reflects best estimates of the UK population's "willingness to pay" to avoid these health impacts. Between 1990 and 2001 reducing the health and environmental impacts of air pollution through road transport policies and the electricity generating sector generated health benefits (again monetised based on "willingness to pay" to avoid such risks) ranging from £2.9billion to £18.4bn and £10.8bn to £50.6bn respectively.[60]

Costs to the NHS

There will also be costs to the NHS from, for example, respiratory hospital admissions triggered by air pollution. These were not included in the estimate above as they represent only a tiny fraction of the above costs (given the rounding of the numbers quoted above, they would be unlikely to alter these rounded numbers). The Committee on the Medical Effects of Air Pollutants' quantification sub-group will be updating its 1998 report on the total impact of air pollution in the UK and this will include updated estimates of numbers of hospital admissions. NHS costs will be calculated subsequent to that.

(b) *How current is the research that has been used to quantify these impacts and costs?*

COMEAP is currently undertaking a programme of work to update its recommendations regarding estimates of the effects of exposure to air pollution (both long—and short-term) on health. This work began in June 2005. As the effect of long-term exposure to particulate pollution on mortality is known to dominate the total impact of air pollution on health, the Committee began its current quantification work program by considering that evidence.

COMEAP published in June 2009 its report on *Long-term Exposure to Air Pollution: Effect on Mortality.* This report summarised the new evidence published since the Committee's last report on this topic in 2001. The report put forward quantitative estimates of the effects of long-term exposure to particulate pollution on mortality for application in the UK. The report suggests that air pollution has a greater effect on mortality in the UK than previously thought, with a 10 μg/m3 increase in fine particles (measured as $PM_{2.5}$) being associated with a 6% increase in risk of death from all-causes. Risk estimates (ie coefficients) linking fine particulate pollution with specific causes of death are also recommended.

This latest report by the Committee is based on a consideration of epidemiological and toxicological literature. A cut-off in early 2006 was adopted for published work which was considered in detail. That recent material could not be included was inevitable because much time needed to be devoted to considering evidence and distilling conclusions after the evidence-collection phase was completed.

[58] A lifetable is a technique used to summarise the patterns of survival in populations. It uses age-specific death rates, derived from numbers of deaths in each age group and mid-year population sizes for each group. Standard lifetable calculations compute survival rates at different ages, either from birth or from a specific achieved age. From these, the total numbers of life years lived at each age can be derived, as can average life expectancy.
(Taken from IGCB – Air Quality Strategy, Volume 3, 2007)

[59] http://www.defra.gov.uk/environment/quality/air/airquality/publications/stratreview-analysis/index.htm (Chapter 2)

[60] http://www.defra.gov.uk/environment/quality/air/airquality/publications/stratevaluation/index.htm

The Committee's quantification work program will also include consideration of the literature pertaining to chronic morbidity effects, an area that has not been considered by COMEAP in the past. Furthermore the program will provide updated coefficients relating to the effects of short-term exposure to air pollutants. These will utilise more recent evidence.

(c) *What would trigger a re-assessment of these impacts and costs?*

Significant qualitative changes in the literature would necessitate a re-assessment of the health impacts, and by extension, costs associated with air pollution. These changes pertain to a range of factors, including: (i) the size of the coefficients linking air pollution and health outcomes; (ii) the emergence of evidence on new health outcomes; (iii) an increase in the evidence on health outcomes not currently included in health impact assessments.

Of course, if it very tempting to incorporate new evidence (eg an individual study) as it emerges. However, COMEAP has advised against 'cherry picking' the evidence and that it is important to consider any new literature in the context of the wider body of evidence before drawing conclusions.

In several instances, although COMEAP might not have considered a recently published study, the Committee may have previously commented on the design of such studies. In those instances, it may not be necessary to request a view on recently published evidence.

The Department of Health and COMEAP are fully committed to updating the coefficients for use in assessing the impacts of air pollutants on health in the UK. This commitment is demonstrated in COMEAP's recommendation of a coefficient for cardiovascular hospital admissions in 2001 and in its current program of work, which began in June 2005, to update its recommendations regarding coefficients.

(d) *How do these costs and impacts compare to other public health concerns such as smoking, alcohol or obesity?*

The Department of Health has commissioned work from the Institute of Occupational Medicine[61]to compare the benefits of a 10 µg/m3 reduction in $PM_{2.5}$ (elimination of man-made $PM_{2.5}$ in 2005), the elimination of motor vehicle traffic accidents and the elimination of exposure to passive smoking.[62] The figures for gains in life-expectancy in a birth cohort were 7-8 months on average for man-made $PM_{2.5}$; 1-3 months for traffic accidents and 2-3 months for passive smoking. The equivalent total gain in life years in England and Wales from 2005-2110 for the whole population including people born during that time has been estimated as 39,058,000 life-years for elimination of $PM_{2.5}$, 8,126,000 for elimination of traffic accidents and 13,194,000 for elimination of passive smoking. The greater impact of $PM_{2.5}$ is mainly due to the fact that everyone in the population is exposed to air pollution. Further work on comparative risks is planned.

Economic costs associated with obesity, alcohol misuse and tobacco use are set out below.

Obesity

The Foresight report, published in October 2007, estimated that problems attributable to excess weight in the UK already cost the wider economy in the region of £16 billion per year, and that this would rise to £50 billion per year by 2050 if the issue was left unchecked.

Obese and overweight individuals' place a significant burden on the NHS – direct costs are estimated to be £4.2 billion per year, and are forecast that these will more than double by 2050.

Alcohol

The cost of alcohol misuse to society is estimated to be between £12-£18billion, with cost to the health service estimated at around £2.7billion per annum, £645.7million of this is estimated to be A&E costs.

Smoking

The current level of tobacco use is estimated to cost the NHS around £2.7billion every year (The cost of smoking to the NHS. Action on Smoking and Health (ASH) 2008). The NHS Information Centre calculates that in England in 2007–08 there were approximately 440,000 hospital admissions of adults aged 35 and over with a primary diagnosis of a disease that was caused by smoking. Recent research estimates that the decline in the number of smokers over the past decade has led to current annual savings to the NHS of around £380 million.

Tobacco use also has a significant impact on the wider economy – through lost productivity and other costs. Smokers take an average of 8 days a year more sick leave than do non-smokers and the current level of smoking costs the economy about £2.5billion each year in terms of sick leave and lost productivity alone.

[61] http://www.iom-world.org/pubs/IOM_TM0601.pdf
[62] MVTAs based on 1999 lifetables; exposure to passive smoking based on Jamrozik (2005) BMJ 330(7495): 812.

4. *What is being done to make all government departments understand the effects on health of poor air quality and it associated costs?*

Defra leads a high-level officials group on air quality which brings together all major departments with a concern for air quality, including DH/HPA, DfT, CLG, EA, Treasury and other departments. Regular meetings are held with other government departments to ensure air quality risks and impacts are taken into account.

5. *What is being done to make local authorities understand the effects on health of poor air quality and it associated costs?*

Local authorities are required to monitor air quality at local level and where necessary to take steps to improve air quality. They are provided with guidance on this which includes guidance on the health impacts of poor air quality.[63] Guidance is also provided on assessing the costs of poor air quality and measures to improve air quality. Defra, DfT and HPA have worked together to raise awareness of health risks at the local level through speaking at local authority events and also through organising events to promote these issues.

Most recently (30 November 2009) Jim Fitzpatrick, Defra's Minister of State for Environment, and Sadiq Khan, Minister of State for Transport, spoke at a joint Defra, DfT and LACORS (Local Authorities Coordinators of Regulatory Services) summit on Air Quality[64] and shared the platform with a speaker from the HPA. This event was attended by a cross-section of local authorities, government departments and external stakeholders. The health impact of poor air quality was a key theme of the Summit.

The Chemical Hazards and Poisons Report,[65] which has contained a series of articles on air pollution and health, is published two-three times a year for staff in the Health Protection Agency, National Health Service, government departments, local authorities and allied organisations, as well as first line responders such as fire and ambulance services. LACORS are also sent a copy and provide a link to the report on their website.

This report performs an important role in sharing high-quality advice and new research with professional colleagues. Articles cover a variety of disciplines including environmental and public health science and policy.

The Chemical Hazards and Poisons Division of the HPA also provides training courses on environmental chemicals, including air pollutants.[66] These are available to people from local authorities.

Speakers from the HPA and COMEAP have lectured on air pollution and health at many conferences where local authority representatives have been in the audience. Examples include the Investigation of Air Pollution Standing Conference and conferences organised by Environment Protection UK. DH/HPA attend Defra's Air Quality Forum for stakeholders, including those from local government and the GLA, in order to respond to any questions on air pollution and health.

6. *What responsibilities do strategic health authorities or primary care trusts have to consider air quality?*

Primary Care Trusts (PCTs) are NHS bodies, performance managed by Strategic Health Authorities. As legally autonomous bodies they are responsible for complying with air quality regulations and are regulated, in this matter, by the Environment Agency. All NHS organisations, including PCTs, are responsible for reducing their own carbon emissions. PCTs work with Local Authorities through the Local Area Agreement process in to address issues, that may include matters that impact on air quality, that affect local communities.

The NHS Carbon Reduction Strategy for England, published in January 2009 by the NHS Sustainable Development Unit, recognises that improved air quality is a benefit both for patients and the wider population. The Strategy recognises that active travel, such as more walking and cycling, leads to a reduced risk of obesity, diabetes, heart disease, and mild mental illness, as well as reducing road traffic injuries and deaths, and improving air quality.

The Health Protection Agency (HPA) is a statutory consultee on IPPC (Integrated Pollution Prevention and Control) applications and consults the relevant PCTs on applications in their area.

7. *What is being done to make the public more aware of the effects of poor air quality on health?*

There are a wide range of actions undertaken by government and the UK's advisory Committee on the Medical Effects of Air Pollutants (COMEAP) to communicate the health effects of air pollutants to the public. The initiatives are targeted at varying groups in the population.

— UK National Air Quality Archive and the Air Pollution Information Service

[63] See http://www.defra.gov.uk/environment/quality/air/airquality/local/index.htm and http://www.defra.gov.uk/environment/quality/air/airquality/local/guidance/index.htm
[64] http://www.lacors.gov.uk/lacors/NewsArticleDetails.aspx?id=22650
[65] http://www.hpa.org.uk/HPA/Publications/ChemicalsPoisons/ChemicalHazardsAndPoisonsReports/
[66] http://www.hpa.org.uk/HPA/EventsProfessionalTraining/ChemicalsTraining/ChemicalsTrainingCourses/

This website provides users with detailed information on levels of several air pollutants in the UK. It includes both daily and historical information on air quality for varying locations in the UK. In addition, information on the causes and effects of air pollution is provided. The Air Pollution Information Service is a subset of the Air Quality Archive. The Archive is maintained and hosted by AEA on behalf of Defra and the Devolved Administrations.

The cost of the communications contract which covers the UK National Air Quality Archive and the Air Pollution Information Service for the financial year 2009/10 is £157,557. This includes the hosting of the national air quality data and the presentation of information on the Archive. There is also an air pollution forecasting contract of value £105,508 for the financial year 2009/10, the information from which is used in the air quality alerts system.

Available at: http://www.airquality.co.uk/and http://www.airquality.co.uk/what_are_the_effects.php (accessed January 2010).

— COMEAP's website

The Committee's website provides all its statements and reports, in addition to Secretariat papers, on various topics. These include both technical scientific material and guidance and advice targeted at members of the public.

The Committee is currently developing a new website which will be made available in 2010. The minutes of previous meetings (http://www.dh.gov.uk/dr_consum_dh/groups/dh_digitalassets/@dh/@ab/documents/digitalasset/dh_109026.pdf) provide details of discussions of the specification for the new website. The specification includes items such as an 'Easy Guide' which seeks to provide members of the public with user-friendly, non-technical information and advice on the health effects of exposure to air pollution.

Current website: http://www.dh.gov.uk/ab/comeap/index.htm (accessed February 2010).

— Initiatives on Carbon Monoxide (CO)

These initiatives are all targeted at members of the public.

— Carbon Monoxide: are you at risk Leaflet
Available at: http://www.dh.gov.uk/en/publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/dh_090124 (accessed February 2010).

  — Press releases raising awareness of Carbon monoxide awareness week—2007, 2008, 2009

  — Press releases on the Dangers of CO whilst holidaying—2008, 2009

  — All press releases had no associated publication costs.

  — Inclusion of information on CO in the '*Keep Warm Keep Well*' booklets. Target audience: families, the elderly, people with disabilities. Available at: http://keepwarmkeepwell.direct.gov.uk/index.html (accessed February 2010).

  — Information on CO given on the website of the Health Protection Agency: http://www.hpa.org.uk/HPA/Topics/ChemicalsAndPoisons/CompendiumOfChemicalHazards/1190384159835/(accessed February 2010).

— Air Pollution and Health Information Pack (2003)

This pack provides information on both indoor and outdoor air quality issues and is available from the Department of Health. It includes a series of fact sheets giving details of contact organisations, helplines, websites, official reports and other materials. Available at: http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4005207?ssSourceSiteId=ab (accessed January 2010).

— Air Pollution—what it means for your health? (2002)

This leaflet was designed to be an easy guide to the Air Pollution Information Service which provides information and alerts for the general public and for vulnerable groups in particular about high-pollution episodes and risks. It was published by Defra in partnership with the Department of Health, the Scottish Executive, and the Department of Environment in Northern Ireland. The text of the leaflet is available as a series of web pages and also as a PDF document:

http://www.defra.gov.uk/environment/quality/air/airquality/publications/airpoll/index.htm (accessed January 2010).

— The Health Effects of Air Pollutants: Advice from the Committee on the Medical Effects of Air Pollutants (2000)

COMEAP published a statement in 2000 giving advice to members of the public on the health effects of air pollutants. Available at: http://www.dh.gov.uk/dr_consum_dh/groups/dh_digitalassets/@dh/@ab/documents/digitalasset/dh_096837.pdf (accessed January 2010).

— COMEAP statement on banding of air quality (1998)

In the UK most air pollution information services use the index and banding system approved by the Committee on Medical Effects of Air Pollutants (COMEAP). The system uses a 1-10 index divided into four bands to provide more detail about air pollution levels in a simple way, similar to the sun index or pollen index. The overall air pollution index for a site or region is calculated from the highest concentration of five pollutants.

The system of Air Quality Banding used by the Department of the Environment (now Defra) since 1990 takes into account the Air Quality Standards, recommended by the Expert Panel on Air Quality Standards (EPAQS) outlined in the Air Quality Strategy for the UK. The system was revised in 1998 and is intended to provide guidance as to the effects of air pollutants on health and is linked with health advice provided via the Air Quality Helpline. Revision of the banding system has been based on advice from the Department of Health and its Committee on the Medical Effects of Air Pollutants (COMEAP).

Available at:

> http://www.airquality.co.uk/standards.php#band and http://www.dh.gov.uk/dr_consum_dh/groups/dh_digitalassets/@dh/@ab/documents/digitalasset/dh_108460.pdf (accessed January 2010).

The Standards Advisory Subgroup of COMEAP (ie former EPAQS members) is currently reviewing the UK's bandings of Air Quality and will report on this in 2010.

— The Department of Health (DH) Handbook on Air Pollution and Health (1997)

COMEAP published the DH Handbook on Air Pollution and Health. This book provided an introductory, non-technical account of the effects of air pollution on health aimed primarily at students. The information provided is based on the detailed reports prepared by the Department of Health's advisory group on the Medical Aspects of Air Pollution Episodes (MAAPE) and COMEAP. It was hoped that the handbook would make available, more widely, the work of these groups and provide a ready source of advice and reference on the effects of air pollution.

COMEAP, in conjunction with its Secretariat, provided by the Health Protection Agency, is currently working to produce a new version of the Handbook on Air Pollution and Health. A prospectus (http://www.dh.gov.uk/dr_consum_dh/groups/dh_digitalassets/@dh/@ab/documents/digitalasset/dh_096802.pdf, accessed January 2010) was presented by the Secretariat to COMEAP members at its meeting in October 2008. Minutes of that meeting are available on its website: http://www.dh.gov.uk/dr_consum_dh/groups/dh_digitalassets/@dh/@ab/documents/digitalasset/dh_109042.pdf (accessed January 2010).

The current Handbook is available at: http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4005373?ssSourceSiteId=ab (accessed January 2010).

Further work is currently ongoing to update the advice provided in many of the initiatives set out above. These include: (i) the UK's banding system on air quality, and (ii) the handbook on air pollution and health.

Where possible, costs associated with these initiatives have been supplied. These are mainly costs associated with publication/production. Costs pertaining to staff time are substantial but difficult to estimate.

At the local level a number of local authorities in London and the South East mainly provide text messaging alert services (Air Text or Air Alerts). These are aimed at persons with medical conditions which might be made worse by poor air quality or elevated pollutant levels, and alert them when such episodes are imminent or taking place so that they can take action to carry medication or to stay indoors etc.

In addition many local authorities have received support from Defra's air quality grant fund to produce locally-focused websites and information services on air quality in their area. Notable examples of this are the Care4air website in South Yorkshire (http://www.care4air.org/). In addition to providing advice for vulnerable groups during pollution episodes these websites also provide advice on actions individuals can take to improve air quality including smoother driving techniques; purchasing choices; controlling domestic bonfires etc.

(a) *How much is being spent on this?*

Where possible, costs associated with the initiatives set out above have been supplied. These are mainly costs associated with publication/production. Costs pertaining to staff time are substantial but difficult to estimate since the provision of advice, both technical and non-technical, is part of DH/HPA core business.

Defra provides grant funding direct to local authorities to implement measures to improve air quality including public awareness and promotion activities. The total amount of air quality grant available each year is approximately £2.3million and around a third of this is utilised for awareness raising purposes by local authorities including developing local authority websites on air pollution and air quality, conferences and other action to raise awareness.

(b) *How does this cost compare to other public health campaigns, on obesity, alcohol and smoking for example?*

DH public health campaigns focus on what individuals can do to improve their own health. Whilst individuals can do little to reduce the amount of, or exposure to air pollution, they can do a great deal to improve and protect their own health, by heeding the advice and information given in our campaigns on diet, exercise, alcohol and smoking. The reason for tackling air pollution lies in its adverse health impacts and the action required lies primarily in appropriate regulation of polluting activities.

Obesity

"Healthy Weight, Healthy Lives: a cross-government strategy for England" set out the Government's strategy to tackle obesity. Change4Life is the social marketing element of it which aims to inspire a societal movement through which all parts of society can play a part in improving children's diet and activity levels. We have spent £50million on the C4L campaign to date, out of an overall budget of £75million over three years. The campaign has been very successful both in terms of achieving behaviour change (over a million mums are already claiming to have made changes to their children's diet or activity levels as a result of C4L) and also value for money.

Alcohol

A new national advertising campaign "Alcohol Effects", was launched in January backed by major health charities that will warn drinkers of the unseen health damage caused by regularly drinking more than the NHS advises. The total campaign spend is £6.85m

This follows on from the Department's "Know Your Limits" campaign that was launched in 2008, to raise the publics' awareness of units. The campaign had an overall budget of £6m in 2008–09.

Smoking

In 2008–09 £23.4million was spent on advertising in relation to smoking cessation.

(c) *Are these campaigns on public awareness linked to any other programmes or policies aimed at changing behaviour?*

The main synergies are with walking and cycling and "Be Active, Be Healthy" and active and sustainable transport policies.

In 2009 DfT produced a leaflet and posters, co-branded with Change4Life and distributed via local authorities, promoting walking and cycling as sustainable forms of transport. In addition, Change4Life has developed toolkits for use by Change4Life local supporters to support our Bike4Life and Walk4Life sub-brands (available as hard copy or for download from the Change4Life website).

These toolkits are to help local supporters promote cycling and walking amongst families in their communities, and contain materials such as activity sheets that can be given directly to families with practical advice on getting up and about and more active by foot or on their bikes. The toolkits talk explicitly about walking and cycling as alternative forms of transport (to save money and help the environment) as well as leisure activities.

Our national partners, both commercial and NGO, continue to support Bike4Life and Walk4Life with co-branded Change4Life activity, such as Walk on Wednesdays (to encourage families to walk to school at least once a week) run by Living Streets, and the Skyride (a mass participation "come and try" city centre cycle event) owned and run by Sky.

The 'Walk Once a Week' scheme run by the Living Streets charity encourages families to ditch the car and walk their children to school at least once a week. In addition to encouraging increased activity and reducing obesity the scheme will help to reduce congestion, pollution and carbon. In January it was announced by Public Health Minister Gillian Merron that the scheme will receive an £800,000 boost from the Government.

The Committee on the Medical Effects of Air Pollutants published a statement on their website providing health advice on the effects of air pollutants.[67] The statement advised members of the public on the benefits of eating fresh fruit and vegetables as well as ways that individuals could 'do their bit' to reduce air pollution by using their cars less, shared use of vehicles and by walking and cycling.

A report by the Department of Health and the Health Protection Agency 'Health effects of climate change in the UK 2008: an update of the Department of Health report 2001/2002' has a chapter on 'The health impact of climate change due to changes in air pollution'.

The Act on CO_2 campaign focuses on giving advice on carbon emissions, but it does include some advice on air pollutants and the important choice between petrol and diesel cars. This recommends that if you spend more time driving in town, where air quality is a greater consideration, then a petrol engine may currently be more suitable."

Link here—http://actonco2.direct.gov.uk/actonco2/home/what-you-can-do/buying-your-car.html

[67] http://www.dh.gov.uk/ab/COMEAP/DH_108448 (follow link for 'Advice')

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